INSTALACION SOLAR FOTOVOLTAICA AISLADA (OFF-GRID) DE UNA ESCUELA EN KIMPESE, REPUBLICA DEMOCRATICA DEL CONGO

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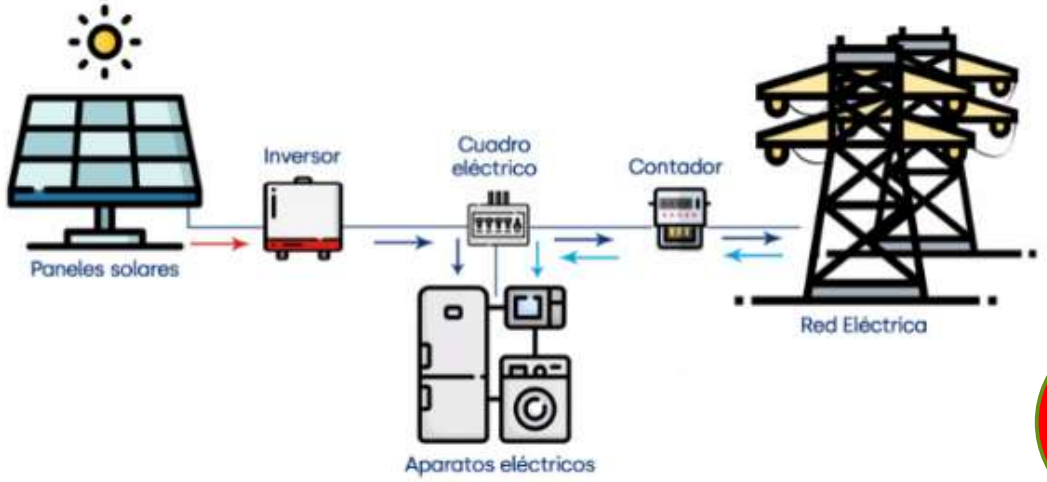
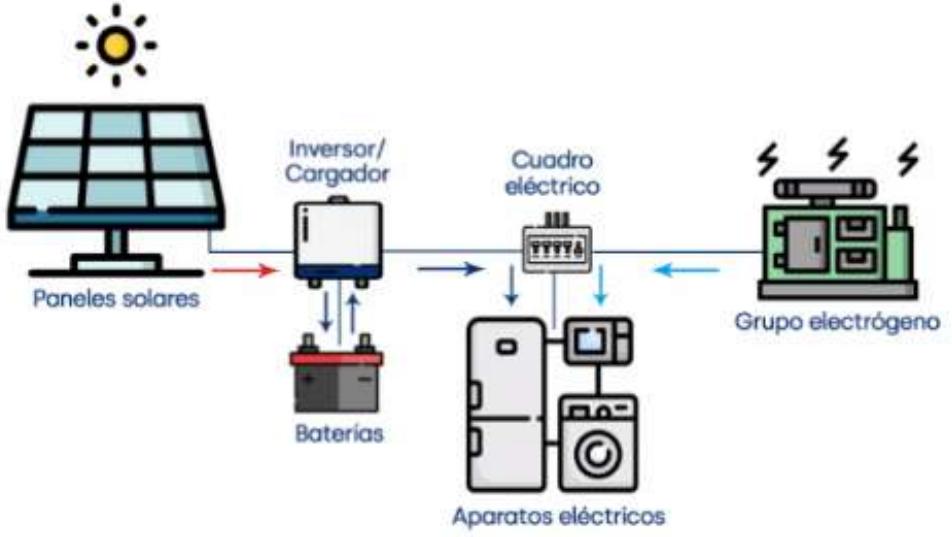
Emplazamiento

