



Data Solution for Solar Energy Application



MORNINGSTAR
World's Leading Solar Controllers & Inverters

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About Morningstar...



About Morningstar...

- Located in **Newtown, PA USA**
- Over **four million sold** since 1993
- Sold in over 100 countries, for mission-critical applications
 - Residential and rural electrification
 - Commercial
 - Industrial including telecom, oil & gas, security
 - Mobile, marine, agricultural, much more...
- The “**charging experts,**” with the widest and most diversified product line
- And the **lowest hardware failure** rate in the industry



Overview of Morningstar Solar Applications

- Remote
- Not connected to an electric grid
- No utility company



Rural Electrification



Mobile



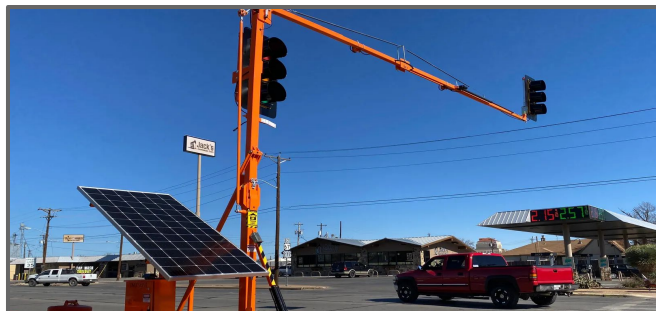
Oil & Gas



Telecommunications



Remote Monitoring



Traffic



Lighting



Railroad

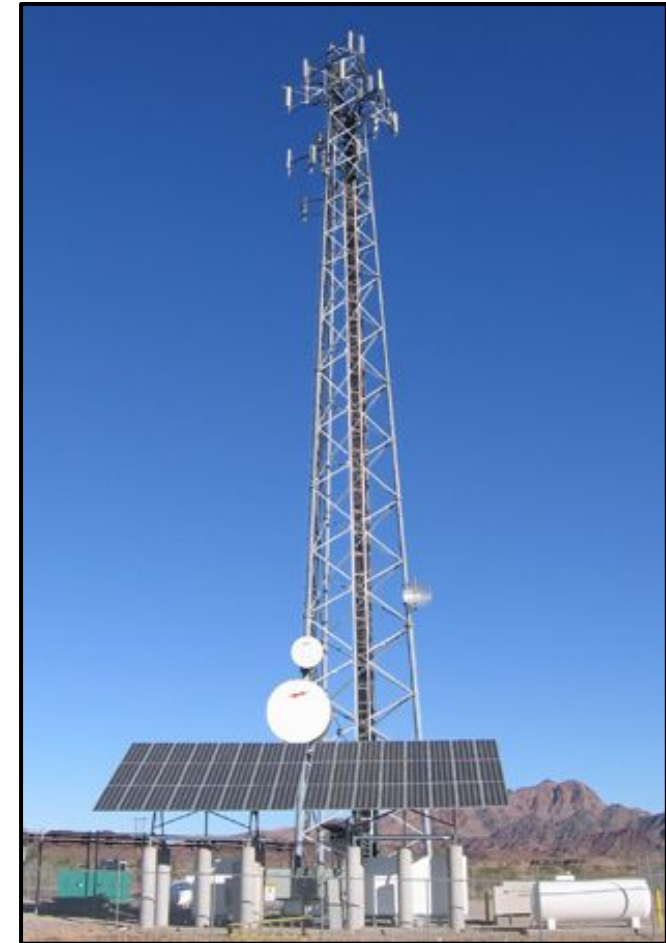
Oil and Gas

Power for oilfield automation, measurement (RTU's), methane injection points.



Telecommunications

- Cellular Base Stations, wireless backhaul links, LMR and VSAT infrastructure.



Small Houses and Rural Electrification

- **Largest, most ambitious rural electrification project in solar history**
- Project will bring access to electricity to nearly one million Peruvians
- Includes over 200,000 DC Energy Boxes 3,000 integrated power systems for community centers

