

Saskatchewan's First Community-Scale Renewable Microgrid

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EMTF Presentation | April 2, 2025



Land Acknowledgment

Greetings and acknowledgement as we are on Treaty 6 territory and the Homeland of the Métis.

We pay our respects to the First Nations and Métis ancestors of this land and reaffirm our relationship with one another.

We understand the importance of acknowledging the past and embracing a future where Indigenous Peoples and their traditions are valued and supported.

Together, we strive for a more inclusive and equitable business environment that benefits all.

Agenda

- SRC Background
- What's A Microgrid?
- Use Case at Descharme Lake
- Design Considerations
- Expected Results
- Status

src

Proudly serving 1,600 clients across the world.



Overview

SRC is Canada's second largest research and technology organization and has supported industry, government and communities to develop and demonstrate technology around the world for over 75 years.

SRC solves technology challenges for industry, commercializes technologies and tests/validates technologies from one industry to another.



OVERVIEW 2023-24



\$83
MILLION
IN ANNUAL
REVENUE



CANADA'S 2ND
LARGEST RESEARCH
& TECHNOLOGY
ORGANIZATION



1,400
CLIENTS
IN 22
COUNTRIES



MORE THAN
350
EMPLOYEES



OF RD&D
EXPERIENCE

ECONOMIC PERFORMANCE 2023-24



\$15.5
BILLION
IN IMPACTS
SINCE 2003



TOTAL IMPACTS
ON PROVINCIAL
ECONOMY:
\$887
MILLION



IN DIRECT
ECONOMIC
BENEFITS



\$102 MILLION
VALUE OF JOBS
CREATED/MAINTAINED



38-TIMES
RETURN ON
PROVINCIAL
INVESTMENT

Industries we serve

- Environment
- Energy
- Mining
- Rare Earth Elements
- Nuclear



Source: SRC

Energy and Process Solutions

Integrated Energy Systems

- Smart Grid & Microgrid Systems
- Storage & Optimization

Oil & Gas Evolution

- Centre for the Demonstration of Emissions Reductions (CeDER)
- Carbon Capture, Utilization and Storage (CCUS)
- Surface Operations and Novel Technology

Emerging Energy Options

- Small Modular Reactor (SMR) Deployment and Applications
- Hydrogen Systems

Circular Solutions

- Biofuels and Waste to Energy
- Waste Valorization

Climate Adaptation Planning

Efficiency Optimization



Clean Energy



Oil & Gas Evolution



Emerging Technologies

The Catalyst for Your Energy Transition™

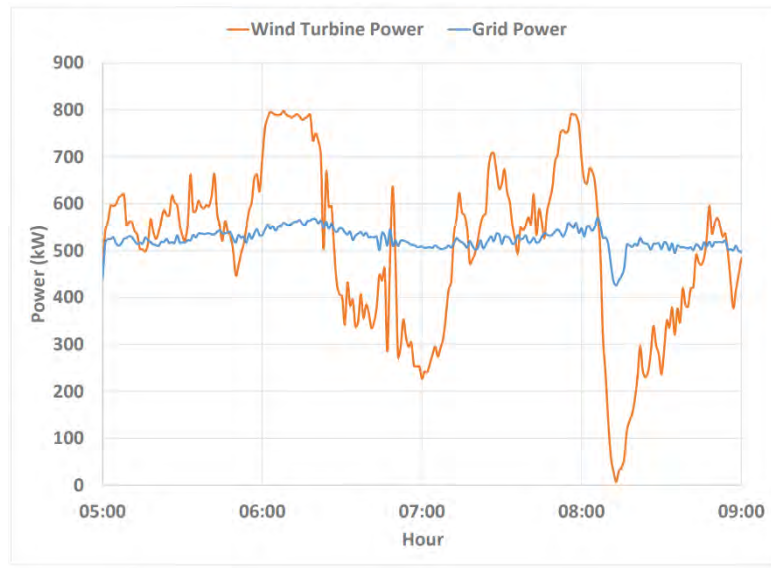


SRC Microgrid Expertise

- Hybrid system design
- Commissioning, operation, maintenance
- Custom monitoring and control
- Remote control, advanced control algorithms
- World's first integrated wind-battery (2013) and wind-solar-battery (2018) demonstrations (owned by Cowessess First Nation)



Source: SRC



Source: SRC



Source: SRC

Resource Assessments and Modelling

- Long-term climate monitoring
- Wind and solar resource assessments
- Customized stations for rugged locations
- Customized sensors