Tipos de instalación fotovoltaica: On Grid VS Off Grid



VS



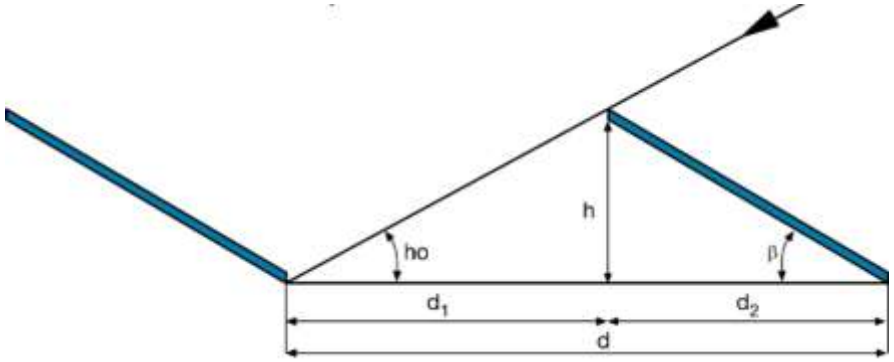
Elementos de consumo

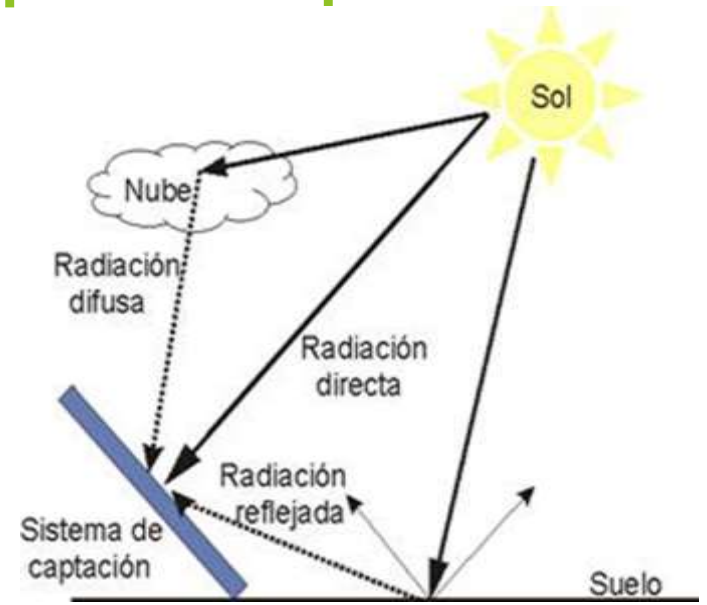
Elemento	Unidades	Potencia	Horas	energía diaria (Wh)
minicámara frigorífica 11m3	1			4800
picadora de carne	1	800	0,5	400
licuadora	1	900	0,5	450
batidora	1	1200	0,5	600
horno de pan	1	2000	1	2000
incubadora de huevo	1	80	24	1920
televisor	1	150	4	600
ordenador	2	200	3	1200
impresora	1	30	0,5	15
cámara de vigilancia	4	10	10	400
molino de grano	1	2000	0,25	500
luces interiores	9	18	8	1296
luces exteriores	12	30	8	2880
otros				500