ADDRESSING “ELECTRICAL POVERTY” IN PERU

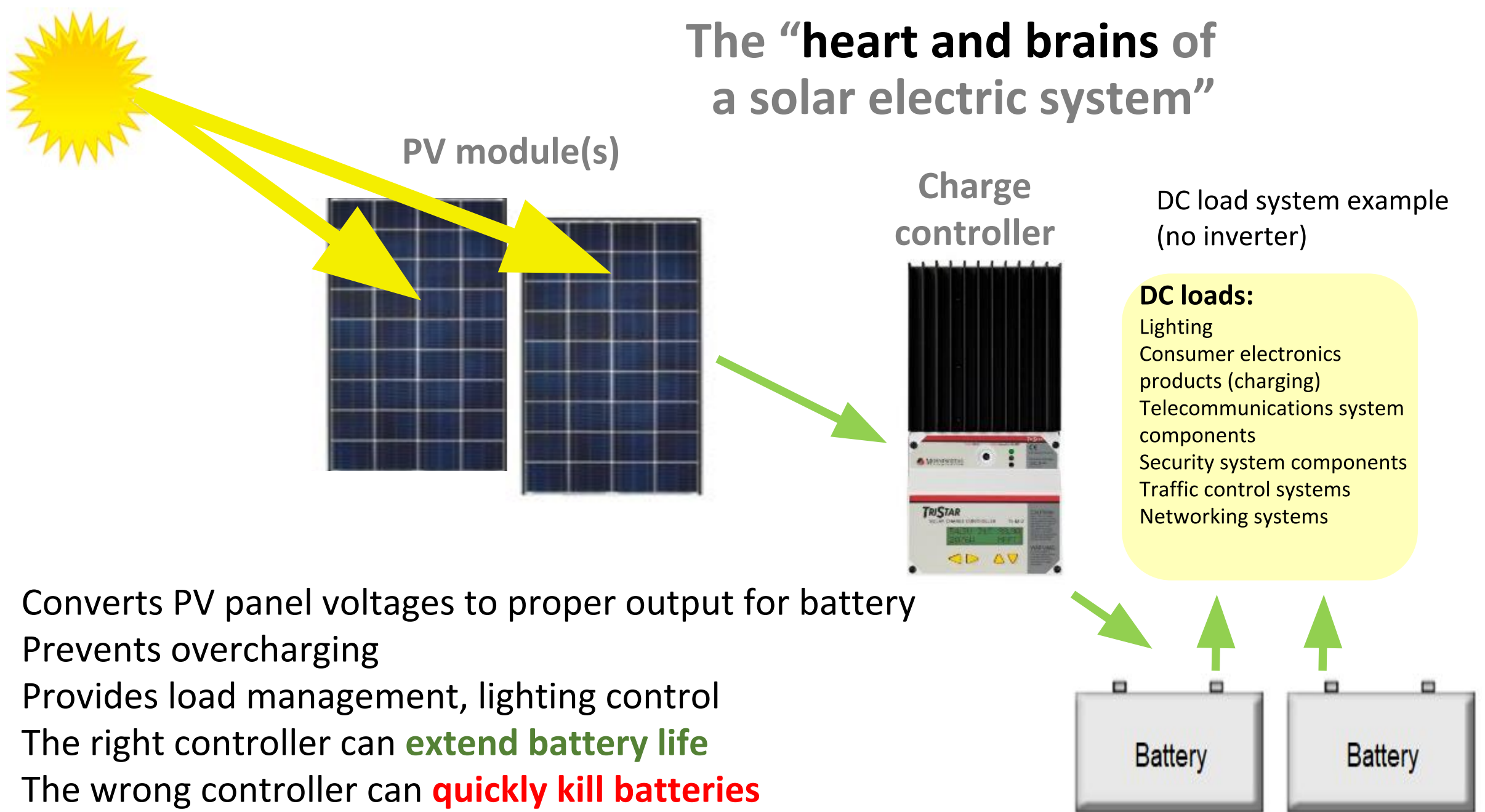


(With Tozzi
Green of Italy)

