Off-Grid Workshop "Meet the Practitioners" at the exhibition, May 12, 2022

CEGASA - Tradition meets Innovation, high performance battery systems from Europe to the world for Off- and On-Grid

Hubert Deubler
CEGASA
Business Development
MSc. Renewable Energy

Agenda:

1. Presentation CEGASA with Elektro-Mechanik Meisl as the German representation
2. Presentation Lithium-Battery storage systems
   - Why these batteries are the best solution for off-grid
3. Examples off-grid systems - Success Cases
4. Outlook with future innovative products

Tradition with Quality Products from Europe

- Focused in **electrochemical energy storage, we design and manufacture our batteries entirely in Europe,** in Vitoria, Alava Technology Park (Basque Country - Spain)

- 7000 m^2 - 100 people - 10 engineers and 2 PhD
- Founded in 1934 with +75 Years of energy storage Experience
- Dedicated to quality, costumer service and reliable business
- Own research, standardisation and material characterisation laboratories
- A business group committed to innovation and sustainable development

Sistema de Gestión
ISO 9001:2015
ISO 14001:2015
TÜVRheinland
CERTIFICADO
www.tuv.com
ID 9105083545

Global footprint

- Headquarters: Alava Technology Park, Vitoria, Spain
- CEGASA representation in Germany – Elektro Mechanik Meisl GmbH
- Commercial Offices: Addison, Illinois, EEUU / Maroubra, Sydney, Australia
- Projects: Australia, Benin, Ghana, Ethiopia, India, Germany, Austria, Italy, Chile, UK, Argentina, Guyana, Mali, Sudan

In-house Lithium-ion laboratories

In-house laboratories, laser welding machines, electrical testing area, etc. for testing and safety approval with a team of professionals with more than 20 years of experience in the areas of cell formulation, design of battery packs, control electronics and BMS

Representation Germany – Elektromechanik Meisl

Since 25 years specialist for off-grid power supply systems
from the Alps through the South Pacific to the Antarctic

Design & Delivery
Installation
Service
Wholesaler
Product
Development

Lithium-ion product portfolio

eBick, the most versatile energy storage solution on the market with Lithium-LFP technology from CEGASA for remote off-grid as well as on-grid and industrial applications

- Scalable modular solution that adapts to your needs
- Approved in the most challenging off-grid installations under all climate conditions since several years
- Easy handling, secure and fast installation in less than 1 hour
- Inherently safe
- Remote control and maintenance possible
- Most favourable warranty conditions
- Fast delivery and easy service, maintenance and repair (changing fuse and circuit board)

eBick Ultra 175

- LFP 48 Vdc Battery
- From 13,44 kWh to 54 kWh
- Compatible with main inverter and charge regulators brands SMA, Victron, Studer, Fronius Litio-charger
- Bluetooth connection

eBick 280 Pro

- Modular system for C&I applications
- From 54 kWh to 3 MWh
- Systems from 48 Vdc to 850 Vdc
- Compatible with main inverter brands

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eBick Ultra 175

Li ION

Cegasa Lithium-LFP technology

Ready to use
Fully factory installed

Integrated wheel option for easy movement

48V

Working voltage 48V

Modular system
13.4 kWh per module up to 54 kWh

Expandable up to 4 modules in parallel

Compatible for communications with Victron, Sunny Island and Studer inverters

Direct replacement of lead batteries

Electrical characteristics				
Rated voltage (V)	48		48	
Maximum voltage	52,2		52,2	
Minimum voltage	43		43	
Rated capacity (Ah)	280	560	840	1120
Rated energy (kWh)	13,5	27	40,5	54
Cyclability	> 5000 (80%DOD)			
Type of communications	CAN Bus			
Electrical safeguards				
Overload	ok			
Over-discharge	ok			
Short-circuit	ok			
Over-current	ok			
Over-temperature	ok			
Passive balancing	ok			
Current level (A)				
Maximum continuous charge current	175	320	450	500
Recommended continuous charge current	140	280	400	475
Rated continuous discharge current	140	280	400	475
Maximum continuous discharge current	175; (8kW)	340; (15kW)	500 (22,5kW)	575 (26kW)
Peak discharge (1) current/time	225 (5 min); (10kW)	450 (5 min); (20kW)	600 (5 min); (26kW)	800 (5 min); (35kW)
Peak discharge (2) current/time	270 (5s); (12kW)	540 (5s); (24kW)	750 (5s); (32kW)	875 (5s); (40kW)
Peak discharge (3) current/time	400 (<1s)	800 (<1s)	1000 (<1s)	1000 (<1s)
Electrical connections				
Power	REMA SR 350 Connector Grey (Similar connector is supplied for installation with pins for 95mm²) For installations with more than 2 Ultra modules, the use of a Busbar is recommended (not included)			
Communications				
Connector	RJ45			

Communication interface card TCC CAN V 2.0

- Wall mounting with DIN rail included
- Status LED and 4 SOC LEDs
- CAN BUS communication with inverters (load parameters, battery data, alarms...)
- Internal memory for data
- Bluetooth connectivity
- USB for SW update and file collection