Consumo total	17561

Conceptos importantes

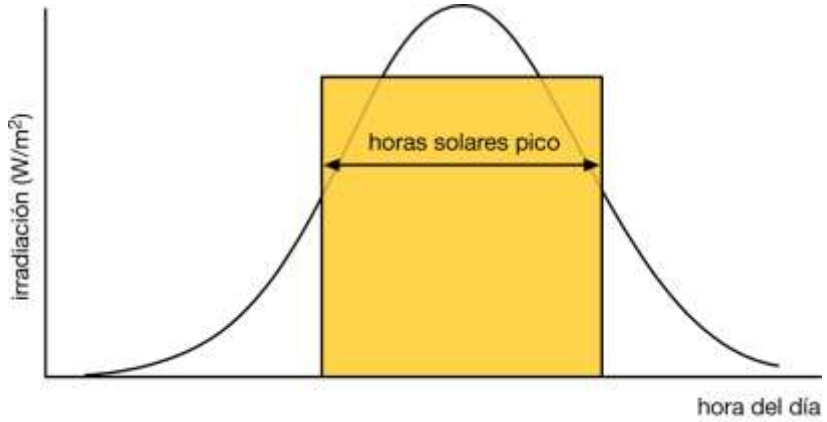
- Inclinación, orientación y sombras

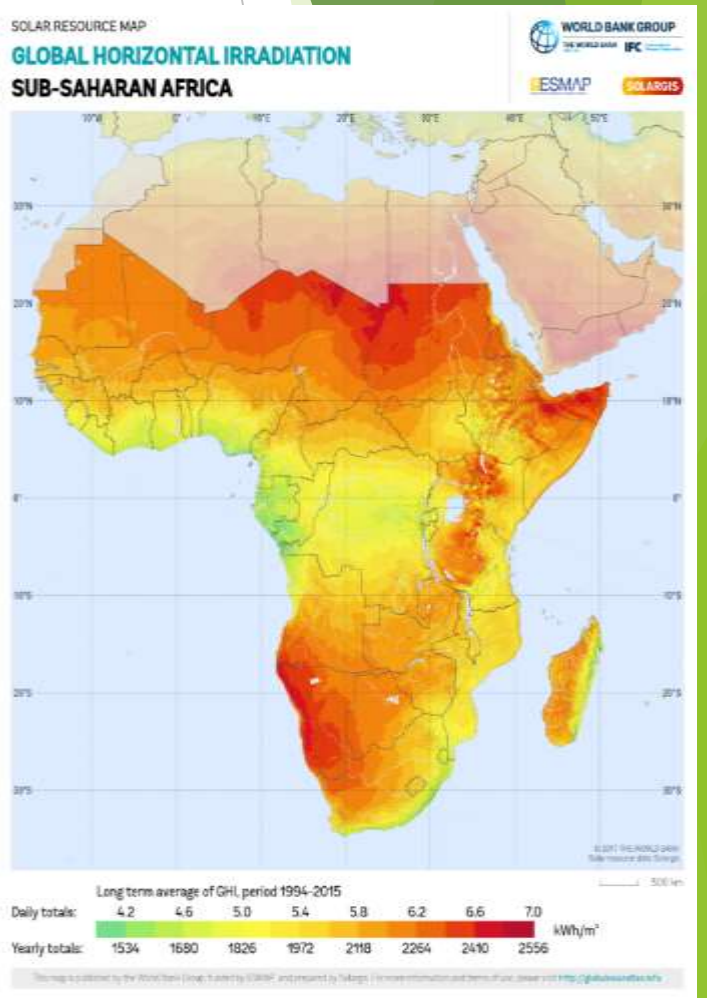




- Horas solar pico

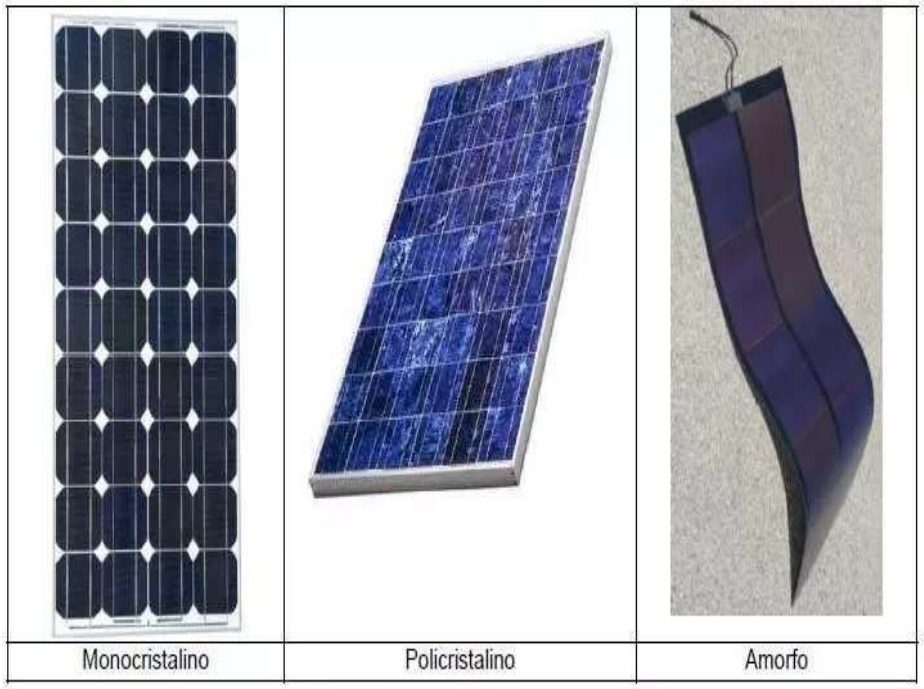
Mes	enero	febrero	marzo	abril	mayo	junio	julio	agosto	septiembre	octubre	noviembre	diciembre
hirradiacion global (kwh/m2/dia)	5,47	5,39	5,71	5,54	4,73	4,48	4,6	4,6	4,7	4,75	5,45	5,04





Elementos de una instalación OFF GRID

Módulos fotovoltaicos



- Tipo: Policristalino
- Modelo: Renesola JC255M-24/Bb
- Potencia nominal: 255 W
- Corriente: 8,39 A
- Voltaje nominal: 30,4 V
- Dimensiones: 1640x992x40 mm

