T4.2-48

Photovoltaic Energy Storage System Solution to Inspection Team

Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

1. Tianjin Lantian Solar Technology Co. Ltd; 2. HOPE Technology Development Co. Ltd; 3. China Arms Control and Disarmament Association

INTRODUCTION AND MAIN RESULTS

As a complete set of emergency power supply solutions, the photovoltaic energy storage system could provide continuous power support for off-grid areas quickly and solving the problem of power shortage at the place of nowhere for OSI exercises and missions.

1 storage-control container and ***N*** solar-power containers to achieve emergency power supply solutions.

Suitable for the energy needs of inspector team, including different categories of OSI equipment and daily accommodation.

SnT 2025 8 SEPTEMBER ONLINE DAY 9 TO 12 SEPTEMBER AT HOFBURG PALACE, VIENNA & ONLINE
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

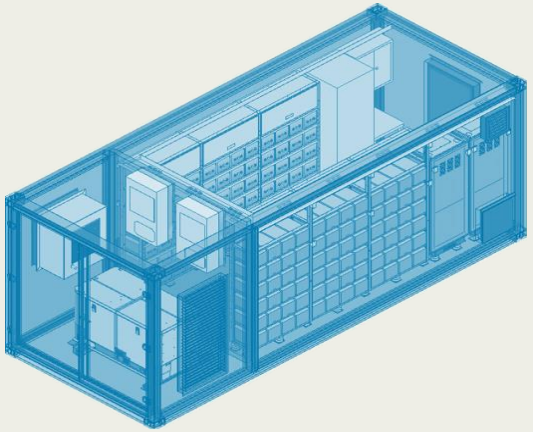
Photovoltaic Energy Storage System Solution to Inspection Team

Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

T4.2-48

Introduction

For the most practical cases, Inspection Team should be self-sufficient in the Inspection Area. From the energy requirement perspective, the inspectors need energy for their daily accommodation support. There are different categories of OSI equipment up to 100 tons, which need electricity supply for normal functionality. This work carries out a photovoltaic energy storage system solution to Inspection Team, which adopts the design concept of "1+N" and consists of one storage-control container and N solar-power containers.



1 * Storage-control container
（50~100 kWh 10-foot CNTR）
（100~400kWh 20-foot CNTR）

Storage-control container

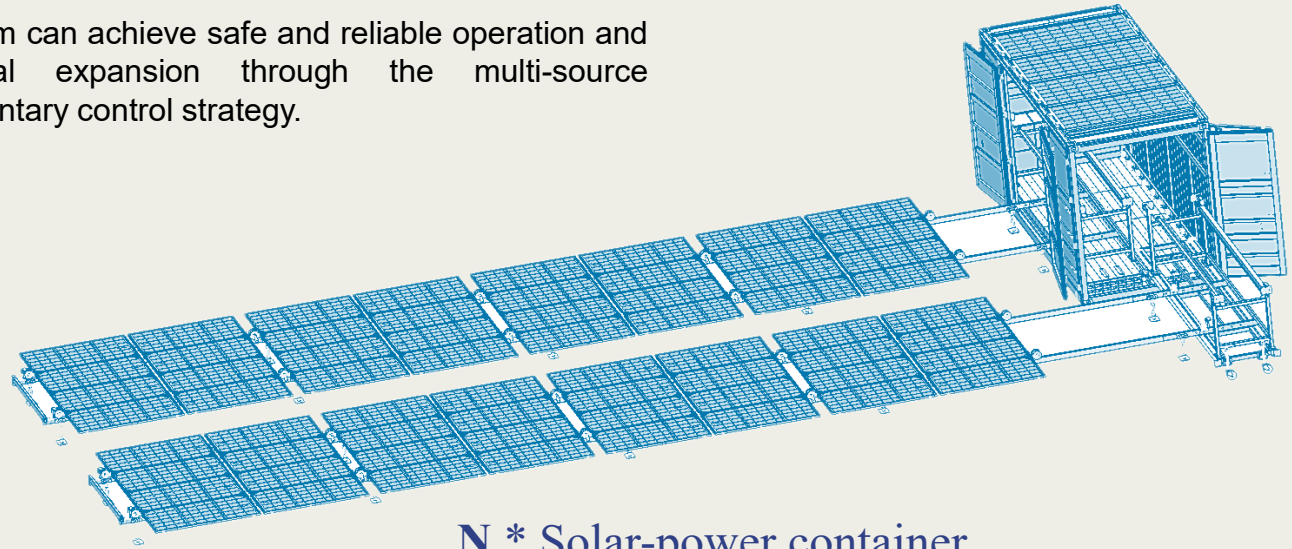
Storage-control container integrates energy storage system, intelligent energy management system, energy storage hybrid inverter, emergency backup power supply and other equipment systems.