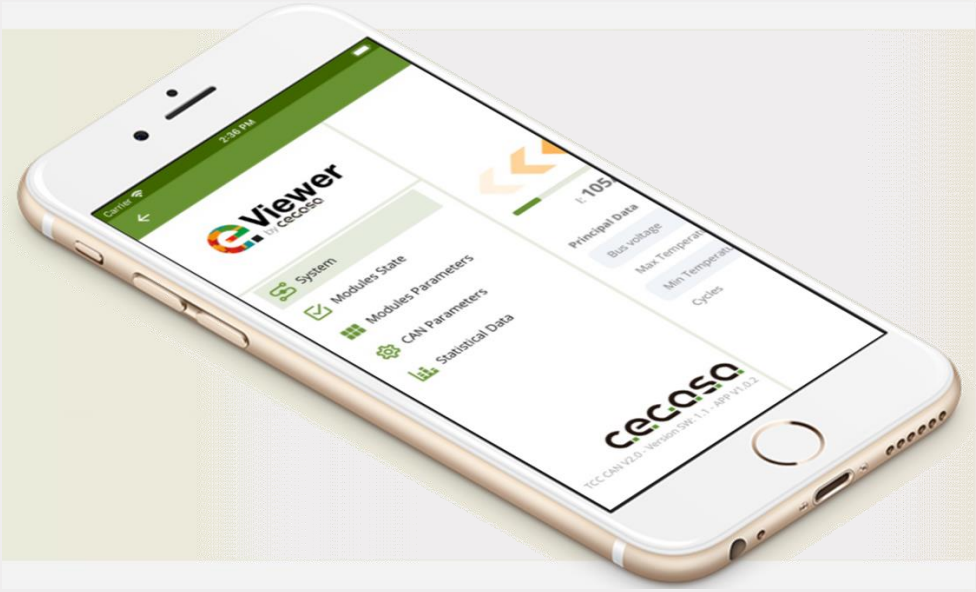
The official App of Cegasa Energía to display the status of your eBick Ultra 175:

• Parameters of the complete system: system voltage, current, state of charge, temperature and cycles performed

• Status of the modules: you will be able to know the status of each module, alarms, warnings, etc

• Parameters of each module: Voltage, current, state of charge, temperature, etc.

• Statistical data: View the energy consumption used by our batteries in the last 24 hours, in the last month and even since it started.



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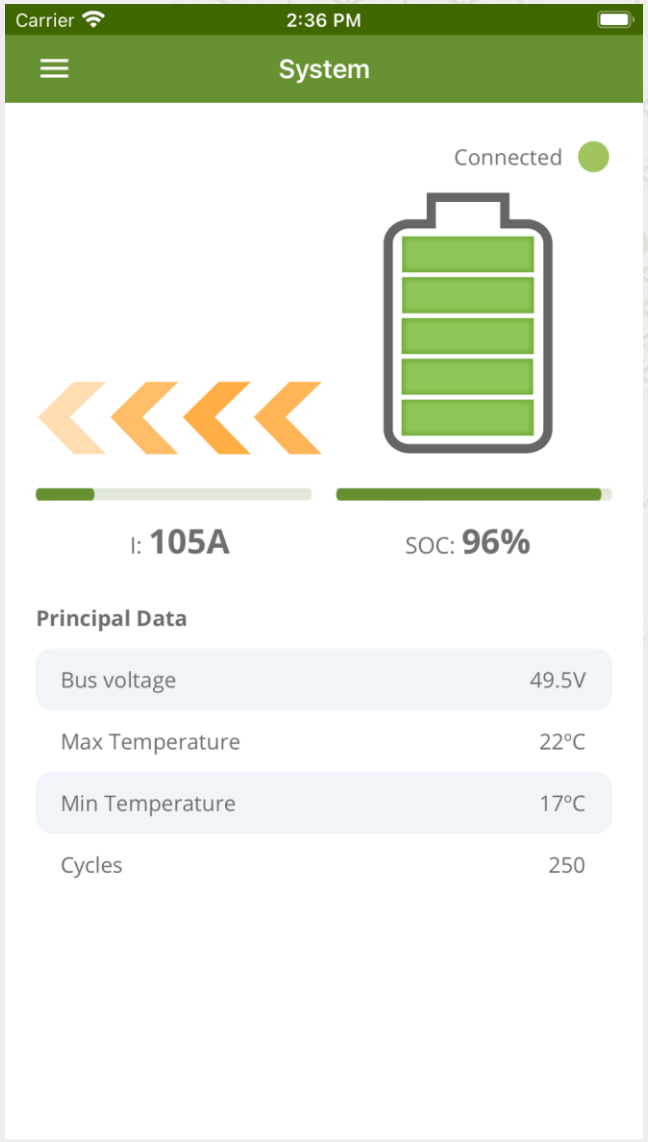
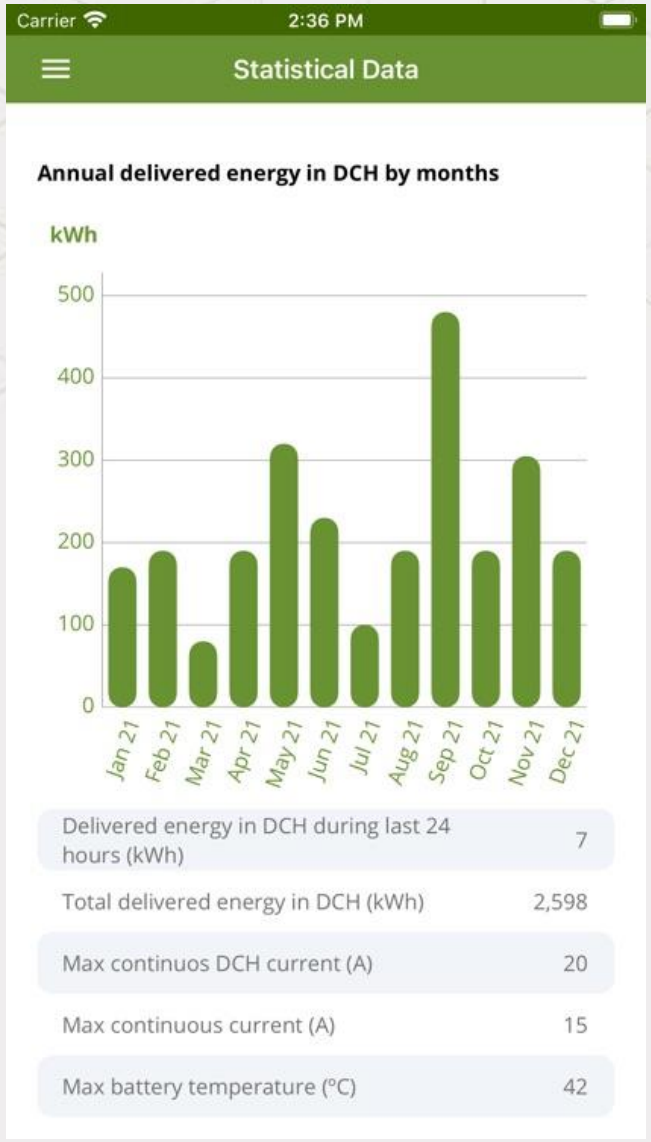
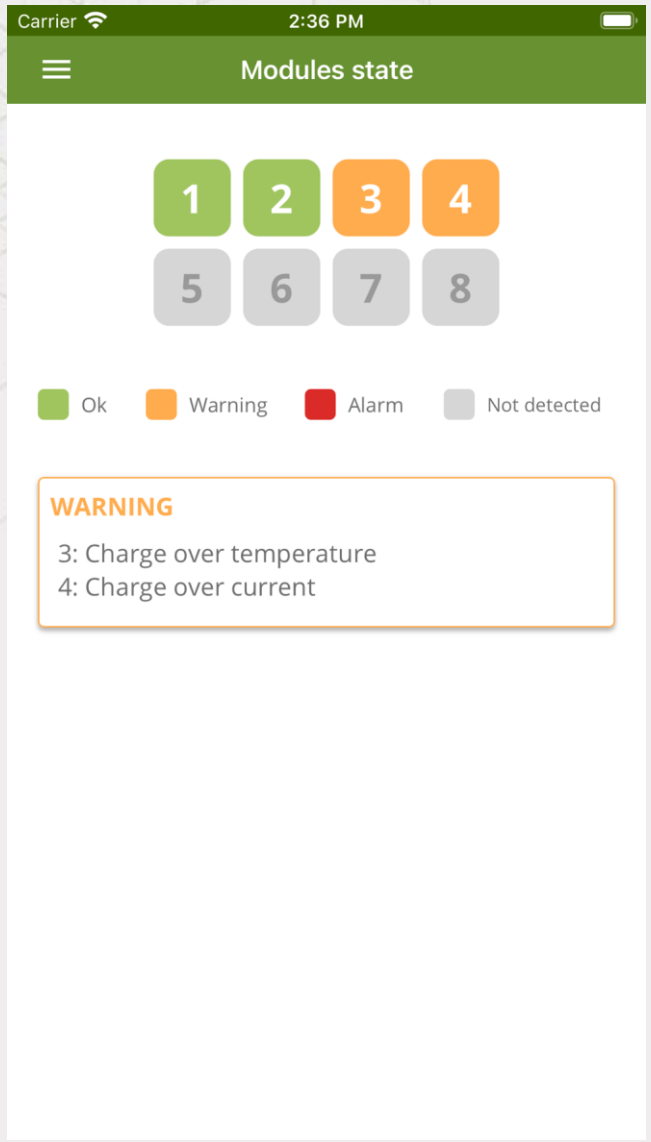
Viewer by cecasa