Source: SRC



Source: SRC



Source: SRC



Source: SRC

Remote Microgrid Development

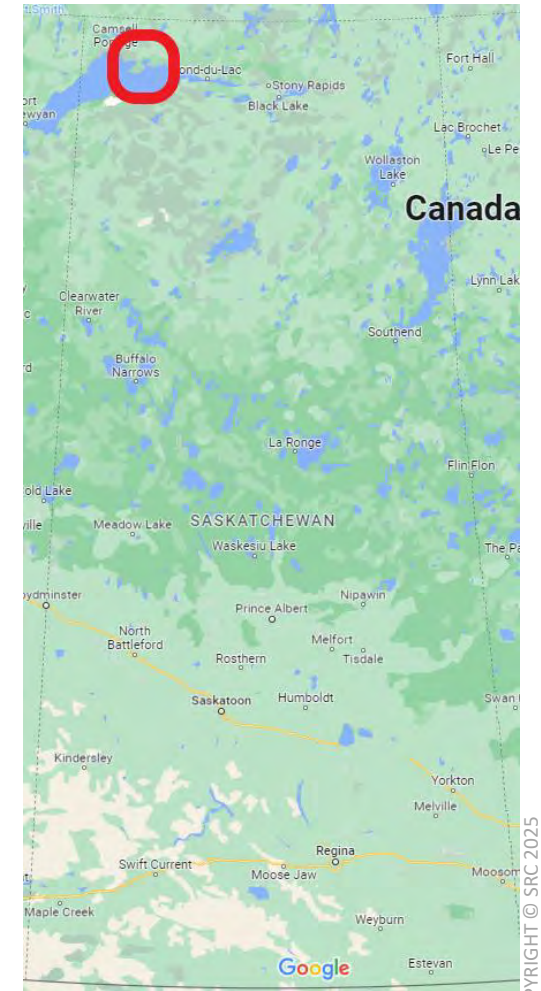
- Integrated solar/battery/diesel systems for remediation site
- Designed, built, ETL certified, installed, and operated
- Reduced diesel consumption by 86%
- Adapted to provide black start capabilities
- Automatic operation with remote override



Source: SRC



Source: SRC



Source: Google Maps

Military and Mission-Critical Applications

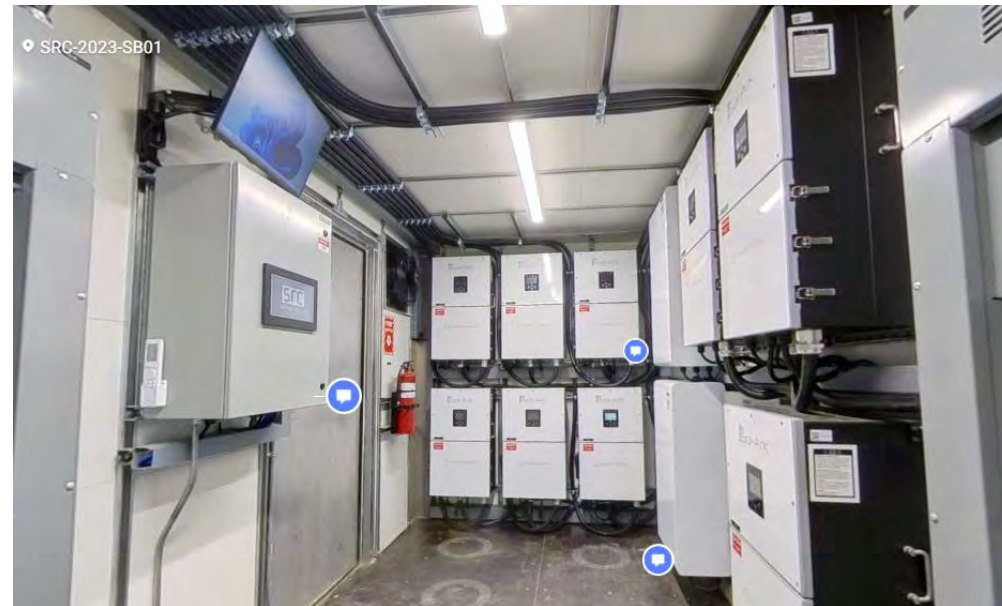
- Award-winning flexible power systems for mission-critical applications
- Designed for difficult terrain and harsh conditions
- Rapidly-deployable
- Ruggedized



Source: SRC



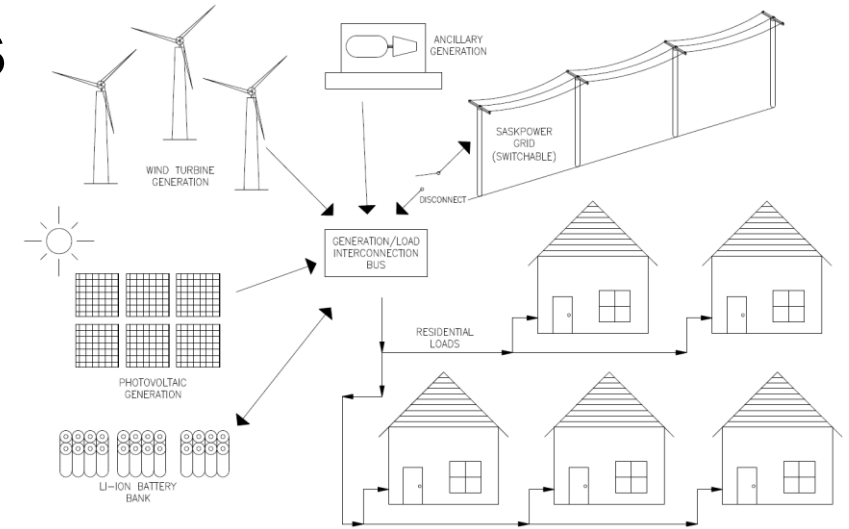
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Source: SRC

Modular Community-Scale Microgrids

- Greater than 75% renewable penetration
- Lithium-Ion/lead acid chemistries
- Redundant diesel generators
- Automated control
- Resiliency throughout (power, internet, etc)



