



Microgrids in an era of social disruption

Remote commissioning, monitoring, and control tools to adapt to the current health crisis

Speaker



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1. Company overview

2. Covid-19 impact on the sector
3. Remote commissioning
4. Autonomous control
5. Monitoring platform
6. Use-cases & references
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Elum Energy footprint



- Offices in **Paris, Casablanca** and **Cape Town**
- Expertise in **Monitoring & Control systems for microgrids**, with over **100 sites** already equipped in more than **40 countries**
- High-end hardware integration & reliable software development from **energy control experts** in France
- Strong clients & partners



Our technology applications

Reliable energy monitoring & control solutions for solar & energy efficiency industries.



Power Plants



Telecom



Industry

ePowerControl - Plug & play, reliable and compatible controllers

From PV integration to Power plants control,
a **tailored solution for each application**

A **cost-effective technology**, saving
engineering time from design to operation



High-end hardware integration & **reliable software** development from energy control experts

An **outstanding service level**
from remote assistance to local commissioning

Compatibility - PV power plants

ePowerControl / ePowerMonitor technologies are **compatible with following equipment:**



Non-comprehensive list - contact@elum-energy.com to know if your equipment is compatible

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Covid19 impact on the solar sector

COVID19 (lockdowns) had a severe impact on manufacturing & supply lead times of equipment and materials used in the construction of solar plants worldwide over Q2 2020.

It has caused delays in almost all project phases :

- Plant commercial operations
- Equipment procurement timeline
- Site commissioning

AND it has created new constraints in an already challenging work environment with multiple generation units, remote locations, reliability requirements ...



Manage safe commissioning & operations with Elum controller

In this new context, what are the main challenges that EPCs need to overcome ?

1. **Procurement** : Manage project delivery timeline due to equipment delivery delays
2. **Commissioning** : Ensure proper site commissioning with international travel restrictions
3. **Operation** : Operate sites with local travel restriction and lockdowns
4. **Maintenance** : maintain service quality and troubleshooting / assistance capabilities

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Remote commissioning - How it can help ?



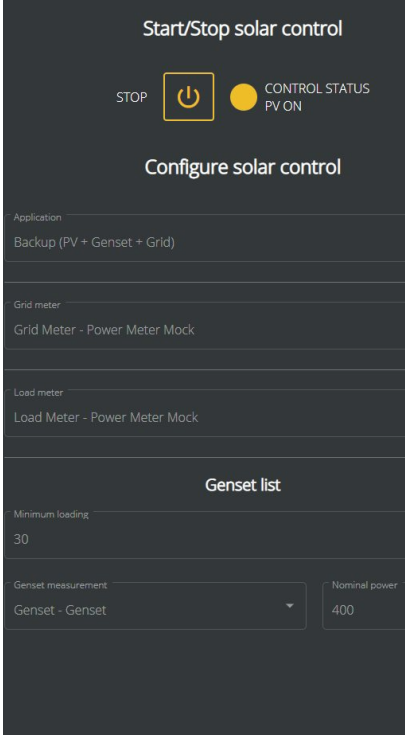
Reducing the number of interactions of people on-site is a priority to all companies due to **social distancing measures**.

Remote commissioning allows you to install the site control system **without having the requirement to ensure on-site travel of an expert** from the technology provider.

Elum technology helps the site operator **successfully commission a site quickly with less workforce involved** :

- Guided local configuration interface
- Remote support from expert for troubleshooting
- Remote assistance through remote control of site controller