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eBick 280 Pro

Description of the battery - CEGASA eBick

General data	
Electrochemical	Lithium Iron Phosphate (LFP)
Cell type:	Prismatic
Electrical characteristics	
Rated module voltage	48 VDC
Minimum module voltage	42 VDC
Maximum module voltage	52.2 VDC
Rated capacity	280 Ah
Rated continuous charge current	140 A
Maximum continuous charge-discharge current	175 A
Recommended continuous discharge current	140 A
Peak discharge current (1-2 min)	280 A
Power characteristics	
Life cycles (80% DoD)	> 5000 cycles
Installed energy	13.44 kWh
Physical characteristics and protection features	
Dimensions (Width x Depth x Height)	762 x 405 x 448 mm (+-2 mm)
Weight	105 Kgs.
Degree of protection	IP30
Communications	
Integration with inverter	
BMS (control and protection)	
Overload	OK
Over-discharge	OK
Short-circuit	OK
Over-current	OK
Over-temperature	OK
Passive balancing	OK
Installation conditions	
Recommended working temperature	From 15 ºC to 30 ºC
Recommended discharge temperature	From -20 ºC to 55 ºC
Charging working temperature	From 0 ºC to 45 ºC
Certificates	
CE Mark	"Low Voltage Directive (2014/35/EU)
Transport regulation	UN Test and Criteria, 38.3

Battery Module eBick

Each **eBick** module includes 15 prismatic LFP-technology cells, the ideal option for stationary applications. Premium cells selected by CEGASA researchers in their own electrical and safety laboratories. To provide your system with the best performance and the longest life, a specific BMS has been designed for electrical and temperature control of each cell.

Serial

- For installations with three-phase high-voltage inverters
- Configurable in strings of 2 to 14 modules: from 96 to 864 Vdc
- Up to 14 parallel strings: 2.6 MWh per converter
- Harting connectors
- 175 A continuous (0.6 C) and 280 A (1C) 1-2 min per string
- Compatible with Ingeteam, Riello, Norvento, Selectronic, Goodwe (50 kW)

Bick 280 Pro Parallel

Control and protection module Bick

Each **Bick** modular system includes a protection and communication module. It includes current measurement, DC cut-off control and a 7" touchscreen HMI to display voltage, temperature, "SOC", "SOH", etc.) in addition to the CAN and Modbus communications module for connection to the inverter.

