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COLOMBIA CLEAN ENERGY PROGRAM

Annual Report:

October 2014 – September 2015



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Annual Report: October 2014 – September 2015

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LIST OF ACRONYMS AND ABBREVIATIONS

ANLA	National Environmental Licensing Agency (<i>Autoridad Nacional de Licencias Ambientales</i>)
ASE	Exclusive Service Areas (<i>Áreas de Servicio Exclusivo</i> – service area concessions)
AWP3	Third Annual Work Plan (October 2014 – September 2015)
AWP4	Fourth Annual Work Plan (October 2015 - September 2016)
BIO-REDD	Reduced Emissions from Deforestation and Degradation (USAID Program)
BWOA	Blanket Work Order Agreement
C&O	Communications and Outreach
CAEM	Environmental Business Corporation (<i>Corporación Ambiental Empresarial</i>)
Cancillería	Colombian Ministry of Foreign Affairs (<i>Ministerio de Asuntos Exteriores</i>)
CCEP	Colombia Clean Energy Program (USAID Program)
CERI	Regional Indigenous Educational Center (<i>Centro Educativo Regional Indígena</i>)
CI	Conservation International
CREG	Power and Gas Regulatory Commission (<i>Comisión de Regulación de Energía y Gas</i>)
CVC	Valle del Cauca Regional Environmental Authority (<i>Corporación Autónoma Regional del Valle del Cauca</i>)
DO	Development Objective
DPS	National Prosperity Department (<i>Departamento para la Prosperidad Social</i>)
EE	Energy Efficiency
EPM	<i>Empresas Públicas de Medellín</i>
EPSA	<i>Empresa de Energía del Pacífico</i>
ESCO	Energy Services Company
FAER	Support Fund for Rural Electrification Support Fund (<i>Fondo de Asistencia a Electrificación Rural</i>)
FAZNI	Support Fund for the Non-Interconnected Zones Support Fund (<i>Fondo de Apoyo Financiero para la Energización de las Zonas No Interconectadas</i>)
FCGI	<i>Fundación Cerrejón Guajira Indígena</i>
FENOGE	Renewable Energy and Energy Efficiency Management Fund (<i>Fondo de Energías Renovables y Gestión Eficiente de la Energía</i>)
FY 2016	Fiscal Year 2016 (corresponding to the period October 2015 - September 2016)
GHG	Greenhouse Gases
GIS	Geographic Information System
GOC	Government of Colombia
IADB	Inter American Development Bank
IPS	Health Services Institute (<i>Instituto Prestador de Salud</i>)
IPSE	Institute of Planning and Promotion of Energy Solutions in the ZNI (<i>Instituto de Planificación y Promoción de Soluciones Energéticas para las ZNI</i>)
IR	Intermediate Result
JASE	Local Community Board for Energy Services Management (<i>Junta Administradora de Servicios de Energía</i>)
JBB	Bogota Botanical Garden (<i>Jardín Botánico de Bogota Jose Celestino Mutis</i>)
KW	Kilowatt

MHP	Micro hydroelectric power generator
MIDAS	<i>Más Inversión para el Desarrollo Alternativo Sostenible</i> (USAID Program)
MME	Ministry of Mines and Energy (<i>Ministerio de Minas y Energía</i>)
MW	Megawatt
NGO	Non-governmental Organization
P1	Portfolio 1
P2	Portfolio 2
P3	Portfolio 3
P4	Portfolio 4
P5	Portfolio 5
P6	Portfolio 6
PERS	Sustainable Rural Energization Plans (<i>Planes de Energización Rural Sostenible</i>)
PESENCA	Atlantic Coast Special Energy Program (<i>Programa Especial de Energía de la Costa Atlántica</i>)
PEZNI	Energy Plan for Non-Interconnected Areas (<i>Plan de Energización para Zonas no Interconectadas</i>)
PINPESCA	<i>Asociación de Pescadores y Piangueras del Río Cajambre</i>
PMP	Performance Monitoring Plan
PPF	Clean Energy Project Preparation Facility (known in Spanish as <i>Mecanismo para la Estructuración de Proyectos de Energía Limpia</i> – Clean Energy Project Structuring Mechanism)
PROURE	Program of Rational and Efficient Use of ene3rgy and Other Forms of Non-Conventional Energy (<i>Programa de Uso Racional y Eficiente de Energía y Fuentes No Convencionales</i>)
PV systems	Photovoltaic systems
PY2	Second program year (October 2013 - September 2014)
PY3	Third program year (October 2014 - September 2015)
PY4	Fourth program year (October 2015 – September 2016)
Q1 FY 2016	First Quarter, Fiscal Year 2016 (corresponding to the period October - December , 2015)
Q2 FY 2016	Second Quarter, Fiscal Year 2016 (corresponding to the period April - March, 2016)
Q4 FY 2015	Fourth Quarter, Fiscal Year 2015 (corresponding to the period October - December, 2014)
RE	Renewable Energy
SECO	Swiss State Secretariat for Economic Affairs
SIN	National Interconnected System (<i>Sistema Interconectado Nacional</i>)
SELF	Solar Electric Light Fund (USAID Program)
SME	Small and Medium Enterprises
T1	Task 1- Renewable energy and energy efficiency enabling environment and institutional capacity development
T2	Task 2- Expanding access to renewable energy sources in currently unserved areas
T3	Task 3 - Energy efficiency and renewable energy investment promotion
Tt	Tetra Tech (Prime Contractor)
UDENAR	Nariño University (<i>Universidad de Nariño</i>)
UNAL	<i>Universidad Nacional de Colombia</i>
UPME	Mining and Energy Planning Unit (<i>Unidad de Planeación Minero Energética</i>)
USAID	United States Agency for International Development
ZNI	Non-Interconnected Zones (<i>Zonas no Interconectadas</i>)

1.SUMMARY OF KEY ACTIVITIES AND ACHIEVEMENTS

1.1 INTRODUCTION

The United States Agency for International Development (USAID) Colombia Clean Energy Program (CCEP) entered a decisive phase during the last fiscal year (FY) October 2014 – September 2015. The program has managed to become a key player in the development of Clean Energy Solutions in Colombia, and is recognized as so. This has been possible due to a strategic implementation logic that has enabled the Program to partner with the Government of Colombia’s (GOC) energy entities, municipal governments, local community organizations, municipal organizations, and the private sector to achieve clean energy goals. Since the beginning of operations, CCEP has focused on working to increase access to renewable energy (RE) sources and improve energy efficient practices in Colombia. By the end of CCEP’s third year of “hands-on” efforts, important results have been achieved. Despite delays in implementation of some specific rural energy projects, CCEP has stayed on track and is running according to its overall implementation plan as shown in the following figure.



Figure 1 CCEP's strategic implementation vision

Although great challenges lie ahead, by the end of FY2015 most of the main projects proposed were either under implementation or ready to start during next quarter, compromising practically all of CCEP’s Incentive Fund (at September 2015 exchange rate) in the three principal tasks assigned: Task 1 (T1) - Renewable Energy and Energy Efficiency Enabling Environment; Task 2 (T2) - Expanding Access to Renewable Energy Sources in Off-grid or Under-served Areas; and Task 3 (T3) - Energy Efficiency and Renewable Energy Investment Promotion.

There are interesting highlights to consider in the three tasks. Focused on the support to GOC to encourage a “Renewable Energy and Energy Efficiency Enabling Environment and Institutional Capacity Development” (T1) CCEP has worked permanently with GOC institutions in the planning and policy front, mainly promoting and consolidating the Sustainable Rural Energization Plans (*Plan de Energía Rural Sostenible* - PERS) for various regions; assessing impacts and proposing to refocus the Program for Rational and Efficient Use of Energy and Other Forms of Non-Conventional Energy (*Programa de Uso Racional y Eficiente de Energía y Fuentes No Convencionales* - PROURE); the National Energization Plan for the Non Interconnected Areas (*Plan de Energización para Zonas No Interconectadas* - PEZNI); and over the past 12

months, on providing technical assistance to support the regulation drafting by the Ministry of Mines and Energy (*Ministerio de Minas y Energía* - MME) in complying with RE and energy efficiency (EE) Law 1715/2014. All these initiatives are under development and will definitely nurture the institutional clean energy scenery for Colombia at least for the decade ahead.

In addition, the Mining and Energy Planning Unit (*Unidad de Planeación Minero Energética* - UPME) and CCEP have fully jumpstarted the implementation of the Clean Energy Project Preparation Facility (PPF), an innovative assistance mechanism which co-finances and accompanies engineering designs and financial structuring to encourage and enable private sector investment. While the PPF was conceived and is being developed as a definitive institutional tool for Colombia's Renewable Energy and Energy Efficiency Enabling Environment (T1), the mechanism has also been important for the development of specific industrial projects for "Energy Efficiency and Renewable Energy Investment Promotion" (T3).

Through the development of strategic projects for vulnerable populations around the country, with decisive community and stakeholder participation, CCEP has managed to effectively "Expand Access to Renewable Energy Sources in Unserved Areas" (T2). A noteworthy portfolio of RE and EE projects have been developed (some completed and others under implementation) for communities in Chocó, Antioquia, Valle del Cauca, La Guajira, and Sierra Nevada de Santa Marta, serving vulnerable groups such as indigenous, peasant, and Afro-Colombian communities, and benefiting more than 20,000 people with clean energy technologies, once completed. Moreover, most of these projects (even the smallest ones) are examples that can easily be replicated around the country.

Regarding "Energy Efficiency and Renewable Energy Investment Promotion" (T3), CCEP has spurred and assisted the development of concrete industrial projects in textile, metallurgical, and brick and ceramic sectors, among others, which are already producing benefits in terms of energy savings, CO₂e emissions reductions, improved employment, productivity and competitiveness – see, for example, Sugres success story, attached. And, as stated above, through the PPF implemented during this fiscal year by CCEP and UPME, the private sector is preparing to invest in EE/RE projects valued close to USD 70 million and with the potential of avoiding over 100,000 tons of CO₂ emissions per year.

1.2 MAIN ACCOMPLISHMENTS AND RESULTS

Many of the accomplishments and results provided in this report, which covers the period from October 2014 to September 2015, are the outcome of work that started since the beginning of the implementation of CCEP and followed during the first three fiscal years. Not all the activities shown below are fully finished, though most of them are in a final phase of implementation. And, definitely, all of them will have been completed, documented and disseminated by the fifth fiscal year of CCEP implementation.

It is important to take into account that by now CCEP has partnered with over 100 public and private agencies and institutions, mobilizing over USD 9 million in public and private funding in clean energy investment projects as shown the following figures.

Projects with approved co-finance by CCEP task		Budgets approved through 30.09.2015	Leverage – GOC/private counterparts & beneficiaries		CCEP technical assistance – in kind		CCEP Incentive Fund		Total FY2015	Total Cost
			FY2015	TOTAL	FY2015	TOTAL	FY2015	TOTAL		
Task 1	Renewable Energy and Energy Efficiency Enabling Environment, and Institutional Capacity Development	USD	\$166,946	\$1,552,981	\$1,104	\$116,833	\$39,510	\$288,984	\$207,560	\$1,958,798
		Percent	8.5%	79.3%	0.1%	6.0%	2.0%	14.8%	10.6%	100.0%
Task 2	Expanding Access to Renewable Energy Sources in Off-grid or Unserved Areas	USD	\$1,335,786	\$3,550,837	\$0	\$0	\$872,627	\$2,313,235	\$2,208,413	\$5,864,072
		Percent	22.8%	60.6%	0.0%	0.0%	14.9%	39.4%	37.7%	100.0%
Task 3	Renewable Energy and Energy Efficiency Investment Promotion	USD	\$1,321,952	\$4,426,157	\$21,908	\$34,873	\$198,840	\$1,250,037	\$1,542,700	\$5,711,067
		Percent	23.1%	77.5%	0.4%	0.6%	3.5%	21.9%	27.0%	100.0%
Portfolio status 30.09.15	Total budgets and co-finance mobilized	USD	\$2,824,684	\$9,529,975	\$23,012	\$151,706	\$1,110,977	\$3,852,256	\$3,958,674	\$13,533,937
		Percent	20.9%	70.4%	0.2%	1.1%	8.2%	28.5%	29.2%	100.0%

Figure 2 Co-financing mobilized from Public, Private and community sources in CCEP projects – through September 30, 2015 (USD)

Projects with approved co-finance by CCEP task		Budgets approved through 30.09.2015	Leverage		CCEP technical assistance – in kind	CCEP Incentive Fund	Total Cost
			GOC/ Public	Private counterparts & beneficiaries	TOTAL	TOTAL	
Task 1	Renewable Energy and Energy Efficiency Enabling Environment, and Institutional Capacity Development	USD	\$1,550,495	\$2,486	\$116,833	\$288,984	\$1,958,798
		Percent	79.2%	0.1%	6.0%	14.8%	100.0%
Task 2	Expanding Access to Renewable Energy Sources in Off-grid or Unserved Areas	USD	\$2,566,687	\$984,150	\$0	\$2,313,235	\$5,864,072
		Percent	43.8%	16.8%	0.0%	39.4%	100.0%
Task 3	Renewable Energy and Energy Efficiency Investment Promotion	USD	\$344,863	\$4,081,294	\$34,873	\$1,250,037	\$5,711,067
		Percent	6.0%	71.5%	0.6%	21.9%	100.0%
Portfolio status 30.09.15	Total budgets and co-finance mobilized	USD	\$4,462,045	\$5,067,930	\$151,706	\$3,852,256	\$13,533,937
		Percent	33.0%	37.4%	1.1%	28.5%	100.0%

Figure 3 Public vs Private Co-financing mobilized in CCEP projects – through September 30, 2015 (USD)

1.2.1 Key achievements this year by task

Task 1. Renewable Energy and Energy Efficiency Enabling Environment

CCEP has been providing technical assistance and training to enhance the capacity of energy sector institutions to formulate and implement RE projects and EE investments, promote policies to use public funds in rural *energization*, and leverage private sector investment.

Key Achievements

- The EE/RE tax incentive promulgated in December 2012 by UPME with CCEP assistance, to stimulate private sector investment in industrial EE, electric-powered public transportation and RE equipment, continues to increase its impact resulting in USD 106.8 million in VAT and income tax exemptions, as of September 2015, including USD 56.1 during this fiscal year.
- CCEP completed the PERS in Tolima and moved forward with its assistance to UPME in the development of PERS Guajira, Chocó, and Cundinamarca. The process of designing and developing PERS, initiated by UPME and CCEP in 2013 in Nariño, continued this past fiscal year in Tolima (completed), Guajira, Choco and Cundinamarca. PERS has become a national strategy engaging both national GOC agencies and regional actors to develop comprehensive energy and socioeconomic baseline diagnoses of the rural sector and 15-20 year *energization* strategies and RE/EE project portfolios for departmental sub-regions. PERS Nariño won the 2014 AMBER award on Research and Development of the Colombian Electricity Sector.
- CCEP initiated additional technical assistance required by the MME and UPME with the design and development of regulations to support the new RE Law 1715/2014, a task which should end next FY2016 with clear legal, tax, financial and institutional incentives for increased public and private sector investment in clean energy.
- CCEP and the Institute for Planning and Promotion of Energy Solutions in Off-Grid Zones (*Instituto de Planificación y Promoción de Soluciones Energéticas para las ZNI - IPSE*), with support from MME and UPME, engaged in the formulation of PEZNI, that includes redesigning the role of MME institutions and proposing a five-year road map for increased public and private sector investment in ZNI, currently under discussion with these agencies to be institutionalized as a component of the Indicative Plan for the Expansion of Electricity Coverage (*Plan Indicativo de Expansión de Cobertura - PIEC*), which is periodically updated by UPME.
- Achieved operational organization and initial roll-out of the PPF, which is currently co-financing the basic engineering designs and financial structuring of nine concrete private sector EE/RE projects to achieve “financial closure”, funding and final implementation; these projects would require private sector investments worth about USD 70 million and reduce CO₂ emissions by over 100,000 tons per year. In addition to the technical, financial and administrative supervision the projects undergo jointly by UPME and CCEP, the individual projects are monitored as the last of T3’s portfolios.
- Installed, calibrated, started operation, and participated in the inauguration in December 2014 of a biomass gasification and solar photovoltaic project to demonstrate and broadly disseminate the use of RE technologies at the Bogota Botanical Garden (*Jardín Botánico de Bogotá José Celestino Mutis - JBB*), which receives 400,000 visitors annually. The minister of Mines and Energy visited the installations in September 2015.

Task 2. Expanding Access to Renewable Energy Sources in Currently Unserved Areas

CCEP continued working in the development of sustainable RE projects in rural communities through technical assistance and project implementation. The projects, with important results for more than 20,000 beneficiaries expected nationwide, also serve as examples that can be replicated around the country. The projects are being developed for communities in Chocó, Antioquia, Valle del Cauca, La Guajira, and Sierra Nevada de Santa Marta, serving vulnerable populations such as indigenous, peasant, and Afro-Colombian communities.

Key achievements:

- Completed essentially the entire infrastructure associated with the Micro Hydro Plant (MHP) to provide energy for productive activities and public lighting in “El Yucal” indigenous community (Chocó), benefiting 94 families (under implementation). This project is scheduled to be inaugurated in November 2015.
- Finalized engineering designs and initiated installation of solar and manual water pumping systems for 42 indigenous communities in La Guajira. Project under implementation with *Fundacion Cerrejon Guajira Indigena* (FCGI).
- Completed project with Empresas Públicas de Medellín (EPM) and the Departmental Government associated with the installation of Clean Energy systems for 14 Rural Indigenous Educative Centers (*Centro Educativo Rural Indígena - CERI*) in Antioquia.
- Completed most of the civil infrastructure associated and work associated with power lines for the community of Palmor which will benefit nearly 1,900 people in the region. Contractor initiated construction of the electro-mechanical components and ordered electronic components from abroad, which should arrive in October 2015. The MHP, which is under implementation in alliance with IPSE, is scheduled to be finalized by December 2015. The business and community development component also started during this fiscal year and is scheduled to be completed by April 2016.
- Completed installation of solar powered refrigeration for the community of Punta Bonita (Río Cajambre – Buenaventura) to support the fishery value-chain that will consolidate income opportunities for more than 300 families (installation completed; technical assistance ongoing).
- Projects benefiting over 10,000 additional rural inhabitants are under final administrative and contracting procedures to start implementation during the last quarter of 2015, which will enable CCEP to surpass its target of 16,000 rural beneficiaries.

Task 3. Energy Efficiency and Renewable Energy Investment Promotion

In this specific line of work CCEP supports the private sector in the design, engineering and development of EE/RE projects. Projects are being structured in ceramic, glass, and brick manufacturing; food and beverages; metal-mechanic; and textile subsectors, in alliance with national businesses and the financial sector. Also the PPF has become a decisive tool for the construction and development of such projects.

Key Achievements

- 11,217 metric tons of CO₂ equivalent reduced as of September 2015, decreasing the quantity of greenhouse gas emissions.