Regulador

·Tipo: MPPT

·Modelo: Victron Energy Smartsolar 250/100

·Voltaje de salida: 48 V

·Corriente de entrada máxima: 100 A

·Dimensiones: 295x249x103 mm

Baterías

·Tipo: Batería estacionaria

·Modelo: Sunlight 2V 12 RES OPzV 2120

·Voltaje: 2 V

·C12: 1678 Ah

·Numero de ciclos: 3000

·Dimensiones: 796x210x575 mm

Inversor

·Modelo: Voltronic Axpert VM III

·Potencia: 5000 VA/5000 W

·Tensión de salida: 230 VAC, 50Hz

·Dimensiones: 400x300x115 mm

Cableado y protecciones

- Cableado

RESUMEN DEL CABLEADO				
Tramo	Intensidad (A)	Tipo de instalacion	Seccion (mm2)	longitud (m)
paneles - caja de conexiones	8,39	B1	6	10
caja de conexiones - regulador	33,56	Enterrada	25	10
regulador - baterias	100	B1	25	3
baterias - inversor	127,31	B1	70	4
inversor - cuadro general de mando	21,74	Enterrada	4	8

- Protección

RESUMEN DE PROTECCIONES (FUSIBLES)	
Tramo	Intensidad (A)
paneles - caja de conexiones	16
regulador - baterias	100
baterias - inversor	160

Soporte de módulos

·Tipo: Soporte inclinado para cubierta plana

·Modelo: SKU/09

·Resistencia viento:150 Km/h

·Kit disponible para 6 módulos en vertical

·Inclinación: 15º - 30º

PVSYST

Project summary

Geographical Site
Kimpese
Congo

Situation

Latitude	-5.57 °S
Longitude	14.42 °E
Altitude	321 m
Time zone	UTC+1

Project settings

Albedo	0.20

Meteo data
Kimpese
Meteonorm 8.0 (1986-2005), Sat=100% - Sintético

System summary

Stand alone system

Stand alone system with batteries

PV Field Orientation

Fixed plane	
Tilt/Azimuth	15 / -180 °

User's needs

Daily profile	
Constant over the year	
Average	17.6 kWh/Day

System information

PV Array

Nb. of modules	24 units
Pnom total	6.12 kWp

Battery pack

Technology	Lead-acid, sealed, Gel
Nb. of units	24 units
Voltage	48 V
Capacity	1680 Ah

Results summary

Available Energy	8870 kWh/year	Specific production	1449 kWh/kWp/year	Perf. Ratio PR	59.10 %
Used Energy	6410 kWh/year			Solar Fraction SF	100.00 %

PV Array Characteristics

PV module

Manufacturer	Generic
Model	JC255M-24/Bb
(Original PVsyst database)	
Unit Nom. Power	255 Wp
Number of PV modules	24 units
Nominal (STC)	6.12 kWp
Modules	4 Strings x 6 In series
At operating cond. (50°C)	
Pmpp	5.51 kWp
U mpp	165 V
I mpp	33 A

Controller

Manufacturer	Generic
Model	SmartSolar MPPT 250/100 48V
Technology	MPPT converter
Temp coeff.	-2.7 mV/°C/Elem.
Converter	
Maxi and EURO efficiencies	99.0 / 97.0 %

Total PV power

Nominal (STC)	6 kWp
Total	24 modules
Module area	39.0 m²
Cell area	35.0 m²

Battery

Manufacturer	Generic
Model	2V 12 RES OPzV 2120
Technology	Lead-acid, sealed, Gel
Nb. of units	24 in series
Discharging min. SOC	20.0 %
Stored energy	64.5 kWh
Battery Pack Characteristics	
Voltage	48 V
Nominal Capacity	1680 Ah (C10)
Temperature	External ambient temperature

Battery Management control

Threshold commands as	Battery voltage
Charging	57.3 / 50.1 V
Corresp. SOC	0.95 / 0.75
Discharging	46.8 / 48.9 V
Corresp. SOC	0.18 / 0.45

