

Newsletter 03/16 Smart Solar Off-Grid for La Gracia

Friday, 26th of February was an important day for the Smart Solar Off-Grid project. Nadja and Silvan, the managers of SESB, ZENNA's local partner for installation, met with Mr. Ambrose Tillett, the Director of the Ministry of Energy, Science & Technology and Public Utilities (MESTPU) at the village of La Gracia to announce the project officially.

Earlier this year, the lack of regulations for Mini-Grid Projects in rural areas led to concerns from Public Utilities Commission (PUC), namely about the tariff structure and the management model. However, it seems that the internal discussions between PUC and MESTPU have cleared the hurdles.

Mr. Ambrose Tillett declared in the presence of the village chairman, the school principle and other representatives from government and the village, that his Ministry is in full support of this project and that he is confident, that the project can be carried out according to the original schedule.



Picture 1: Byron Miranda (Chairman of La Gracia), Noemi Westby (School Principal), Luis Carballo (Ministry of Education), Nadja and Silvan (SESB), Ambrose Tillett (Ministry of Energy), Ansel Dubon (Ministry of Energy)

The three big questions of the villagers are:

1. When will I get electricity?
2. What appliances will I be able to run?
3. How much will it cost?

If we follow our schedule, the first phase of electrification will be accomplished by the end of August. The villagers will be able to use appliances such as mobile phone chargers, light bulbs, TV and small fridges. The fee for electricity will be the same as people pay for grid electricity in Belize.

Silvan from SESB will provide the school principal with a list of appliances that can be used with the new power grid and others that won't work, because they need too much power. Via a simple educational tool, this knowledge will be transferred to the kids in a dedicated lesson about energy awareness. The goal is, to integrate the kids from the very beginning and have them share their newly learned lessons with the entire family.

The villagers also hope for work during the installation of the Smart Solar Off-Grid. SESB will try to involve villagers for simple duties like digging and constructing the concrete foundations for the container. As the work on the solar system itself requires professional skills, the SESB workers will carry out this part.



Picture 2 Mr Tillett (Ministry of Energy), Mr Carballo (Ministry of Education), Mr Miranda (Chairman of La Gracia) discussing in the school building

We also made a big step forward regarding the system design. As presented in these visualization pictures, the solar panels will build the rooftop of a 40 feet shipping container. The inverters, the batteries and the battery inverters will be mounted inside the container. It will also accommodate a small office used by the chairman of the electricity board to hand out and recharge the RFI prepaid-cards. The gas tank and the LP-gas generator will be set outside the container, while a fence is protecting the whole installation.



Picture 3: 40 feet ship container with solar rooftop



Picture 4: Gas-tank and LP-gas generator outside the container

To inform the villagers about the project, we are planning to place the container in the village as soon as possible. The villagers will have the possibility to enter the container and find relevant project information on an information wall. Outside the container we will place a billboard with the logos of our project partners.



Picture 5 Billboard with logos of the project partners

All our partners mentioned above make this project possible. We thank all our project partners for their support, especially the Rotary Clubs of Bad Ragaz (CH) and Vaduz (LI) who even took a special effort of starting a global grant request to support the Smart Solar Off-Grid for La Gracia.

ZENNA's Smart Solar Off-Grid for La Gracia Project is displayed online now by the REPIC-platform of the Swiss federal offices SECO, SDC and SFOE.

<http://www.repic.ch/repic-en/projects/ongoing-projects/photovoltaics/zenna-belize/>

An animated video about the Smart Solar Off-Grid for La Gracia project is available on vimeo:

<https://vimeo.com/145614639>

Newsletter 05/16 Smart Solar Off-Grid for La Gracia

Sunday, 13th of March, three weeks after the official announcement of the Smart Solar Off-Grid Project, a public information meeting for the La Gracia villagers was held by Mr. Tillett amongst other representatives from the Ministry of Energy in Belize and SESB.



Most of the households were present, when Silvan and Nadja from SESB explained the Smart Solar Off-Grid concept, it's opportunities, but also it's limits.



They outlined the importance of the village support in this pilot project, as their village solar system will serve as proof of concept for other remote communities. Nadja and Silvan answered the different questions of the villagers concerning the system capacity, the operation model and the do's and don'ts when living with an off-grid solar system.