	PROTECTION AND CONTROL MODULE (PCM) 48 Vdc 300 A	PROTECTION AND CONTROL CABINET (PCC) 48 Vdc 500 A	PROTECTION AND CONTROL CABINET (PCC) 48 Vdc 1000 A
General data			
Rated current	300 A	500 A	1000 A
Rated power	14 kW	24 kW	48 kW
Peak current (1-2 min)	450 A	700 A	1400 A
Peak power (1-2 min)	21 kW	33 kW	57 kW
Power source	24 Vdc source self-supplied from string modules	24 Vdc source self-supplied from string modules	24 Vdc source self-supplied from string modules
Customisation			
	Configurations of up to 2,000 A per string. Consult Cegasa.		
Main components			
	Cegasa master or slave EMS (control system and string management)		
		500 A Contactor	1000 A Contactor
	Current measurement (LEM or board)		
	HMI (7" touchscreen)		
	Parallel connection of busbars		
		Includes fuse in the main busbar	Includes fuse in the main busbar
	1 intake or module string	Customisable up to 18 intakes or module strings	Customisable up to 18 intakes or module strings
Parallel string connection			
	Up to 18 strings by means of a combination of master and slave control modules or cabinets		
Physical characteristics and protection features			
Dimensions (Width x Depth x Height)	762 x 300 x 165 mm	1000x800x300	1200x800x300
Weight	10 Kg	60kg	90 kg
Degree of protection	IP30	IP55	IP55
Communications			
	CAN and Modbus		

- For 48 Vdc systems
- Strings of up to 14 modules in parallel 188 kWh
- Up to 14 strings in parallel 2.6 MWh
- Control and power cabinets configurable up to 1,500 A per string
- Anderson quick connectors
- Compatible with Victron, Sunny Island, Studer, Goodwe, Solis, Ingeteam

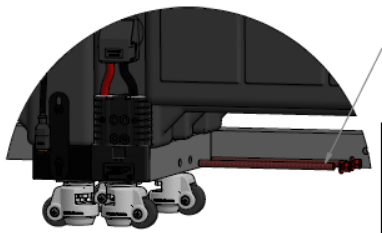
BESS Container Solutions

Paso 8: Repetir los pasos anteriormente descritos para crear el resto de columnas.
Tener en cuenta de realizar el montaje a 60cm aprox. de la pared para, posteriormente, empujar el sistema a su posición final.

¡¡ATENCIÓN!!
REALIZAR ENTRE DOS O MÁS PERSONAS.
RIESGO DE APLASTAMIENTO

Paso 9: Unir los dos zócalos colindantes mediante la tornillería sugerida en el detalle G

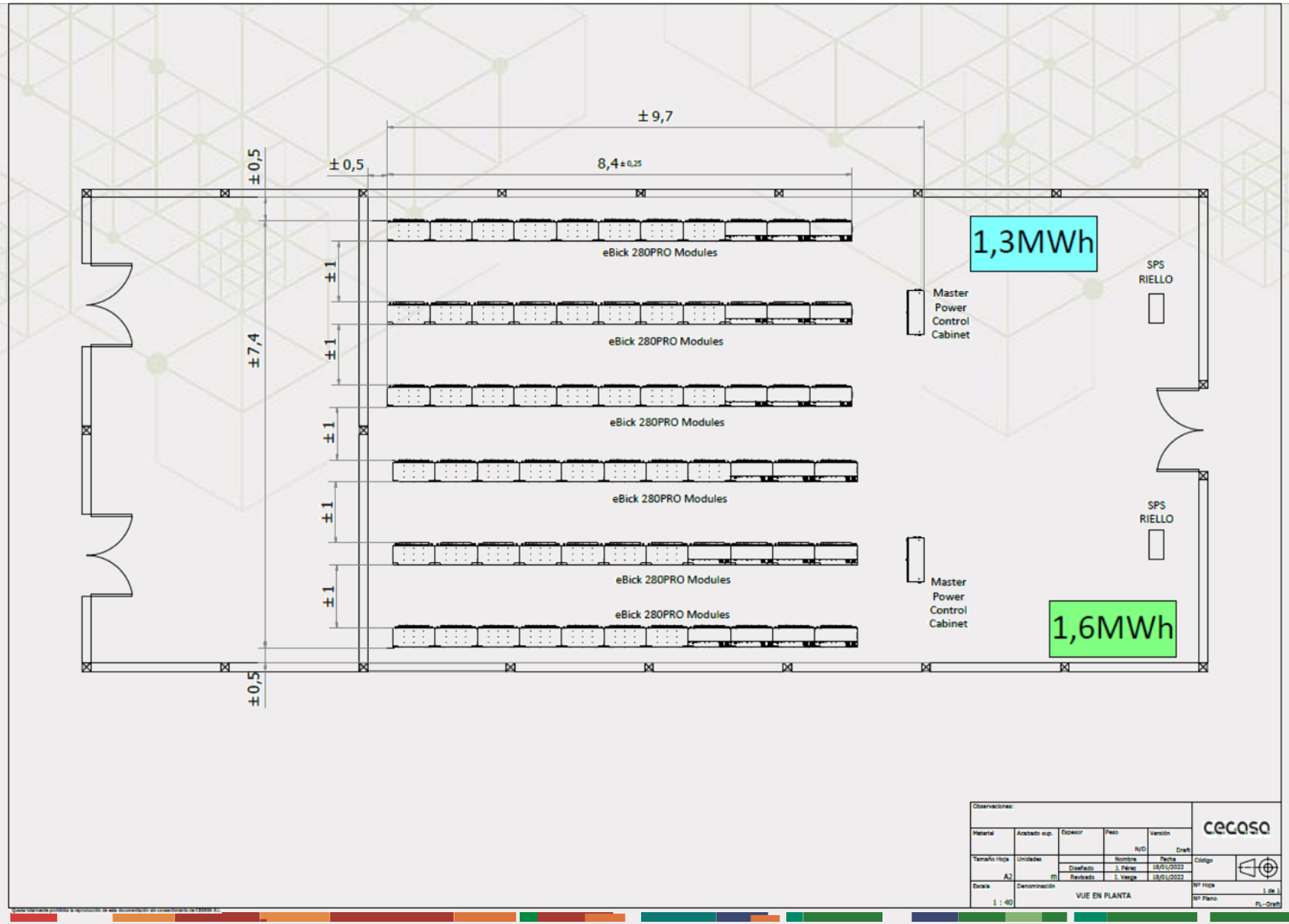
G (1 : 6)
Suerencia de materiales para ata



