



"Giving light to mothers and infants in Chiulo"

Assessment for Minigrid and Solar Systems

*Nino Cirrincione
Fabio Ciapponi*

*Chiulo Hospital
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Chiulo Hospital – Municipality of Ombadja, Cunene, Angola

CUAMM Activity in the Region



- Chiulo Hospital was founded in the 1950's and is owned by the Archdiocese of Ondjiva.
- Doctors with Africa CUAMM has been in Angola since 1997 and its complex since 2000
- The administration of the hospital is supported by the Angolan government.
- The hospital has 234 beds, and has a medicine and surgery department, pediatric and maternity, delivery room and surgery room and a basic laboratory and a room for tuberculosis patients
- Chiulo Hospital serves a population of close to 300,000 in the province
- Every year it has close to 20,000 visits, 5,600 recoveries, 18,000 vaccinations, 1,600 births and 5,000 prenatal visits.



Goals and Objectives of the Project



The project was born out of the need to resolve grave insufficient energy conditions for the complex with the objective to assure the meeting of all electrical needs of the hospital on an on-going, stable and secure way. The hospital is in an area not served by the national grid system, and currently its electricity is served by a diesel generator that works only at certain times of the day, with very grave supply and sanitary conditions. The project ESFI is considering is to build a mini-grid system made up of PV at 50kwp and with a diesel generator system. This system should produce enough electricity for current and future needs. The diesel generator should only be used for brief periods to cover peak loads or to recharge batteries in case of insufficient solar resources. A structural intervention would be undertaken to assure an adequate distribution network for the complex, taking into account a selection to give preferences for areas of particular load needs.

This project is supported by Bticino, with material and financial resources, and from ENEL Green Power with a donation of solar panels.



Analysis of the current situation

Generation:

The hospital has a diesel generator of 120kw plus three other small generators used to cover interruptions or special needs. The generator group is turned off from 2:30pm until 6:30pm and from 11pm until 9am the following day.

Distribution:

The general panel (160 A) located in a building adjacent to the generator, has 7 electrical circuits and serves hospital rooms and residences. The electrical circuits underground are deficient in the area of the electrical panels and are unsafe. The lighting of the hospital rooms are incandescent and neon and are in conditions of decay and inadequacy.

Loads:

The loads revealed by the analyzer of the installed grid in the general panel showed a power profile for the complex oscillating between 5kwh (afternoon hours) and 20kwh (evening hours). The air conditioner and the lighting of the new building and the renovated hospital rooms could have incremental nominal power of close to 25kw.



“Giving light to mothers and infants of Chiulo”