- Cleaner energy solutions installed in six brick, metallurgical and textile factories in the departments of Antioquia, Atlántico, Caldas, and Cordoba.
- 20 brick manufacturers in Bogotá DC, Cundinamarca, and Boyacá initiated a combustion optimization project aimed at reducing 16,680 tons of CO₂ emissions per year.
- Projects under design as part of the PPF mechanism in the paper & pulp, steel, metallurgical, chemical, and food & beverages sectors, as well as two major retail chains in eight cities, are being monitored for potential contribution to PMP indicators associated with T3. For example, in its 2016 investment budget the Board of Directors of *Carvajal Pulpa & Papel* has already approved the acquisition and installation of the main (but not all) equipment required for its No. 5 boiler in the Yumbo plant as specified in the PPF study by Jansen Boiler Co. (co-financed by CCEP), and T3 team will have the responsibility of assuring proper registration of the adjusted project, baseline and ex-post energy and emissions measurements, and impact reporting – which is beyond the scope of the PPF project structuring team itself.

1.3 SUMMARY OF PROGRAM EXPENDITURES

USAID has obligated to date a total of USD 11,971,983 to the contract and Tt has invoiced for USD 9,345,802 through the period ending September 30, 2015, which was about 78% of the obligated funding. The following figure presents an itemized summary of invoiced cumulative program costs for the January 2012 - September 2015 period.

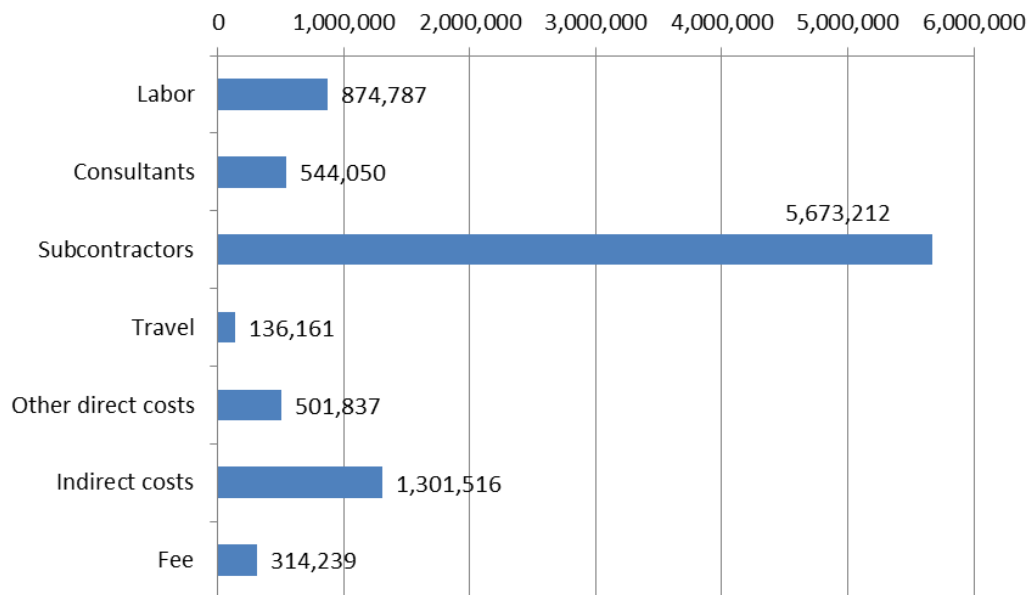


Figure 4 Invoiced program costs through September 2015

As shown in Figure 4, average monthly program expenditures have increased at a steady pace but rate of increase has fallen short of the ideal spending rate for a number of reasons, as described below. As a result, overall program expenditures as of September 2015 have reached just over 50% of the contract ceiling amount while about forty five months have passed since contract was signed representing about 75% of the period of performance. However it is important to note that this simple mathematical calculation must be framed in the proper context. Spending rates have been affected by actual conditions found on the ground to comply with the contract implementation limitations (which also took some time

to change contractually) and by the perception of lower billings to USAID due to the dramatic effect of currency exchange as explained below.

- Actual conditions found on the ground - Program design did not take into consideration (or underestimated) the time it has actually taken to comply with all the Colombian partners' regulations to implement these types of projects under the conditions established by USAID (cost share, target indigenous and Afro-Colombian populations, geographic focus, etc.). The Program was specific in its general purpose and what it intended to accomplish – and is being accomplished – but it did not take into account the actual time and effort necessary to follow those rules and procedures to obtain the cost-share required, get the community and environmental licenses and permits (forest, water use, etc.) and achieve multiple objectives per project (productive uses, number of communities, CO₂ emissions reductions, etc.).
- Unusual construction delays - Another factor negatively affecting the spending rates has being delays caused by local construction engineering companies, international equipment suppliers and GOC partners in delivering and completing activities as scheduled. A few examples include delays in projects such the Arusi MHP construction, Sabana de Crespo, Yucal, Bunkwimake, and the Bogotá biomass gasification equipment. Causes of these delays range from difficulty in coordinating administrative and contracting procedures of subcontractors by GOC project partners, to delays in obtaining final environmental licenses and indigenous religious leader permits and suppliers' equipment and materials delivery.
- Currency exchange - Another of the main factors for falling short of the ideal spending rates has being the currency exchange rates particularly during the last two years, which have reduced the effective amount of dollars spent at the time of disbursement. Ideal spending rates were based on exchange rates around COP 1,900 per USD 1 in 2012 and they have moved closer to COP 3,100 per USD 1 during the last few years.

However, CCEP is committed and fully focused and engaged in accelerating and bringing all our projects to their completion and achieve the results and objectives of the Program. As it is known to USAID, some of the expected results have not being reflected in some of the specific indicators due to some road blocks and implementation delays caused by factors outside of CCEP's control and the Program. Jointly with USAID decisions have been taken on several instances to find work arounds and, in occasions, solutions to move forward but only after some valuable time has passed.

Following the trend shown in the figure below, we expect to continue accelerating program expenditures moving forward as numerous RE and EE projects are under advanced stages of construction / implementation and will be completed during the coming year.

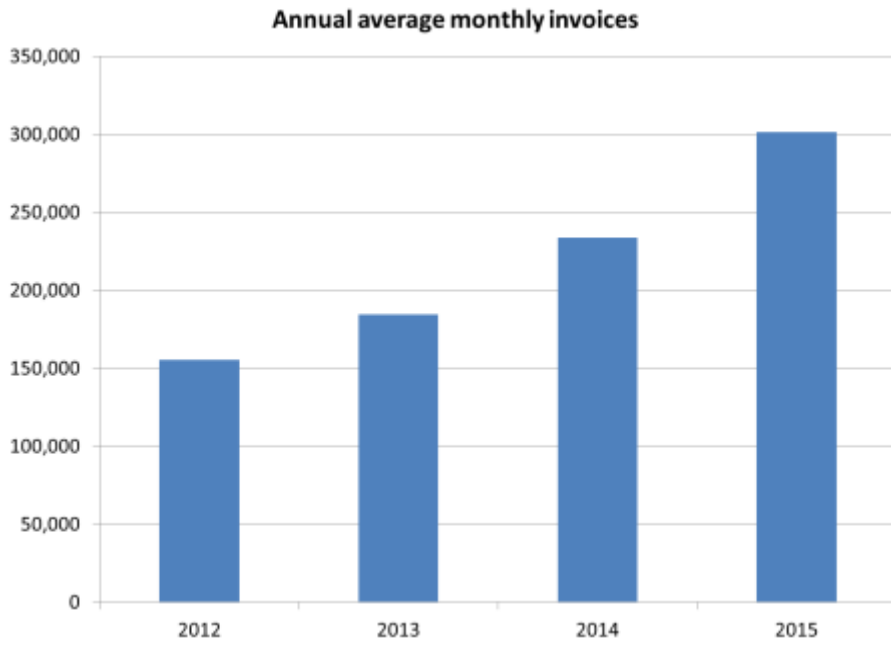


Figure 5 Invoiced monthly average through September 2015

2.TASK 1: RENEWABLE ENERGY AND ENERGY EFFICIENCY ENABLING ENVIRONMENT AND INSTITUTIONAL CAPACITY DEVELOPMENT

2.1 HIGHLIGHTS

USAID is building the capacity of energy sector institutions to formulate and implement RE projects and EE investment, promote policies to use public funds for rural energization, and leverage private sector investment.

Key Achievements this year

- Implementation of a Tax Incentive Regulation encouraging private sector investments in clean energy, which total USD 56.1 million in VAT and income tax exemptions between October 2014 and September 2015. Since January 2013, tax incentives total about USD 106.8 million.
- Partnered with over 100 public and private agencies and institutions, leveraging USD 9,530,000 in public and private funding and registering 47 institutions with improved capacity to address climate change issues as a result of CCEP interventions through the third Program Year (PY3).
- Long term PERS made significant progress and were under different phases of development in five departments (Nariño, Tolima, Guajira, Chocó, and Cundinamarca); a national PERS Strategy and methodological guideline was under publication by UPME (with CCEP co-authorship and USAID branding).
- CCEP provided technical assistance to MME and associated GOC institutions in the technical and regulatory roll-out of RE/EE Law 1715/2014, primarily in the design of the technical standards for distributed generation (injection of self- and cogeneration surpluses of electricity to distribution grids); financial modeling of the Law's tax incentives on the basis of specific RE and EE investment projects with feasibility studies developed in industry and off-grid communities with private sector partners; and expansion of electricity coverage in off-grid zones.
- CCEP and UPME partnered in establishing the PPF, co-financing the first nine engineering and financial designs for industrial and commercial sector projects with potential investments of nearly USD 70 million and emissions reductions of over 100,000 tons of CO₂e per year.

2.2 ACTIVITY SUMMARY BY WORK STREAM

2.2.1 Work Stream 1.1: Renewable energy and energy efficiency strategic planning and policy


The following table presents an overview of CCEP activities carried out under work stream 1.1, Renewable energy and energy efficiency strategic planning and policy as well as the status of milestones as of September 2015.

Table 1 - Task 1 Work Stream 1 Activities

Activities Work Stream 1.1	Description	Status
Departmental Sustainable Rural Energization Plans PERS	Milestone 1- November 2014, Signing of a general agreement between UPME and CCEP to provide technical and logistical support to UPME in its commitments for the development of new Departmental Sustainable	Completed

Activities Work Stream 1.1	Description	Status
	Rural Energization Plans - PERS.	
	Milestone 2- March 2015 completion of the Tolima and Guajira PERS.	Completed
	Milestone 3- May 2015 recollection of the regional information and lessons learned of the Nariño, Guajira and Tolima PERS, to provide technical inputs in the design of the national methodology.	Completed
	Milestone 4- August 2015 report on lessons learned and feedback to the national PERS methodology on the basis of additional regional PERS supported by UPME with CCEP technical assistance during 2015 – foreseeably Choco and Cundinamarca.	Completed
National methodology to structure sustainable rural energization plans	Milestone 1- October 2014, Revision of UPME’s methodology first draft.	Completed
	Milestone 2: February 2015, Finalize and incorporate CCEP’s technical annexes to UPME’s methodology.	Completed
	Milestone 3: September 2015. Final version and publication of the methodology.	Completed
Energy plan for the Non interconnected areas - PEZNI	Milestone 1 – November 2014, Signing and extension of the agreement between IPSE and CCEP to include the development of PEZNI, to facilitate IPSE’s execution of the resources allotted to PEZNI	Completed
	Milestone 2 – April 2015, Strategic Energization Plan for ZNI document and roadmap for its implementation.	Completed

- PERS:** CCEP is fully working on the development of the PERS, comprehensive energy and socioeconomic baseline diagnosis of the rural sector and a 15-20 year rural energization strategy for particular regions. Two departments (Nariño and Tolima) have already designed their PERS. [PERS Nariño](#) won the 2014 AMBER award on Research and Development of the Colombian Electricity Sector. PERS for two other departments (Guajira and Chocó) are finalizing their designs, and the most recent PERS (Cundinamarca) started in July 2015. PERS are part of a strategy to expand access to energy sources and their uses, along with productive activities towards sustainable projects. In August 2015 CCEP invited all PERS technical teams to a workshop in Villeta, Cundinamarca, resulting in a productive exchange of perspectives and lessons learned throughout the different PERS processes around the country. Specifically, the work on these far-ranging rural energy plans, has been accomplished as follows:



PROGRAMA DE ENERGÍA LIMPIA PARA COLOMBIA - CCEP
TALLER PERS-PECTIVAS

Objetivo:
Orientar metodológicamente la formulación del Plan de Energización Rural Sostenible de cada territorio.

Objetivos secundarios:

- Fortalecer procesos de planeación de la energización rural en el contexto local.
- Aprender juntos cómo los equipos PERS pueden nutrir la planeación territorial y contribuir a la planeación nacional.
- Reflexionar sobre el proceso PERS que se ha desarrollado hasta el momento.

Acceso:
De acuerdo a los objetivos mencionados la agenda combina actividades donde se dan lineamientos para desarrollar la planeación energética territorial con ejercicios prácticos donde los participantes se enfrentan al reto de aplicarlos a sus territorios. Se intercalan actividades que buscan inspirar y promover la reflexión y el aprendizaje colectivos.

Lugar y fecha: Villeta, Agosto 25 y 26 de 2015.

Participantes: Equipos PERS, UPME, CCEP y aliados pertinentes.

DIA 1: Lunes, 24 de agosto		
HORA	ACTIVIDAD	DESCRIPCIÓN
12:00m – 02:30 p.m.	Recepción de invitados PERS en el punto de encuentro UPME - Calle 26 #882-85	
03:30 p.m. – 05:00 p.m.	Traslado desde Punto de encuentro hacia Resort Villeta, Cundinamarca R. e 5-247, Calle 1492	
05:30 p.m. – 06:00 p.m.	Check in Resort Villeta, Cundinamarca	
07:00 p.m.	Cena	

Figure 6 Day 1 agenda August workshop "PERS-pectivas" in Villeta

- **National PERS:** CCEP supported UPME in the final design of the PERS strategy guidebook and annexes and other methodological tools for stakeholders, including departments, municipalities and energy service providers. The guidebook was published in the last quarter of fiscal year 2014, but will be adjusted next quarter to incorporate the new financial mechanisms derived from the application of the new decree on expanding electricity service to off-grid zones (see PEZNI). It is a step-by-step guide for teams to design and implement PERS methodology in their departments.



Figure 7 Participants actively contribute at "PERS-pectivas" workshop in Villeta

Moreover, CCEP has continually offered technical support to all PERS processes under the National PERS agreement signed with UPME, and the National Federation of Departments (*Federación Nacional de Departamentos*) has approached UPME to join the initiative looking forward to include PERS methodology in regional policy planning activities, considering that governors to be elected next October start their periods in January 2016.

- **PERS Nariño:** This fiscal year, UPME contracted (*Universidad de Nariño –UDENAR*) to build upon its experience in developing the PERS Nariño information system to assist it in structuring a national PERS information system and provide technical support to ongoing PERS projects in information processing, analysis and reporting to the national PERS information system. This project is focused on improving current geographic information systems (GIS); developing standards for other PERS; raise funds for projects formulated in the first phase; and provide technical support to other PERS teams currently under implementation. It is important to note that UDENAR has continued PERS work with practically no CCEP support, showing that PERS institutionalization is possible when political will and sufficient funding are available. This specific PERS won the 2014 AMBER award on Research and Development of the Colombian Electricity Sector. In this way the PERS approach has become a referred strategy to regional energy planning, making its way into the RE Law 1715 of 2014 and the National Development Plan.



Figure 8 PERS Nariño won the 2014 AMBER award

Additionally, [PERS Nariño](#) is also working to improve its [website](#) and designing the PERS Information System Handbook. And UDENAR also is developing a study to analyze fundraising opportunities to implement PERS projects as a guideline that will be integrated by other PERS teams.

- **PERS Tolima**: CCEP technical assistance supported the PERS Tolima team in processing survey data from residential sectors. The PERS Tolima team is composed by Tolima University professors, whereby CCEP is forming local capacity by assisting local institutions in implementing PERS methodology. The project concluded the survey process and final results of energy demand and socioeconomic information, deriving energy use patterns and necessary social indicators such as unsatisfied basic needs in rural subzones of the department, used in finalizing this PERS analysis and to serve as a reference for other planning activities.
- **PERS Guajira**: The PERS Guajira team worked on completing information about energy demand and supply, as well as finalizing the first set of project profiles. CCEP assisted in processing survey results obtained from residential sectors and finished the energy and socioeconomic modules. The team prepared the socioeconomic report and continues to formulate projects. Additionally CCEP worked with the PERS team to process data and validate databases to prepare tables that describe energy use and consumption, by source and sector. The GIS expert for PERS Guajira also provided technical assistance to the PERS Chocó technical team on system design and requirements.
- **PERS Chocó**: PERS Choco is progressing according to the initial work plan. The technical team conducted surveys in residential, commercial and institutional sectors in sample municipalities. This activity, new to the PERS Chocó plan is funded by the Colombian Ministry of Foreign Affairs (*Ministerio de Asuntos Exteriores - Cancillería*), and includes conducting a baseline survey and identifying potential PERS projects in these municipalities. Overall results will widen the statistical data and project base in PERS Chocó.
- **PERS Cundinamarca**: During this fiscal year CCEP and UPME promoted the development of an additional PERS for Cundinamarca encouraging potential regional partners to join efforts to implement PERS Cundinamarca: the Cundinamarca Energy Company (*Empresa de Energía de Cundinamarca*), the Cundinamarca's Governor's Office, and several universities, among other institutions. As a result, by end of quarter, UPME, IPSE, and the District University (*Universidad Distrital*) signed an agreement to implement the PERS methodology in the department. Field activities recently started with CCEP assistance along with a short intervention by UDENAR.
- **PEZNI**: IPSE and CCEP started the design of PEZNI. The team of experts hired for this task worked closely with CCEP's T1 team. The design of this important institutional tool, that includes redesigning the role of MME institutions and developing a five-year road map for IPSE, was initially conceived and developed in two phases over a 6-month period, already culminated:
 - Collection and analysis of basic information on past development of rural energy policy, norms and investments; and
 - Identification of energy needs in Non Inter Connected Zones (*Zonas no Interconectadas - ZNI*); strategizing policy recommendations to design the Plan; and review and analyze technical regulations applicable to ZNI.

Through these consultancy reports, finalized with constant interaction and feedback by CCEP and MME institutions involved, a comprehensive PEZNI draft was fully designed with a proposal for the Plan (objectives, strategies, indicators, and goals) for the period 2015-2020. Recommended activities aim to develop sustainable energization projects and programs with significant impact in social

development; improve access and quality information about ZNI; increase business management capacities of energy service companies concentrating in long-term sustainability; and strengthen institutional coordination at different levels, based on projects and programs implemented in ZNI.

Nonetheless, a third phase of institutional discussions and formalization of the PEZNI as a public policy has been under discussion with the three GOC agencies most directly involved in expanding energy service solutions in off-grid communities: the MME itself, UPME and IPSE in order to produce and publish a final document towards Q1 of 2016.

Because PEZNI touches aspects covered by other policy instruments recently developed – such as the decree on electricity access service expansion (D1623, August 2015) – under design – such as the creation of standards for solar projects in ZNI (an “in-house” design by CCEP for MME), the design of business models such as “exclusive service areas” (in charge of UPME) and the design of a ZNI information system (in charge of UPME/IPSE), among others topics, it is most likely that the final version of PEZNI will be integrated in the PIEC 2013-2017, which is an official UPME publication that has to be updated every five years but can be added to at any time.