Source: SRC



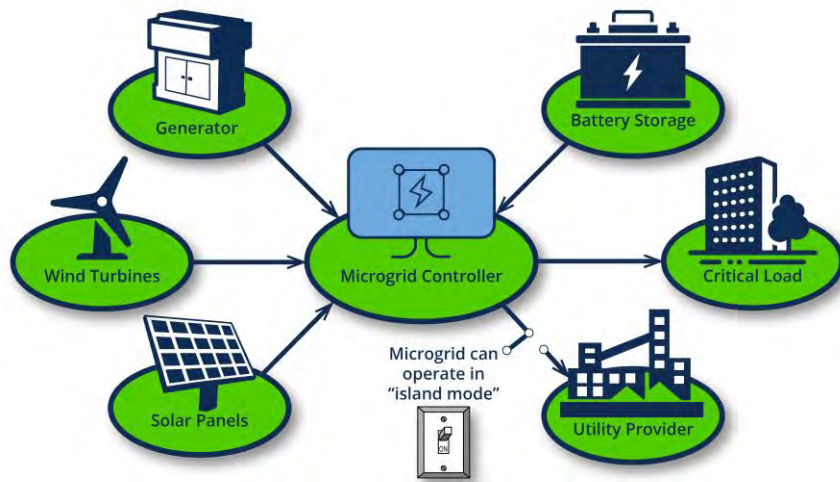
Source: Google Maps



Source: Google Maps

What's a Microgrid?

- A self-sufficient energy system that serves a set of loads within a specific physical area
- Microgrids typically consist of a combination of distributed generation sources, energy storage and advanced control



Source: Mesa Solutions



Source: SRC

Use Case at Descharme Lake

- Edge-of-grid community
- Costly to maintain 14.4 kV line
- 96-km line is scheduled for replacement
- Relatively low usage
- 40 kW peak load
- 75 kW cold load pickup



Source: Google Maps

Preliminary Modelling and Assessment

SRC conducted an assessment for the site in 2023, and recommended:

- 180-kW of inverter/charger capacity
- 492-kWh of energy storage
- 234-kW of photovoltaic generation
- Modular design
- Automated operation with remote accessibility
- Redundant diesel generators for backup

Expected Outcomes

- 85% Renewable Penetration
- GHG Intensity Factor: 213 g / kWh
- Increased Reliability
- Prove out a replicable base system and financial return

Benefits

- ✓ Financially – The Best Option
- ✓ GHG Intensity ↓
- ✓ Reliability ↑
- ✓ Wildfire Avoidance
- ✓ Herbicide and Veg Mngt ↓
- ✓ Customer Experience ↑
- ✓ Indigenous Relations ↑



Source: SRC

Design Considerations

- Maximize renewable generation
- Find balance for lithium-ion storage
- Ensure capacity for load growth
- Backup generators
- Reliable communications / controls
- Efficiency
- Redundancy for all!



Source: SRC

Construction



Source: SRC

Construction



Source: SRC

Construction



Source: SRC

Construction



Source: SRC

Construction



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Construction



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Commissioning



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Commissioning



Source: SRC

Commissioning



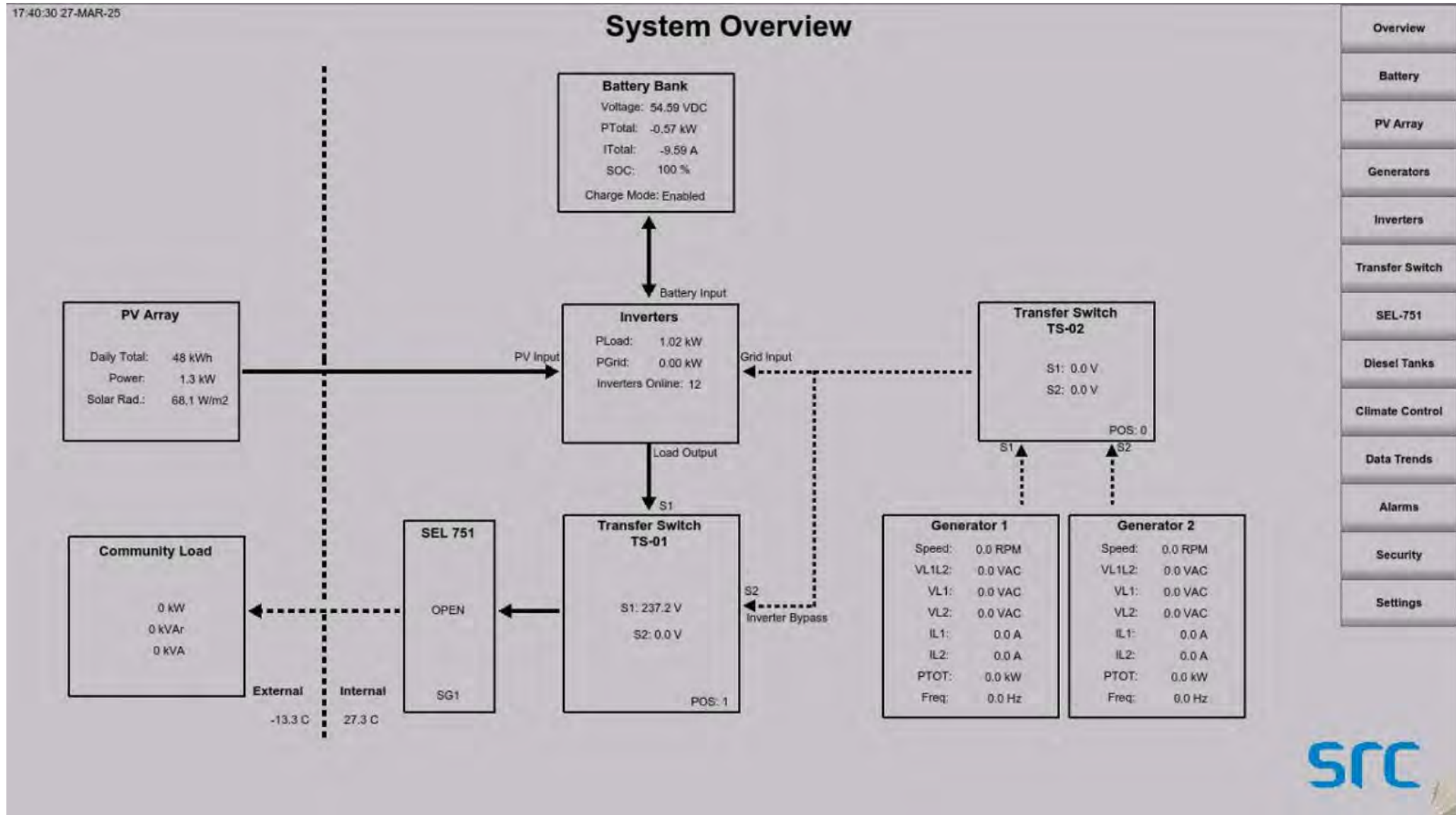
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Commissioning