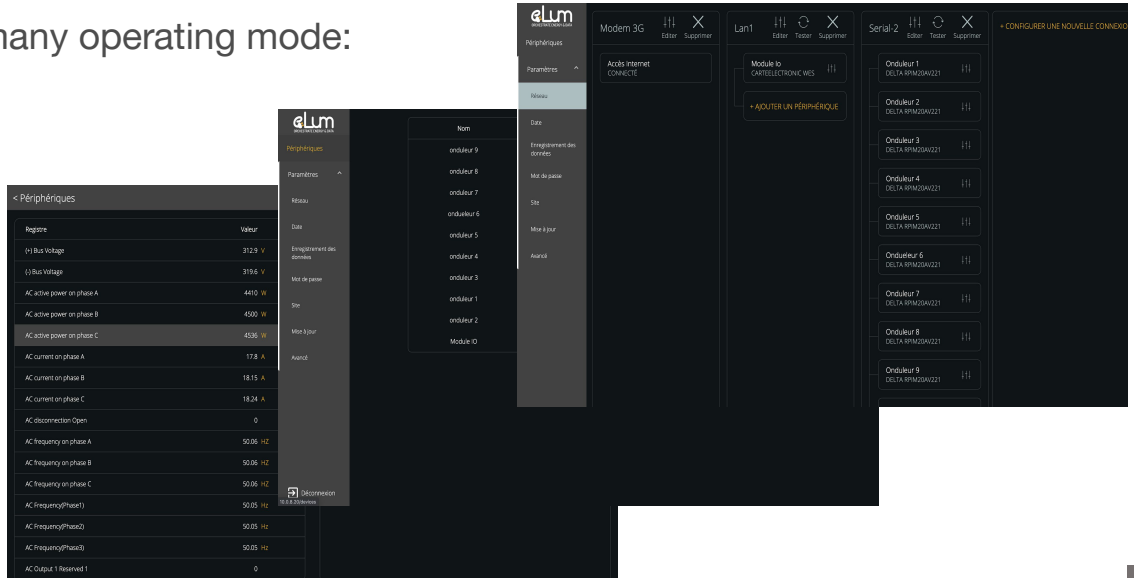
Remote commissioning - How does it work in practice ?



Once site equipments have been wired and configured, **Elum Energy local configuration interface enables you to autonomously commission your plant(s)** and to edit locally your equipments parameters such as PV inverters, BESS, Gensets, meters...

It works with many operating mode:

- grid-tied
- off-grid
- mixed



Remote commissioning of a Solar powered resort in the Bahamas



Caribbean Resort

Bahamas Island - Exuma

PV - 74 kWp

Gensets - 108 kVA

Storage - 80 kWh

Power system complexity : several gensets have to be controlled independently in a system with SMA Sunny Island ESS inverters.

COVID19 has brought necessity of full remote commissioning, which has been a success.

1. EPC Onsite engineers have autonomously commissioned system communication
2. Elum technical team has remotely conducted BESS / genset commissioning tests

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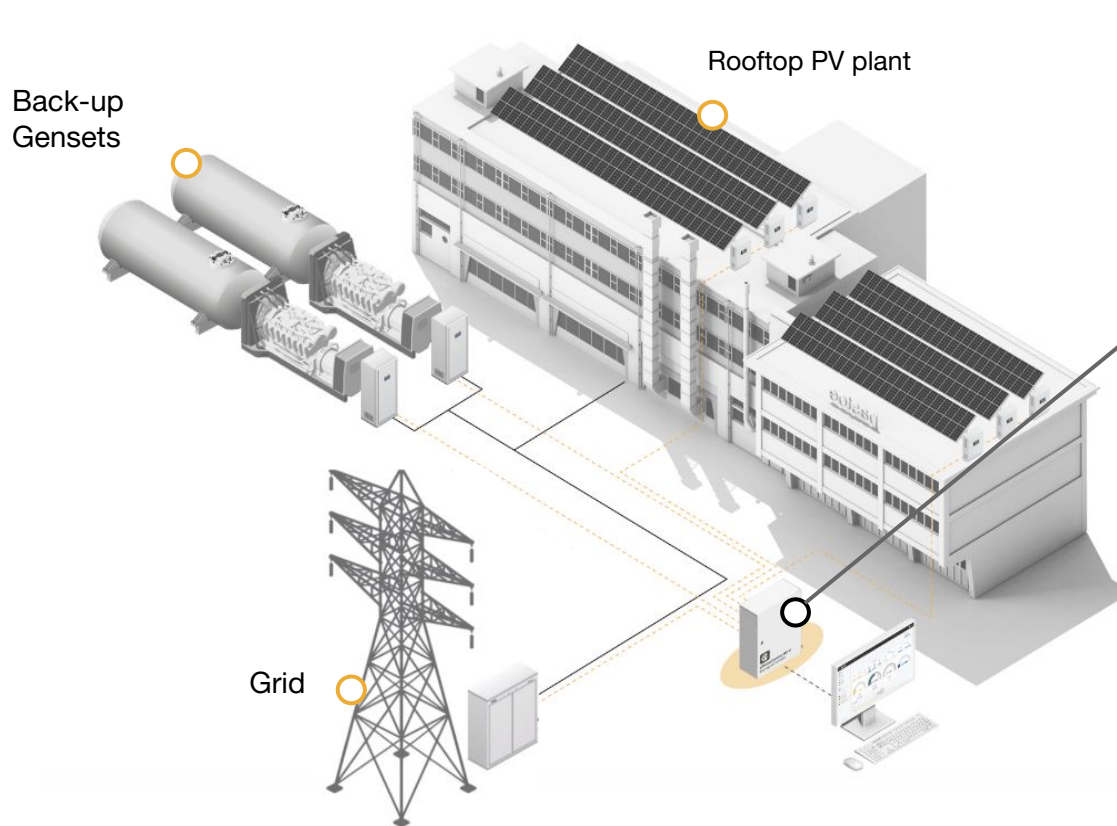
Autonomous control - How does it help ?