Location: Municipality of Ombadja, Province of Cunene, Angola

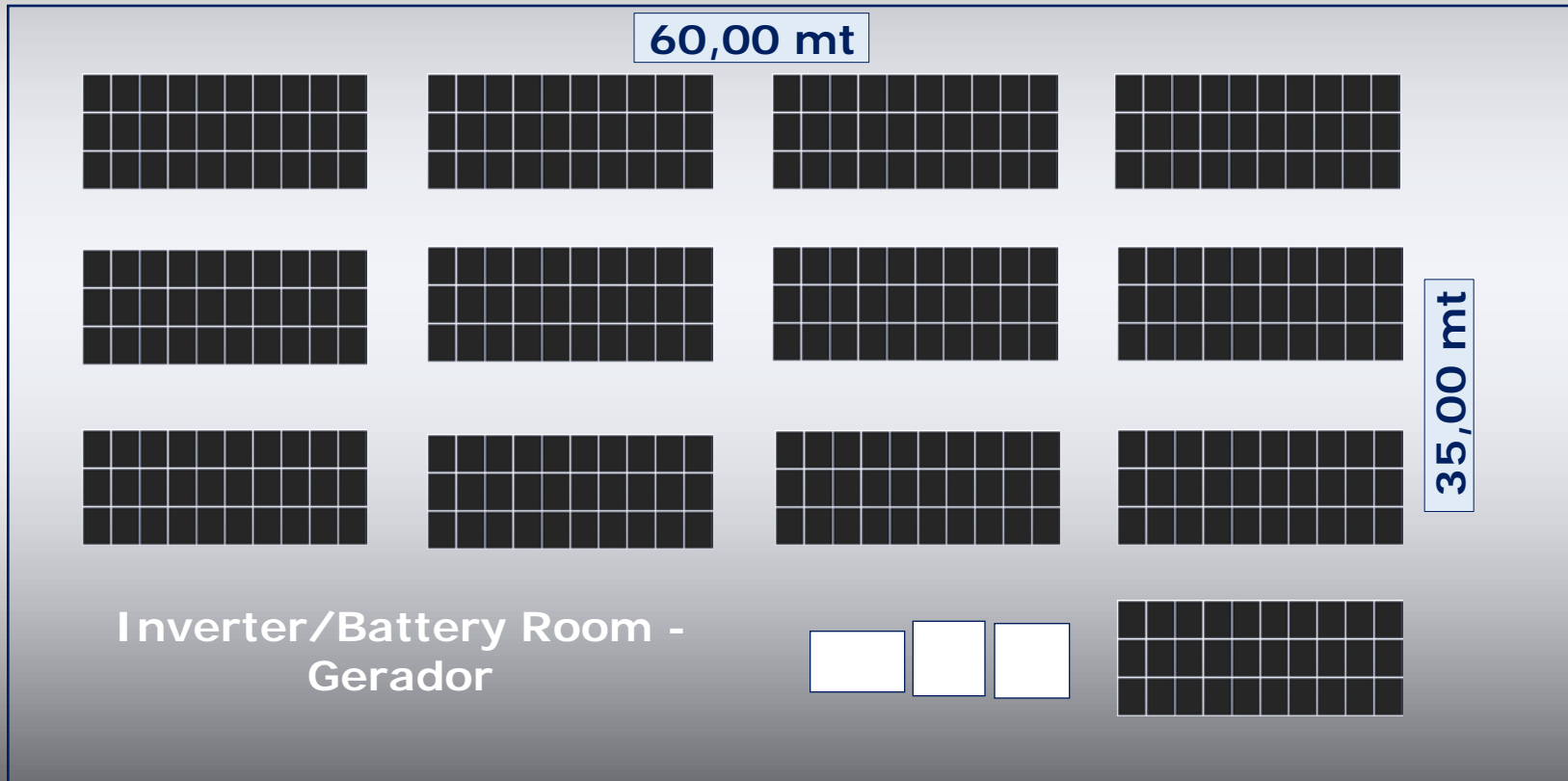


Rehabilitation Project for Chiulo Hospital

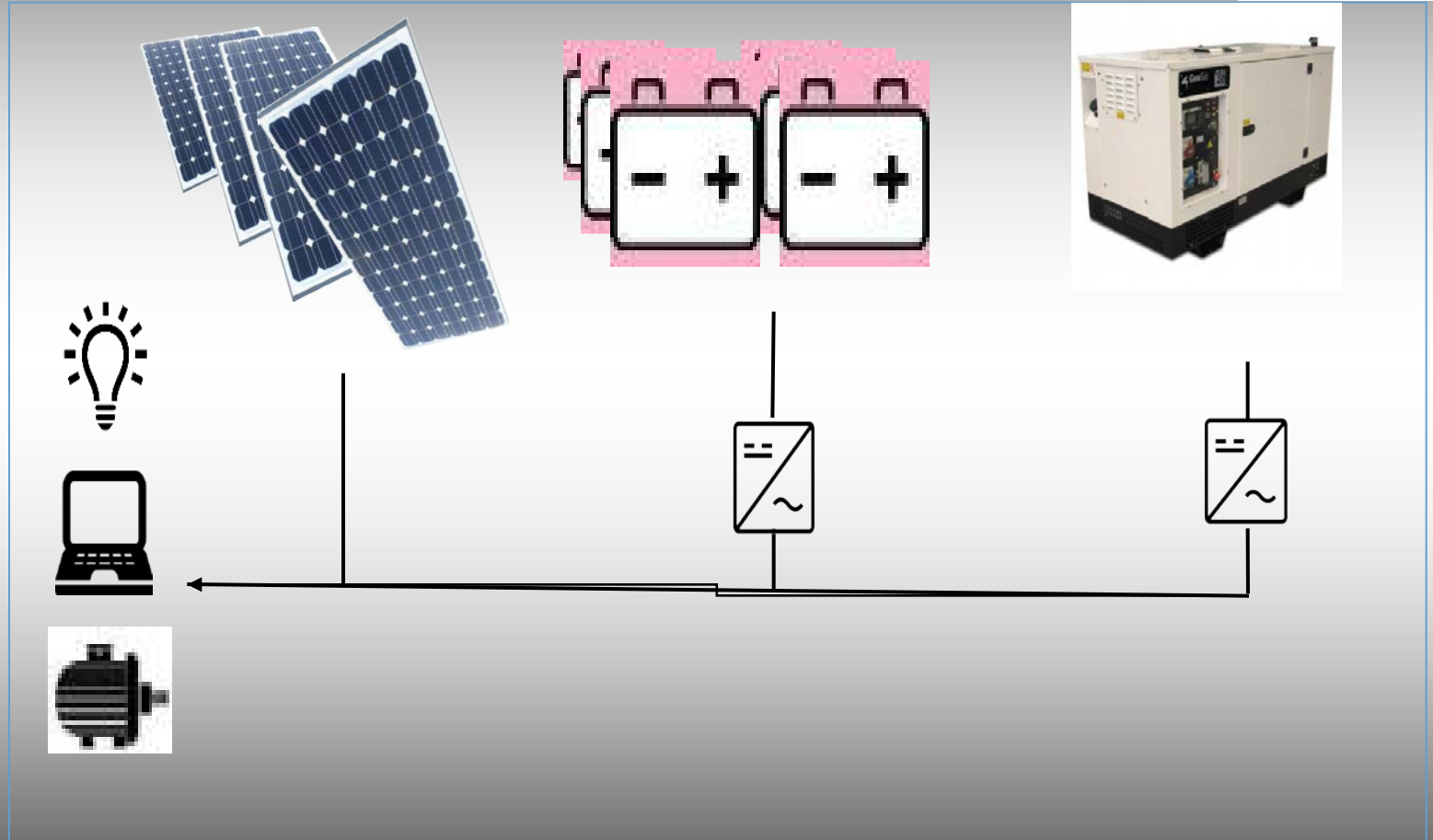
Positioning of PV on the ground



PV array - (390 PV panels 3SUN - 52,65 kWp)



Block diagram of the mini grid system



Pot. PV array: 52,65 kWp

Space occupied: 2.160 mq

Estim consum: 65,00

mWh/y

Covered consum: 100%

Pot. Generator: 120 kW

Overall load

compl. ampliarni: 45,00 kW

Study of available electricity on site

PVGIS estimates of solar electricity generation

Location: 16°32'4" South, 14°51'55" East, Elevation: 1124 m a.s.l., Solar radiation database used: PVGIS-CMSAF

European Commission Joint Research Centre Ispra, Italy

Nominal power of the PV system: 54.0 kW (CIS)

Estimated losses due to temperature and low irradiance: 15.9% (using local ambient temperature) Estimated loss due to angular reflectance effects: 2.4%