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Commissioning



Source: SRC

Commissioning

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Generator Control

Generator 1 Mode Select

Auto Mode
Press to Select

Manual Mode
Press to Select

Send to Generator
Send

Message:

Generator 1 Settings

Set as Priority
Selected

Heater
Press to Enable

Generator 1 Status

Active Event	Run State H	Engine Speed	Voltage L1-N	Current L1	Power L1
0x2	0x0	0.0 RPM	0.0 V	0.0 A	0.0 kW
Active Fault	Run State L	Engine Temp	Voltage L2-N	Current L2	Power L2
0xFFFF	0x0	0.0 C	0.0 V	0.0 A	0.0 kW
Warning Map		Internal Temp	Voltage L1-L2	Engine Runtime	Frequency
0x0		8.8 C	0.0 V	0.0 Hrs	0.0 Hz
Fault Map		Heater Temp	Battery Voltage	Total Hours	Oil Pressure
0x0		-0.9 C	12.80 V	112.6 Hrs	0.0 PSI
Mode					
Auto					

Global Settings

Call Source

Inverter

Gen Select
Automatic

Timed Gen Mode
Disabled

Manual Gen Start
Press to Start

Generator 2 Mode Select

Auto Mode
Press to Select

Manual Mode
Press to Select

Send to Generator
Send

Message:

Generator 2 Settings

Set as Priority
Press to Select

Heater
Press to Enable

Generator 2 Status

Active Event	Run State H	Engine Speed	Voltage L1-N	Current L1	Power L1
0x2	0x0	0.0 RPM	0.0 V	0.0 A	0.0 kW
Active Fault	Run State L	Engine Temp	Voltage L2-N	Current L2	Power L2
0xFFFF	0x0	0.0 C	0.0 V	0.0 A	0.0 kW
Warning Map		Internal Temp	Voltage L1-L2	Engine Runtime	Frequency
0x0		12.6 C	0.0 V	0.0 Hrs	0.0 Hz
Fault Map		Heater Temp	Battery Voltage	Total Hours	Oil Pressure
0x0		-0.4 C	12.70 V	93.7 Hrs	0.0 PSI
Mode					
Auto					