Mr. Deon Kelly, a representative from Ministry of Energy, talked about the government responsibility and commitment to electrify all the villages in Belize. He explained the impacts and opportunities that a basic electricity supply can bring to their community and declared the full support of this pilot project.



SESB created a banner to represent all the supporters of the project. These banners - here lying on the SESB show system - will be put on the Smart Solar Off-Grid container.



A few days later, SESB broke ground and began to set the concrete foundations. The SESB crew is now getting additional hands-on support from two villagers. They are employed by SESB during the course of the project and will be performing construction duties, painting and fencing amongst others.



Friday, 15th of April, the 40' container was delivered and a crane placed it on the previously built foundations.



It requires a precise eye, a strong crane and an experienced operator.



After the container was set, the painting started inside. The white color ensures a bright working space.



Because of the school building nearby, a fence has been constructed to protect the kids from the high voltage installations and also to secure the core equipment of the solar system.



Now everything is prepared for the installation of the Smart Solar Off-Grid. This week, the solar panels have been delivered to the port of Belize and are now awaiting installation.



The outside of the container was getting a face lift as well.



The basic racking for the solar panels has been mounted.



The new system layout contains 96 solar panels.



The batteries, the battery inverters and the solar inverters will be arranged inside the container, along one wall. This is to ensure the best possible working conditions for the solar equipment.



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ZENNA also developed the updated presentation video of the Smart Solar Off-Grid. The movie is available online on vimeo:

[vimeo https://vimeo.com/145614639](https://vimeo.com/145614639)

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<http://www.repic.ch/repic-en/projects/ongoing-projects/photovoltaics/zenna-belize/>

Newsletter 07/16 Smart Solar Off-Grid for La Gracia

A successful project implementation depends on having all stakeholders on board as well as to have all necessary hardware on-site to start the installation. This was the main focus during the



past weeks. Mr. Deon Kelly from the Ministry of Energy conducted an inventory check and ensured, that the main hardware components are indeed on-site and ready to be installed.

In May and June 2016 we welcomed several delegations from different project stakeholders.



Representatives from cdw Stiftungsverbund in Germany visited the project site in La Gracia. Besides being a donor toward the project, cdw Stiftungsverbund also brings a vast background in the development of business models for rural electrification projects.



They shared their valuable expertise and experiences with the project managers of ZENNA and the local installer SESB as well as with the Ministry of Energy.



The Smart Solar Off-Grid Project in La Gracia gained even further international attention, as Mrs. Maria Salaverria from United Nations Industrial Development Organization UNIDO visited the project site. She is the coordinator for Sustainable Energy in the region of Central America.



Meanwhile, work continued on-site. The structure for the solar panels was being welded and enforced and the drains for grounding and to the first power substations have been dug - yes, by hand. Quite some blisters needed some attention during those days, as the soil proves to be very rocky! As soon as the fence is completed, installation of the solar hardware will start.



We are thankful for the continuous support of the Government of Belize, namely the Ministry of Public Service, Energy and Public Utilities. It is substantial for the success of this project.



Minister Hon. Frank Mena, CEO Dr. Peter Allen and Energy Director Mr. Ambrose Tillett of the Ministry of Public Service, Energy and Public Utilities met with the local installer SESB in La Gracia village to gain a first hand impression of the progress made.



The visit of Minister Hon. Frank Mena and his delegation caused quite some excitement amongst the students and their teachers. When the kids were asked, if they were looking forward to get electricity, one student answered: "We are waiting for the internet that comes with it!"



Such a visit is certainly not an everyday occurrence, so it was recorded in the school principal's "special guests & historical events" book.





Smart Solar Off-Grid for La Gracia.