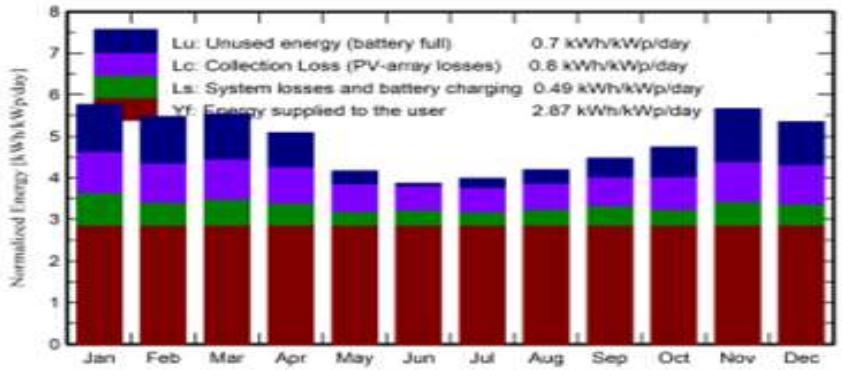
Main results

System Production

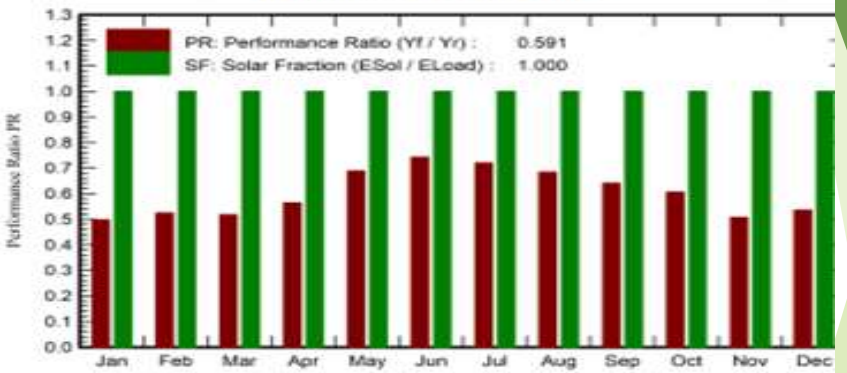
Available Energy	8889 kWh/year
Used Energy	6410 kWh/year
Excess (unused)	1567 kWh/year
Loss of Load	
Time Fraction	0.0 %
Missing Energy	0 kWh/year

Specific production	1452 kWh/kWp/year
Performance Ratio PR	59.10 %
Solar Fraction SF	100.00 %
Battery aging (State of Wear)	
Cycles SOW	96.3 %
Static SOW	94.0 %
Battery lifetime	16.7 years

Normalized productions (per installed kWp)



Performance Ratio PR



Balances and main results

	GlobHor kWh/m²	GlobEff kWh/m²	E_Avail kWh	EUnused kWh	E_Miss kWh	E_User kWh	E_Load kWh	SolFrac ratio
January	169.6	174.4	891.7	213.5	0.000	544.4	544.4	1.000
February	150.9	149.7	762.4	189.7	0.000	491.7	491.7	1.000
March	177.0	167.1	853.3	205.3	0.000	544.4	544.4	1.000
April	166.2	147.6	759.1	149.4	0.000	526.8	526.8	1.000
May	146.6	124.0	648.6	56.3	0.000	544.4	544.4	1.000
June	134.5	110.8	590.4	9.3	0.000	526.8	526.8	1.000
July	142.7	118.4	631.1	39.0	0.000	544.4	544.4	1.000
August	142.6	125.4	662.0	59.1	0.000	544.4	544.4	1.000
September	141.1	130.2	680.6	82.2	0.000	526.8	526.8	1.000
October	147.2	143.0	736.0	133.3	0.000	544.4	544.4	1.000
November	163.4	165.9	851.4	233.7	0.000	526.8	526.8	1.000
December	156.2	161.9	822.6	195.9	0.000	544.4	544.4	1.000
Year	1837.9	1718.3	8889.2	1566.7	0.000	6409.8	6409.8	1.000

Presupuesto

- Precio instalación sin IVA

Total elementos fotovoltaica	15601,33
Total elementos cableado	261,80
Total elementos proteciones	317,81
Total Mano de obra	472,00
TOTAL INSTALACION (SIN IVA)	16652,94

- Precio con IVA y Beneficio industrial

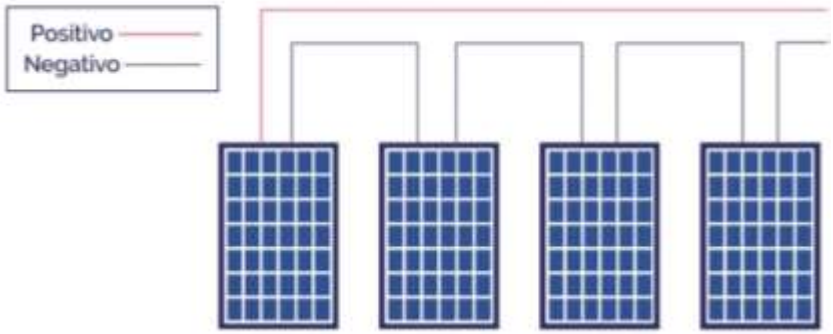
TOTAL INSTALACION (SIN IVA)	16652,94€
Beneficio industrial (6%)	999,18€
Presupuesto para imprevistos (10%)	1665,30€
COSTE TOTAL (SIN IVA)	19317,41€
IVA (21%)	4056,66€
COSTE TOTAL*	23374,07€