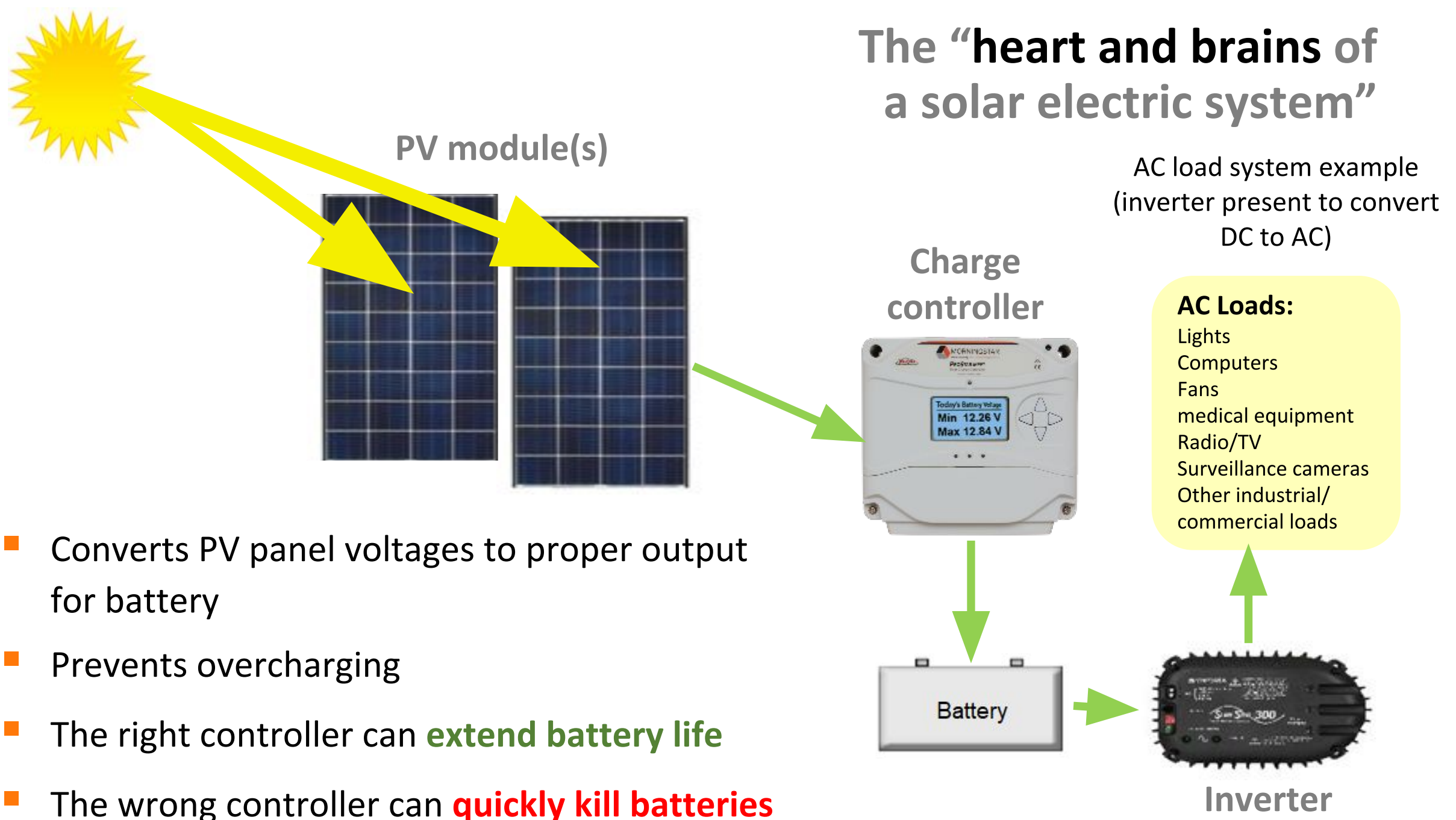
Products and technologies



The “heart and brains of a solar electric system”



The “heart and brains of a solar electric system”



The Leader in Solar Controllers

PWM Charge Controllers

ProStar



TriStar



MPPT Charge Controllers

SunSaver MPPT



ProStar MPPT



TriStar MPPT



**TriStar MPPT
600V**



Inverters

SureSine inverter



MultiWave inverter/charger



Accessories

**Ethernet MeterBus Converter
EMC-1**



Data Solution for Solar Applications...