- CCEP also accompanied IPSE in the three Regional Integration Fora on Renewable Energy for the Chocó, southwestern Pacific Coast and the Orinoco and Colombian Amazonia regions, as well as the International Forum on Renewable Energy held in Riohacha, Guajira – all during the current fiscal year. These exercises were intended to be part of the presentation of the RE/EE Law 1715 to local administrations, energy companies, private sector investors and academia from all over the country. In these events, CCEP presented program objectives and scope in Colombia, as well as the contents and expected institutional development of the Law, the methodological approach in the structuring and implementation of RE projects in ZNI and the strategy supported by the various PERS.

2.2.2 Work Stream 1.2: Design and implement renewable energy and energy efficiency methodologies, technologies and tools to facilitate the project preparation and information management processes

CCEP moved forward during the year and continues working with UPME on the integration and updating of the information systems managed by UPME, IPSE, DANE, and regional power companies. Using the methodology developed and presented by CCEP to UPME in September 2014¹, the entity has engaged other related institutions in developing a common database, starting with populated rural centers. To date, UPME has integrated the information from the other GOC entities in a common framework, as part of its PIEC databases.

The following table presents the status of milestones in this work stream, as of September 2015:

Table 2 – Task 1 Work Stream 2 Activities

Activities Work Stream 1.2	Description	Status
Renewable energy sources	Milestone 1- December 2014 incorporate the wind and solar maps	Completed

¹ “Approximation to the Conceptual Design of the Information Layer on UPME Populated Centers associated to the Information on Areas with Electric Energy Needs (ANESSEE) as an Input to Planning Phases by Different UPME Teams” (CCEP, September 25, 2014).

Activities Work Stream 1.2	Description	Status
mapping	generated by WESTEVA in CCEP's Information System (Server) and make the resulting geodatabase available to GOC.	
	Milestone 2- April 2015 Technical workshop with UPME, IPSE, MME, IGAC, IDEAM and Westeva to present, compare and design a work plan to integrate RE mapping results on a common platform. Further milestones for this activity would result from the workshop.	Completed
Integrated information about population centers	Milestone 1- October 2014, Review and adjust the unification proposal presented by CCEP with UPME, IPSE and other pertinent technical institution.	Completed
	Milestone 2- April 2015 create the procedures for information exchange and unification.	Completed
	Milestone 3. June 2015 Provide support to UPME to publish the final methodology and results of its application	Completed
GIS support	Milestone 1- November 2014, ensure that the three regional PERS system databases are working properly and exchanging information.	Completed
	Milestone 2- April 2015. Assist in the integration of the geodatabases developed by the regional PERS projects completed the previous month in that national PERS GIS.	Completed
HOMER Modeling	Milestone 1- November 2014. Specific hybrid projects modeled and designed for investment in the ZNI using the Homer tool together with IPSE, EPM and EPSA	Completed
	Milestone 2- December 2014. Projects derived from PERS Tolima and Guajira are designed using the HOMER tool.	Completed
	Milestone 3- May 2015. Integrate the tool in the National methodology to structure sustainable rural energization plans	Completed

The table presents the status of milestones in this work stream, as of September 2015:

2.2.3 Work Stream 1.3 Technical assistance in achieving, complementing and monitoring PROURE energy efficiency targets

CCEP concluded modeling the scenarios for reducing consumption of natural gas by economic sector and fossil fuel intensity in the transportation sector; the final conclusions of the Natural Gas Market were presented to UPME.² Additionally CCEP worked with UPME staff to incorporate analysis of biofuel usage and technological change in future vehicle fleets in setting EE targets for the transportation sector as a significant component within the next PROURE Action Plan (under construction for 2016). The transportation technology scenarios were directly integrated in UPME's medium- and long-term energy demand forecasts and PROURE policy targets. It is clear that CCEP is well positioned both with UPME and the Ministry to continue providing technical assistance in the design and roll-out of the next PAI-PROURE once the different institutional responsibilities are confirmed.

² Technical and Economic Evaluation of Scenarios to Reduce Natural Gas Demand, by Ana María Macías (CCEP Consultant), May 2015.

Further work by CCEP on the next 2016-2020 PROURE Indicative Action Plan (PAI-PROURE) was suspended until GOC agencies reach agreement on which institution will be in charge of leading the design and formalization of this next version, given that (a) the text of the EE/RE Law 1715/2014 mandates the GOC to produce, update and finance the PAI-PROURE as a strategic element of EE policy; (b) the MME commissioned an international firm to analyze and propose options and institutional mechanisms to promote EE in Colombia, and the PAI-PROURE will likely be one component of that strategy; and (c) it is unclear whether UPME will maintain its role as lead agency in charge of PROURE, whether the Ministry itself will assume the role, or whether a new “National Energy Efficiency Agency” (or similar entity) will be proposed by the Executive to Congress. At time of writing, what is clear is that the current 2010-2015 version of the PAI-PROURE is about to expire (December 2015) and that a legal limbo could ensue if a new one valid as of 2016 is not promulgated, since such acts as the UPME EE/RE tax incentive resolution is based on targets that expire with the current PAI.

The table presents the status of milestones in this work stream, as of September 2015:

Table 3 – Task 1 Work Stream 3 Activities

Activities Work Stream 1.3	Description	Status
Assist the GOC in the evaluation and analysis of major aspects identified for the PROURE 2016-2020 Action Plan	Milestone 1- November 2014 Modeling scenarios for reducing consumption of natural gas by economic sector and reducing fossil fuel intensity in the transportation sector . Definition and screening of scenarios of demand for natural gas by economic sector and alternative energy demand patterns in transportation based on economic, market and technological factors for the next twenty years.	Completed
	Milestone 2- February 2015. Policy proposals aimed at curtailing growth in the consumption of natural gas in the economy and of fossil fuels in urban, metropolitan and inter-urban transportation, under the next Action Plan for the Program of the Rational and Efficient Use of Energy and Conventional Sources -PROURE 2016-2020.	Completed
	Milestone 3- Abril 2015. Final Report. Summary of the most significant results of the technical and economic modeling scenarios and policy recommendations for efficient use of natural gas in the Colombian economy to be incorporated into the PROURE 2016-2020 Action Plan.	Completed
	Milestone 4- June 2015 Final Report. Summary of the most significant results of the energy efficiency strategy and goals for the transportation sector to be incorporated into the PROURE 2016-2020 Action Plan.	Completed

2.2.4 Work Stream 1.4 Support in establishing financial mechanisms for EE/RE investments in industrial, commercial or other strategic sectors

During this fiscal year, CCEP and UPME formally established, staffed, developed operational procedures and committed funding to kick off the Clean Energy PPF, a joint technical, commercial and financial assistance mechanism to promote and enable private sector investment in concrete EE/RE projects. Appendix A includes a brochure summarizing the PPF mechanism used to disseminate it at seminars and other relevant events.

The table below shows an overview of the milestones for this work stream:

Table 4 – Task 1 Work Stream 4 Activities

Activities Work Stream 1.4	Description	Status
Financial mechanisms for EE/RE investment	Milestone 1– September 2014. Signed an agreement with UPME where UPME commits COP \$600 million from its 2014 investment	Completed

Activities Work Stream 1.4	Description	Status
	budget and CCEP COP\$700 million, for immediate implementation.	
	Milestone 2 – October 2014. Complete all operational and governance procedures and start PPF operations	Completed
	Milestone 3 – December 2014. Co-financing the first COP\$600 million in a diversified portfolio of industries and sectors.	Completed
	Milestone 4 – June 2015. Interim report on PPF results to date and guidelines for future institutionalization.	Completed
	Milestone 5 – September 2015. Unless additional resources are added by UPME and CCEP to enlarge and continue operations, finalize PPF co-financing and draw lessons learned for future investments	NA; as of September 2015, CCEP funding was available for PPF initiatives

- In conjunction with staff from the UPME, CCEP finalized the operational manual and application formats to be filled by both beneficiary and engineering companies wishing to postulate their proposals.
- CCEP and UPME opened a request for proposals available in both CCEP (www.ccep.co) and UPME (www.upme.gov.co) websites. The request for proposals was also published in important financial media of Colombia. Through this initiative CCEP looks forward to identifying additional companies in transport, industry and services sectors for the PPF.



Figure 9 PPF Public announcement to present projects

- By the end of the fiscal year, nine engineering and financial structuring project designs were already under implementation in the following sectors:

- **Steel and metallurgy:** heat recovery in ovens powered by natural gas used to produce car parts and thermic treatments for the equipment. The project aims to implement a new system that will help the company reduce fuel consumption and costs, and improve overall competitiveness.

Tipo de proyecto	Sector	Inversiones potenciales (MCOF)	Impacto ambiental (Ton CO ₂ /año)
Recuperación de calor residual	Metalúrgico	1.300	1.000
Cogeneración	Químicos	104.000	30.740
Cogeneración (FNCE)	Papel	41.600	16.400
Sustitución combustibles (FNCE)	Alimentos	1.300	1.240
Motores eléctricos	Textil	3.400	2.129
FNCE Solar fotovoltaica	Comercial	2.600	197
FNCE Solar fotovoltaica	Grandes Superficies	5.200	400
Recuperación de calor residual	Metalúrgico	7.800	5.000
Co-combustión carbón-biomasa	Papel	6.000	45.625
		173.200	102.731

Figure 10 PPF's current pipeline of projects

- **Pulp and paper:** this sector produces great amounts of relatively moist residue biomass used partially in boilers that power the production process. The company receiving PPF co-financing for engineering designs and direct PPF assistance in financial designs has two separate plant (one in Yumbo; the other in Cauca). There are two projects under design and Board of Director approvals: at the Yumbo plant, upgrading its main boiler to increase the share of residual biomass and substitute mineral coal (USD 2.5 million project with estimated CO₂ emissions reductions of 45,625 tons per year, to be self-financed); at the Cauca plant, installation of a new cogeneration facility for its production expansion plan, aimed at increasing use of residual biomass for self- and co-generation (and sale of surplus electricity to the grid). The second project has been subject to tax incentive modeling by CCEP under the proposed RE Law tax incentive decree, and requires investments above USD 15 million, with a decrease in CO₂ emissions of 16,400 tons per year. Both projects present great economic and environmental benefits and their implementation and have passed on to budget appropriation phases for implementation as of 2016.
- **Retail:** PPF is working on technical and financial structuring with several retail chains interested in using solar energy to generate electricity to power stores, as a complement to traditional power from the national grid.
- **Food industry:** companies in the food industry produce waste water with high contents of organic material that can be used to produce biogas. PPF is working on structuring a project focused on using biogas to produce heat and electricity for the partner company.
- **Chemical industry:** PPF is assisting a partner company interested in installing a co-generation system powered by natural gas (this study was co-financed strictly by UPME, given the magnitude of the investment involved – USD 40 million – and the economic group involved, with no co-funding by CCEP).
- **Textile:** CCEP is working with MGM Innova and the partner company to replace up to 340 low-efficiency electric engines with high-efficiency ones, resulting in increased production and substantial cost savings.

- In all, CCEP's PPF team is assisting in the technical and financial structuring for projects that total anticipated private sector investments in clean energy technologies worth approximately USD 70 million.
- Within this package, CCEP signed a subcontract with Jansen Boiler Co, a USA-based company, to facilitate PPF participation in the final design stage of a fossil fuel substitution project for the Yumbo plant of the energy intensive Colombian company that produces pulp and paper. The major equipment recommended has already been approved for acquisition and installation the

first semester of 2016 by the Company's BoD, so the investment will be finalized and recorded as a CCEP project by end of Program. CCEP and the Colombian company expect to intensify the use of residual biomass as a substitute fuel (reducing coal burning).

- PPF's team of experts participated in the *Foro de Eficiencia Energética en Industria*, organized by UNECLA and UPME. CCEP presented its experience in overcoming the barriers to industrial investment in EE and RE projects, stressing the role the PPF is having in involving major economic groups in clean energy development within their companies.
- The PPF has become a model for energy efficiency investment promotion widely accepted and closely watched by public and financial institutions as well as private sector production and engineering firms, as it was quickly implemented and began producing results within 6 months, while many previous and concurrent initiatives have basically produced diagnoses, recommendations, power point presentations and little impact.
- CCEP initiated discussions with the MME regarding the possibility of working together to consolidate conceptual and methodological aspects in the Renewable Energy and Energy Efficiency Fund (*Fondo de Energías Renovables y Gestión Eficiente de la Energía - FENOGÉ*) by transferring PPF experience, tools, and knowledge base. The FENOGÉ was created by RE/EE Law 1715/2014 and its operational procedures and funding mechanisms are being worked out during the rest of 2015 to begin operations in 2016. Although the fund contemplates additional work streams and objectives for RE and EE, the PPF mechanism offers a starting point with a wider approach to work with the industrial sector and strategic EE projects that contribute to reduce CO₂ emissions. Detailed progress for PPF projects is described under T3.

2.2.5 Work Stream 1.5 Support in overcoming regulatory and financial barriers to EE/RE power generation and distribution

CCEP was engaged and continues actively involved in providing technical know-how and development of strategic inputs towards the regulatory, administrative and technical designs for the institutional and financial implementation of Law 1715/2014, mainly through direct assistance to the GOC teams in charge of RE, EE, and rural electrification at the policy, planning and regulatory levels – various dependencies of the MME, UPME and Power and Gas Regulatory Commission (*Comisión de Regulación de Energía y Gas - CREG*).

One example is the work CCEP initiated regarding the design of the technical regulations for the injection of surplus power to the grid with small scale alternative energy sources, under responsibility of the Ministry's Energy Division. In addition, CCEP was approached by the Vice Minister's team to design the technical standards, installed capacity requirements, indicative costs and installation guidelines for individual solar systems. CCEP initiated its technical support to MME in designing the technical regulations on distributed generation, which allows small-scale alternative energy sources, such as house-hold solar panels, to inject surplus power into distribution grids while guaranteeing system stability and user protection. The project included the review of international experiences and regulations on distributed generation and involved extensive discussions and consensus-building with MME, UPME, CREG and power companies, among other actors, to receive institutional feedback and support for the proposed technical regulations. Technical drafts submitted by CCEP resulted in extensive review and discussion with the MME Energy Division team in charge of power sector technical standards, as well as UPME and CREG. The study, recently finalized, provides the technical standards, background information and precise wording to regulate distributed generation and delivery of excess power generated by households or businesses to

the distribution grids. Once finalized by the consultancy team and delivered by CCEP to the Ministry, a period of public discussion and final enactment of these standards will follow, accompanied by CCEP.

Furthermore, CCEP agreed to support the MME in analyzing how investment incentives contained in Law 1715 will impact the financial viability of concrete EE and RE investment projects, and the concomitant fiscal costs, in preparation for the national roll out of the tax incentive regulation currently under review. The Minister requested CCEP assistance due to its experience with real life projects and business allies, and the companies with which CCEP had been structuring detailed technical and financial feasibility studies for RE, EE and hybrid RE/diesel generation investment projects quickly agreed to share their internal accounting and other detailed financial information with the Program to develop case studies. Two ministerial advisors accompanied CCEP technical and financial analysts to discussions with companies in Cali (*Carvajal Pulpa & Papel* and *Empresa de Energía del Pacífico* - EPSA) and in Medellín (EPM) to discuss the application of each type of incentive being developed to regulate the tax incentives envisioned by the Law on their specific investment projects, and CCEP analysts prepared the financial models reflecting actual budgets and tax breaks. These models served as input for the MME’s discussions with Ministry of Finance and tax authorities (DIAN) on the nuances and anticipated impacts of the decree being developed to regulate the tax incentives envisioned in Law 1715, as well as to test hypotheses being discussed at senior GOC levels. One of the outcomes of CCEP modeling resulted in the interpretation accepted by tax authorities of concurrent applicability of 50% cost deduction of RE investments from income taxes payable while at the same time applying accelerated depreciation to 100% of the investment, both over a 5-year period. Prior to modeling, the two benefits were to be mutually exclusive. CCEP finalized its analysis and delivered final inputs to the Ministry in mid-August. The Ministry anticipates the final regulatory decree should be signed and announced in a specific event by November 2015.

In July 2015, the Ministry also requested support from CCEP to “determine technical standards for isolated solar photovoltaic systems and cost comparisons for regions in Colombia,” a derivative of one of the articles to be passed in what became Decree 1623 of August 11, 2015 “with respect to the establishment of policy guidelines for the expansion of electricity service coverage in the National Interconnected System (*Sistema Interconectado Nacional* - SIN) and the ZNI”. For the first time, a single policy is to be applied to currently unattended populations (in terms of access to electricity) regardless of where they are located in the country, and part of future electricity service is expected to be provided by individual solar PV household systems. CCEP designed a methodological approach based on in-house expertise and various CCEP project experts, subsequently accepted by the Vice Minister, the head of the Ministry’s Regulatory Division, and the National Coverage Expansion Manager; the study initiated mid-August and is expected to be finalized and submitted by end of October.

Lastly, CCEP attempts to support a pico light market study and trials to develop and implement sustainable business models for RE systems were unsuccessful. The Program analyzed results and approaches and will restart efforts to establish business models with grassroots organizations.

The table below includes the status of work stream milestones as of September 2015.

Table 5 - Task 1 Work Stream 5 Activities

Activities Work Stream 1.5	Description	Status
Assist the GOC in the design of some of the regulations required by Law 1715 of 2014	Milestone 1- December 2014, Consultancy hired and revision of the information, inputs and updates collected by the MME, CREG and other energy sector institutions.	Completed

Activities Work Stream 1.5	Description	Status
	Milestone 2: April 2015, Delivery of the study including suggestions to upgrade the current RETILAP standard.	Completed
	Milestone 3: May 2015, Delivery of the study consolidating the parameters for the operation of small-scaled solar, wind and hydro generators, focusing on aspects such as setting the maximum power limit and guaranteeing the stability and quality standards of the energy fed into the national grid.	Completed
Design a pico light market study and perform market trials to contribute to the contract's expected result regarding "Sustainable business models developed and implemented for rural renewable energy systems"	Milestone 1 April 2015: Complete the initial trial project including: the distribution scheme, sales and payment systems (monetary and in kind), specific information that allows scaling up the model to different parts of the country; and lessons learned after distributing 300 lamps through the GHF study.	Not completed
	Milestone 2 June 2015: Complete one or two additional market studies and trials in parallel or tandem with other CCEP projects in the SNSM and La Guajira – such as PERS Guajira, FCGI water pumping, Palmor and Sabana de Crespo MCHS, etc.	Not completed
	Milestone 3 August 2015. Evaluate the applicability of results and lessons learned from these studies and trials to other regions of the country, or whether to sponsor further trials in the Pacific coast or other regions.	Not completed
	Milestone 4 September 2015. Design a project or mechanism to create an extensive distribution system to provide access to the general population of la Sierra Nevada de Santa Marta and La Guajira.	Not completed

2.2.6 Work Stream 1.6: Renewable energy and energy efficiency educational, awareness and outreach program.

a. Renewable energy systems at JBB

CCEP and the JBB finalized the installation of 40 kWp biomass gasification and 9.5 kWp photovoltaic system, both connected to the internal power distribution grid, in the new RE and biomass residue management and educational compound. In this project, the JBB installed the infrastructure to house the RE systems and prepare and dry wood chips as feedstock for the gasifiers, while CCEP designed, purchased, installed and commissioned the RE technologies.