- Precio Subvencionado

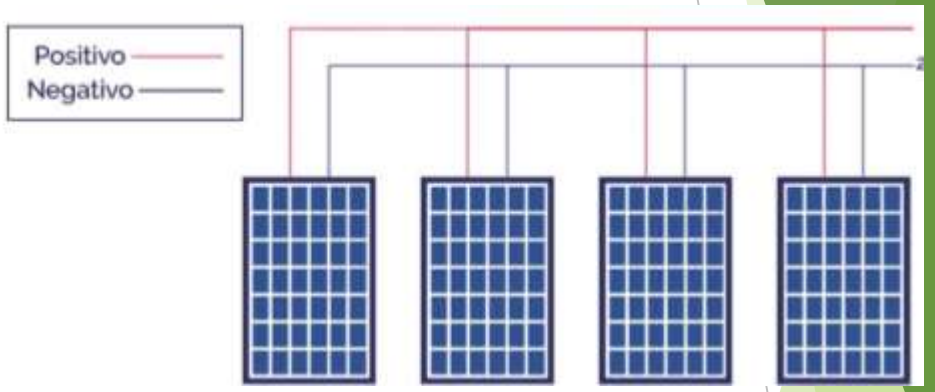
18.318,24 Euros

Manual de montaje

- Placas y estructura



Conexión serie

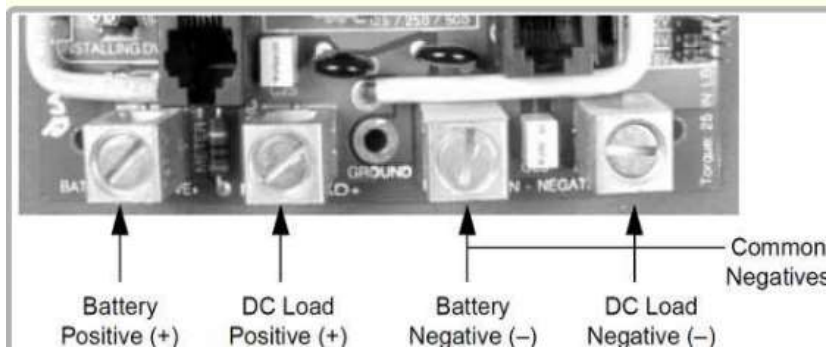


Conexión paralelo

- Regulador

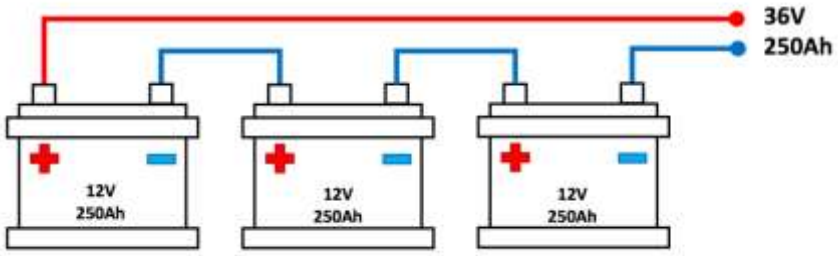

xantrex
Charge/Load Controller


INSTALL
JUMPER TO
SELECT
VOLTAGE
12V
24V

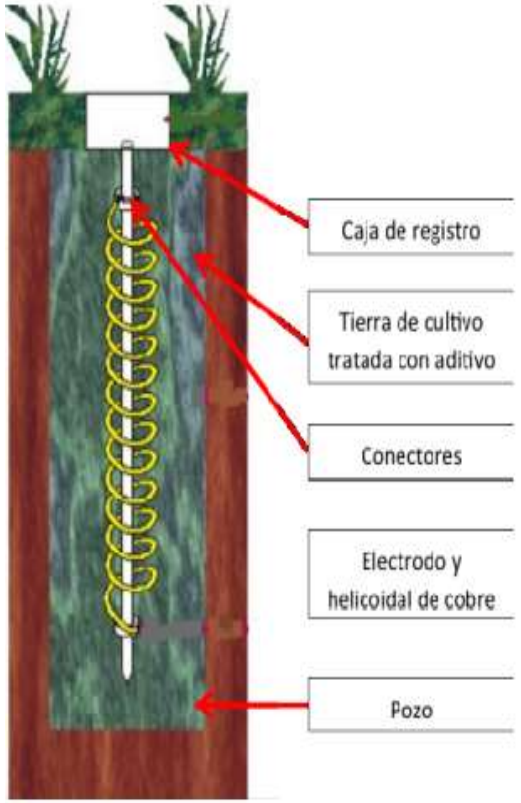

Battery
Positive (+)
DC Load
Positive (+)
Battery
Negative (–)
DC Load
Negative (–)
Common
Negatives