2x Varillas de M10
4x Arandelas DIN125 M10
4x Arandelas DIN127B M10
2x Tuercas DIN934 M10
2x Tuercas DIN 985 M10

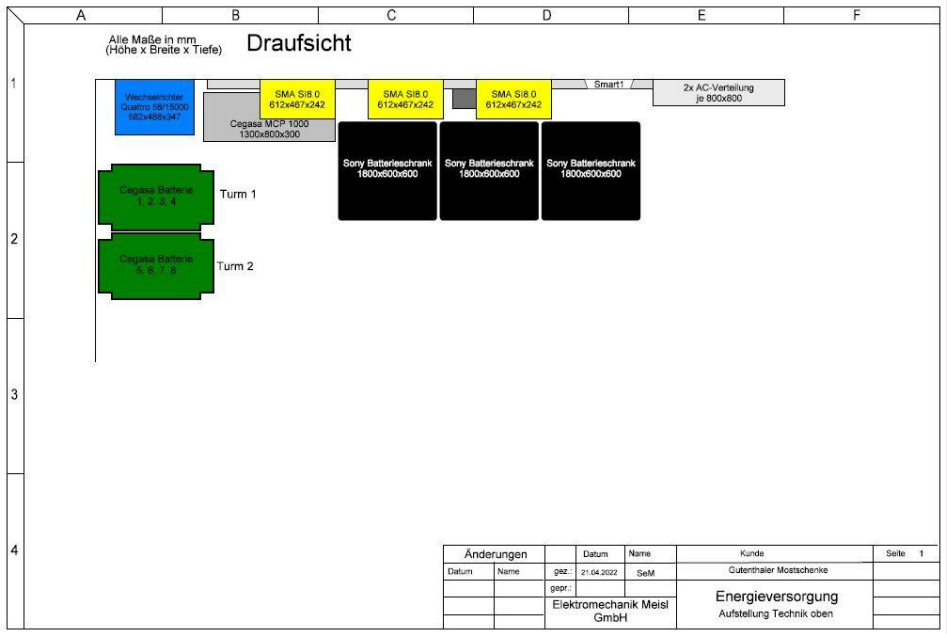
Observaciones: LAS PIEZAS DE COLOR ROJO EN LOS PLANOS NO SON SUMINISTRADAS POR CEGASA ENERGÍA S.L.U. Y SERÁN RESPONSABILIDAD DEL CLIENTE					cegasa
Material	Acabado sup.	Espesor	Peso N/D	Versión 01	
Tamaño Hoja A3	Unidades mm		Nombre	Fecha	Código
		Diseñado	J. Pérez	03/03/2021	
		Revisado	I. Vesga	03/03/2021	
Escala 1 : 12	Denominación Ensamblaje Proyecto Chile				Nº Hoja 4 de 4
					Nº Plano PL--01