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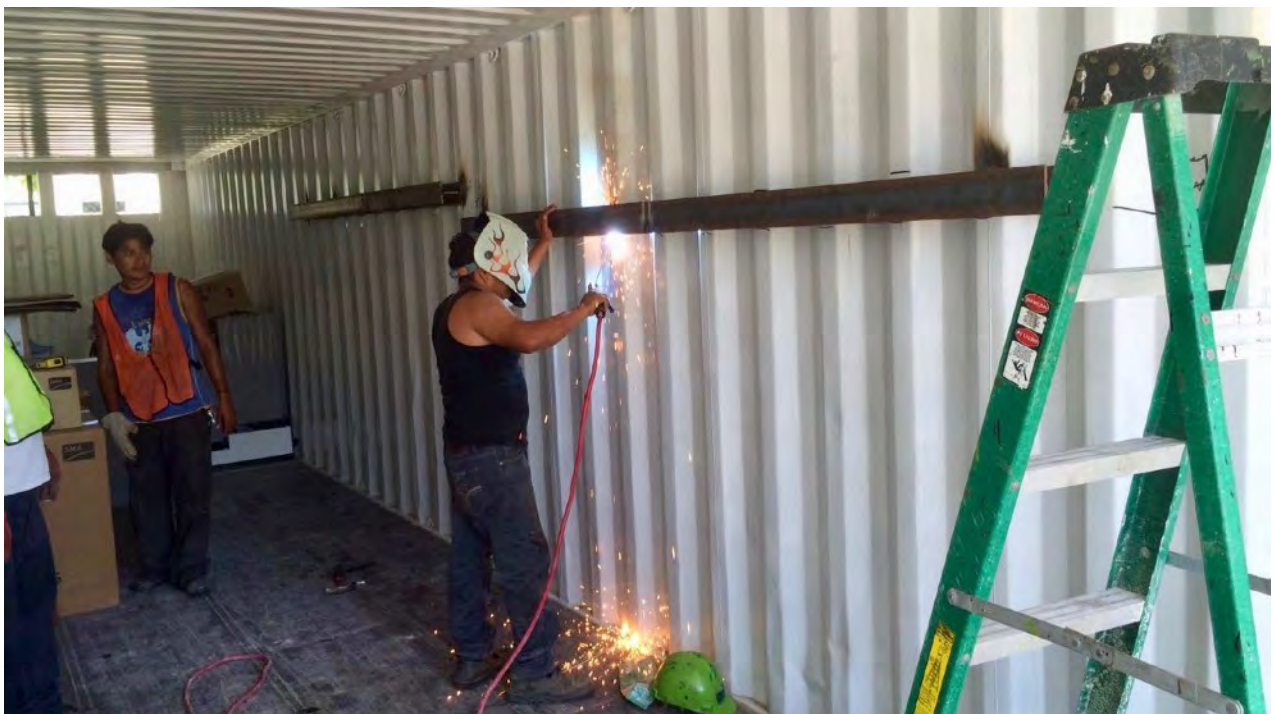
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Newsletter 11/16 Smart Solar Off-Grid for La Gracia

No news are usually good news, right? It's not any different when it comes to the Smart Solar Off-Grid project for La Gracia!



Despite Hurricane Earl making landfall in Belize beginning of August and delaying the works by several weeks due to the nationwide clean-up efforts, significant progress has been made since we last reported on the project. We are actually running the last tests before connecting the houses! But first things first:



The focus was on preparing and securing the container, so that the solar equipment could be safely mounted.



Simultaneously, a crew of villagers along with the team from SESB continued to work on the drains and the power substations. After Hurricane Earl it was clear, that running the distribution lines underground was the way to go.



Upon completion of the fence around the container, the solar panels, inverters and batteries were mounted and connected. 96 solar panels are adding up to 24 kWp of Photovoltaic and are producing 96 kWh/day average.



The Hoppecke battery bank is maintenance free and supplying the village with power during the night and on rainy days.



The LP-Gas back-up generator was delivered, connected to the gas tank and the solar system. On rainy days it will start automatically and cover the electricity demand if needed.



One of the core items to be highlighted is the green "Power-Sale and Monitoring Board" that will ensure the prepaid sale of electricity and the remote monitoring of the solar system. It is the first of it's kind in Belize and has been customized for this project.



This power substation is now as good as finished and the prepaid meters for the houses were mounted inside.



The first houses are now ready to be connected. And it's as clear as it can be: The villagers of La Gracia are ready, too!



Right before starting into the CARICOM Energy Week November 13-19, 2016, a workshop was held in collaboration with representatives of the cdw Stiftung, the Energy Unit, SESB, ZENNA. An essential part of this pilot project is to narrow down on different operation and tariff models when it comes to the solar system in La Gracia in particular and to off-grid community based systems in general.