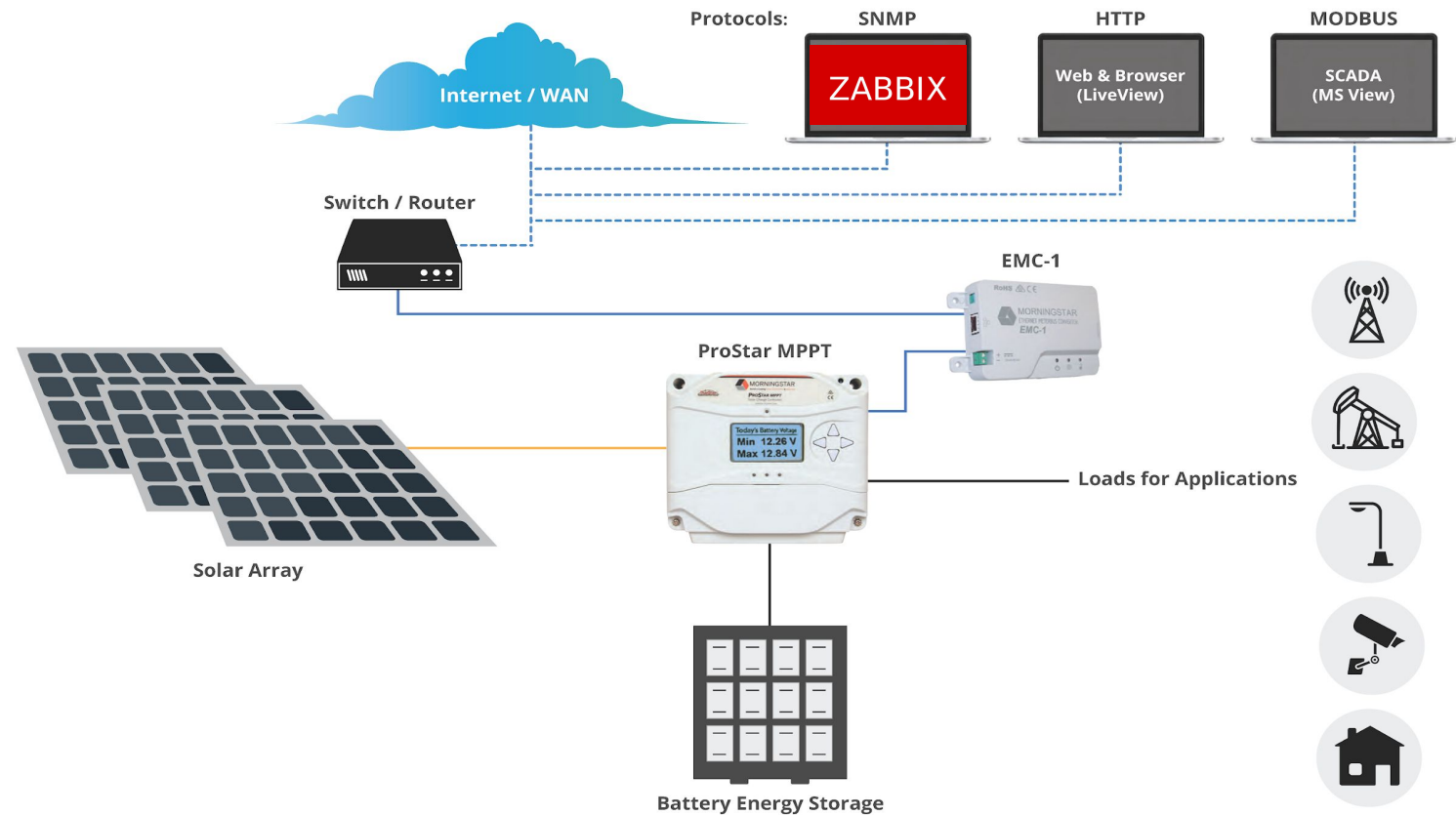
Challenges to remotely monitor solar power sources

- Power for Wireless ISP Infrastructure is a common off-grid application requiring both network traffic and power to be monitored together.
- What monitoring can help us achieve:
 - Measurement of true load consumption in the field
 - Detection and root cause of network outages
 - Ensuring sufficient power at the site to in order to prevent deep battery discharge.
 - Measurement of current system status as well as historical data
 - Ensure system resiliency during low periods of production (winter)
 - Detect anomalies or negative trends during operation that could indicate pending battery failure



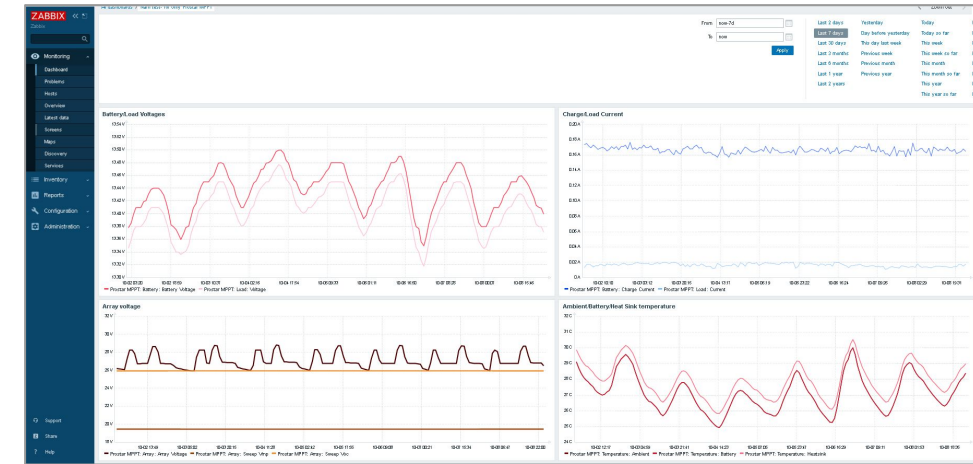
Bringing it all together with Zabbix monitoring solution