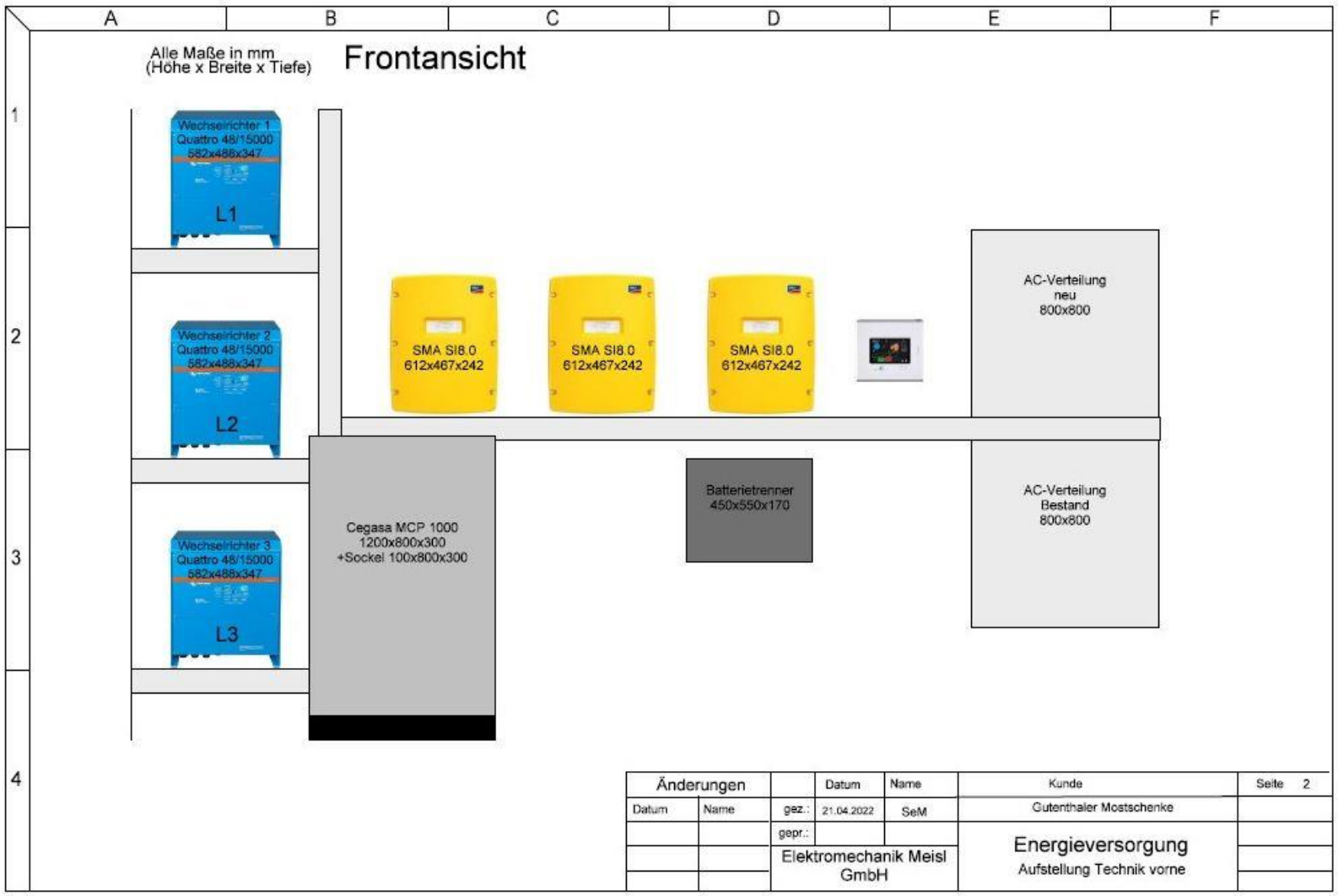
Project engineering support



Project engineering support

Representation Germany





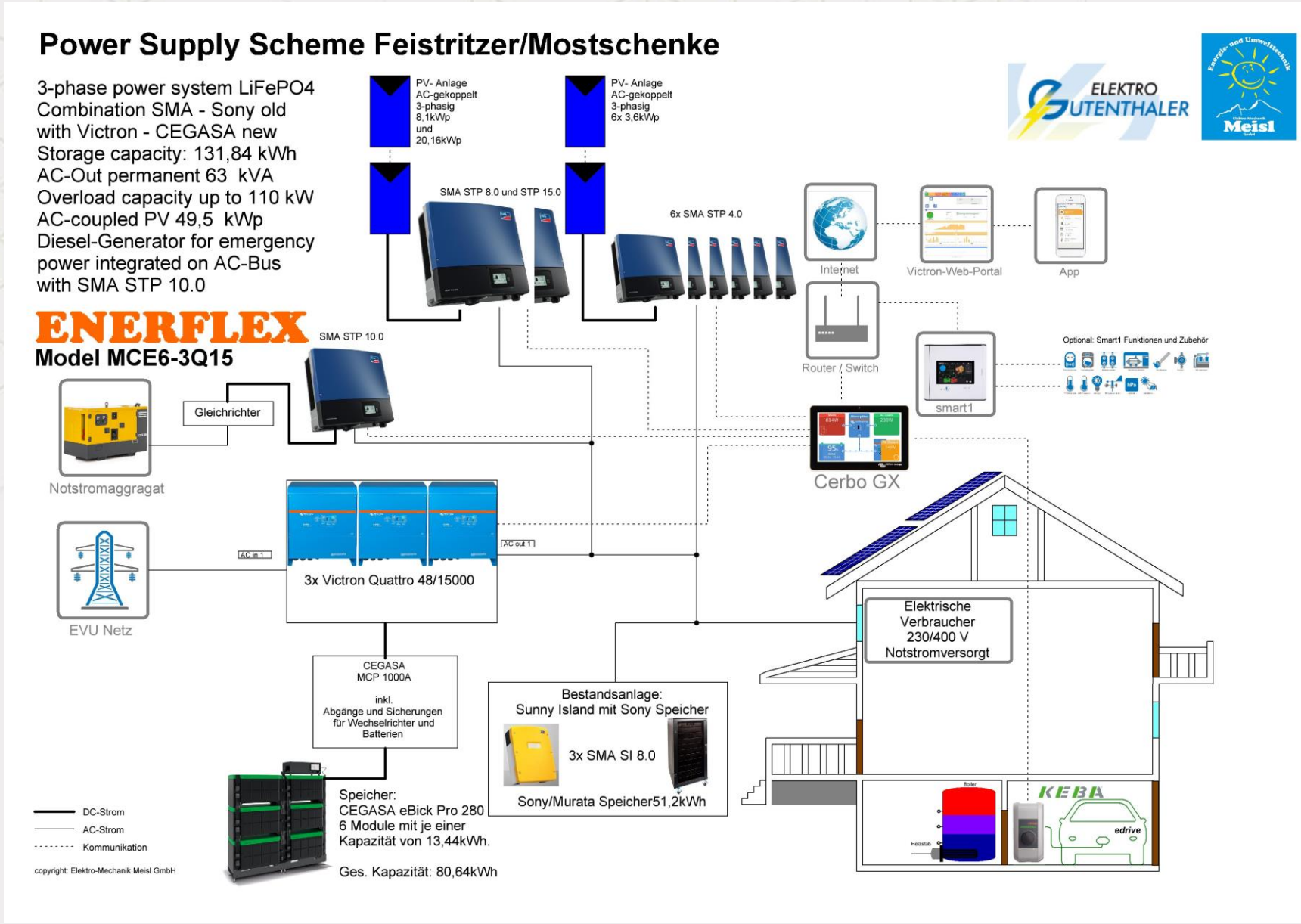
Project engineering support

Representation Germany

PV Power supply for a farm in Austria on-grid

Full off-grid functionality with uninterrupted emergency power supply

Combination of old system (SMA Sunny Island with Sony Lithium Battery) and new system (Victron with CEGASA Battery) managed by Smart 1