During November, 39 solar panels (9.5 kWp) were installed by CCEP on the roof of the new biomass gasification system; the two (20 kWp) gasifiers arrived to the JBB and, during the installation, the equipment supplier trained the CCEP technical team and the JBB operators. The training session included the preparation of biomass to be used as raw material for the process. Later on, in



Figure 11 Inauguration event at Bogota Botanical Garden – Dec/2014

December, CCEP and the JBB inaugurated the whole renewable energy system and a demonstration of the gasifiers was provided to attendants from universities, public entities, NGOs and other key CCEP partners. USAID produced two videos, one for [adults](#) and a second one for [children and young audiences](#), explaining the sustainable origin of the wood being used (city tree trimmings) and the wood-chip gasification and power generation system.

Over the course of the rest of the fiscal year, CCEP continued to work on optimizing performance of the gasifier system for JBB. The equipment provider visited the garden twice as part of the inspection process to ensure proper operation of the system and to resolve some technical aspects that have surfaced regarding the energy generation efficiency due to the high elevation, humidity and biomass moisture content found on site.

CCEP also met with USDA representatives from the Eastern Regional Research Center to share lessons learned in gasification processes. This organization was working on a similar project with Cenicafe in Chinchiná, Caldas.

On September 17, the Minister of Mines and Energy (Mr. Tomás González), congressmen, GOC officials, academics, NGO and Inter American Development Bank (IADB) representatives visited the installations, together with USAID, CCEP and JBB staff as part of the launching of a RE publication by UPME, IADB and Conservation International (CI). The Minister specifically requested that the book launching be held at JBB as an appropriate setting to announce RE policies due to the clean energy project installed by CCEP and JBB on the premises, and a tour of the installations was included in the agenda.

As a result of the visit, the IADB and CI approached CCEP to review the possibility of developing a joint biomass gasification project at one or two communities in the Pacific Coast region as a pilot test for rural electrification as part of the Plan PAZífico being designed by GOC and IADB for 2016-2018. IADB has committed USD 90 million to the plan, which is scheduled to expand electric coverage to 20,000 isolated villages and households.

As a research and educational center, JBB has invited different universities in Bogotá to develop research and academic experience around the clean energy project. The first of such agreements was reached with the National University (*Universidad Nacional de Colombia - UNAL*) to monitor RE generation by the gasifiers



Figure 12 View of one of two gasifiers installed at the Bogota Botanical Garden



Figure 13 The Minister of Mines and Energy visited the biomass gasification and solar photovoltaic system (September/2015)

and solar photovoltaic system in real time through the Smart Grids Laboratory LAB+i. The University installed a remote monitoring platform to assess performance and technical conditions information on this type of energy systems in Colombia.

The following table presents the milestones achieved as of September 2015 in this work stream.

Table 6 - Task 1 Work Stream 6 Activities

Activities Work Stream 1.6	Description	Status
RE and EE educational projects	Milestone 1 November 2014: Complete installation of two 20 kW gasifier units using biomass residues from the Garden's tree trimming that would supply approximately 30% of its daily power demand.	Completed
	Milestone 2 November 2014: Implementation, supply and installation of a solar system to be interconnected to the water cycle system.	Completed
	Milestone 3 January 2015: Test, deliver / transfer RE systems	Completed

b. Other awareness and outreach activities

Through its participation in national, regional and sub-sectoral workshops and events, CCEP broadened general awareness of clean energy initiatives, investment opportunities, CCEP's project pipelines and methodologies, and the status and expected impacts of the RE/EE Law passed in 2014, beyond the specific public, private and community allies it worked with during this fiscal year.

Some of these workshops, such as the national PERSpectivas workshop for PERS teams, have been mentioned in previous sections. Others include:

- II Latin American Congress on "Biodigestion in sustainable agriculture: towards food and energy sovereignty and the protection of environment" held in Cali (November 13 and 14). CCEP presented the new regulations on electricity market/Biodigesters in the framework of Colombian National Regulation: Law 1715 of 2014".
- On the same dates in La Guajira, CCEP participated in the VI International Forum on Renewable Energy organized by the National Training Institute (*Servicio Nacional de Aprendizaje - SENA*), at which the initial results and project profiles of PERS Guajira were presented.
- To promote participation in the CAEM/CCEP coal dosifier project, workshops on "Best practices for brick production" were held on March 12 in Cogua, Cundinamarca, and March 13 in Sogamoso, Boyacá, with over 80 participants (42 men and 8 women attended the workshop in Cogua; and 17 men and 17 women in Sogamoso) from surrounding brick factories and interested institutions.
- "Workshop on Energy Efficiency and Renewable Energy in Water Treatment Systems," organized by the Ministry of Housing, City and Territory with USAID's LCRD on August 27-28, CCEP presented a conference on the "Installation of Clean Technologies for Water Pumping in Wayuu Communities," sharing the option of solar and dual manual/bicycle pumps being installed in Guajira.

At a series of workshops, CCEP and UPME promoted PPF:

- Market Development and Investment in Energy Efficiency Projects in Colombia (UPME/ECLA, March 2015)
- Workshop “Formulation of Clean Energy Projects” on May 9 in Barranquilla, organized by UPME, National Association of Industries (*Asociación Nacional de Industriales - ANDI*) and *Universidad del Norte*. The work session focused on identifying initiatives that could become potential PPF projects. Twenty-eight participants (24 men; 4 women) representing 23 companies from various sectors attended the workshop.
- GREENPYME COLOMBIA 2015. Workshop to present the results of 40 energy audits performed by Colombian ESCO E2 and promotional fair on financial mechanisms for EE project investment, organized by IADB, UPME and E2 (July 31). UPME and CCEP set up a stand to promote the PPF mechanism.
- Energy Efficiency in Industry Forum, organized by UPME and ANDI, September 24.



Figure 14 CCEP’s PPF stand at the GREENPYME Energy Efficiency Promotion event, Bogotá, July 31, 2015

CCEP’s communication and outreach program, currently under revision, was updated this fiscal year to revamp CCEP’s website, produce a number of project videos and communications pieces, and generate greater written and televised press coverage on CCEP project impacts. The effects of this program will be seen next fiscal year.

3. TASK 2: EXPANDING ACCESS TO RENEWABLE ENERGY SOURCES IN CURRENTLY UNSERVED AREAS

3.1 HIGHLIGHTS

During this third year CCEP focused on construction and implementation of the existing projects in the pipeline and continued stimulating the development of sustainable RE projects in rural communities through technical assistance and project implementation. The Program worked on clean energy projects for communities in Chocó, Antioquia, Valle del Cauca, La Guajira, and Sierra Nevada de Santa Marta, serving vulnerable groups such as indigenous and Afro-Colombian communities. CCEP's current pipeline of projects has some of them at their final design stages as described later in this chapter.

Key Achievements this Year

- Completed essentially all of the infrastructure associated with the MHP to provide energy for productive activities and public lighting in “El Yucal” indigenous community (Chocó), benefiting 94 families (under implementation). This project is scheduled to be inaugurated in November 2015.
- Finalized engineering designs and initiated installation of solar and manual water pumping systems for 42 indigenous communities in La Guajira. Project under implementation, in alliance with FCGI.
- Completed project with EPM and the Departmental Government associated with the installation of clean energy systems for 14 CERIs in Antioquia.
- Completed most of the civil infrastructure associated and work associated with power lines for the community of Palmor which will benefit nearly 1,900 people in the region. Contractor initiated construction of the electro-mechanical components and ordered electronic components from abroad, which should arrive in October. The MHP, which is under implementation in alliance with IPSE, is scheduled to be finalized by December. The business and community development component also started and is scheduled to be completed by April 2016.
- Completed installation of solar powered refrigeration for the community of Punta Bonita (Río Cajambre – Buenaventura) to support the fishery value-chain that will consolidate income opportunities for more than 300 families (installation completed; technical assistance ongoing).
- Projects benefiting over 10,000 additional rural inhabitants are under final administrative and contracting procedures to start implementation during the last quarter of 2015, which will enable CCEP to surpass its target of 16,000 rural beneficiaries.

3.2 ACTIVITY SUMMARY BY WORK STREAM

3.2.1 Work Stream 2.1: Cost analysis of renewable and hybrid options

For all the projects under implementation or design, CCEP has been revising the solutions using Cost Analysis Models. The experience gained using Homer software for these project analyses has been shared with UPME, IPSE, CREG and MME, at the national level with energy company allies such as EPM and EPSA in projects under joint design, and with the regional PERS teams. After multiple training sessions and joint use of this methodological instrument that enables comparison and life cycle optimization of renewable and hybrid solutions versus conventional energy options, Homer has become the tool of choice for rural electrification project analysis at UPME, IPSE and regional PERS.

The table below presents the status of milestones for this work stream as of September 2016.

Table 7 - Task 2 Work Stream 1 Activities

Activities Work Stream 2.1	Milestones	Status
Provide Cost Analysis Models	Milestone 1- October 2014: Develop Hybrid Energy Options for EPM's Vigia del Fuerte – Bojayá and for EPSA's Punta Soldado projects.	Completed
	Milestone 2 – March 2015. Complete engineering designs and financial arrangements for EPM's Vigia del Fuerte – Bojaya projects, seeking to assure implementation by mid-2016.	Completed
	Milestone 3 – February 2015 – June 2015. Provide technical assistance and hand off to IPSE in the use of the HOMER software to design hybrid solutions and provide cost analysis to some of the other ZNI municipalities included under IPSE’s mandate to provide municipalities with 24 hour energy service.	Completed

CCEP continues to review solutions using Cost Analysis Models for all projects under implementation or in design stages.

3.2.2 Work Stream 2.2: Project identification, implementation and sustainability

The specific achievements by project are summarized below grouped by geographic location.

a. **Chocó**

Arusí, Termales, Partadó -

This year this project had serious difficulties due to verified lack of progress by the project contractor, *Consortio Arusí*. Construction of GOC component was scheduled for a maximum of six months ending in March 2015. By the end of the fiscal year the contractor reported unverified 45% progress; which is lower than

Box 1 Details on project at Arusí, Termales, Partadó

Location: Chocó: Nuquí (Arusí, Partadó, and Termales Villages, *Consejo Comunitario Mayor Los Riscables* and local *Consejos* of each village)
Objective: Construction of a 100 kW micro hydro plant (MHP) in Arusí, Partadó, and Termales (Nuquí, Chocó), including household electrical installations, public lighting, EE training, creation of a small/medium enterprise (SME) for ice production, and support to strengthen the Energy Service Administrative Board (*Junta Administradora de Servicio de Energía - JASE*)
Status: Underway, with GOC counterpart funds totaling over USD \$1,000,000 and serious delays in implementation of GOC components. It has been agreed with USAID and GOC that additional CCEP intervention is conditioned to verification of completion of GOC construction and installation components by an independent engineering firm (in terms of quantity and quality). The verification to date has shown that the GOC component has not progressed much, and construction was suspended as of August 2015.

expected, due to constant delays, suspensions, and extensions, plus cost overruns. Taking this into account, the project definitely won't be finished by the end of 2015. CCEP has had several meetings to discuss project progress and roles and responsibilities of parties involved in its implementation: the Department for Social Progress (*Departamento para la Prosperidad Social - DPS*), IPSE, and the Financial Fund for Development Projects (*Fondo Financiero de Proyectos de Desarrollo - FONADE*), with the participation of USAID representatives. The parties have shown their disposition to resolve the complications; DPS has assumed a more active role to manage social issues with the community and FONADE asserted that they will act as main point of contact to communicate project activities and progress. CCEP intervention so far is still limited to engineering designs, environmental and social permits and the implementation of the forestry management plan, all completed. And USAID confirmed to the GOC that future CCEP's participation in the project (ice production facility, energy service company,

household electrical installations, and prepaid meters) depends on whether or not the MHP is completed in quantity and quality, as certified by an independent 3rd-party engineering firm. Regarding the Forest Management Plan, the regional environmental authority extended the wood extraction and reforestation permit to cover the full volumes required, and CCEP extended the subcontract for this work, which has been completed.

El Yucal – This year CCEP made significant progress and this project is in its final construction phase: civil works were completed according to plan. These include intake, forebay tank, penstock, and power house,

and the hydroelectric equipment (including turbine, generator and governor) was adequately shipped and installed. All other works were previously completed; and the MHP is already operating. At the end of this year, CCEP was working on final adjustments and details. The project should be officially inaugurated and transferred to the community by November 2015. Also CCEP developed business and community strengthening activities focused on project sustainability. Financial sustainability is guaranteed with the proceeds of the rice/corn mill productive project, while operational sustainability is assured with local capacity trained to operate and maintain equipment and facilities. Community participation and ownership, which is critical for project success, has been proficient with continual participation of Río Panguí community.

Box 2 Details on project at El Yucal

Location: Chocó: Nuquí (*Cabildo Indígena Río Panguí El Yucal*)

Objective: Construction of an 18 kW MHP, including household electrical installations, public lighting and EE training; support to a rice and corn mill productive project and a carpentry workshop; community and entrepreneurial strengthening

Status: Underway (almost completed)

Number of beneficiaries: 472

b. La Guajira

Fundación Cerrejón Guajira Indígena (FCGI)

– By the end of this fiscal year, FCGI finished the installation of solar water pumping solutions in at least eight indigenous communities, and was installing four on a weekly basis. All of the commissioned systems for 19 communities will be fully installed and in operation by November 2015. Also, the first three of 23 mechanically-assisted water pumping systems have been installed. These systems, which are innovative in their kind, are under technical revision in order to settle details and final adjustments before installing the remaining ones. CCEP has organized training workshops on solid waste management, efficient use of water resources, and basic environmental awareness to 119 representatives from 39 Wayuu indigenous communities.

Box 3 Details on water pumping project with FCGI

Location: Guajira: Maicao, Manaure, Uribia

Objective: Installation of 42 photovoltaic (PV) and manual/bicycle pumping systems to guarantee access to clean water for the Wayuu indigenous community in La Guajira

Status: Underway (final implementation phase)

Number of beneficiaries: 2445



Figure 15 - Solar water pumping completed in Guajira

c. Department of Antioquia

CERIS - This solar energy project implemented by the EPM and the Governorship of Antioquia for underserved rural indigenous educational institutions was fully completed by the second

Box 4 Details on project CERIS

Location: Antioquia: Urrao, Dabeiba, Chigorodó, Necoclí, Zaragoza, Segovia, Mutatá, and Frontino

Objective: Install photovoltaic systems in Regional Indigenous Educational Centers, in alliance with EPM

Status: Completed

Number of Beneficiaries: 495

quarter of the fiscal year – installations fully leveraged from counterpart funding. CCEP provided training and technical assistance to project implementers to guarantee adequate technology transfer and a solid baseline socioeconomic analysis. Fourteen photovoltaic systems were installed in schools in seven municipalities: Urrao (Majore, Andabú, Valle de Perdidas, and Majore schools); Dabeiba (Nendo school); Chigorodó (Guapa Alto School); Necoclí (Ule school); Zaragoza (Pablo Munera - El Paramo branch school); Segovia (La Po school); Mutatá (Bedó, Mungudó-El Silencio, La Primavera, Porroso, and Sabaleta schools); and Frontino (San Miguel school). This project directly benefits 495 people (467 students; 28 teachers and/or indigenous leaders).

d. Sierra Nevada de Santa Marta

Sabana de Crespo – By the end of this fiscal year CCEP had evaluated, adjudicated and formalized contractual procedures to initiate the six-month construction phase. This achievement was the result of a long and challenging process. This fiscal year the Cesar Regional Environmental Authority (*Corporación Autónoma Regional del Cesar - CORPOCESAR*) authorized the environmental permits required for construction works, the last legal requisite to initiate the project. However, shortly after receiving bids from prospective constructors and engineering auditors, their leaders, traditional indigenous authorities (*mamos mayores*) sent word that the project was no longer authorized, due to the prolonged drought brought on by “El Niño”. After several meetings and discussions with the indigenous community

Box 5 Details on project at Sabana de Crespo

Location: Cesar: Valledupar (*Resguardo Indígena Arhuaco*; Sierra Nevada de Santa Marta)

Objective: Construction of an 18 kW MHP to provide power for social infrastructure (health, school, community store, child care center, teachers residence center), and production process of coffee drying.

Status: Construction and auditing subcontracts in process to begin implementation in October 2015.

Number of beneficiaries: 4194



Figure 16 Sabana de Crespo indigenous leaders visiting Palmor of Sabana de Crespo, on July 23, the community leaders and *mamos* authorized CCEP to go ahead with the project. This authorization was reinforced by a visit community leaders and two *mamos mayores* made to the Palmor MHP, where all doubts on the possible impact of the project on river flows were totally dispelled and the environmental and social benefits of the project were gauged.

Bunkwimake – This year’s activities focused on carrying out implementation of the portion of the original project that was not affected by the fact that the GOC could not produce the

environmental permits for the MHP designed by CCEP with IPSE participation, due to legal impasses. This year the Program prepared studies to implement the project and estimated costs of lighting systems based on number of potential beneficiaries and equipment characteristics. After the GOC could not produce the environmental permits for the MHP, the community persisted in requesting support in solving its basic energy needs, at least in terms of lighting. CCEP analyzed different options and decided that the best way to proceed was to provide simple lighting systems for the boarding school's dormitories, bathrooms and dining room, using three small solar photovoltaic systems. The project will also provide individual solar lanterns (pictured) for students and teachers in the area.

Box 6 Details on project at Bunkwimake

Location: Magdalena: Santa Marta (*Resguardo Indígena de Bunkwimake*; Sierra Nevada de Santa Marta)

Objective: Install solar lighting system in Bunkwimake school, Sierra Nevada de Santa Marta and pico lights for 200 students and teachers in the surrounding area (downgraded from the original objective to install 10-kW MHP due to lack of environmental license required by the National Environmental Licensing Agency ANLA)

Status: Planned

Number of beneficiaries: 1050



Figure 17 Arhuaco leaders examine the type of "pico light" that will be distributed in Bunkwimake

Palmor – By the end of this fiscal year this project and its civil works reached the final implementation phase. The civil works and power grid were constructed and fully installed; the turbine and

generator were built; the governor was ordered and under construction abroad for shipment in October. The electro-mechanical equipment will be assembled and installed in November. CCEP also started working in the business strengthening component with *Electro Palmor* personnel, emphasizing in administrative, accounting, financial and annual planning issues to ensure long-term sustainability. The project will be officially launched by the end of 2015.

Box 7 Details on project at Palmor

Location: Magdalena: Ciénaga (*corregimiento Palmor*; Sierra Nevada de Santa Marta)

Objective: Refurbishment of an existing 150 kW MHP, installation of a second turbine, and new power distribution grid to cover increasing energy demand in Palmor, Ciénaga, Magdalena

Status: Underway (final implementation phase)

Number of beneficiaries: 1895

e. Valle del Cauca

Cajambre - CCEP

completed the installation of the photovoltaic systems in Cajambre to provide power to PIMPESCA cooperative's fish

refrigeration installations. And the business strengthening component was begun focused on training the local co-op on administrative and social aspects considered for long-term sustainability. This final component should be completed by end of 2015.