We were happy to welcome several project stakeholders in La Gracia Village during the past few weeks. Mrs. Irene Cramer from cdw Stiftung Germany made a day-trip out to La Gracia. We truly appreciate her sincere interest in the project.



Minister Hon. Frank Mena, CEO Dr. Peter Allen and other delegates from the Energy Unit of the Ministry of Public Service, Energy and Public Utilities as well as Mrs. Grace Chung, Deputy High Commissioner were amongst the visitors.



The village chairman Mr. Menendez joined the group on a tour around the village to see the work in progress.

We are positive, that in the next newsletter you will hear about the first experiences operating the Smart Solar Off-Grid Project in La Gracia!



For people interested in the technical aspects of the system we have created a public link, that allows you to follow the systems performance:

<https://www.sunnyportal.com/Templates/PublicPageOverview.aspx?plant=115eff94-d189-434f-858d-05e8719934ac&splang=>

SUNNY PORTAL US-English

SES8 La Gracia PV System Profile

Location: La Gracia, Belize
Operator: SES8 - Solar Energy Solutions Belize Ltd
Commissioning: 11/7/2016

PV system power: 25.200 kWp
Annual Production: approx. 34,020 kWh (1,350 kWh/kWp)
CO2 avoided: Approx. 23.8 tons per annum

Modules: Rensola VirtusII 255Wp
Communication: Sunny WebBox
Inverters: 4 x Sunny Boy 6000TL US-22
4 x Sunny Island 6048U

Description:

Belize is located in the southeastern part of the Yucatan peninsula, bordering on Mexico to the north and Guatemala to the west. Around 10,000 inhabitants in Belize's rural areas have no access to the electricity grid.

Within the REPIC project's framework, a stand-alone network shall be built in the La Gracia municipality, comprised of 45 households. This autonomous network is powered by a 24 kW photovoltaic system with battery storage and a back-up gas generator. The network has a modular design and uses only proven technologies. It is designed to be locally operated and maintained by the villagers, as well.

A part of this REPIC Project is to develop a resilient business model, which shall serve as a basis for the regional multiplication of such small stand-alone networks.

For this project, ZENNA is supported by SES8 - Solar Energy Solutions Belize, zshw Zürcher Hochschule für Angewandte Wissenschaften (CH), cdiw Stiftungswettbewerb (DE), Ministry of energy (BZ), ROTARY International, Coin Invest Trust (LI), LIPPUNER EHT (CH), Triana Techno Ambiental (ES), HOPPECKE Batterien (DE), SMA Solar Technology (DE), Müller Azmoos AG (CH).

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We would also like to introduce our newest project partner. We are very grateful for the support at this stage of the project, thank you! <http://www.muellerazmoos.ch>



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www.muellerazmoos.ch

The Energy Department has posted a video on it's youtube channel to announce the "Energy Week" in Belize. The Smart Solar Off-Grid project takes place in this video.



<https://www.youtube.com/watch?v=wBESiuW7s>

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Newsletter 04/17 Smart Solar Off-Grid for La Gracia

It is a good while since we last reported from the solar project in La Gracia Village, Belize.

A number of obstacles have slowed down the progress of the project unexpectedly. However, we were able to resolve the issues that were mainly of legal, organizational and financial nature such as:

“How to start operating the system within the existing legal framework?” or “How exactly will we realize the connections from the power-substations to the actual houses (last mile) since the project under REPIC-umbrella ends at the substations?”

Some of the unknowns we were able to address with the assistance of the Government of Belize, others were resolved by welcoming the British Government as a new project partner.

With their assistance, every household can now be connected to the solar system and will receive proper wiring, a breaker-box, two outlets and three light fixtures including LED light bulbs. It is particularly important to the project, that the villagers from the very beginning will use energy efficient appliances.



On April 11th, the British High Commissioner Mr. Peter Hughes OBE and his deputy Mrs. Grace Chun as well as representatives of the Energy Unit of the Belizean Government visited La Gracia to see how the project is developing.



After a period with lots of activities done behind the scenes, physical work has resumed in the village. SESB could finally connect nine households to the first two power towers. The houses will be electrified in May.