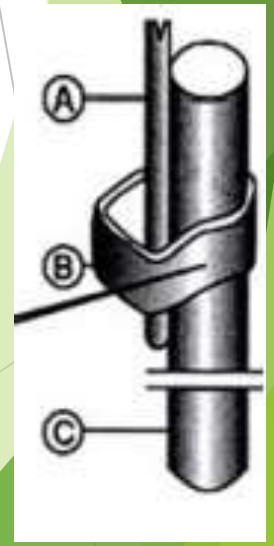
- Baterías e inversor

CONEXIÓN DE BATERÍAS EN **SERIE**



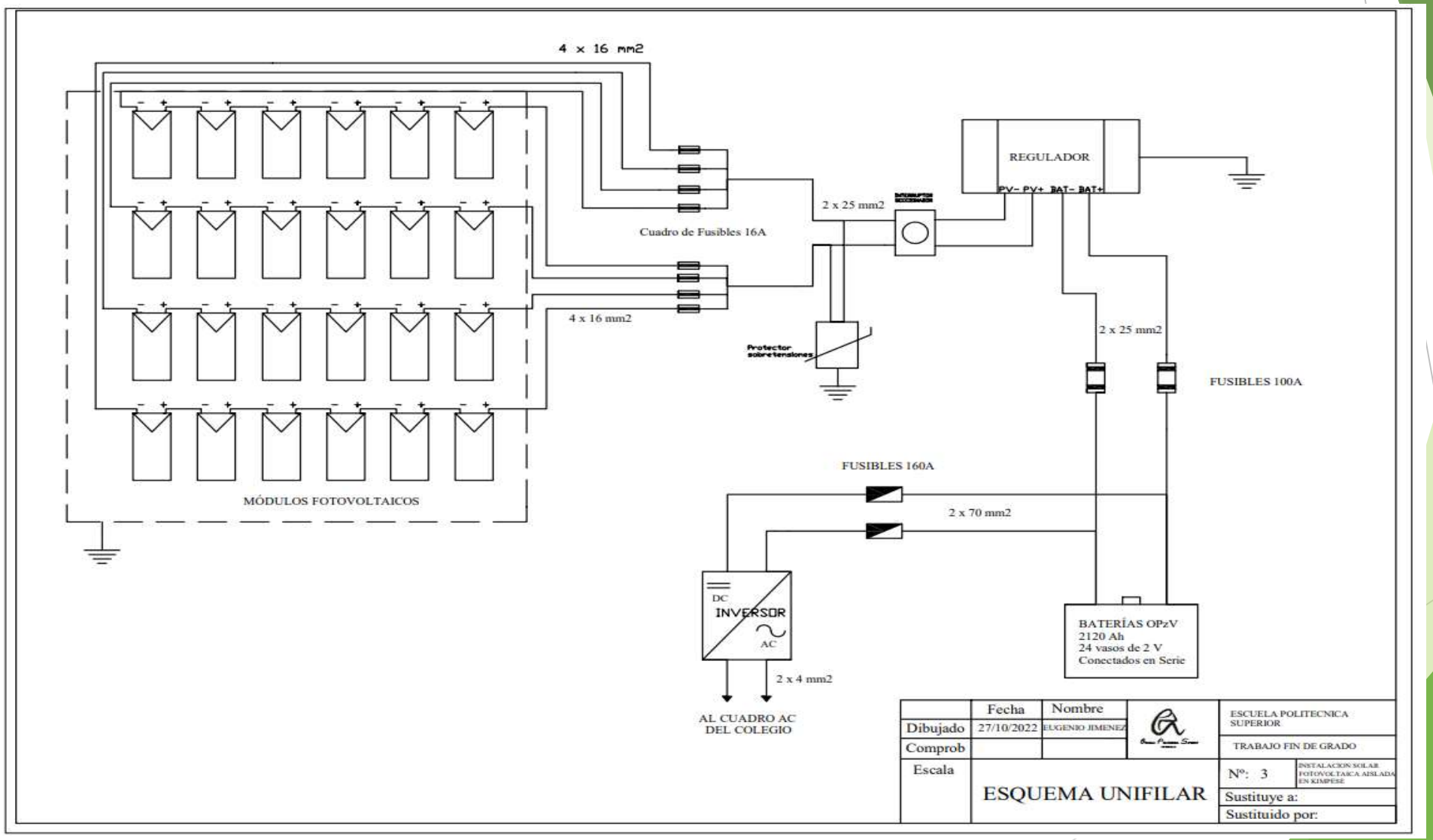