Other losses (cables, inverter etc.): 10.0%

Combined PV system losses: 26.1%

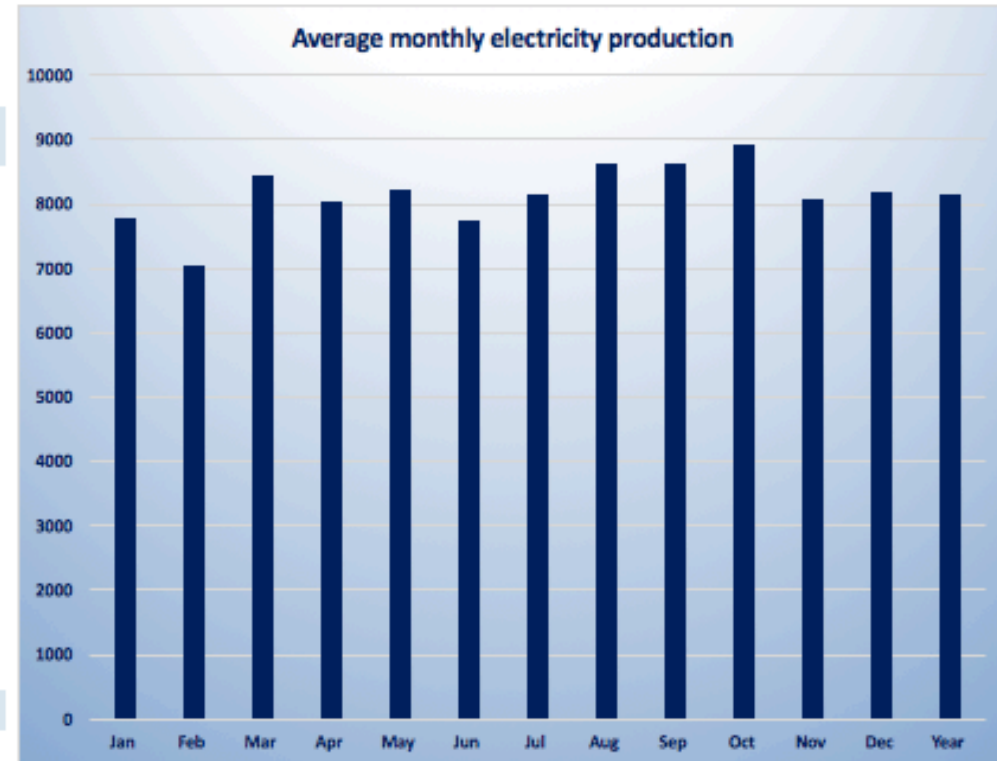
Fixed system: Inclination=12 deg., orientation=-165 deg.

Month	Ed	Monthly electricity	Hd	Hm	Cons. elettrici
Jan	251.00	7790	6.37	197	5208
Feb	251.00	7040	6.40	179	5208
Mar	273.00	8450	6.89	213	5208
Apr	267.00	8020	6.70	201	5208
May	265.00	8220	6.57	204	5208
Jun	258.00	7750	6.30	189	5208
Jul	262.00	8140	6.43	199	5208
Aug	279.00	8640	6.96	216	5208
Sep	288.00	8640	7.35	221	5208
Oct	287.00	8910	7.46	231	5208
Nov	269.00	8070	6.90	207	5208
Dec	264.00	8190	6.69	208	5208
Year	268.00	8150	6.75	205	
Total for year		97900		2470	62496

Ed: Average daily electricity production from the given system (kWh)

Em: Average monthly electricity production from the given system (kWh)

Hd: Average daily sum of global irradiation per square meter received by the modules of the given system (kWh/m²) Hm: Average sum of global irradiation per square meter received by the modules of the given system (kWh/m²)



Chiulo Hospital – Emergency First Aid



Cuamm Medical Group with ESFI technicians



Inspection of the electrical system



Inspection of the electrical system



Review of electricity parameters and load profile



Feasibility study and looking for solutions



Providing information to patients



Visit to Pediatric Room



Visit to deliver room and surgery room



Mothers and family members waiting



Mothers and relatives waiting



Project supporters:

The logo for Enel, featuring the word "enel" in a lowercase, sans-serif font. The letters are colored: 'e' is red, 'n' is pink, 'e' is blue, and 'l' is green.The logo for Edison, featuring a stylized green 'e' followed by the word "EDISON" in a bold, black, uppercase, sans-serif font.The logo for Bticino, featuring the word "bticino" in a bold, black, lowercase, sans-serif font. The 'b' is orange.The logo for Enel Green Power, featuring the word "enel" in a green, lowercase, sans-serif font, with "Green Power" in a smaller, black, uppercase, sans-serif font below it.

PROVINCIA
AUTONOMA
DI TRENTO

The logo for RES4AFRICA, featuring the text "RES4AFRICA" in a green, sans-serif font. The '4' is a stylized green map of Africa. Below it, the text "RENEWABLE ENERGY SOLUTIONS FOR AFRICA" is written in a smaller, black, uppercase, sans-serif font.The logo for BFP, featuring a stylized orange flame icon to the left of the text "BFP" in a bold, blue, uppercase, sans-serif font. Below it, the website address "www.bfpgroup.net" is written in a smaller, black, lowercase, sans-serif font.The logo for Friem, featuring the word "FRIEM" in a bold, green, uppercase, sans-serif font, enclosed within a green oval. Below it, the text "Power Converters" is written in a smaller, black, uppercase, sans-serif font.