The local crew from La Gracia is currently digging the ditches for the underground wires from the sub-stations to all the houses - they are doing a fantastic job!



Amongst the first ones to receive electricity is also the Pentecoste Church. The pastor is looking forward to skip using the expensive energy from his small generator in the future.



In order to provide road safety during the Easter Holidays, the drains crossing the street were closed just in time for Good Friday.



Now the cables from the houses are getting connected with the energy dispensers of each household...



...where the villagers can activate their power supply with a personalized RFID-Card. The electricity can be purchased on a prepaid bases, that allows every household to consume power according to the respective budgets.



Mr. Thomas Flügge and Ms. Sarah Link from the German cdw-Foundation also visited the village to get an impression of what happened during the last few months. On this picture Mr. Silvan Küffer from SESB speaks with two villagers about the inside wiring of their house. Keep in mind - all of the 40 households need proper wiring before they can be connected!



On Sunday, April 24th, SESB organized another village meeting together with representatives from the Energy Unit of the Belizean Government and the villagers. The phases of electrification, facts and figures as well as power limitations were discussed.



It won't be long until the first villagers can use the energy from the La Gracia Smart Solar Off-Grid system! At the beginning of May SESB is planing to start handing over the chip cards to the first households.



For people interested in the technical aspects of the system we have created a public link, that allows you to follow the systems performance:

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Newsletter 07/17 Smart Solar Off-Grid for La Gracia

We are proud to announce that the system is running flawlessly!

Registration process commenced on the 15th of May, 2017. Upon completion of filling the registration form and paying the connection fee, the first villagers received their personalized RFID-Card.



To prevent possible mishaps during the start up procedure the villagers received free power for the first two weeks. The selling of power followed shortly thereafter. Twice per week the villagers are able to purchase electricity, which is sold in bundles of \$5, \$10, \$20, and \$50.



The villagers were trained on how to use the energy dispenser, how to transfer their credit to their respective meters and the procedures to follow in the event that there is no electricity in their home. In addition, SESB developed a customized step by step operation and handling of the energy dispenser instructions for the villagers that was displayed on each power tower.



One by one the villagers were transferring the credit from their cards onto their meters for the first time.



Eventually this process became easier for new electricity consumers as they had already learned certain things from their neighbors that were connected prior to them.

The system was officially inaugurated on 24th of May, 2017 by Peter Hughes, the British High Commissioner, Hon. Frank Mena, Minister of Public Service, Energy and Public Utilities, Hon. Rene Montero, Cayo Central Representative and Dario Menendez, chairman of La Gracia Village.



The gathering took place at La Gracia Primary School grounds near the heart of the Solar System. It was well attended, and after several speeches and presentations there was a little feast. The villagers prepared delicious Belizean BBQ for the attendees.



Sending children's smiles your way...



The children were actively involved in the inauguration ceremony. They did role-plays, sung a song about SESB and made posters on how the electricity is going to affect their daily lives. We were really happy to see that the kids from the village were being educated and are now aware of how electricity is going to improve their lives..



Belize Now published a video on the inauguration ceremony. We invite you to click the link below to view and hear the wonderful comments the villagers had to say.

Serious equipment and no-fear of heights were needed to install the internet antenna way up in a tree. Now the system can be configured and monitored remotely.



By Friday, 23rd of June, 2017 the last houses were connected.

This villager was so over joyed at the sight of his light turning on that he called on SESB's director of operation to witness it.



Furthermore, the upkeep of the system is very important; therefore, six (3 women and 3 men) residents of La Gracia village attended a Solar Care-taking training that SESB provided. It was held between Monday 26th June and 6th July, 2017.



Patricia Molina: "I decided to attend this course because we have a system at the village. I didn't know anything about solar energy. Having knowledge about the system is very important for us and for the growth of the entire village. Also, I think what I learned here I can apply to my personal daily consumption of electricity."



Everyone has power flowing to their houses and villagers are now enjoying their electricity in one way or another.



We would like to take this opportunity to express our sincere gratitude to all the project partners. Due to your continued support of this project the village of La Gracia is now electrified. It is a huge improvement in the lives of 290 people!

Belize Now's broadcast: <https://vimeo.com/220650692>

Zenna developed a snippet of the Project! <https://vimeo.com/225085545>

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