The energy storage system uses LiFeO4 batteries, which are characterized by good safety and high specific energy (175Wh/kg).

The system can achieve safe and reliable operation and incremental expansion through the multi-source complementary control strategy.

Solar-power containers

Solar-power containers, as a fast transportable solar ground power station, can realize rapid deployment and installation, which integrates dimension transition folding mechanical structures and high efficiency(23%), light weight flexible photovoltaic modules.



N * Solar-power container
（10kWp 10-foot CNTR）
（20kWp 20-foot CNTR）

蓝天太阳 Lantian Solar Tech.

Photovoltaic Energy Storage System Solution to Inspection Team

Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

T4.2-48

Introduction

As a complete set of emergency power supply solutions, the photovoltaic energy storage system could provide continuous power support for off-grid areas quickly and solving the problem of power shortage at the place of nowhere for OSI exercises and missions. During day time, it would charge the energy storage by sunlight; during the night time, it would charge the OSI equipment for use of the next day. Photovoltaic energy is also a kind of green energy. It's application to the OSI mission is also in line with the United Nations' SDG goals.

Taking 20-foot containers as an example, the photovoltaic power generation capacity can reach 20kWp/80kWh/CNTR/Day, and the maximum output capacity can reach 200kW/400kWh/ CNTR. Through the combination of multiple containers, the photovoltaic power generation capacity of 10kWp~100kWp, energy storage capacity of 50kWh~500kWh, output power of 25kW~300kWh can be achieved.

蓝天太阳 Lantian Solar Tech.

SnT 2025 8 SEPTEMBER ONLINE DAY 9 TO 12 SEPTEMBER AT HOFBURG PALACE, VIENNA & ONLINE
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