Overview

Battery

PV Array

Generators

Inverters

Transfer Switch

SEL-751

Diesel Tanks

Climate Control

Data Trends

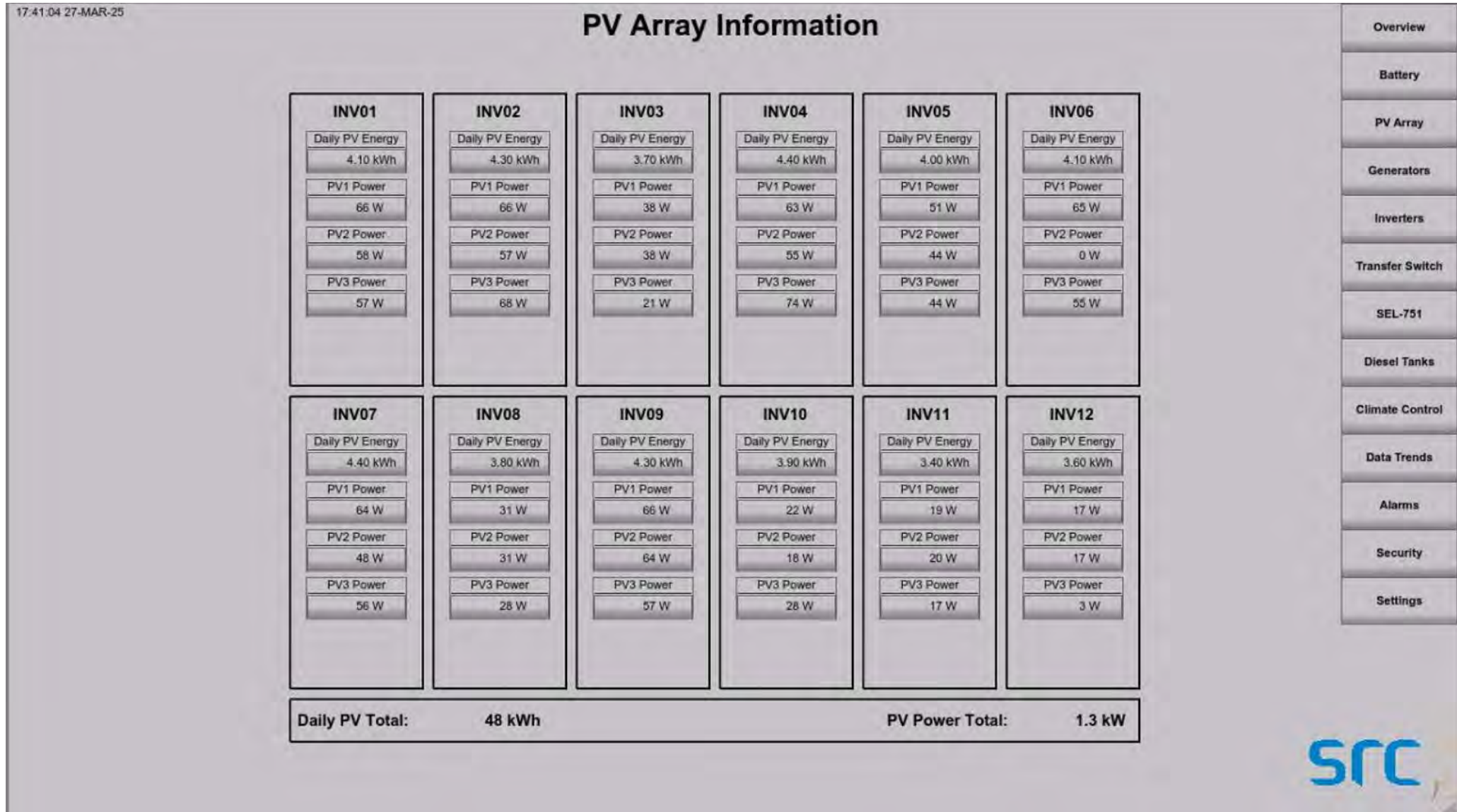
Alarms

Security

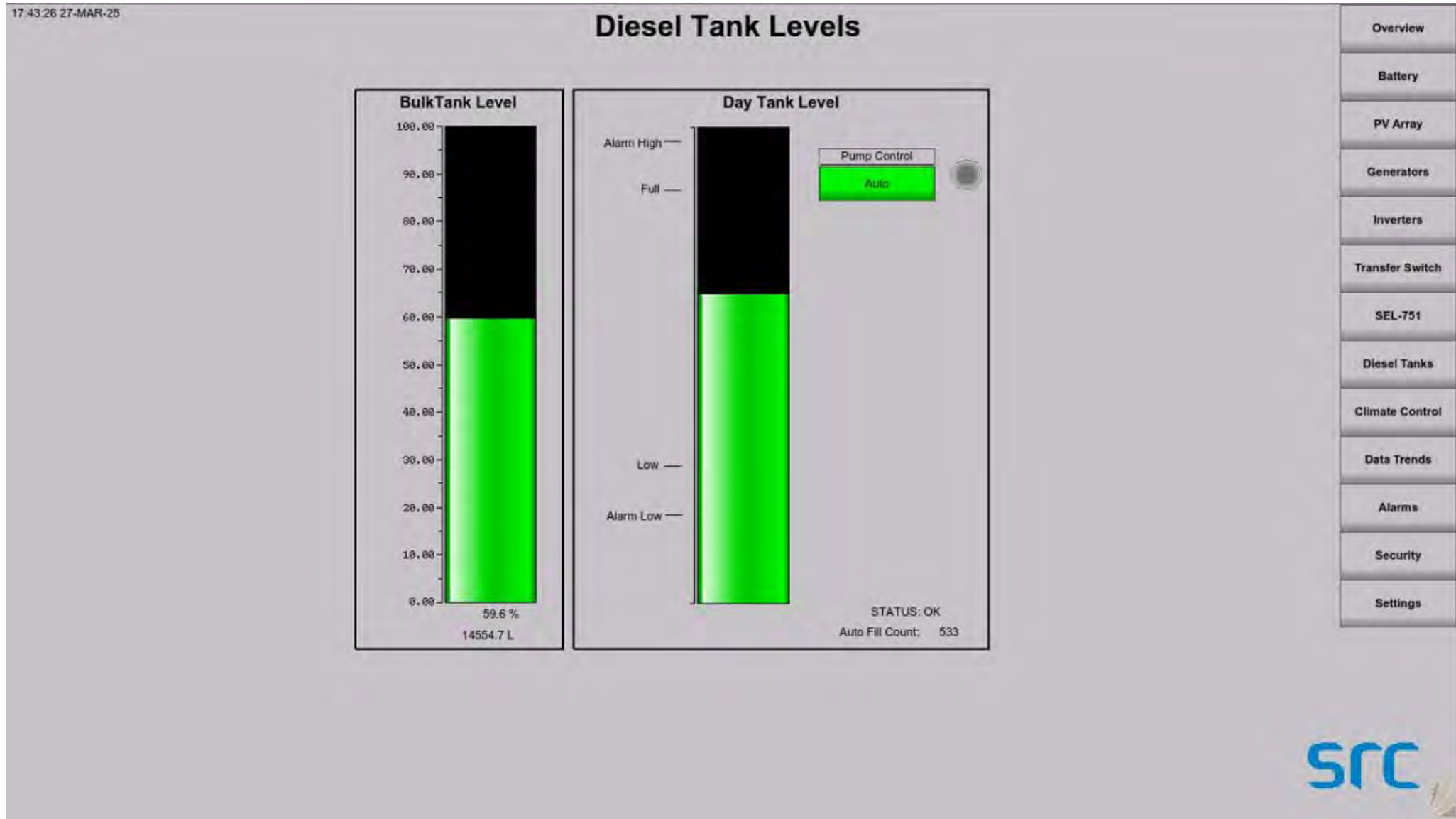
Settings



Commissioning



Commissioning



Source: SRC

Commissioning

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Climate Control

Automatic Mode Settings

Auto Control Enabled	Cold Storage Disabled	Heat Storage Disabled
Cooling Stage 3 45.0 C	Cool Threshold 30.0 C	Heat Threshold -20.0 C
Cooling Stage 2 35.0 C	Cool Store SP 10.0 C	Heat Store SP 30.0 C
Cooling Stage 1 28.0 C	SOC ThreshL 90.0 C	SOC ThreshH 95.0 C
Heating Stage 1 12.5 C		
Heating Stage 2 5.0 C		
Heating Stage 3 1.0 C		

Calculated Cooling: 20.2 C
Calculated Heating: 20.2 C

Top: 30.1 C
Bottom: 24.6 C

Manual Control

Vent Fan 1 Off	HP1 Cool Off
Vent Fan 2 Off	HP1 Heat Off
Diesel Heat Off Exhaust: 2.6 C	HP2 Cool Off
Electric Heat Off	HP2 Heat Off
Vent Close Press to Close	Vent Open Press to Open