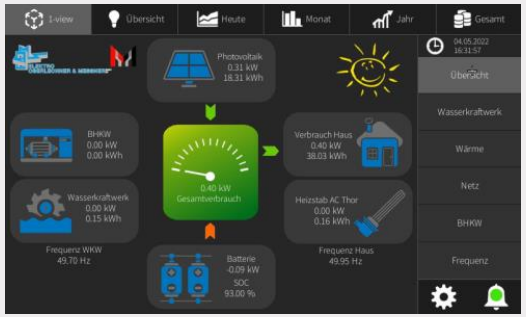


Success Cases

Success Cases

Success Cases – OFF-Grid; Mountain Hut in the Alps

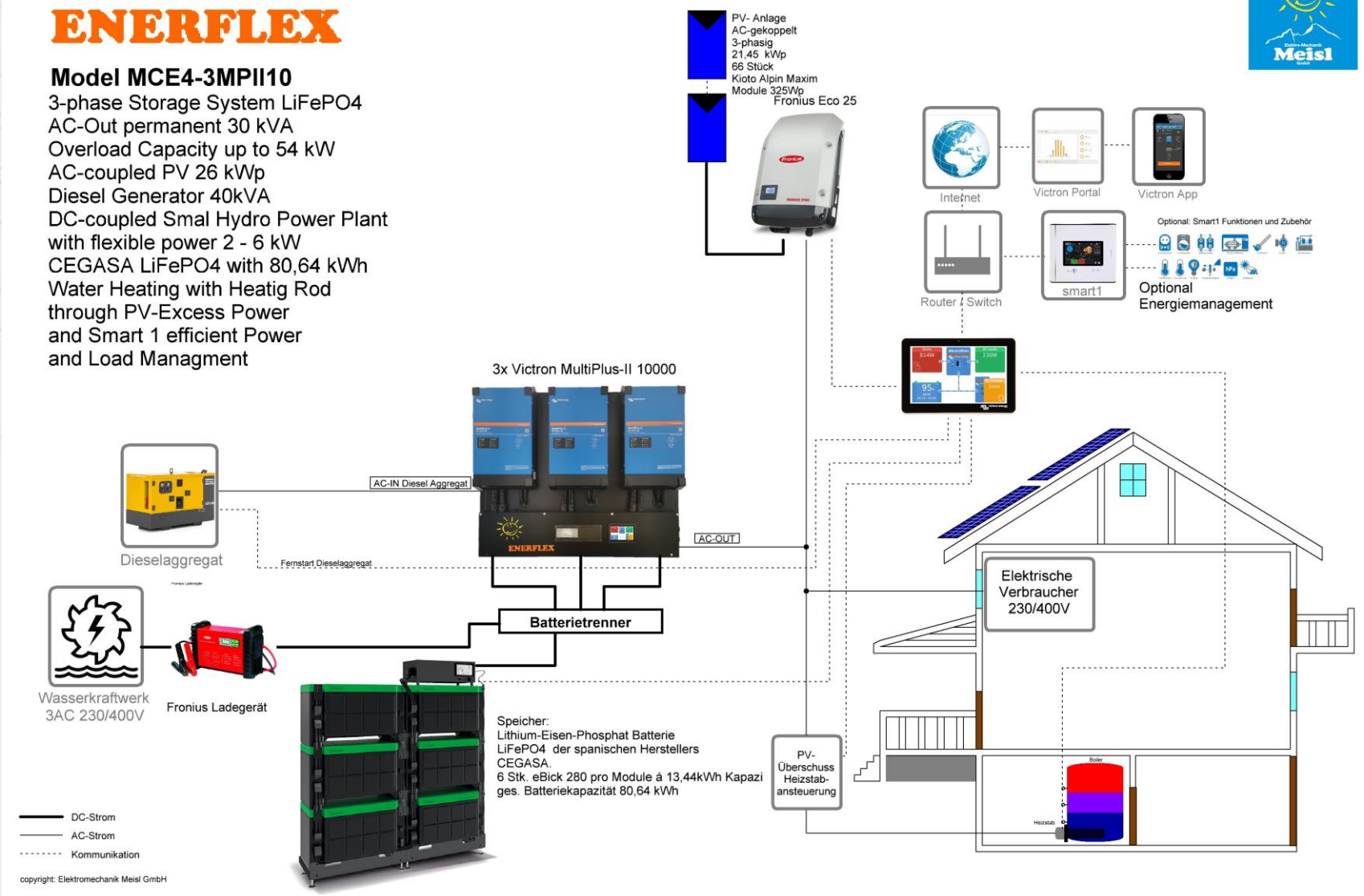
Representation Germany



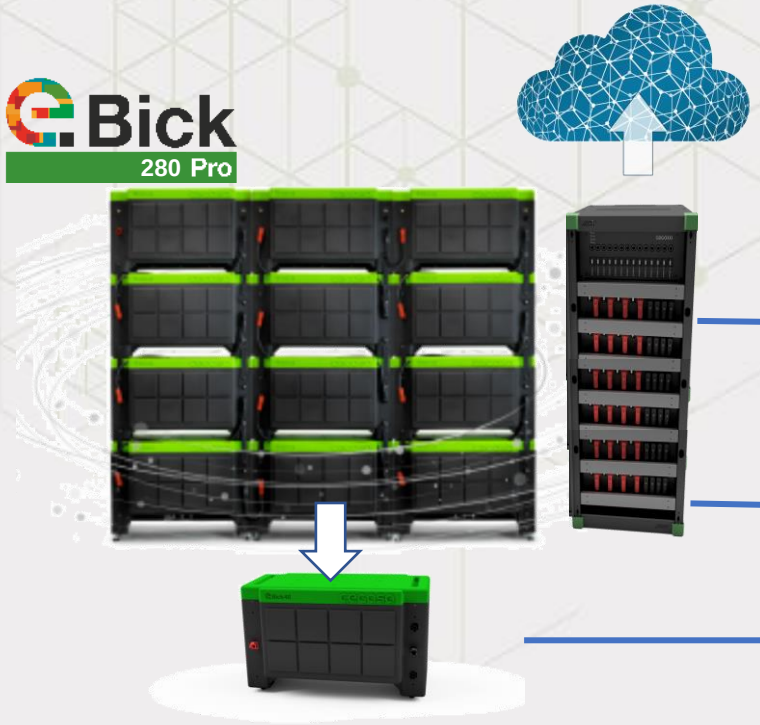
Power Supply Scheme Stoißer Alm

ENERFLEX

Model MCE4-3MPII10
3-phase Storage System LiFePO4
AC-Out permanent 30 kVA
Overload Capacity up to 54 kW
AC-coupled PV 26 kWp
Diesel Generator 40kVA
DC-coupled Smal Hydro Power Plant
with flexible power 2 - 6 kW
CEGASA LiFePO4 with 80,64 kWh
Water Heating with Heatig Rod
through PV-Excess Power
and Smart 1 efficient Power
and Load Managment