- Puesta a tierra



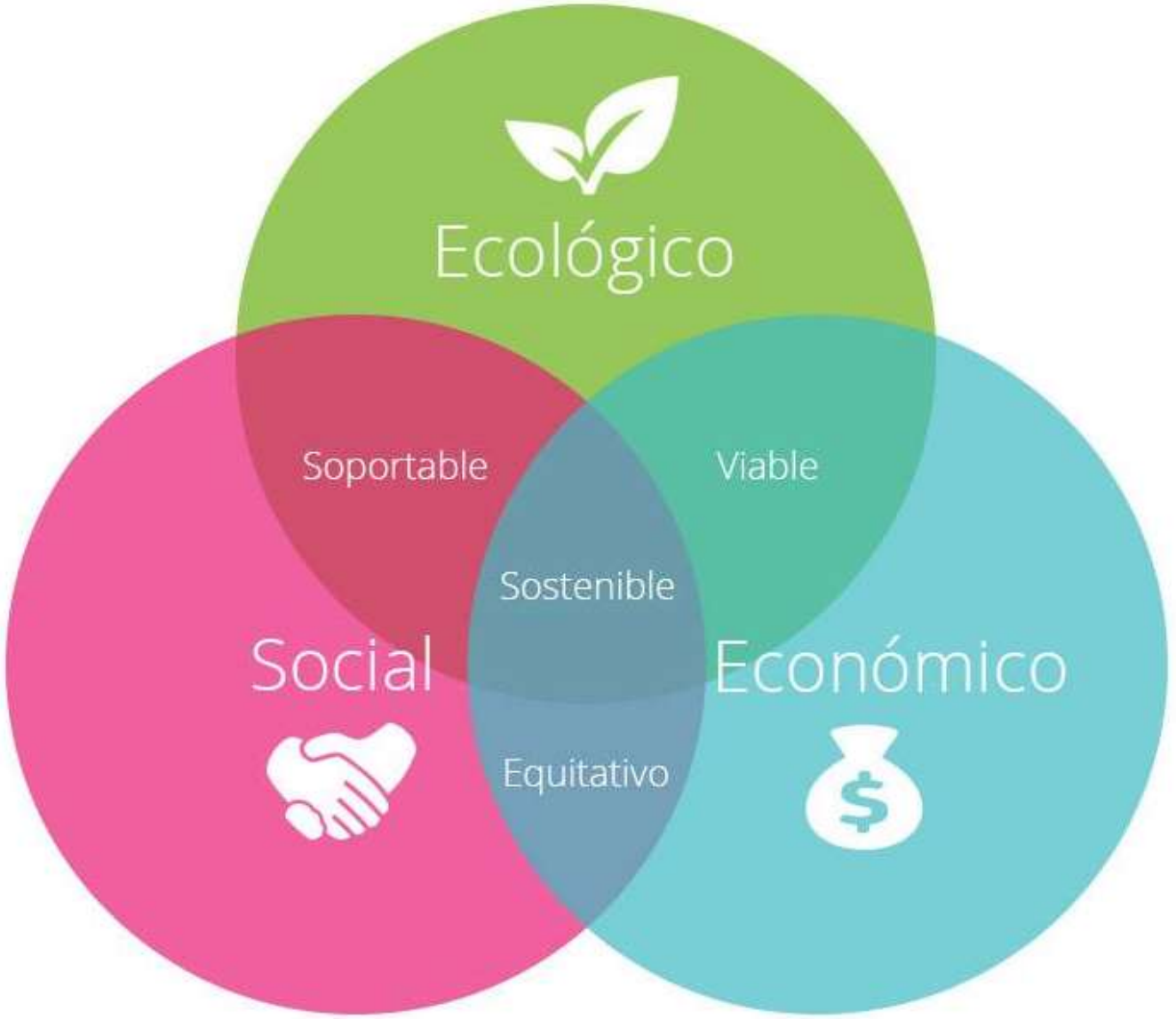


Mantenimiento

Plano unifilar



Impacto del proyecto



Gracias por su atención