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# POWERING SMALL COMMUNICATION NODES DURING LONG POWER OUTAGES

Development Experience. Implementation and  
Key Benefits for Critical Infrastructure

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# Problems Faced

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- Unpredictable behaviour during power outages
  - No real time information
  - Unknown remaining battery time
  - Unknown SOC, SOH
  - No remote power control and monitoring
  - Variety of battery types
  - Limited space inside the box
  - No climate control
  - No integration into existing CRM
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# Why A Custom Solution. Pros And Cons.

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## **Pros:**

- All in one solution
- Flexible functionality
- Independence from third-party solutions
- High security level
- Easy integration into existing infrastructure

## **Cons:**

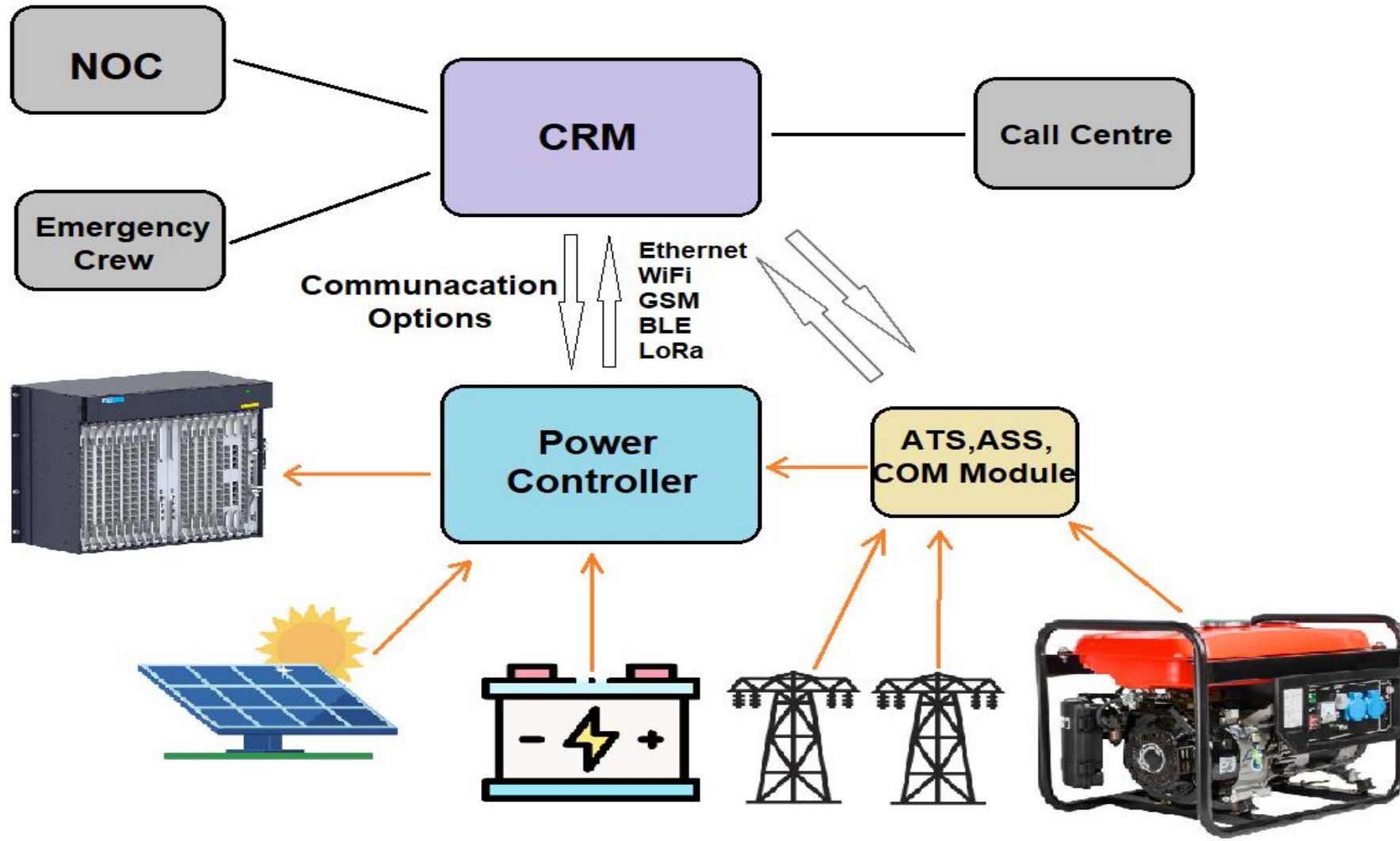
- Long-term development process (design, prototype, live tests)
- High initial investment

# System Design Requirements

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- Real-time control and telemetry aligned with NOC
  - Universal, software-defined power controller
  - Compact size: 136x185x45 mm
  - Battery types: Lead-Acid/AGM/GEL/Li-ion/LFP
  - Cell quantity: 3-16 Cell
  - Stack voltage: 10–80 V
  - Charging current: 0.1 - 40 A
  - Low cost: \$200–250.
  - Fast and easy installation
  - NMS/CRM/Cloud integration
  - Power sources: Grid, Generator, PV, Battery Pack
  - ASSC/ATS functionality
  - Communication Interfaces: Ethernet, Wi-Fi, LoRa, UART, BLE, CAN, RS-485
  - Scalability
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# System Diagram



# Web Interface

PW - Power - devices

PW

PW

PW

PW

Devices

Admin

Пошук ...