Box 8 Details on project at Cajambre

Location: Valle del Cauca: Buenaventura (*Consejo Comunitario del Río Cajambre*)

Objective: Installation of PV systems for fish refrigeration with PIMPESCA (fishing association) in Punta Bonita, Buenaventura, Valle del Cauca

Status: Underway (final implementation phase)

Number of beneficiaries: 313



Figure 18 Cajambre PV system and refrigeration installations



EPSA Punta Soldado -

EPSA, CCEP's ally for this project, is currently evaluating proposals for the installation of PV equipment. CCEP will co-finance the PV equipment

and is also responsible for contracting the civil works required to install the solar panels and the electric equipment. The project is ready to be installed and transferred by first quarter 2016.

Box 9 Details on project at Punta Soldado

Location: Valle del Cauca: Buenaventura (*Consejo Comunitario de Punta Soldado*)

Objective: Installation of a hybrid solar-diesel system in Punta Soldado, Buenaventura, Valle del Cauca

Status: Contracting process

Number of beneficiaries: 650

EPSA Bajo Calima – CCEP

completed all necessary designs and budgets for the solar home systems. In addition, CCEP, EPSA, and the community are

discussing final details regarding long-term sustainability for the project. Once the community is in agreement, EPSA will proceed with the bidding and contracting process.

Box 10 Details on project at Bajo Calima

Location: Valle del Cauca: Buenaventura (*Consejo Comunitario Bajo Calima*)

Objective: Solar rural solar home system project for Bajo Calima,

Status: Planned

Number of beneficiaries: 660

CVC - Santa Rosa de Guayacan – The project was successfully completed in October 2014.

Box 11 Details on project at Santa Rosa de Guayacan
Location: Valle del Cauca: Buenaventura
Objective: Installation of solar system to provide power to the crafts workshop; a community solar fridge; and individual efficient woodstoves and portable solar systems to provide lighting to households. The project also included planting a fuelwood crop for sustainable biomass supply, which CVC as regional environmental authority will monitor.
Status: Completed
Number of beneficiaries: 122

CVC – Chachajó, CVC Valledupar, CVC - Puerto España, CVC – Chucheros - During this fiscal year CCEP completed the design and budgeting stages for four community projects, and the contracting process via public bidding for CCEP’s 50%

Box 12 Details on project at CVC - Chachajó, Valledupar, Puerto España, Chucheros
Location: Valle del Cauca: Buenaventura (Resguardo Indígena de Chachajó, Resguardo Indígena de Valledupar - Bajo Calima, Consejo Comunitario de Puerto España - Miramar, and Consejo Comunitario de Chucheros)
Objective: Install PV systems for schools and fish refrigeration facilities in consejos comunitarios Chucheros and Puerto España - Miramar; Buenaventura, Valle del Cauca; biomass to produce electric power in resguardo Valledupar; and consejo comunitario Chachajo, Buenaventura, Valle del Cauca
Status: Contracting process for Chachajó; suspension of other components pending counterpart participation.
Number of beneficiaries: TBD

commitment began in June. The full four-community project that would be developed in alliance with the Valle del Cauca Environmental Authority (*Corporación Ambiental del Valle del Cauca - CVC*), includes solar home systems and rural schools with solar refrigeration and PC capacity; it is expected that these clean energy solutions would benefit 258 families.

Nonetheless, in an external audit by Colombia’s inspector general’s office (*Contraloría General de la República*) it was found that the agreements made between CVC and Afro-Colombian and Indigenous communities to channel funding for investments, such as the 50% committed to these projects, could not be implemented. Therefore, CVC suspended its commitment, to be possibly reactivated in 2016, or definitely cancelled.

Given all the preparatory work already sunk into the projects, CCEP reviewed each project and decided to go ahead with the full project in the largest of these communities, Chachajo, which has the strongest viability for self-sustained operation and maintenance; and suspend all action in the other communities pending reactivation or definite cancellation of CVC commitments.

The business strengthening component for the project will include administration, maintenance and operation of these photovoltaic systems.

Arquíá – This year CCEP moved forward this project by helping to find solutions to numerous challenges that by the middle of the fiscal year were resolved and today construction phase is underway for completion scheduled by December 2015. By June

Box 13 Details on project at Arquía
Location: Chocó: Unguía (*Resguardo Indígena de Arquía*)
Objective: Install solar PV systems to provide electric power to 3 existing community installations and 4 new education and social infrastructure installations being built by DPS in Arquía indigenous community.
Status: Planned
Number of beneficiaries: 630

2015 the construction and auditing contracts for GOC components were adjudicated and legalized and the year ends with updated cost estimates and 7 installations that are in the pipeline for installation by CCEP during the first quarter of 2016.

CCEP first visited this indigenous community in 2014 at the request of DPS, the Uguía Mayor’s Office and the Arquíá indigenous community, which had adjudicated COP 1,100 million (approx. USD 548,000 at mid-2014 exchange rates) to construct and furnish new social infrastructure but lacked the resources for RE installations in the new and existing community buildings. As soon as CCEP received the blueprints for the new buildings, the program completed the design and budgets for the solar installations required. However, DPS and the Mayor’s office suffered delays in their own bidding and adjudication process and, until end of the current fiscal year, only three facilities are available for CCEP intervention, of the seven planned originally. Early in 2015, CCEP informed DPS and allies that it would incur in unjustifiable extra costs if it had to install three systems in existing buildings now and have to return in 2016 to install four systems in future buildings once these were completed, and needed demonstration that the new installations had actually been initiated by last quarter of this fiscal year. If the new buildings were not under construction by this fiscal year, CCEP would limit its intervention to the three existing buildings. Fortunately, the construction and auditing contracts for GOC components were adjudicated and legalized, and construction is already under way for completion scheduled by December 2015.

f. Various locations

Telemedicina - CCEP's alliance with *Cancillería* in this project has progressed during the year. CCEP has a working alliance with the Colombian Ministry of Foreign Affairs to set up 11 health centers powered with

Box 14 Details on project Telemedicina at various locations

Location: Amazonas (La Pedrera, El Encanto), Cesar (Chimichagua), Chocó (Juradó), Guajira (Uribia, 2: Siapana, El Paraiso; Dibulla), Nariño (Tumaco), Putumayo (Puerto Leguizamo: Piñuña Negra), Vaupés (Mitú), Vichada (TBD).
Objective: PV systems in 11 off-grid health centers to provide basic health services using "tele-medicine" program involving 70 hospitals and rural health centers
Status: Contracting process
Number of beneficiaries: 4110

of-the-grid photovoltaic systems. The project includes the installation of laboratory and telecommunications equipment in remote areas, supported by one or more specialized medical centers. CCEP staff carried out environmental site visits in three of the 11 planned interventions. *Cancillería* hired an NGO to implement its counterpart funds as of next quarter. In June, CCEP issued a public bidding requesting proposals for multiple PV systems, including those to be used on this project.

CCEP/ EPM/Antioquia Governor's Office - Bojayá / Vigía del Fuerte- During the first semester of 2015, CCEP - EPM - Antioquia Governor's Office explored the

Box 15 Details on project at Bojayá / Vigía del Fuerte

Location: Antioquia: Vigía del Fuerte, Chocó: Bojayá
Objective: Installation of public street lighting, solar pumping and water treatment
Status: Planned
Number of beneficiaries: 2725

possibility of working in Bojayá, Chocó and Vigía del Fuerte, Antioquia to install solar public lighting in Bojayá (CCEP), public lighting, solar pumping and water treatment, and aqueduct and waste water pipeline distribution for Vigía del Fuerte (EPM and Antioquia Governor's Office). Approximately USD 475,000 in counterpart funds have been assigned to the project that shall be fully developed in the next fiscal year; CCEP will focus on the public solar lighting requirements in the urban areas of Bojayá and Vigía del Fuerte, as well as two villages (“corregimientos”) of the latter, and the socio-entrepreneurial component of the

full project, while Governorship/EPM resources will be channeled to solar water pumping and distribution, plus an additional CERI whose construction was finalized after the end of the aforementioned CERI project.

3.2.3 Work Stream 2.3: Capacity building for rural energy SMEs

- CCEP worked with some of the energy system providers, reviewing the productive needs of the communities, and selecting and hiring the personnel and equipment needed to ensure that the rural energy enterprises can really become sustainable during the lifetime of the system.
- CCEP conducted a market research to identify providers of pre-paid metering systems that have the potential to be used in CCEP projects – including both conventional micro-grids in MHP (such as Palmor) or hybrid systems (such as Punta Soldado) and isolated individual solar systems (such as Bajo Calima and Chachajó).
- Capacity building and social and business strengthening components were initiated and are currently underway in four projects (Yucal, Palmor, Cajambre and FCGI).
- CCEP completed plans to start social and business enterprise assistance for the Vigía del Fuerte/Bojayá solar lighting and water pumping project under implementation in partnership with EPM and Governorship of Antioquia.
- CCEP partner EPSA plans to start social and business enterprise assistance for local capacity building in Punta Soldado (under CCEP methodology; the purpose of having EPSA contract this assistance is to prepare this energy service provider for future).
- Social and business strengthening components will be implemented in other projects as they reach implementation, based on project characteristics to ensure sustainability and community productive activities.

3.2.4 Work Stream 2.4: Impact evaluations

As required by contract, CCEP “will undertake impact evaluations to quantify the impact that rural electrification (and possibly other renewable energy solutions) has on a number of key factors such as economic growth and job creation, education, conflict reduction, and improved health service delivery. Baseline studies will be conducted in select communities to provide before and after comparisons....” Up to now, CCEP has been systematically conducting baseline studies, but is awaiting project closure and follow-up in the main rural electrification projects prior to initiating impact evaluations. Thus, during this fiscal year CCEP did not perform any impact evaluation.

4.TASK 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY INVESTMENT PROMOTION

4.1 HIGHLIGHTS

Through this Task, USAID has been providing technical assistance and advisory services to promote and catalyze industry and business sector investment in energy efficiency and renewable energy opportunities in specific establishments to guide EE/RE project investments in strategic sectors. Energy efficiency/renewable energy projects are being structured and promoted in ceramic, glass, and brick manufacturing; agro-industrial, food and beverage; metal-mechanic; and textile subsectors, in alliance with national businesses and the financial sector; and through the Project Preparation Facility.

During PY3 CCEP focused on industries and companies that represented: (i) economic viability of EE/RE investments; (ii) potential impact of EE/RE investments in terms of energy reduction and cost-savings; (iii) potential for a demonstration effect, information-sharing, and replication among similar facilities/companies (e.g., through an industrial or business association; with industries that are physically clustered); and (iv) complementarity with other donor activities or with specific financial credit lines for EE/RE investments available through national banks and other organizations.

Following these lines, and as presented in the Annual Work Plan covering this period, CCEP worked this year on several concrete and distinct project portfolios: (Portfolio 1 - P1) case by case project applications; (Portfolio 2 - P2) industries located in the Yumbo industrial corridor; (Portfolio 3 - P3) EE/RE project initiatives with Energy Service Companies (ESCOs); (Portfolio 4 - P4) coal dosifier systems with small brick manufacturers; and (Portfolio 5 - P5) industries with process steam and heat combustion based on coal and natural gas boiler and kiln systems. The sixth line (Portfolio 6 - P6) was composed of the project pipeline under design through the PPF mechanism, where the Program worked with UPME and companies representing different sectors on structuring engineering and financial components of a first tier of nine EE/RE projects and the identification and formulation of additional company proposals.

Key Achievements

- 11,217 metric tons of CO₂ equivalent reduced as of September 2015, decreasing the quantity of greenhouse gas emissions.
- Cleaner energy solutions installed in 6 brick, metallurgical and textile factories in the departments of Antioquia, Atlántico, Caldas and Cordoba.
- 20 brick manufacturers in Bogotá DC, Cundinamarca and Boyacá initiated a combustion optimization project aimed at reducing 16,680 tons of CO₂ emissions per year.
- Finalized remaining project structuring activities in the Yumbo industrial corridor (P2) and project designs with ESCOs (P3); subsequent project phases or new activities were channeled to remaining pipelines.
- Projects under design as part of the Project Preparation Facility (PPF) mechanism in the paper & pulp, steel, metallurgical, chemical, and food & beverages sectors, as well as two major retail chains in eight cities, are being monitored within Task 3 for potential contribution to PMP indicators associated.

4.2 ACTIVITY SUMMARY BY WORK STREAM

4.2.1 Work Stream 3.1: Industrial subsector and/or technology assessment

CCEP continued focusing on the strategic industrial subsectors and cross-cutting technologies initially identified during year 1. This consistency has permitted advancing in project formulation and implementation in priority sectors from the perspective of energy-intensity, economic impact and employment – such as agro-industry, food & beverage, brick & ceramic, and textile sectors – and strategic technological challenges common to many sectors, such as heat recovery to reduce fossil fuel demand per unit of output³.

In addition, the Garper – Fenaltiendas project completed during Q2 FY2015 provided a comprehensive analysis of energy use and potential energy savings from conversion to energy efficient refrigeration and lighting technologies in the small and medium sized shops of Bogotá and several cities in the Caribbean region. Project results are included later on in this report.

Finally, consultancies finalized this year by Incombustion (university alliance) and Corpoema (NGO) for UPME on energy use technologies and consumption patterns in 20 industrial subsectors complemented CCEP sectorial and technology assessments as part of the background work that resulted in the creation of PPF as a CCEP Program portfolio under T3.

Table 8 - Task 3 Work Stream 1 Activities

Activities Work Stream 3.1	Milestones	Status
Update sectorial and technology assessment	Milestone 1 - December 2014. As a result of the studies performed by Incombustion and progress to date by CORPOEMA, CCEP will update its sectorial and technology assessment.	Completed
Include commercial sector project opportunities	Milestone 1 - In May 2014 CCEP signed a co-financing agreement with Garper to conduct detailed engineering studies and financial structuring required to determine energy efficiency and operational parameters of the electric system, refrigerators and illumination systems in 300 stores affiliated to FENALTIENDAS	Completed
	Milestone 2 - February 2015 Completion of feasibility study, business model and installation and operation of the first refrigeration and lighting equipment in participating stores.	Study completed; FENALTIENDAS members did not implement the project
	Milestone 3 - July 2015. First trench of Fenaltiendas program implementation completed	FENALTIENDAS members did not implement the project
	Milestone 4 – September 2015. M&E completion about Fenaltiendas program.	FENALTIENDAS members did not implement the project

³ One of CCEP's first T3 projects, at Los Cerros brick factory, recovered waste heat from a neighboring incineration plant to dry bricks and totally eliminate coal use for the drying process. This is an example where both the prioritized sector and the technology were combined in a single energy efficiency project.

4.2.2 Work Stream 3.2: Identification of target industries/companies and project development

a. *Portfolio 1 Case by case project applications in conjunction with financial institutions*

CCEP continued working with companies interested in designing, financing and implementing clean energy projects, particularly in conjunction with Bancolombia/SECO “Environmental Credit Line” (LCA for its Spanish acronym), which condones up to 25% of credit incurred by SMEs for incremental (not environmentally mandatory) EE/RE investment projects achieving measured energy savings and CO₂ emissions reduction targets⁴. CCEP’s assisted companies in structuring eligible projects and credit applications, making baseline and post-investment energy and emissions measurements, and accompanying technical implementation of the projects financed through the mechanism. This year three of these projects reached implementation phases and a fourth is pending environmental permit to transfer production and install the project at a new plant location.

Ladrillera Sugres - Investment was finalized on the ceramic kiln substitution and the technology optimization was completed in this project located in Supía, Caldas. This project consisted of substituting five traditional beehive kilns with a more energy-efficient tunnel kiln. This year CCEP closely monitored project progress and found positive results to date, both in profits and operations:

- CCEP estimates the impact of this USD 662,000 investment resulted in avoiding 3,569.8 tCO₂ per year, and a total estimated reduction of 35,598 tCO₂ over a 10-year period.
- The company reports 65% reduction in coal consumption per ton of production, from 208 kg of coal/ton to 69 kg coal/ton of brick.
- Production increased 211%, from an average of 802 to 1700 tons/month.
- Overall operating costs decreased 60%; despite production increase, monthly coal consumption decreased from 166 to 118 tons/month, which represents 28% in savings (approximately COP 8 million or USD 3,200 per month).
- Personnel increased by 75%, from an average of 40 to 70 employees. All company departments benefited from increased production.
- Reduction of workload to employees relative to transfers and movements of finished products.
- Improvements in production time, work environment for employees (mostly kiln operators).



Figure 19 Completed Hoffman kiln at Sugres



Figure 20 Automated pulverized coal injection system at Sugres

⁴ Swiss cooperation absorbs up to 25% of loans incurred under the LCA program, depending on achievement of energy and emissions savings from the investment projects implemented by SMEs.

- Decrease in production of second rate products, from 12% to 3%.

Pueblo Viejo – CCEP estimates that about 40% of the project has been completed as of September, 2015 located in Amagá, Antioquia. This project is underway and it involves the installation of a new pressure drying line and Hoffman kiln. Project completion is expected by end of March, 2016. This 18-month, USD 1,473,000 investment project began implementation in October 2014, and primarily consists of installing a new 50-m long Hoffman kiln.



Figure 21 Construction progress at Pueblo Viejo (Partial view)

- Bancolombia visited company facilities and approved project financing for COP 1 billion (33% of cost through approved Bancolombia LCA leasing; rest is self-financed).
- To date, the chimney is installed as well as the first 28 meters of the kiln.
- The anticipated emissions reduction amounts to 2,287 tCO₂ per year, and a total estimated reduction of 22,870 tCO₂ over a 10-year period.
- The company also announced it will hire an engineer dedicated exclusively to project implementation.

Ladrillera Delta - CCEP staff completed technical and financial assistance for project design and currently the project, located Medellín, Antioquia, is being implemented and scheduled for completion by June, 2016. This USD 310,000 investment project (70% funded by Bancolombia's Environmental Credit Line – LCA; rest self-financed) involved the design and construct of a new natural drying area to decrease fossil fuel dependency for this process, as well as to optimize its current heat recovery process. CCEP staff provided technical and financial assistance for project design; Ladrillera Delta is responsible for project implementation. After CCEP carried out evaluation visits to the site, conducted baseline measurements, and reached an agreement on indicators, reporting requirements and project scope with the company, the project credit was approved by LCA in June. It is estimated that this project will decrease coal consumption for brick drying process by 60% with associated reductions in GHG emissions.