- Remotely monitoring a Morningstar EMC-1 adapter's IP connection through the **Zabbix monitoring platform** provides several advantages:
 - Compatible with any packet based network transport
 - Lightweight in terms of bandwidth and overhead
 - Enables use of existing network monitoring infrastructure

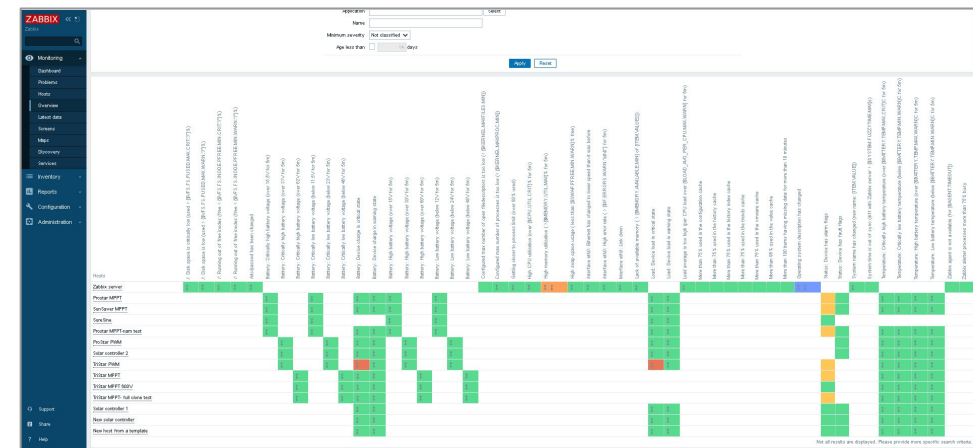


Monitor Morningstar solar systems with Zabbix

- **Native** Morningstar SNMP support
- **Performance visibility** of solar-powered systems. Easily scaled for large deployments.
- **Dedicated templates** for supported Morningstar devices
- Accelerate troubleshooting with **time-series data correlation**
- **At a glance dashboard** status of all Morningstar devices on the network
- **Advanced and custom alerts** triggered by power system events



Monitoring Dashboard for Morningstar devices



View at a glance health status of Morningstar devices

Advantages with Zabbix Monitoring Solution

ZABBIX

Morningstar LiveView

Morningstar MSView

| | | | |
|-------------------------------------|---|---------------|---------------------|
| User Interface | PC-based software or Cloud-based Website | HTML webpage | PC-based software |
| # of connected devices | Unlimited | one at a time | ~ 12 at a time |
| Data Protocol | SNMP, Modbus | HTTP | Modbus IP or Serial |
| Real-time data display | ✓ | ✓ | ✓ |
| Remote Email Alerts | ✓ | ✗ | ✗ |
| Custom alarm/fault notifications | ✓ | ✗ | Only TS-MPPT-60 |

Advantages with Zabbix Monitoring Solution (Cont.)

ZABBIX

**Morningstar
LiveView**

**Morningstar
MSView**

| | | | |
|------------------------------------|---|--|--|
| Data storage capacity | Unlimited Cloud Storage OR limited local server storage capacity | Limited by MS device internal memory capacity | Store Internal Log File downloads on PC |
| Custom logged data interval | ✓ | ✗ | ✓ |
| Download logged data | ✓ | ✗ | ✓ |
| Historical data display | ✓ | Limited by MS device internal memory capacity | Limited by connected PC's memory capacity |
| Multiple site management | ✓ | ✗ | Limited |
| All-site monitoring at a glance | ✓ | ✗ | ✗ |
| Report generation | ✓ | ✗ | ✗ |

Summary

- Morningstar is the global leader to provide solar charge controllers
- Zabbix is a leading provider of monitoring software for networks
- As solar equipment is often used to provide power for remote network infrastructure, integrating data from the network components and power systems into a centralized NMS provides an essential management tool to optimize system health and increase network uptime
- Zabbix adds custom configuration options and valuable data analytics to ensure full system visibility

Thank You

Merci

DANKE

谢谢

Takk

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Спасибо

有り難う

धन्यवाद

Gracias