Power facilities have to be prepared & resilient to almost all outcomes, therefore reliable & fully autonomous controllers are required to ensure continuous and safe operations, without any presence onsite required. Examples are :

- **Internet connectivity loss** : fully autonomous controller with ability to store plant data for days during connectivity outages
- **Grid power supply loss** : automated curtailment of inverter power output when switching to another power source (genset / BESS)
- **Main power source loss** : PV inverter safe mode through direct com.
- **Equipment communication loss** : automated decoupling of PV plant through relay control



Autonomous control - How does it work?



ePowerControl controller provides autonomous operation

- Solar energy production during an outage while maintaining the gensets minimum loading
- Export limitation to the grid
- Site data & alarms collection
- BESS state of charge management

And many more...

Solar diesel integration on a mall in South Africa



5 star Superspar Mall

South Africa

PV - 360 kWp

Gensets - 559 kVA

Load shedding may involve main power source loss triggering site backup gensets. ePowerControl SD provides safe and autonomous solar integration.

Embedded control system + dedicated UPS **ensure resilient PV curtailment during main power source / grid losses protecting diesel gensets at all times.**

Alongside with the ATS, ePowerControl brings serenity to the EPC during load shedding period, **reducing site visits & onsite interactions with the system**

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ePowerMonitor - How it can help ?



During local travel restriction / lockdown periods, remote site monitoring and control allows for safe and efficient supervision of geographically spread assets, without moving from the control room.

- **Site monitoring:** keep track on plant behaviour through live data feed with graphs and KPIs for each plant equipment
- **Site analysis:** analyse and report site performance through historical data without moving from your desk
- **Portfolio overview:** GIS menu with site status to quickly identify bottlenecks
- **Anomaly detection:** Configure and manage alarms to remotely detect equipment failures and receive automated notification for critical issues requiring onsite intervention

ePowerMonitor - How does it work ?

eLum Home Sites

Total Sites: 165 | Active Alarms: 32 | Sites on alarm: 5 | Offline Sites: 23

STATUS	NAME	LAST SEEN
Alarm	Mine - Madagascar	7 minutes ago
Alarm	Hybrid Power Plant - Nigeria	7 minutes ago
Alarm	Pilot Project - South Africa	9 minutes ago
Online	Building - Ojodu	12 minutes ago
Online	Commercial Building - Kasa	15 minutes ago
Online	Commercial building - Lekki	15 minutes ago
Online	Commercial Building - Saint Denis	15 minutes ago
Online	Commercial Building - Saire Leu	1 hour ago
Online	Demo - Eum Office	1 hour ago
Online	Telecom Tower - Malaysia	25 minutes ago
Online	Telecom Tower - Morocco	45 minutes ago

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eLum Home Sites Admin

MRC Gambia

Solar Inverter Status

Inverter Operating Mode

Inverter	Operating Mode	Details
Inverter 1.2	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 1.1	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 1.3	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 2.3	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 2.1	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 2.2	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 4.1	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 5.1	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 5.2	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 7.1	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 8.1	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 11.1	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 9.2	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 11.2	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 16.1	No info	Information not available (1677200)
Inverter 15.1	No info	Information not available (1677200)
Inverter 15.2	No info	Information not available (1677200)
Inverter 20.1	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 20.2	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 21.1	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)
Inverter 21.2	Waiting for DC start conditions (1393)	Waiting for DC start conditions (1393)