Figure 22 Improvements to doors in drying area at Delta

IDEA - CCEP staff also worked with IDEA, located in Bucaramanga, Santander, to implement an electric induction furnace to replace the cupola furnace used in metal casting process. The company is very interested in following program recommendations on EE once the plant was transferred to Piedecuesta, Santander. IDEA requested the regional environmental authority to approve the construction of new facilities and is pending authorization. Until then, project implementation is on hold since IDEA cannot proceed with construction works.

b. Portfolio 2. Yumbo industrial corridor projects under prefeasibility analysis

CCEP completed the identification process of the projects in the Yumbo industrial corridor located in Cali, Valle del Cauca. The effort focuses on achieving significant emissions reduction through the optimization of combustion processes in manufacturing firms in association with the Air Quality division of the regional environmental authority CVC. Out of 37 companies identified in the Yumbo Industrial Corridor with potential to reduce at least 100 tCO₂/year, CCEP conducted 24 diagnostic visits, selected 10 for in-depth analysis and identified six potential project initiatives, for which technical, environmental and financial studies were hired through counterpart CVC funding or the PPF Mechanism.

- Ten in-depth analyses identified EE/RE projects with potential emissions reductions totaling 31,014 tCO₂/year.
- Carvajal Pulpa & Papel (CP&P), Yumbo. Of the various opportunities identified together by CCEP and the company, engineering designs were co-financed between CCEP and CP&P under the PPF mechanism and the company assigned 2016 investment budget resources to implement the project. This project alone would contribute 65% of the emissions reduction potential in the Yumbo cluster, ratifying the initial significance placed on this paper & pulp mill by CVC and motivating the MOU subscribed by CCEP and CP&P for intense collaboration in clean energy project structuring at both its Yumbo and Cauca plants.
- The next largest opportunity for emissions reduction was identified at food processing plant Comestibles Aldor, where engineering firm Azimut formulated an electricity-generation project based on the biogas produced at its waste water treatment plant (*planta de tratamiento de aguas residuales* - PTAR). CO₂ emissions could be reduced by nearly 2,000 tCO₂/year.
- Several project opportunities detected went on to form part of other T3 portfolios:
 - Siderúrgica de Occidente (SIDOC) Waste heat recovery from electric kilns; evaluated under PPF mechanism with co-financing by UPME.
 - Cartones del Valle – boiler combustion optimization project eligible for Portfolio 5 (“boiler project”)
- In August, CCEP subcontractor CNPML delivered its final report and annexes on the Yumbo Cluster project to CVC, with results of the project identification and baseline analyses of the different companies studied.
- At the time of writing, other Yumbo cluster companies involved in the initiative have either desisted from investing in the projects identified or had not yet made decisions on moving forward.

c. Portfolio 3. ESCO projects under development

Since 2013, CCEP and two of the three major Colombia ESCOs have co-financed several engineering designs and project structuring for EE/RE investment opportunities, resulting in “energy service contract” offers by the ESCOs to participating companies, and extended negotiation periods – much more than the 90 days initially foreseen.

The last ESCO project structuring study under development with 50% CCEP co-financing was completed during this FY; one of the projects formulated the previous year reached contract closure with dairy plant Colanta in Antioquia and another with ceramics manufacturer Cerámica Italia in Cúcuta was nearing contract closure, as shown below:

Fenalttiendas/ Garper - Detailed engineering study and financial model for ESCO investment in energy efficient refrigeration and lighting in commercial establishments – CCEP completed the study and followed-up on contract offers negotiations which are still underway. The purpose of this detailed engineering study focused in Bogota, Atlantic Coast and Antioquia was to determine the current level of energy consumption and opportunity for energy savings through improvement in the efficiency of refrigeration and lighting systems in 3,000 commercial establishments (neighborhood tiendas, mini-markets, supermarkets, etc.) in a representative sample of 300 stores, perform a cost/benefit analysis of energy savings opportunities and determine the feasibility of energy service contracts to implement the identified technologies.

The final report identifies the necessary equipment substitution and associated cost/benefits to increase the energy efficiency of the refrigeration and lighting systems found in the sample of commercial establishments, indicating that from the technical and economic point of view the ESCO model can be most optimal for mini markets and supermarkets rather than small neighborhood stores in order to optimize the economic and environmental results for the final beneficiaries of the project. As a result of the study, the implementing ESCO (Garper Energy Solutions) entered a USD 2.5 million negotiation with one of the mini-market chains (Éxito) for refrigeration and lighting solutions in over 100 of its stores.

COLANTA / MGM - Construction, operation, production/sale and transfer of a biogas capture and steam production system at a dairy factory – CCEP/MGM's study was completed the previous year (March 2014), but negotiations continued and contract closure and signature signed was achieved this year, for this USD 300,000 ESCO investment (August 2015) located in San Pedro, Antioquia. The objective of this project is to develop a biogas capture system on the basis of an existing waste water treatment plant (PTAR) at this dairy factory to produce and sell of a minimum of 45,000 m³/mo of process steam during an 8-year period under an ESCO contract. The project aims to substitute 78,000 gallons of fossil fuels per year with biogas and reduce emissions by 846 tCO₂/year. The contract signed calls for an up to 6-month construction period for biogas cleansing, compression, pipeline transport and steam generation equipment, to be built, maintained and operated by MGM for up to 10 years (or the accumulated sale of 50,000 tons of steam, whichever comes first). COLANTA commits to producing and providing the biogas required for MGM's steam plant, to purchase the steam at negotiated rates, and to receive the system from MGM at salvage value once the commitment is completed.

Cerámica Italia / Garper - Final engineering design and ESCO contract design for the replacement of 177 conventional electric motors (82% of installed capacity) with high-efficiency motors at Cerámica Italia ceramics plant located in Cúcuta, Norte de Santander. Though this study was completed (June 2014) and reported the previous year, during the current year negotiations ensued between the two parties. After nearly one year of discussions, the company's management and board of directors approved the project, currently under scrutiny and definition of legal clauses by the two parties. Energy audit and technical evaluation of each motor targeted for substitution and final engineering and ESCO contract design of an approx. USD 1,826,000 efficient motor and lighting substitution investment project. The project aims to substitute 6.6 million kWh per year and avoid emissions estimated at 2,576 tCO₂/year, with annual cost-savings of 60.7% of current electricity bills. Investment recovery period is expected to be less than 3 years. Though this project was formulated prior to CCEP-UPME agreement to develop the PPF mechanism, both teams and Garper Energy Solutions have maintained active dialogue with company management to clarify conditions of ESCO types of contracts unfamiliar to national businesses, and top management has approved reaching

final agreement to implement the project. It is expected to reach a final contract by end of 2015 and project implementation to take place during 2016.

Five additional ESCO requests for co-finance were transferred to PPF Portfolio 6, and corresponding engineering and financial studies are underway.

d. Portfolio 4. CAEM coal dosifier project for 20 small- and mid-scale brick manufacturers in Cundinamarca and Boyacá.

The "Implementation of adequate air–fuel combustion systems for the brick industry" project was formally launched at an event held on October 22 at the Bogota Chamber of Commerce (BCC). CCEP's COR (Danielle Spinard) joined directives from the BCC, CAEM and the national brick manufacturers' association, ANAFALCO, in highlighting the objectives, expected outcomes and replicability of this initiative, which seeks to reduce coal consumption and CO₂ emissions per unit of brick manufactured in 20 SMEs of Bogota, Cundinamarca and Boyacá through the introduction of coal dosification systems. Through CAEM, CCEP provides technical and financial assistance (up to 50% cost of dosifiers) to participating SMES, to stimulate investment in energy efficiency by this strategic subsector from the perspective of fossil fuel use and dependency, CO₂ emissions, low-skilled employment creation and market competitiveness.

The project began implementation with public technological rounds and bids on November 26. About 24 brick companies, eight providers of dosification systems technology (Maquilab de Colombia, Wilsor Benitez Engineering, Aserdim Ltda, Metalúrgica de Santander, etc.) and four financial institutions attended the "Business Matching Forum on Energy Efficiency Technology for Brick Industries" at the BCC. CCEP attended this technology conference to observe how suppliers and buyers interacted with each other in kicking off the negotiation process to match supply and demand for technologies within project. Study tours to manufacturers that have already adopted the technology in Norte de Santander and many workshops, site visits and rounds of negotiation have ensued this first of two years, yet to date only one dosifier had been installed (January 2015) and five or six are under construction for installation by end of 2015.

The performance of the first dosifier installed this year under this program, at the company Arcillas de Colombia at its Cogua (Cundinamarca) plant demonstrates the immediate benefits of the technology chosen. The company optimized its production process by installing and operating a new system to pulverize and inject coal granules to



Figure 23 CCEP's COR addressing audience at CAEM lunching event



Figure 24 CCEP's COR addressing audience at CAEM launching event



Figure 25 CCEP's COR greeting brick manufacturer that signed-up

its Hoffman kiln, thus reaching 40% reduction in coal consumption per ton of brick processed and concomitant CO₂ emissions. In March, USAID officials and CCEP's COP and engineers visited the plant to verify installation and operation.

The project has progressed slower than anticipated, primarily due to difficulties the SMEs have had meeting the investment requirements to participate (first 50% down payment of the equipment selected; CCEP funds the second 50%). Nonetheless, the year ends with orders to purchase and install 15 of the 20 dosifiers within the next three to five months.

e. *Portfolio 5. Combustion optimization or “Boiler project”*

Inspired by the simplified concept behind the CAEM project – that not all EE/RE projects require extensive engineering designs, complex technological investments and sophisticated project finance (bank or ESCO funding) –, this project is focused on the promotion of relatively low-cost, rapid-deployment combustion optimization technologies to quickly reduce fossil fuel consumption in often “old-but-still-durable” coal- or natural gas-fired boilers and kilns. Energy-use equipment inventories recently completed under the Incombustion/Corpoema industrial subsector analyses for UPME point out the general old age and energy-inefficient performance of industrial boilers and kilns, and their recommendation of priority actions to take against poor performance and high emissions coincide with this portfolio’s approach. Of the 6 actions recommended to improve energy efficiency, the first is exactly what this portfolio seeks: to optimize combustion through automated electronic control systems.

Though this particular portfolio was actually initiated after approval of our Work Plan, in a short time 10 companies have already agreed to participate in the initiative (two others under discussion), and it is likely that up to 20 companies could adhere and complete installations by mid-2016 . Through this Portfolio, CCEP finances the engineering studies involved (up to 30% of total project cost) and the companies themselves finance the cost of equipment acquisition and installation (minimum 70% of total project cost). CCEP also provides technical assistance in identifying equipment manufacturers, costs and baseline and ex-post fuel consumption and emissions measurements to estimate project impacts. Project implementation, baseline indicators and calibration can be completed within one month of reaching agreement between the beneficiary company, the equipment supplier and CCEP.

Support initiatives to optimize combustion in industry and promote energy efficient practices by optimizing combustion in thermal steam-and-kiln based systems – As of September 2015, Five systems were installed and seven were under varying phases of development in Antioquia, Atlántico and Caldas, to date and Cundinamarca and Valle projects under definition. Interventions in textile companies Punto Flex, Crystal, Amtex and Wash as well as metallurgical company Procables, were completed between June and August, and are expected to contribute 6,849 tCO₂ emissions reductions per year during project lifetimes. Estimated impacts from each of these interventions are:

- Punto Flex: Intelligent Solutions, the technology provider for this initiative, installed oxygen sensor in funnel. CCEP estimates that this investment will contribute 565 tons of CO₂ avoided/reduced per year during the project lifetime.
- Procables: CCEP estimates that this project will cut natural gas consumption by 318,000 cubic meters / year and 889 tons of CO₂ avoided/reduced per year during the project lifetime.

- Crystal: Technology provider Intelligent Solutions installed combustion control systems in plant boilers. Project implementation is expected to reduce/avoid CO₂ emissions by 2,750 tons/year over its lifetime.
- Wash (CI Jeans): CCEP estimates a 40% reduction in coal consumption, 50% in electricity consumption and 1,924 tons of CO₂ per year in this electronic boiler control project, with cost-recovery period of 12 months.
- Amtex: the natural gas combustion optimization equipment installed by Azimut represents 721 tons of CO₂ avoided/reduced per year during the project lifetime.

In addition, interventions have been designed and under varying phases of evaluation or implementation in Ladrillera Sugres and Ladrillera Ambalá, as well as Riotex, CI PACK, Termimoda and Lafayette.

CCEP has already identified new opportunities to work with additional companies, limited basically by availability of CCEP Incentive Fund commitments.

f. Portfolio 6. PPF transition phase.

The PPF transition phase was initiated at the beginning of the current fiscal year. PPF manuals and procedures to identify and co-finance engineering and financial structuring projects were quickly developed by the two technical teams partnering in the endeavor (CCEP/UPME), and an initial portfolio of nine viable studies to co-finance was rapidly defined on the basis of previous preparatory work by the two teams over the course of calendar year 2014, for which UPME committed funds that had to be disbursed by December. Eight of the projects identified were co-financed by UPME, and the ninth by CCEP. Additional projects identified were also promoted with companies throughout the country, but due to initially limited human resources available within the two teams more emphasis during the first semester of 2015 were devoted to supervision, complementation and engagement of company management and technical teams in following through with project structuring and investment decision-making. The year ended, however, with a PPF project team in place at CCEP and an open call for PPF proposals to be received, filtered, analyzed and, to the extent of funding availability for solid projects, co-financed by CCEP by December 2015.

The initial portfolio of nine projects is summarized the following figure and status of each at end of this report period described individually further below.

Project N°	Sector	Type of Project	Estimated investment (\$USD MM)*	Estimated Emissions Reductions (Ton CO2/year)	
1	Chemical	Cogeneration	40	30,740	
2	Metallurgical	Residual heat recovery	0.5	1,000	
3	Metallurgical	Residual heat recovery	3	5,000	
4	ESCO	Paper & Pulp (Cauca)	Cogeneration (RE)	16	16,400
5		Commercial chain # 1	Solar Photovoltaic (RE)	2	400
6	Model	Commercial chain # 2	Solar Photovoltaic (RE)	1	197
7		Food & Beverage	Fuel substitution (RE)	0.5	1,240
8		Textiles	Efficient electric motors	1.3	2,129
9	Paper & Pulp (Yumbo)	Co-combustion (coal-biomass)	2.3	45,625	
TOTAL			66.6	102,731	

* Estimated investment prior to study completion

Figure 26 Initial PPF Project Portfolio – as of August 2015

Sucroal S.A. - Design and complete financial plan for a co-generation system powered by natural gas in Valle del Cauca. - Technical studies and financial studies were completed by ANTER engineering company and reviewed and complemented by CCEP PPF financial team. This study was financed by UPME under the PPF mechanism, with no direct investment by CCEP.

Given the magnitude of the investment involved, this project has been subject to close scrutiny and participation at all stages of design and development by top technical, financial and management teams at SUCROAL and Ingenio Providencia (head energy team of the parent holding, Organización Ardilla Lulle - OAL). The company decided to set up a co-generation system based on a turbine powered by natural gas, two recovery boilers and a steam-powered turbine. The system was designed to generate process steam and 23.17 MW at this plant: 9MW for plant use and 14.17 MW to sell to the national grid.

The PPF team completed the engineering review process and is carried out technical and financial simulations for the co-generation system designed. While engineering designs, blueprints and equipment selection have met approval by the company, energy management at Providencia, and CCEP/UPME teams, the USD 36 million budget presented was underestimated in terms of tax components and wrong application of foreseen RE Law tax incentives and has been subject to much discussion and financial modeling with the financial, tax and legal teams of the OAL. The final project requires a USD 40 million investment and is pending Board of Directors approval and project finance, which have been postponed to end of 2015.

Imal S.A. - Use oven heat residue from an oven powered by natural gas in Cundinamarca: Bogotá. - Financial and technical studies were completed; the project was submitted to COLCIENCIAS (Colombia's equivalent of the National Science Academy) for funding as it was deemed eligible to 75% tax incentive under Science and Technology legislation.

PREMAC, an expert engineering and combustion company, and *Universidad de Antioquia* completed the baseline monitoring phase, obtaining data on variables and mass and energy balances in each of the oven lines, and formulated the investment project. The project designed involves a USD 300,000

burner recovery system. Top management is pending results of COLCIENCIAS evaluations prior to committing resources for project implementation.

SIDOC S.A. - Oven heat recovery to preheat scrap material and reduce electric energy consumption in Valle del Cauca: Yumbo. The financial and technical studies underway. The Engineering firm Azimut submitted its engineering design and budget estimates in June, based on mass and energy assessments undertaken as a critical input for engineering designs for oven heat recovery. SIDOC evaluated recommendations and required investment, and decided not to continue due to side effects in the emissions control system, limited space to adjust equipment, and low return on the investment.

Carvajal Pulpa y Papel S.A. / MGM Innova - Increase capacity to self-generate electricity and process steam using residue biomass resulting from paper production in Cauca: Caloto (Guachené). Detailed technical and financial studies were completed by engineering company AV Engineers in June and received initial top management and board of directors' approval to enter financial negotiations and definitions for implementation over a 2-year period through mid-2018. Company officials have travelled to India and Brazil seeking quotes for major equipment components, seeking to increase the share of biomass vs mineral coal required and assure access to RE law tax incentives for renewable energy projects

The contractor and the company reviewed and adjusted thermal and electric processes based on new production goals; the turbine was set for 8MW and the new boiler at 60 tons/hour. MGM subcontractor AV Ingeniería, a Colombian company experienced in co-generation projects in the region, completed the advanced engineering designs, blueprints and detailed budget for the USD 14.9 million-investment involved.

This project has been subject to continued and detailed financial modeling by PPF and Carvajal staff, both as part of the RE law tax incentive modeling undertaken for the MME (see Task 1) and for final project finance and BOD decision. Three scenarios have been modeled, of which two require majority biomass composition for co-generation and one would depend highly on mineral coal combustion. MGM, which is willing to finance the investment under an ESCO contract already designed and under negotiation, as long as the project remains focused on cogeneration of steam and electricity for self-consumption or minor sale of electricity surplus to the grid, depending primarily on renewable energy since its funding source looks closely at CO₂ emissions.

Carvajal is analyzing whether to scale the project upwards, primarily for sale of electricity, but this would require a higher net dependency on fossil fuels and a would not qualify for MGM finance or RE law tax incentives. MGM Innova is currently working on financial and technical studies to increase steam production capacity by 20% and electricity in 5 MWe, the maximum eligible for its project finance. Final decisions are expected to be made by the BOD by end of 2015.

Homecenter / MGM Innova - Photovoltaic generation to provide solar energy for Homecenter stores during daylight in several capital cities including Córdoba, Huila, Cesar and Cundinamarca. Financial and technical studies underway. MGM Innova completed the engineering review process, determined monthly and hourly electricity consumption, the resulting energy demand curve and information to define connection points for photovoltaic system. It also developed the financial plan for the project. The company is reviewing the document and the financial model proposed to carry out recommendations on basic and detailed engineering phases.

Corona S.A. / MGM Innova - Photovoltaic generation to provide solar energy for Corona showroom during daylight in Cundinamarca: Tocancipá. Financial and technical studies are underway. Corona provided MGM information about energy consumption, equipment, and hours of operation / day to corroborate average daily power requirements. MGM also assessed facilities to determine where to install solar panels and connection points within the store. Finally, the contractor designed the installations based on types of panels, grid connections, layout, and connection system in seven locations nation-wide, including Toncicipá as a pilot project. MGM Innova completed the engineering review process and the financial plan for the project. The company is reviewing the document and the financial model proposed to carry out recommendations on basic and detailed engineering phases.