укр

Вихневич Юрій

AB/AA

TR

MC

AT

AG

+ device

DEVICE ON: Zhov

LOGS

Controller

Power **ON**

Uptime **7d. 1h. 28m. 39s.**

Input voltage **57.96 V**

Systime **2025.08.14 23:55:08**

Last uptime **22h. 15m. 23s.**

CPU temp **54.2 °C**

System status **ok**

Last offtime **59s.**

Heat sink temp **35.2 °C**

Вхідні дані

Sensors

Charger, **26.1°C**

Input voltage **210.3 V**

Input power **327 W**

Input current **1.62 A**

Total energy **1095 Kw/h**

Battery: **Idle** | **Charging finished**

Cell temperature: Min./Max. **28.85/29.95 °C**, Max. Cells  $\Delta V$  **2 mV**

100%

Voltage: **53.94 V**

Current: **0.00 A**

Power: **0.00 Watt**

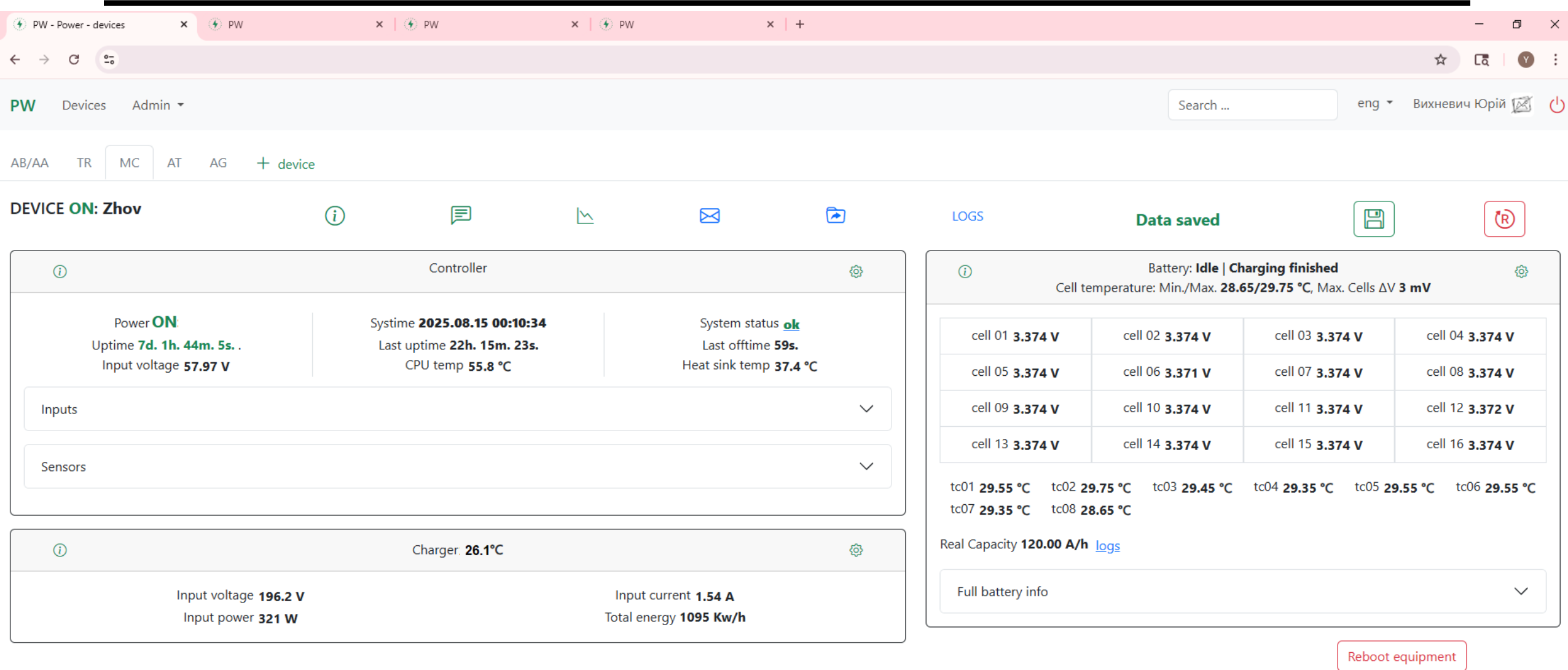
Capacity: **120.00 A/h**

Energy: **6471.60 W/h**

Remaining time: **18h. 10m.**

Reboot equipment

# Web Interface



# Web Interface

PW - Power - devices

PW

PW

PW

+

←

→

↺

⋮

PW

Devices

Admin

Search ...

eng

Вихневич Юрій

⌵

🔌

AB/AA

TR

MC

AT

AG

+ device

DEVICE **ON**: New device

ⓘ

IN 1: Idle

⚙

U: 0.00 V

I: 0.00 A


P: 0.000 Kw

F: 0.00 Hz

E: 1 Kw/h

M: 2h.

Additional info:



Select ☐

ⓘ

IN 2: fault

⚙


U: 0.00 V

I: 0.00 A

P: 0.000 Kw

F: 0.00 Hz

E: 5 Kw/h



Select ☐

ⓘ

IN 3: active

⚙


U: 118.16 V

I: 0.26 A

P: 0.030 Kw

F: 60.08 Hz

E: 1 Kw/h




Select ☒

ⓘ

St: ok

⚙

49.0 °C



U: 13.1 V

Uptime 2m. 1s.

auto ☒ manual

ⓘ

⚙


U: 118.16 V

I: 0.26 A


P: 0.030 kW


F: 60.08 Hz

E: 24 Kw/h



Data saved







# Inside The Box

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# Results And Benefits Achieved

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- Full automatization, monitoring, management and control of node power
- Quick modernization of existing nodes
- Significantly shortened service outages
- Reduced expenses for nodes service
- Extended equipment and battery lifespan
- Increased number of new customers

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# Thank You!

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