Outlook with future innovative products



→ CLOUD-I: Remote connectivity to equipment

→ PROPLUS: Master algorithms improvements

→ PCC-M: New Master/Slave system

→ 160 PRO: New module 57,6V/9,2Kwh

→ TCC v2: New cards with Wireless communication

→ BMS03: Cegasa new BMS with the TCC integrated

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Thank you for your attention

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Rangers HQ Fraser Island, Queensland (Australia)

Who, What & Where

Cegasa Energia
Energy Storage System for a hybrid photovoltaic solar power plant built by Solar Hybrids Pty Ltd for Queensland Parks and Wild Life service
Fraser Island, QLD (Australia)

The Challenge

The application is an off-grid installation to power a group of buildings that make up the Rangers Headquarters in Fraser Island, consisting of bedrooms, offices and auxiliary services.
The most important challenge of this project has been the logistics. Fraser Island is totally sandy without urbanised areas or paved roads. The access to the island is by barge. The main transit via is a beach of more than 100km of length, just passable with 4x4 during low tide

Renewable Solution

The project deploys a power of 81,34 kWp / PV installed on ground, with Containerised Cegasa lithium LFP batteries backup providing 464 kWh (144 Vdc) storage capacity, integrated with three 120V battery inverters of Selectronic.

Project Financing and Costs

Queensland Government (Australia)

Project Outcome

Great example of CEGASA Energy Storage applied to powering remote, off-grid applications with an initial calculation of 80% reduction in the use of diesel.

High ESS for a Mini Hybrid PV Solar Power Plant (Benin)

Who, What & Where

Cegasa Energia
High Energy Storage System for a mini hybrid photovoltaic solar power plant built by SAGEMCOM Energy & Telecom / Sahel Energie Solaire / AEP, for UEMOA (West African Economic and Monetary Union)
Malenville (Benin)

The Challenge

Malenville (Benin) is situated at the border between Benin and Niger where the grid is very underdeveloped and has many problems.
The project consisted in the construction of a photovoltaic solar power plant coupled to the private low voltage grid of the Benin - Niger border post in Malenville, with the aim of powering the Juxtaposed Control Stations of the border post, and having an energy backup provided by the Cegasa's High Energy Storage solution.

Renewable Solution

The project deploys a power of 450 kWp / PV installed on roofs, with Cegasa lithium LFP batteries backup providing 484 kWh (672 Vdc) storage capacity to guarantee the power supply (self-consumption) of the Juxtaposed Control Stations in Malenville (Benin) border post.

Project Financing and Costs

European Union

Project Outcome

The investment in photovoltaic solar power plants with energy storage systems can be the solution for the access to the energy in most of the rural communities all around the world, thus making them easier their development and life conditions.

ESS for Peak Shaving Application Project in New Delhi,India

Who, What & Where

Energy Storage System for Peak Shaving Application
Project built by RAACH SOLAR, for GIZ India
New Delhi (India)

The Challenge

One of the main problems in India is the peak power demand as a reflection of revival of economic activity in the country. “India’s peak electricity demand recorded an all-time high of 200,57 GW” – words of Mr. Raj Kumar Singh (The Union Power Ministry) the 7th of July 2.021.
The project consisted in the construction of a photovoltaic solar power plant with an energy storage system at the ‘Shivalik Grid’ premises of BSES Rajdhani Power Limited (BPRL) in New Delhi to help with the peak power demands (peak shaving).

Renewable Solution

The project deploys a power of 100 kWp / PV installed on ground, with Cegasa lithium LFP batteries providing 466 kWh (48 Vdc) storage capacity integrated with 27 SMA Sunny Island 8.0H inverters, to help with and eliminate peak power demands.

Project Financing and Costs

Germany

Project Outcome

Investing in photovoltaic solar power plants with energy storage systems can be the solution to help with and eliminate peak power demands (peak shaving) in countries where this problem is increasingly common.

High ESS for a Local Energy Community (Crevillente, Spain)

Who, What & Where

Cegasa Energia
High Energy Storage System for a Local Energy Community built by ENERCOOP
Crevillente (Spain)

The Challenge

The project consisted in the construction of a hybrid microgrid plant (off-grid & on-grid) with an energy backup provided by the Cegasa, whose main functionality is energy arbitrage, frequency and voltage control and automatic islanding in case of power outages in an local energy community.

Renewable Solution

The project deploys a power of 117 kWp / PV installed on roofs, with Cegasa lithium LFP batteries providing 242 kWh (672Vdc) storage capacity integrated with Norvento Gridmaster Converter nGm-100-OFFG (100Kva).

Project Financing and Costs

Crevillente Town Hall (Spain), Generalitat Valenciana Government (Spain), IDEA (Spain)

Project Outcome

Great example of CEGASA High Energy Storage system to guarantee the energy arbitrage, frequency and voltage
control and automatic islanding in case of power outages in a Local energy Community.

Next Steps

Design and Construction of Off-grid Energy Communities with Cegasa Energy Storage Systems.