Colombina S.A. / MGM Innova - Use biogas from the water residue treatment plan (PTAR) to generate electricity and/or process steam or heat in Valle del Cauca: Zarzal. Financial and technical studies are under review. MGM Innova completed detailed engineering studies to evaluate project feasibility, including measuring CH₄, CO₂, O₂, CO y H₂S emissions in Upflow Anaerobic Sludge Blanket (UASB) reactors and information on electric installations, steam and hot water lines. MGM also presented the financial plan for the project. Colombina is reviewing the document and the financial model proposed to carry out project options and recommendations. Given the volumes and characteristics of biogas produced by the PTAR, as well as market prices for electricity, it is unlikely that the cogeneration option will be feasible.

Coltejer S.A. / MGM Innova - Replace 300 electric engines with high-efficiency motors in textile company in Antioquia: Rionegro and Itagüí. Financial and technical studies are underway. Coltejer decided to modify the engines targeted for replacement, to include more intensely operated engines which cannot be monitored until subject to maintenance, and thus postponed baseline measurements. MGM contracted MITSUMO SAS to carry out this activity. By end of FY, the ESCO completed the monitoring phase to establish the electric demand for each motor. CCEP's ally is currently working on the financial plan for the project. Final results and contract negotiation for the investment under ESCO model are anticipated for the last quarter of 2015.

Carvajal Pulpa y Papel - Use of waste heat to dry bagasse dust and sludge (decrease humidity content) and use of drier biomass fuels to substitute coal fuel in Plant 1 in Valle del Cauca: Yumbo. Financial and technical studies completed and BOD decision to implement the major (imported) technological component has been taken. National components are under quoting process prior to defining final budgets and implementation phase.

CCEP provided technical and financial support to structure engineering studies required to increase residue biomass in boiler No. 5. Jansen, a US-based company, performed the boiler performance analysis and modeling and structured the project, conducting all required assessments to increase use of biomass in the boiler system.

Study results show that by replacing fossil fuels with more bagasse and sludge, the company could reduce coal consumption between 43 and 49 tons/day, therefore reducing production costs and emissions by approximately 45,000 tons CO₂/year. The company has decided to implement immediate adjustments to the boiler combustion system during its next maintenance stop in February 2016, which will represent an initial emissions reduction of 14,333 tons CO₂/year.

In the annual investment budget, the company has assigned resources to implement additional investment in boiler components (purchase order to Jansen Boiler Co. has been developed).

This project represents 45% of all CO2 emissions reductions under structuring by the PPF, and 65% of the Yumbo corridor air quality target, and will be implemented, monitored and reported by CCEP before Program closure.

4.2.3 Work Stream 3.3 Technical and financial facilitation of selected projects

CCEP has identified technology providers and engineering consultants that are interested in providing equipment and/or services. CCEP's team has worked jointly with vendors and technology providers in the identification and selection of the technological alternative that better suits the needs of each individual project.

4.2.4 Work Stream 3.4 Training, outreach, and advisory services

- CCEP participated in the II Latin American Congress on "Biodigestion in sustainable agriculture: towards food and energy sovereignty and the protection of environment" held in Cali (November 13th and 14th). CCEP presented the new regulations on electricity market/Biodigesters in the framework of Colombian National Regulation: Law 1715 of 2014".
- CAEM. Workshops on "Best practices for brick production" were held on March 12 in Cogua, Cundinamarca, and March 13 in Sogamoso, Boyacá, with over 80 participants (42 men and 8 women attended the workshop in Cogua; and 17 men and 17 women the one Sogamoso) from surrounding brick factories and interested institutions. CCEP participated in the Cogua workshop.
- CCEP/PPF conducted the workshop "Formulation of Clean Energy Projects" on May 9 in Barranquilla, Atlántico, organized by UPME, ANDI, and Universidad del Norte. The work session was focused on identifying initiatives that could become potential PPF projects. 28 participants (24 men; 4 women) representing 23 companies from various sectors attended the workshop.

5. STRATEGIC CLEAN ENERGY COMMUNICATIONS

In the last five months of the fiscal year, CCEP hired a new Communication Specialist, who has been working in the development of a Communication Strategy for the remaining of CCEP's implementation. The specifics of the Strategy are being discussed with USAID; a final version will be presented once we get additional input and comments from USAID.

Communications are being focused in order to accomplish the following goals:

1. Positioning USAID as developer of innovative initiatives for the promotion of Clean Energy in Colombia
2. Generating visibility and understanding of CCEP's main activities
3. Supporting the positioning of the principal partners of CCEP

Although the strategy is currently under discussion, a series of actions tending to these goals have been completed. Based on worthy Public Relationships (with main partners and media) the Program has been working on the creation of synergies for greater impact knowledge management and public outreach. A special emphasis has been set on digital (and online) communication materials. High-quality communication pieces will be available through a newly redesigned CCEP website, which is currently under production, and other digital distribution channels.

CCEP developed digital online material for presenting its scope, projects, results and perspectives. A brochure (in its Spanish and English versions) is available in the following links: www.energiyalimpia.co/ccep (English) and www.energiyalimpia.co/ccep-es (Spanish). The piece can be updated permanently and is easy to share either via its online or email versions.

The Program also started working on enhancing project visibility, beginning with its team members and close partners through the creative weekly bulletin "Energetic Communication" that has had 21 editions from May 6 through September 24. In addition to distributing weekly information on clean energy facts, news and developments, the bulletin has functioned as a trial instrument for analyzing the outreach possibilities of the program communications. This has been done looking forward to the distribution of a broad sphere external monthly bulletin that shall start its publication on the beginning of next fiscal year.

The results obtained through innovative analytics means have been quite interesting and serve as a solid base for the online products that will be produced for the last phase of implementation of the Program. With 51.9% of "Opens" in its last edition before the end of the fiscal year, the product exceeds well over the industry average (18.5%), with the plus that its number of subscribers has augmented on a timely basis. In a period of roughly 5 months, the bulletin has had 420 effective verified impacts with a small base of subscribers (52 in total). CCEP, in addition to gaining program recognition throughout its team members and close partners, with the "Energetic Communication" bulletin is testing the real value (and scope) of the information that it produces.

CCEP also has been developing broad media alliances with some of the most recognized media channels in the country. There have been conversations with EL COLOMBIANO, RCN and EL TIEMPO for the establishment of win-win alliances and the development of co-productions based on the journalistic contents of the CCEPs projects. The strategy is founded on editorial journalism pieces (not publicity). In this way, CCEP is already working on the coproduction of high-impact press coverage for

particular projects such as the ones set on Punta Bonita in Rio Cajambre (with RCN) and Urrao-Supía-Medellín (with EL TIEMPO-PORTAFOLIO). The pieces shall be published at the beginning of the next fiscal year.

In addition, CCEP is working with allied institutions (such as IPSE and Jardín Botánico de Bogotá (JBB)) in the development of strategic communication projects for the program beneficiaries.

Appendix B includes a listing of some of the news media coverage of some of CCEP's projects and samples of CCEP's newsletter and bulletins.

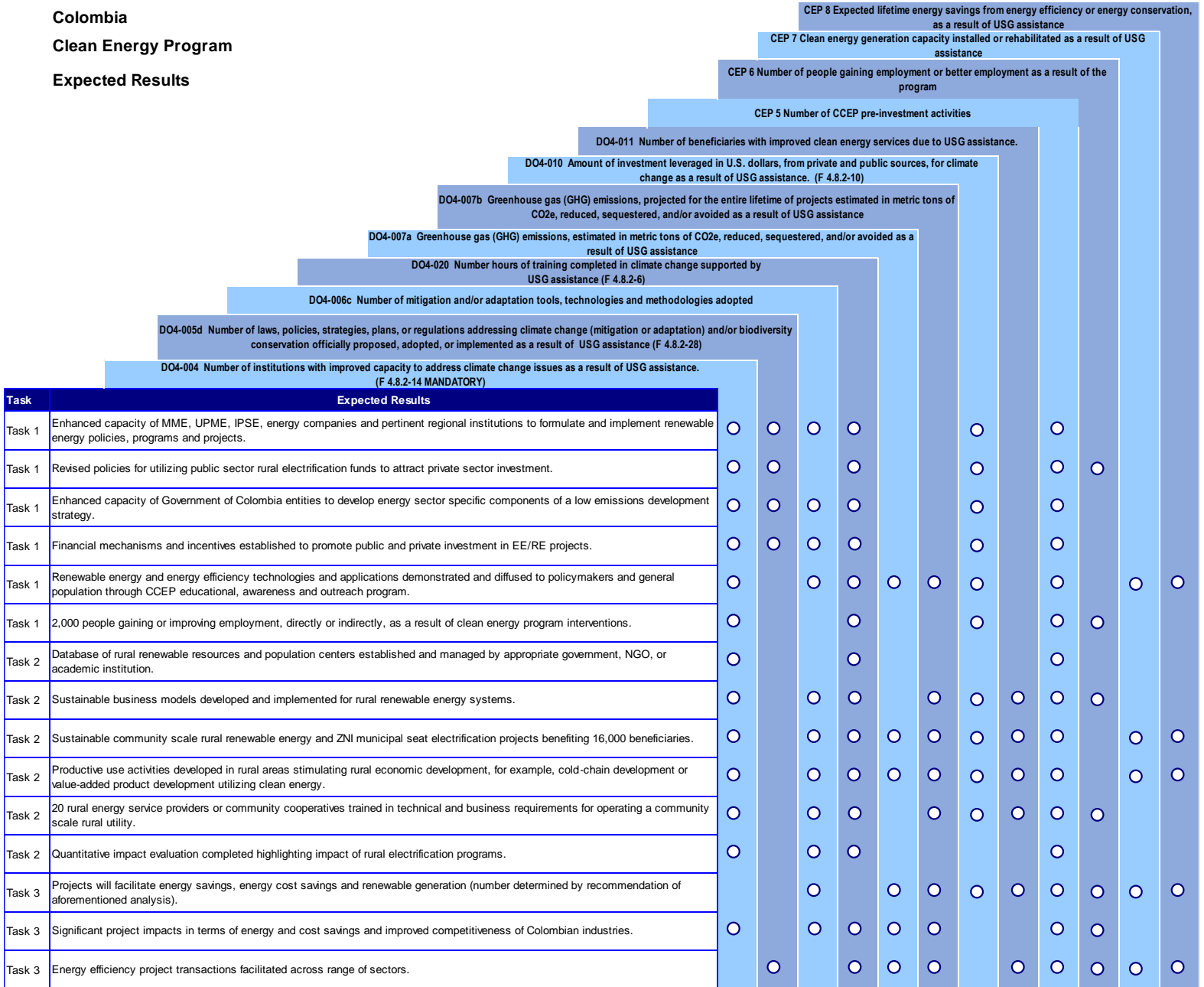
6. PERFORMANCE INDICATOR RESULTS AGAINST TARGETS

In this Chapter we present CCEP’s indicators as detailed in the Performance Management Plan (PMP) and included in MONITOR. As reference framework we present in the following figure the linkages between CCEP’s twelve indicators and expected results per main task.

Colombia

Clean Energy Program

Expected Results



During the first quarter of FY2015, CCEP worked with USAID to review program indicators, resulting in a modification in November 2014 that was necessary to line them up with USAID/Colombia mission changes. Indicators that were removed or are no longer applicable were moved to archive. The results

CCEP achieved through / during the third program year are shown below by program indicators. The results indicate that CCEP is exceeded some of the goals, is below target in some but overall CCEP is on track to meet its goals.

USAID Indicators	Indicator	Unit	Output Target	FY 2015 GOAL	FY2015 CONTRIBUTIONS	Total Project Contributions	CUMULATIVE PROJECT CONTRIBUTIONS	TOTAL PROJECT CONTRIBUTIONS	Program Target
DO4-007a	Greenhouse gas (GHG) emissions, estimated in metric tons of CO ₂ e, reduced, sequestered, and/or avoided as a result of USG assistance	Tons of CO ₂ e	Tons of CO ₂ e reduced or avoided	8,233	4,011	Ecofuego Los Cerros Tonny San Antonio Santa Rita Utria Santa Rosa JBB CERIS CAEM Yucal Cajambre Sugres	1,210 1,211 126 13 4,646 4 4 28 29 2,928 121 5 892	11,217	80,000
DO4-007b	Greenhouse gas (GHG) emissions, projected for the entire lifetime of projects estimated in metric tons of CO ₂ e, reduced, sequestered, and/or avoided as a result of USG assistance	Tons of CO ₂ e, during projects life time	Tons of CO ₂ e reduced or avoided, during projects life time	99,500	128,369	Ecofuego Los Cerros Tonny San Antonio Santa Rita Utria Santa Rosa JBB CERIS CAEM Punta Soldado Puerto España Valledupar Chucheros Bajo Calima Yucal Cajambre Sugres Sabana Crespo Chachajo Tolda Fría Bunkwimake Telemedicina FCGI	8,070 8,070 995 269 37,167 79 85 563 571 29,280 1,275 26 63 43 394 2,413 108 35,690 2,413 184 48 24 226 314	128,369	495,000

USAID Indicators	Indicator	Unit	Output Target	FY 2015 GOAL	FY2015 CONTRIBUTIONS	Total Project Contributions	CUMULATIVE PROJECT CONTRIBUTIONS	TOTAL PROJECT CONTRIBUTIONS	Program Target																											
4.8.2-28	Number of laws, policies, agreements and/or regulations addressing clean energy (climate change) adopted by the government as a result of USG assistance	Law, Policy, Agreement	Number of policy initiatives - national level	5	1	EE Tax Incentive	1	5	10																											
DO4 005d						CREG ZNI Tariff Resolution	1			PERS Nariño	1	EE/RE Law	1	Reglamento Técnico	1																					
DO4 011	Number of people who now have access to modern energy services as a result of renewable energy technologies through USG assistance.	Person	Number of people	7,072	1,690	San Antonio	271	2,098	16,000																											
						Utria	12			Santa Rosa de Guayacan	125	CERIS	495	CAEM	15	Yucal	472	FCGI	395	Cajambre	313															
4.8.2-6	Number of person hours of training completed in climate change as a result of USG assistance	Hours	Hours / Person	38,520	16,198	San Antonio	800	16,198	50,000																											
DO4-020						Tax Incentives	5,610			PERs Nariño	392	Eventos Socialización	1,009	Utria	72	Santa Rosa	1,172	Hommer	80	JBB	42	CERIS	824	CAEM	732	PPF	112	FCGI	1,656	Yucal	249	Cajambre	600	Palmor	276	PERs Nacional
4.8.2-14	Number of institutions with improved capacity to address climate change issues as a result of USG	Institution	Institutions PUBLIC SECTOR	23	15	UDENAR	1	19	47																											
						UPME	1																													
						IPSE	1																													
						PNN	1																													

USAID Indicators	Indicator	Unit	Output Target	FY 2015 GOAL	FY2015 CONTRIBUTIONS	Total Project Contributions	CUMULATIVE PROJECT CONTRIBUTIONS	TOTAL PROJECT CONTRIBUTIONS	Program Target
	assistance					CERIS JBB	14 1		
DO4 004			Institutions PRIVATE ENTERPRISES		2	Ecofuego Los Cerros Tonny Santa Rita CAEM (Arcillas de Colombia) Sugres	1 1 1 1 1 1	6	
			Institutions COMMUNITY GROUPS		1	Pastoral Social Dibulla Mano Cambiada ACIVA PIMPESCA	1 1 1 1	4	
DO4 006c	Number of mitigation and/or adaptation tools, technologies and methodologies developed.	Tools	Number of tools, technologies and methodologies	3	7	San Antonio (wood stove; energy crop) PERS Nariño (energy demand surveys; strategic energy plan, SIG, energizing surveys) Utria (PV system) CREG ZNI (levelized cost of energy) HOMER (microgrid software) Santa Rosa (integral environmental and social methodology) JBB (gasification; solar interconnection) CAEM (dosifier) FCGI (solar/manual water pumping system) Yucal (MHP)	2 4 1 1 1 1 2 1 1 1	15	10
4.8.2-10	Amount of investment leveraged in U.S. dollars,	US Dollars	US Dollars	165,654	3,960,999	Ecofuego Los Cerros	257,300 257,300	9,529,974	5,000,000

USAID Indicators	Indicator	Unit	Output Target	FY 2015 GOAL	FY2015 CONTRIBUTIONS	Total Project Contributions	CUMULATIVE PROJECT CONTRIBUTIONS	TOTAL PROJECT CONTRIBUTIONS	Program Target
	from private and public sources, projected for climate change as a result of USG assistance.					Tonny San Antonio PERS Nariño Santa Rita Colanta Utria Arusi Palmor (including IPSE Grid adequation) Santa Rosa Yucal FCGI Fenaltendas Peldar CAEM HOMER Ceramica Italia PERS Tolima PERS Guajira Sugres JBB Gran Estación CERIS Calderas PPF Punta Soldado Puerto España Valledupar Chucheros Bajo Calima Tolda Fría Chachajo Bunkwimake Telemedicina Pueblo Viejo Resol IVA	691,800 18,818 528,806 130,772 11,111 28,716 1,124,773 819,172 1,491 261,865 174,491 59,783 22,810 635,122 17,484 47,632 263,287 370,885 747,010 366,790 42,674 419,791 210,014 698,940 227,087 10,741 46,492 21,847 142,472 33,868 80,056 533 138,624 613,889 5,729		
DO4 010									
Custom 5	Number of CCEP pre-investment activities	Activities	Activities	3	12	Dibulla San Antonio Tax Incentives	1 3 1	66	60

USAID Indicators	Indicator	Unit	Output Target	FY 2015 GOAL	FY2015 CONTRIBUTIONS	Total Project Contributions	CUMULATIVE PROJECT CONTRIBUTIONS	TOTAL PROJECT CONTRIBUTIONS	Program Target
						PERS Nariño Arusi Bunkwimake Yucal Utria IPSE CREG Santa Rosa Pepitas JBB Palmor FCGI CAEM Sabana de Crespo PERS Tolima PERS Guajira HOMER Cajambre Peldar Ceramica Italia Vigia y Bojayá CERIS Punta Soldado Reglamento Técnico	2 4 3 4 4 1 1 4 4 4 3 4 5 3 1 1 1 3 1 1 2 1 3 1		
Custom 6	Number of people gaining employment or better employment as a result of the program	Persons	People	147	510	Ecofuego y Los Cerros Tonny San Antonio Santa Rita Utria Santa Rosa Sugres CERIS CAEM FCGI Cajambre Sugres	52 77 7 4 12 15 21 28 15 84 313 70	698	2,000
Custom 7	Clean energy generation capacity installed or	Total capacity of	Total capacity of the system on	0.393	0.080	San Antonio Utria	0.002 0.006	0.095	0.500

USAID Indicators	Indicator	Unit	Output Target	FY 2015 GOAL	FY2015 CONTRIBUTIONS	Total Project Contributions	CUMULATIVE PROJECT CONTRIBUTIONS	TOTAL PROJECT CONTRIBUTIONS	Program Target
	rehabilitated as a result of USG assistance	the system on Thousands of kW	Thousands of kW			Santa Rosa CERIS JBB Yucal Cajambre	0.007 0.004 0.050 0.018 0.008		
Custom 8	Expected lifetime energy savings from energy efficiency or energy conservation, as a result of USG assistance	Thousand kilowatt-hours saved	Thousand kilowatt-hours saved, during projects life time	323,094	273,786	Ecofuego Los Cerros Tonny Santa Rita Sugres JBB	24,293 24,293 4,084 111,845 107,394 1,877	273,786	1,500,000

The following tables present CCEP indicators, actual progress through September 2015, and some remarks explaining why some of them are behind and how we expect to catch-up.