Battery Room

Temperature: 27.3 C

Relative Humidity: 9.7 %RH

Dew Point: 9.2 C

FLIR Max: 42.2 Cmax

Generator Room

Temperature: 4.9 C

Relative Humidity: 24.1 %RH

FLIR Max: 7.9 Cmax

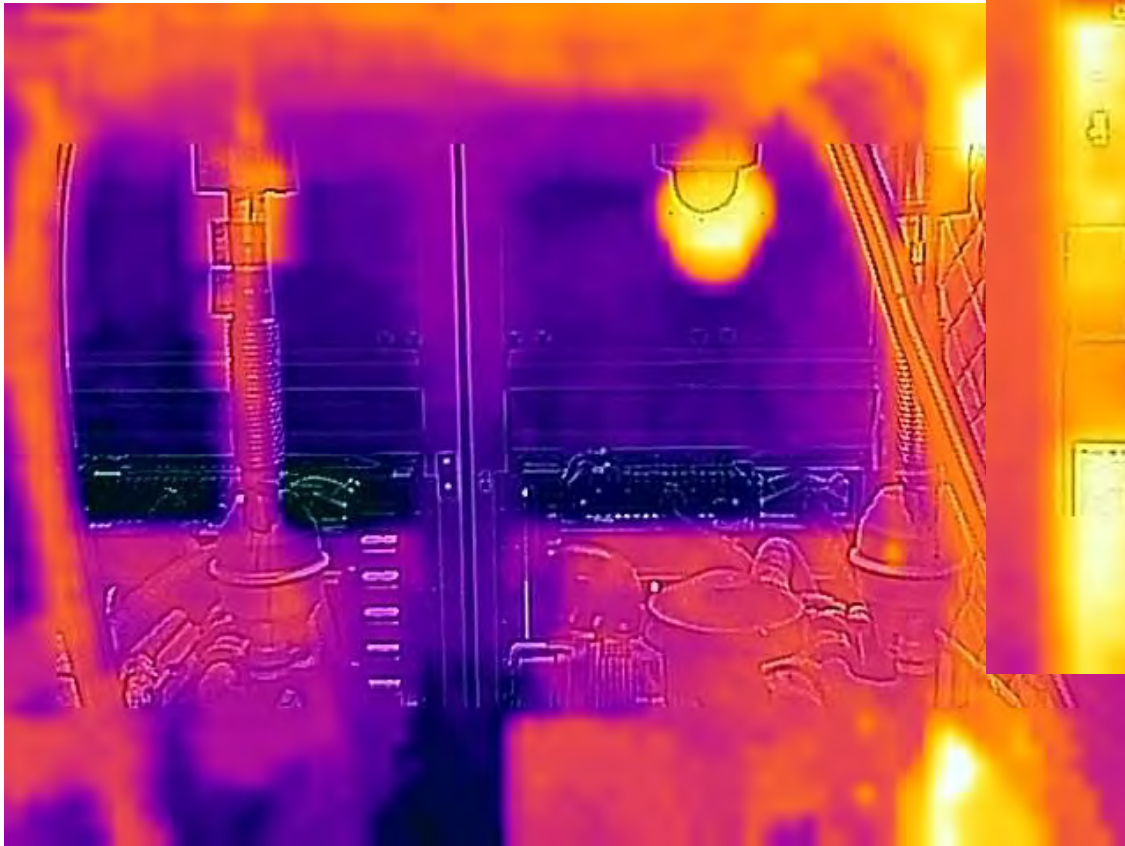
Outside

Temperature: -13.3 C

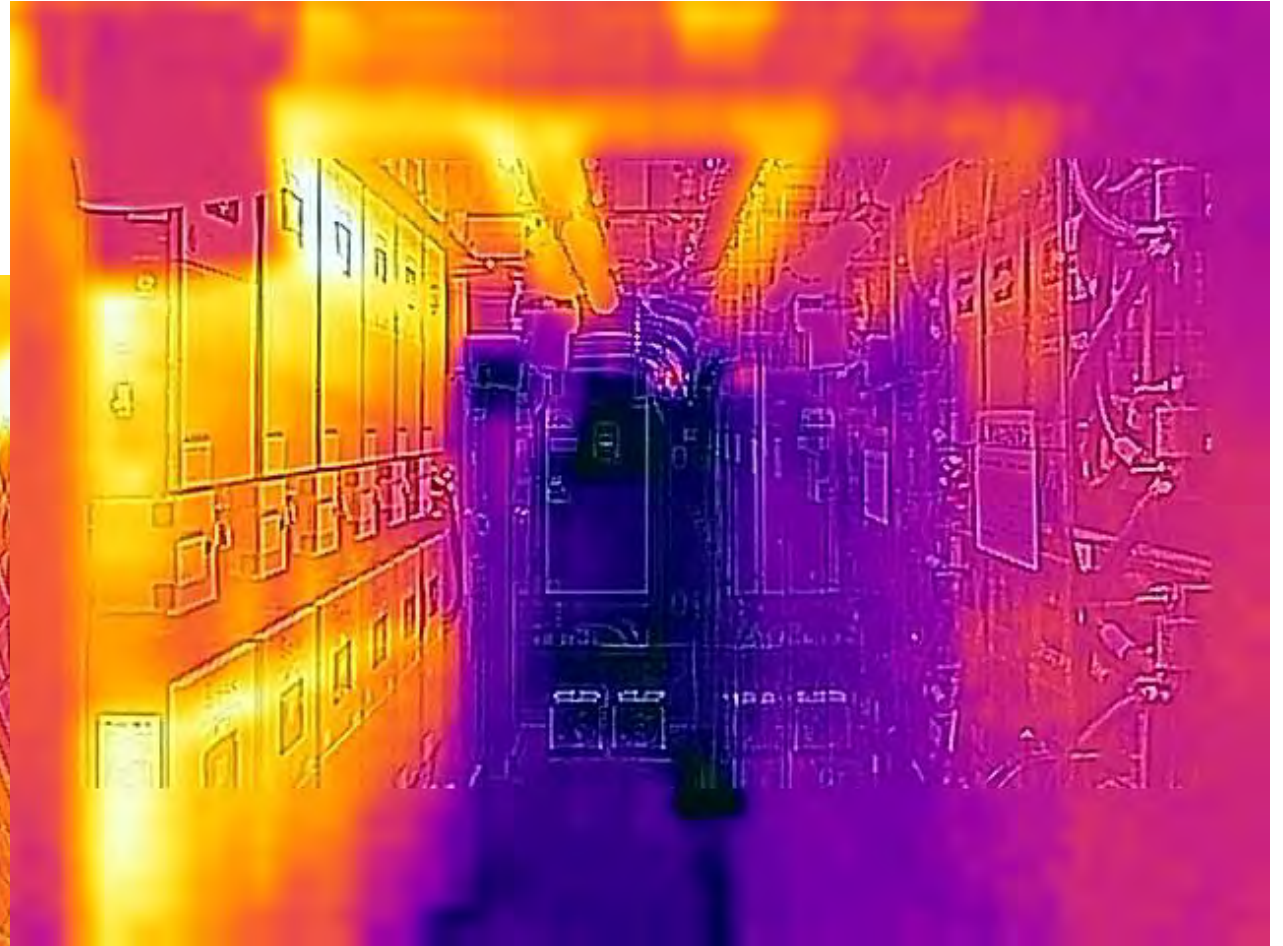
- Overview
- Battery
- PV Array
- Generators
- Inverters
- Transfer Switch
- SEL-751
- Diesel Tanks
- Climate Control
- Data Trends
- Alarms
- Security
- Settings