Legend: Waiting for DC start conditions (1393) | MPP (215) | Information not available (1677200) | No info | Stop (281) | Start (1467)

eLum Home Sites Admin

Overview | Solar Inverters | Battery Charger | Battery Charger Old | Alarm Logs | Alarm Settings

enviroearth / Battery Charger -

PCS Apparent Power

PCS Output Voltage

Phase A-B | Phase B-C | Phase C-A

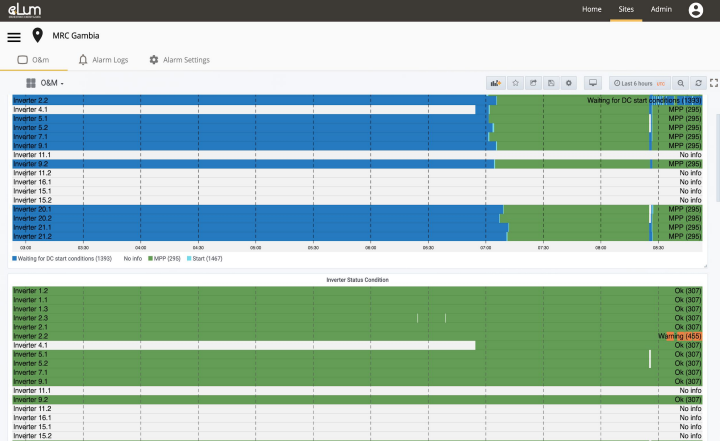
eLum Home Sites Admin

Alarm Logs | Alarm Settings

Edit Alarm

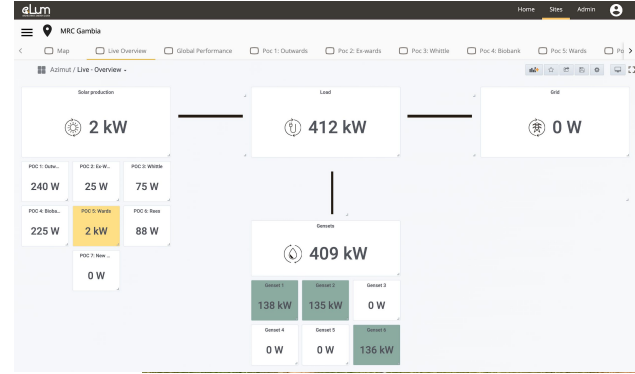
Alarms	Message	Condition	Criticality	Email Notif.
STWarning on inv_18	Low fuel level	STWarning = 1	low	
STFault on inv_8	Fuel level is below 30%	STFault = 1	medium	
STFault on inv_4	Criticality High	STFault = 1	medium	
STWarning on inv_4	Bus Voltage Phase A to B	STWarning = 1	low	
STFault on inv_5	Number of genset starts	STFault = 1	medium	
STFault on inv_7	Genset reactive power phase C	STFault = 1	medium	
STWarning on inv_1	Bus Voltage Phase B to C	STWarning = 1	low	
STWarning on inv_19	Bus Frequency	STWarning = 1	low	
STWarning on inv_19	Genset Voltage Offset A to B	STWarning = 1	low	
STFault on inv_9		STFault = 1	medium	
STWarning on inv_2		STWarning = 1	low	

Solar diesel integration control for UN facility in Gambia



Medical Research Center
 Gambia
 PV - 501 kWp
 Gensets - 6*450 kVA

Context: In this complicated retrofit project, 7 new PV plants were added to the existing 2 PV + Diesel plant (6 DGs). ePowerControl HFS allows there to maximize PV penetration and protect gensets during grid blackouts.



ePowerMonitor is used by the EPC company to reduce site visits :

- Monitor inverter by inverter state to optimize maintenance visits
- Supervise plant by plant (on each building roof) to identify performance ratio bottlenecks
- Alert the operation team in case of critical alarm occurrence

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Thank you for your attention, contact us for any question

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