Table 9 — Indicators: GHG emissions / Expected lifetime energy savings

Indicator	Actual	Target	%
GHG emissions, estimated in metric tons of CO ₂ e, reduced, sequestered, and/or avoided as a result of USG assistance	11,216.86	80,000	14%
GHG emissions, projected for the entire lifetime of projects estimated in metric tons of CO ₂ e, reduced, sequestered, and/or avoided as a result of USG assistance	128,368.95	495,000	26%
Expected lifetime energy savings from energy efficiency or energy conservation, as a result of USG assistance	273,786	1,500,000	18%

CCEP activities that contribute to these indicators have fallen behind schedule. During PY4, the Program will catch up and will be able to report GHG emissions that were initially considered in PY3

Table 10 — Indicator: Institutions with improved capacity

Indicator	Actual	Target	%
Number of institutions with improved capacity to address climate change issues as a result of USG assistance	29	47	62%

This indicator is also affected by the delays in Program implementation. Many T1 partners participating in PERS will be reported during the next program year, as PERS Tolima, Guajira, Chocó, and Cundinamarca present results to new governors in early 2016. T2 projects also contribute to program goals: 11 health centers in Telemedicina and 36 coffee farms in *Serranía del Perijá* will help CCEP reach and exceed Program targets.

Table 11 — Indicator: Laws, policies, strategies, plans or regulations

Indicator	Actual	Target	%
Number of laws, policies, strategies, plans, or regulations addressing climate change (mitigation or adaptation) and/or biodiversity conservation officially proposed, adopted, or implemented as a result of USG assistance	5	10	50%

PY4 goal in this indicator shows clearly CCEP work in public policy in the past, as laws and policies are enacted and rolled out. Just to mention one example, the Program expects four decrees that regulate Law 1715/2014 by the end of Q2 FY 2016.

Table 12 — Indicator: Person hours of training

Indicator	Actual	Target	%
Number hours of training completed in climate change supported by USG assistance	16,198	50,000	32%

Many CCEP project designs have changed in the course of Program implementation and due to strategic decisions made to ensure completion of activities by scheduled dates. In previous years, CCEP planned to carry out technical and socio-entrepreneurial training as part of project sustainability. However, modifications in project scopes (such as interventions Bunkwimake and Vigía del Fuerte/Bojayá) and agreements with project counterparts where these are responsible for these components (such as *Telemedicina*, with *Cancillería*, or Vigía del Fuerte/Bojayá, with EPM) have created some delay in reaching the targets.

Table 13 — Indicators: Clean energy generation capacity

Indicator	Actual	Target	%
Clean energy generation capacity installed or rehabilitated as a result of USG assistance	0.095	0.500	19%
Clean energy generation capacity supported by USG assistance that has achieved financial closure (NEW)	0	0.240	0%

During the first three quarters of PY4, CCEP expects that all T2 projects will be completed and thus the Program will be able to report clean energy generation capacity. Since this indicator is reported every time a project is completed, CCEP will be able to keep closer track of indicator progress and be better prepared to respond to contingencies.

"Clean energy generation capacity supported by USG assistance that has achieved financial closure" is a new standard indicator, considered by USAID since June 2015 and included in CCEP's PMP for FY2016. "Financial closure" makes reference to the moment when all relevant parties in the project sign the subaward. Since most CCEP implementation mechanisms were signed in previous years, only those scheduled to start after October 2015 were taken into account to estimate a target. Initial estimates led Program staff to consider a target of 0.320 megawatts (MW); however, after close examination and taking into account projects where CCEP intervention is suspended or cancelled, such as Arusí, CCEP proposed 0.240 MW for FY2016 and overall target.

Table 14 — Indicator: Beneficiaries

Indicator	Actual	Target	%
Number of beneficiaries with improved clean energy services due to USG assistance	2,098	16,000	13%

As T2 projects are completed, CCEP will report beneficiaries related to these projects. During this program year, CCEP will report significant numbers in large T2 projects, such as solar water pumps in La Guajira with FCGI, the MHPs in Palmor and Sabana de Crespo, and PVS for Telemedicina health posts.

Table 15 – Indicator: Employment

Indicator	Actual	Target	%
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Number of people gaining or improving employment, directly or indirectly, as a result of clean energy program interventions	698	2,000	35%
--	------------	--------------	------------

As T3 projects are completed, particularly CAEM and activities with boilers/kilns, CCEP will report new and/or improved employment related to these projects. CCEP will keep close track of indicator progress as expected goal is very close to the Program target.

7. SUCCESS STORIES

7.1 GHG EMISSIONS REDUCED IN BRICK PRODUCTION



SUCCESS STORY

Burning less coal increased brick production

New brick furnace burns 29% less coal reducing GHG emissions by avoiding over 3,000 tons of CO₂e emissions per year while increasing monthly production over 200%



USAID's CCEP Program brings innovative clean alternatives to improve air quality and productive processes to the Colombian brick sector.

October 2015
This publication was produced for review by the U.S. Agency for International Development. It was prepared by the USAID/Colombia Clean Energy Program (Tetra Tech Es, Inc prime contractor)

U.S. Agency for International Development
www.usaid.gov

Sugres Brick Factory, located in Supia, Caldas, was founded 29 years ago and is a company dedicated to the processing and marketing of clay bricks. Before the implementation of the project, the company produced in average 802 tons product / month and employed 49 people. Clay products, mostly bricks, were loaded and fired to high temperatures in furnaces called kilns, which in this case were kiln type beehive. These kilns were burning coal feed manually by workers to produce the required temperatures to harden and strengthen the bricks. After cooling, the bricks were removed and packaged. Product stocking, burning, cooling, and delivery took 11 days, at best; production processes were irregular with uneven baking cycles, resulting in high coal consumption and costs and abundant defective bricks. In Addition, working conditions were severe as the smoke, ash and particulates generated by this burning process represented a health hazard for the factory workers and were also affecting the environment.

USAID's Colombia Clean Energy Program (CCEP) assisted Sugres to carry-out the project which involved replacing the five inefficient beehive kilns with a tunnel kiln with automatic coal feeding to reduce GHG by lowering the amount of coal burning and at the same time optimizing its production process, product quality, and working conditions. CCEP provided technical assistance to guide Sugrés in setting up the production line, maximizing heat recovery with improved technology. The company received a \$ 500,000 loan via Bancolombia's Environmental Credit Line to build the new kiln tunnel.

As a result of the implementation of this project over 3,000 tons of CO₂e emissions per year have been avoided, with an estimated reduction of more than 35,000 tons of CO₂e for the next 10 years. Sugres has achieved a 29% reduction in coal consumption; 80% overall reduction in production costs; more than 200% increase in brick production increasing to an average of 1700 tons product / month; and a 50% growth in workforce due to increase efficiencies in production. Also, working conditions improved dramatically.

Through USAID's technical and financial assistance, Sugres has achieved significant gains in reducing GHG while increasing operational efficiencies. In addition it has increased its capacity to implement additional climate change interventions to reduce its emissions footprint and it is now evaluating other projects to improve heat recovery options that will expand overall energy performance of its brickmaking operations.

7.2 A CLEAN SLATE IN ETHNIC EDUCATION



USAID | COLOMBIA
DEL PUEBLO DE LOS ESTADOS
UNIDOS DE AMÉRICA

SUCCESS STORY

A Clean Slate in Ethnic Education

CCEP, the Antioquia Governor's Office and EPM form an alliance that strengthens education



Remote communities, like Andabú, in Urao, Antioquia, lack the most basic infrastructure, not to mention electric power or basic sanitation. USAID's CCEP expands access to alternative energy sources, like solar panels, empowering communities to work on their own vision of sustainable development.

CCEP helps improve education by assisting regional governments in creating opportunities to work with indigenous leaders in merging traditional knowledge and practices, while expanding solar energy services and education infrastructure

U.S. Agency for International Development
www.usaid.gov

Colombia has one of the richest legislations in the world to protect indigenous communities. Unfortunately, this legal framework presents many loopholes and shortcomings to protect those meant to serve. Issues like education are usually seen under a Western lens and governments too often ignore traditional knowledge, practices, and leaders. In order to address some of these shortcomings, the Antioquia Governor's Office worked with indigenous leaders to design a strategy that strengthens ethnic-based education in rural settings, known as CERIs - Rural Indigenous Education Centers (*Centros Educativos Rurales Indígenas*) that combine traditional and 21st century teaching methodologies. Most communities are quite remote and lack the most basic infrastructure, not to mention electric power or basic sanitation.

USAID's Colombia Clean Energy Program (CCEP) formed an alliance with Antioquia Governor's Office and *Empresas Públicas de Medellín* (EPM) to provide power to communities participating in the CERIs strategy by strengthening the department's ethnic education model and providing the tools needed to facilitate instruction with the installation of solar panels that provide electric power to 14 schools and various community facilities, benefiting 495 people. Parties invested close to USD 400,000 to install solar energy systems, involve traditional leaders and assure consensus-building, resulting in a project that was acceptable, viable and sustainable to community members, project funders, and the environment.

The alliance helped community members see CERIs as education scenarios that respect their traditions. While the Governor's Office and EPM strengthened ethnic education and its linkages to Western knowledge, CCEP trained community members on energy efficient practices and environmental sustainability. Furthermore, USAID's CCEP worked with these two institutions to build a social intervention model they will replicate to work with indigenous communities in the future, creating a sound basis that takes into account community needs in their future development work in indigenous territories.

7.3 100% RURAL ENERGY FOR COLOMBIA



CASE STUDY

100% Rural Energy for Colombia

Thanks to USAID's Colombia Clean Energy Program (CCEP) three departments of the country now have wide-ranging Rural Energy Plans



Colombia Clean Energy Program

Through the development of *Departmental Sustainable Rural Energy Plans (PERS)* for Nariño, Guajira and Tolima, these departments, with great rural populations, currently count with updated socioeconomic and energy diagnoses that have permitted the design of far-reaching energization plans for the next 15 to 20 years.

"The success of this strategy is linked to its distinctive methodological approach, which focuses on gathering non-existent and reliable primary data and formulating initiatives with regional impact that incorporate local resources and that are sustainable over time"

Andrés Pantja
PERS Nariño University Coordinator

JUNE 2015
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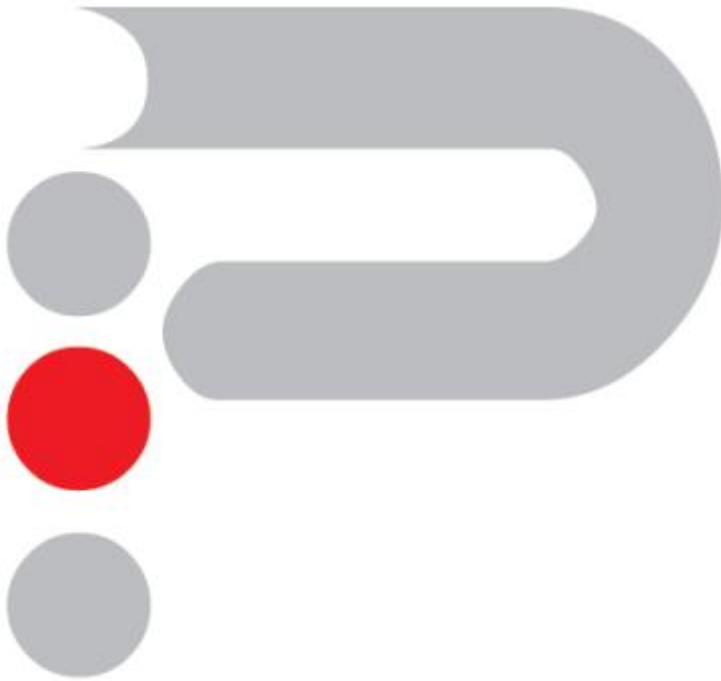
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CHALLENGE Although 96% of Colombia's population is served through the national central electric grid, the remaining 4% which accounts to over 3.5 million Colombians either have poor or no access at all to modern energy services. Most of the people that live in these "electrically unserved" areas come from the rural sector; generally peasants and vulnerable ethnic communities. Though the National Colombian Government (GOC) has for decades undertaken rural electrification programs, and some departments have made interesting advances in policies and actions concerning energy usage and enjoyment, most of them are unprepared not only for guaranteeing quality energy resources for their rural population, but even for planning what to do with the lack of energy in the years ahead.

INITIATIVE With the leadership of USAID's Colombian Clean Energy Program (CCEP) in partnership with GOC, the departments of Nariño, Guajira and Tolima have designed *Departmental Sustainable Rural Energy Plans*, termed "PERS" for their Spanish acronym, for the next two decades. The PERS are comprehensive energy and socioeconomic diagnoses of the rural sector, and 15-20 year *rural energization* strategies for each department's subregions. The three departments together have a rural population of more than 700,000 people, with significant energy difficulties, and with the great potential of implementing clean energy developments in the future. The PERS were designed in partnership with the Colombia's Mining and Energy Planning Unit (UPME), the Institute for the Planning and Promotion of Energy Solutions for the Non-Connected Zones (IPSE) and interdisciplinary teams from the Universities of Nariño and Tolima, and the National Learning Service Agency (SENA) in Guajira. The wide-ranging PERS initiatives included the application of geo-referenced surveys in rural households, commercial establishments, industries and institutions, which provided key primary information to develop broad energy and socioeconomic diagnoses of the regions, established focalized energy policy guidelines, and proposed innovative methodologies for the formulation of sustainable productive projects that will encompass the use of clean energy sources in their development.

RESULTS The PERS Nariño, the first of these initiatives to be thoroughly designed, received in December 2014 the AMBER award on Research and Development of the Colombian Electricity Sector. It is already under implementation and has received public funding worth over USD \$3 million for its development, which includes detailed studies of clean energy alternatives, and the installation of photovoltaic systems, clean refrigeration solutions and public lighting for rural areas. Guajira and Tolima PERS' are in their last designing phase and will enter implementation in the second semester of 2015. Moreover, thanks to these advances in the three departments, work has begun for the development of PERS in the departments of Chocó and Cundinamarca this year. In this way, USAID is baking-up the development of solid-based energy strategies for the Colombian rural sector with the potential to change the lives of vast rural populations in the country.

APPENDIX A: PPF BROCHURE



Mecanismo para la Estructuración de Proyectos de Energía Limpia

Recursos de cofinanciación para fases de ingeniería de proyectos en industria, transporte y servicios.



Contáctenos:
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Más energía sostenible, más minería responsable para un país en crecimiento

Mecanismo de Estructuración de Proyectos de Energía limpia*

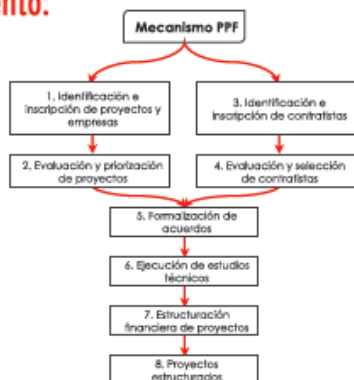
Conformación:



Objeto:

“Promover la identificación y formulación técnico-financiera y la gestión de proyectos, que permitan viabilizar y movilizar inversiones significativas en eficiencia energética y en energía renovable en los sectores industrial, transporte, comercial o de servicios.”

Procedimiento:



¿Qué hacemos?

¿Qué cofinanciamos?

- Hasta un 50% del total de los estudios de ingeniería básica y de detalle.

¿A quién va dirigido?

- Empresas de los sectores industrial, transporte, comercial y servicios.

¿Qué hemos hecho?

Tipo de proyecto	Sector	Inversiones potenciales (MCOP)	Impacto ambiental (Ton CO ₂ /año)
Recuperación de calor residual	Metalúrgico	1.300	1.000
Cogeneración	Químicos	104.000	30.740
Cogeneración (FNCE)	Papel	41.600	16.400
Sustitución combustibles (FNCE)	Alimentos	1.300	1.240
Motores eléctricos	Textil	3.400	2.129
FNCE Solar fotovoltaica	Comercial Grandes Superficies	2.600	197
FNCE Solar fotovoltaica	Comercial Grandes Superficies	5.200	400
Recuperación de calor residual	Metalúrgico	7.800	5.000
Co-combustión carbón-biomasa	Papel	6.000	45.625
		173.200	102.731

¿Qué tipo de proyectos aplican?

- ▲ Disminución de la intensidad energética por unidad de producto.
- ▲ Recuperación de calor.
- ▲ Optimización de sistemas térmicos.
- ▲ Cambio de accionamientos mecánicos por eléctricos.
- ▲ Incorporación de nuevas tecnologías de acondicionamiento de aire y refrigeración.
- ▲ Utilización de biomasa residual y biogás.
- ▲ Aumento de la biomasa residual en combustión combinada con combustibles de origen fósiles.
- ▲ Proyectos de energía renovable solar, eólica, geotérmica o mareomotriz
- ▲ Complementariedad entre demandas de frío y calor de dos o más instalaciones productivas.
- ▲ Aumento de la eficiencia energética global de una o varias instalaciones productivas.

* El mecanismo de estructuración de proyectos de Energía Limpia, llamado Mecanismo PPF por sus siglas en inglés - Project Preparation Facility

APPENDIX B: CCEP IN THE MEDIA

During this fiscal year several notes and articles on CCEP's projects were published by the national media. Here a selection, with their respective links:

- [Renewable Energy for the Colombian Pacific](#) (“Energía renovable para el Pacífico”). November 13, 2014. EL TIEMPO.
- [Experiment to generate energy with trees in Bogotá](#) (“El experimento para que árboles generen energía para Bogotá”). December 26, 2014. EL TIEMPO.
- [Solar Energy for Water Pumping in La Guajira](#) (“Energía solar para sacar agua en La Guajira”). March 3, 2015. PORTAFOLIO.
- [Clean Technologies for Wayuu Communities](#) (“Tecnologías limpias para comunidades wayuu”). March 10, 2015. EL HERALDO.
- [Three National Parks are implementing Sustainable Energy systems](#) (“Tres parques naturales le apuestan al sistema de energía sostenible”). September 16, 2015. EL TIEMPO.
- [Three National Parks are implementing Sustainable Energy systems \(replica\)](#) (“Tres parques naturales en Colombia se abastecerán con energía solar”). September 16, 2015. MINUTO 30.COM.

Some of the projects were also highlighted through CCEP's internal creative weekly bulletin. Here some examples, with their respective links:

- [Palmor: great example of Clean Energy in Colombia](#) (“gran ejemplo de energía sostenible para el país”) Comunicación con Energía, August 14, 2015.
- [Clean Energy for Punta Bonita \(Buenaventura\)](#) (“Energía Limpia... ¡Y bonita!”) Comunicación con Energía, August 21, 2015.
- [Clean Energy Water Well in La Guajira](#) (“El pozo sí tiene agua”) Comunicación con Energía, September 24, 2015.