src

Commissioning

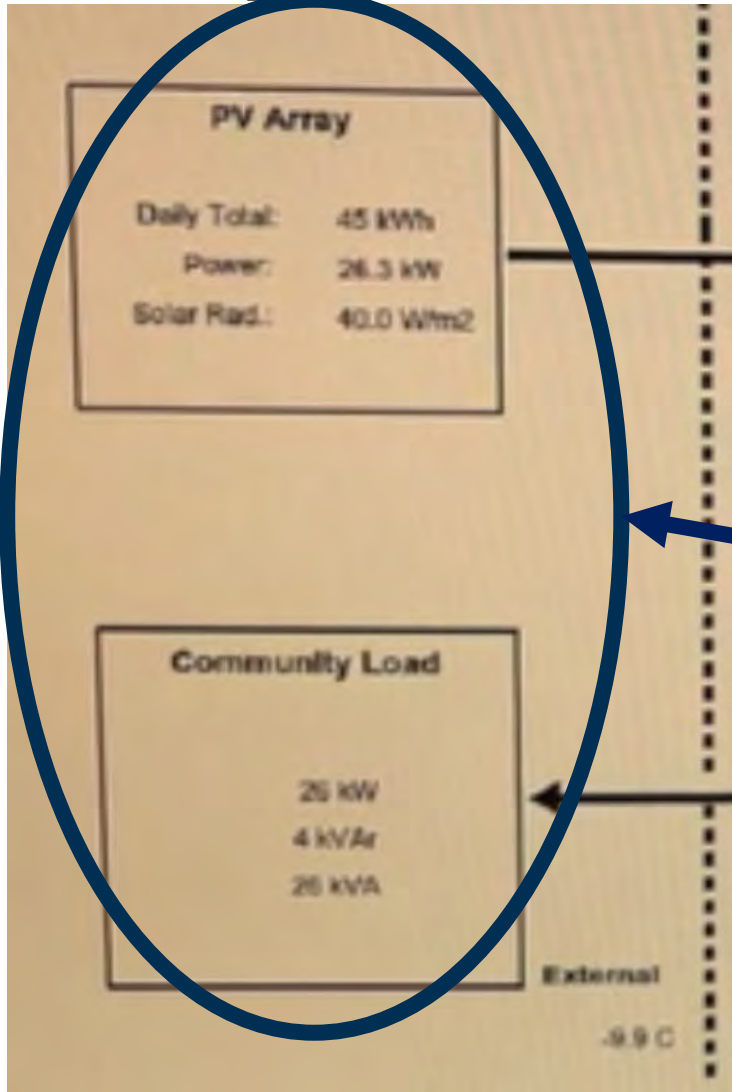


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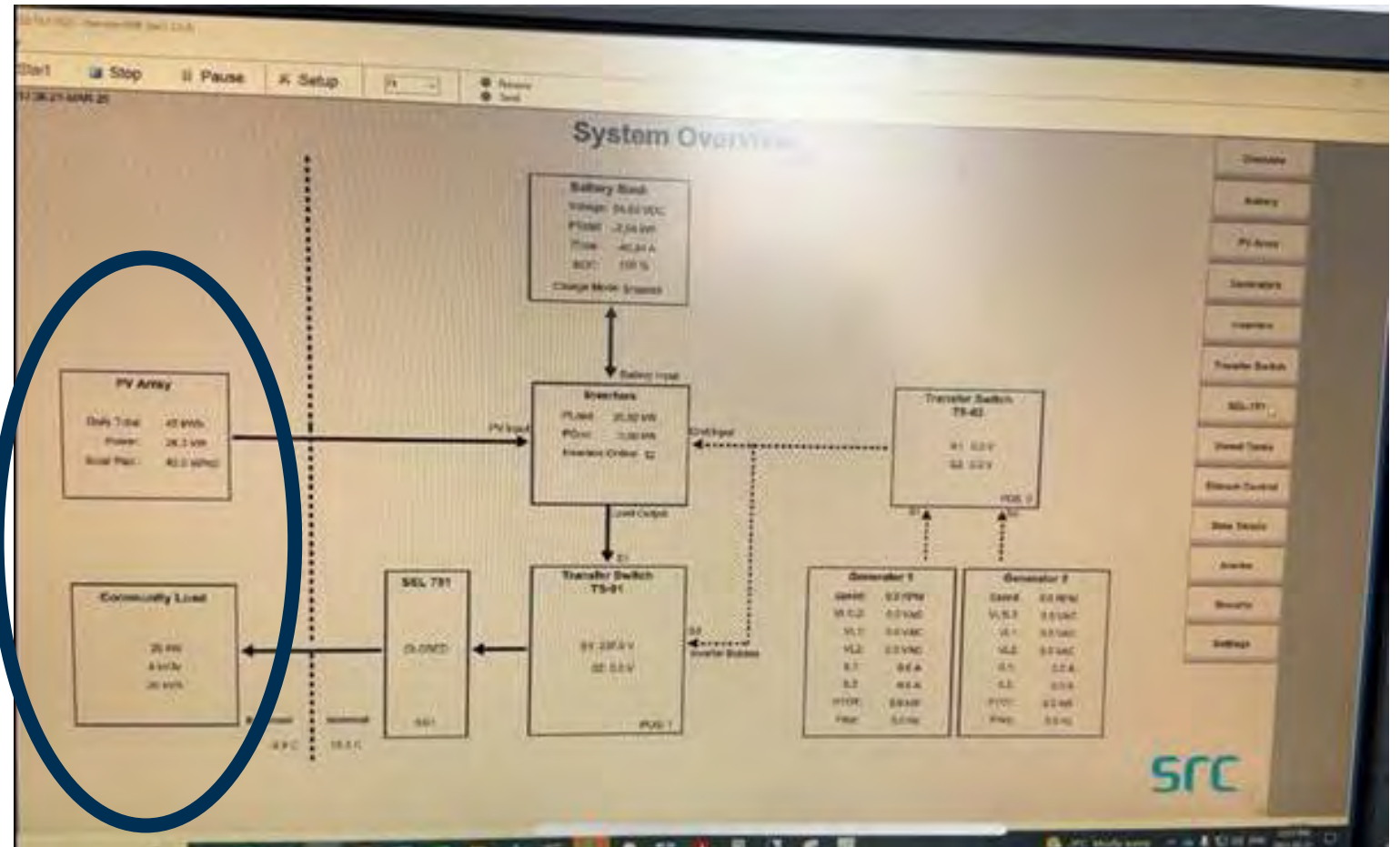


Source: SRC

Operation



Source: SRC



Source: SRC

Next Steps

- Data, data and more data!
- Verify and optimize
- Capitalize on lessons learned
- Look for opportunities to replicate
- Operate / train through the next year



Source: SRC



Questions?

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