Photovoltaic Energy Storage System Solution to Inspection Team

Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

T4.2-48

Objectives

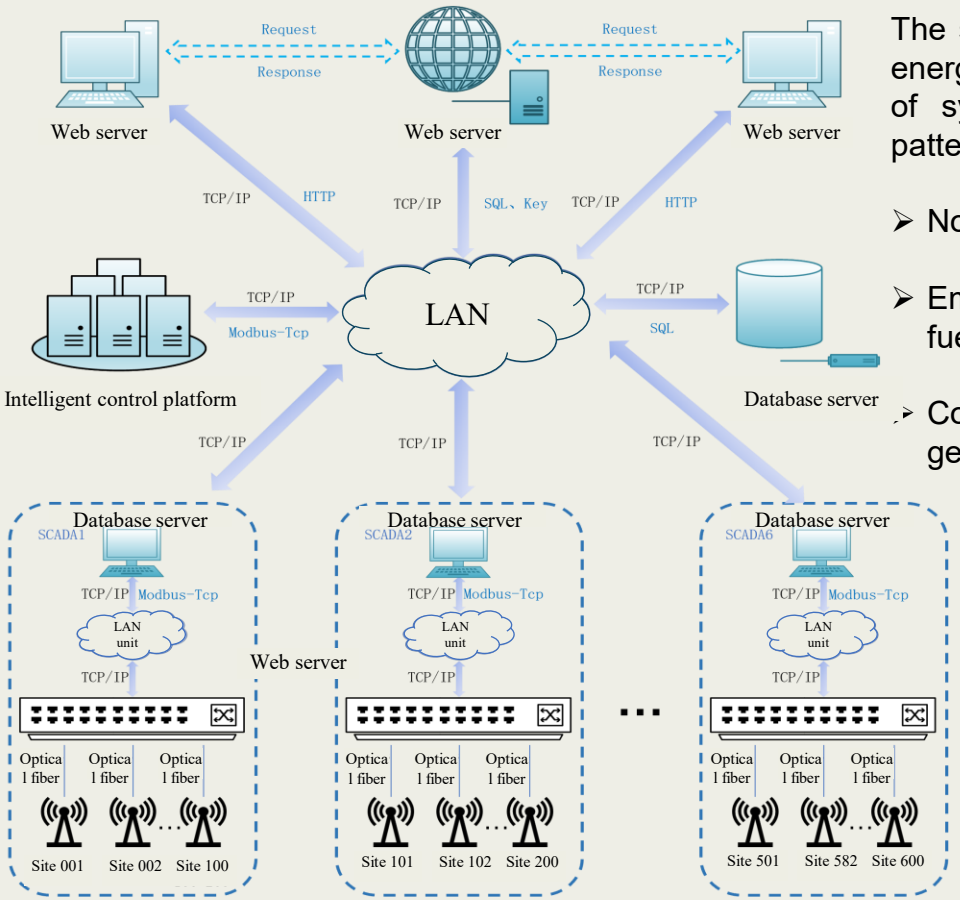
Sufficient power support for the normal functioning of various OSI facilities such as bases, command centers, detection equipment, and the basic requirements of the dairy life and the OSI operations.
Suitable for field camp life power supply and large-power emergency power support in various application scenarios.

Adapt to a variety of terrains, including mountains, plains, and islands, with deployment and retrieval time of less than 1 hour for 6 people.

Realize semi-automated/ automated rapid deployment and retrieval operations through modular containers and dimension transition folding mechanical structures.

Additionally, the system can adopt a highly mobile transportation method by vehicle, enabling rapid transfer and cyclic reuse among multiple sites.

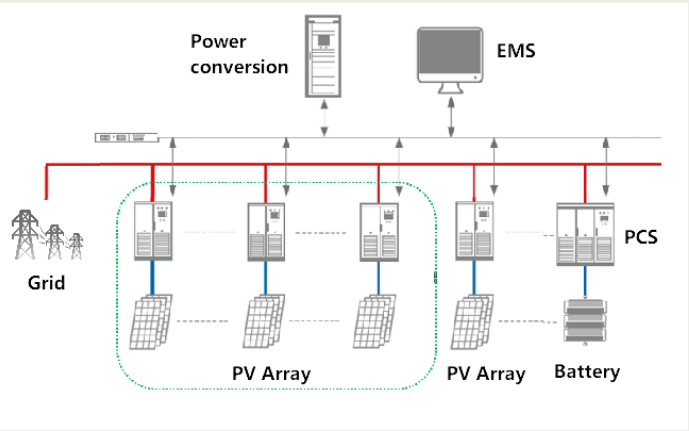
Easy to achieve safe and reliable operation and incremental expansion.
Unmanned station.



Methods/data

The system realizes the operation of photovoltaic, grid, energy storage integration, and can realize multiple sets of systems. The system has a variety of working patterns.

- Normal mode of electricity or fuel power generation.
- Emergency mode after the power failure of the city or fuel.
- Comprehensive energy model for electricity or fuel generation and new energy and storage.



蓝天太阳 Lantian Solar Tech.

Photovoltaic Energy Storage System Solution to Inspection Team

Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

T4.2-48

Methods/data

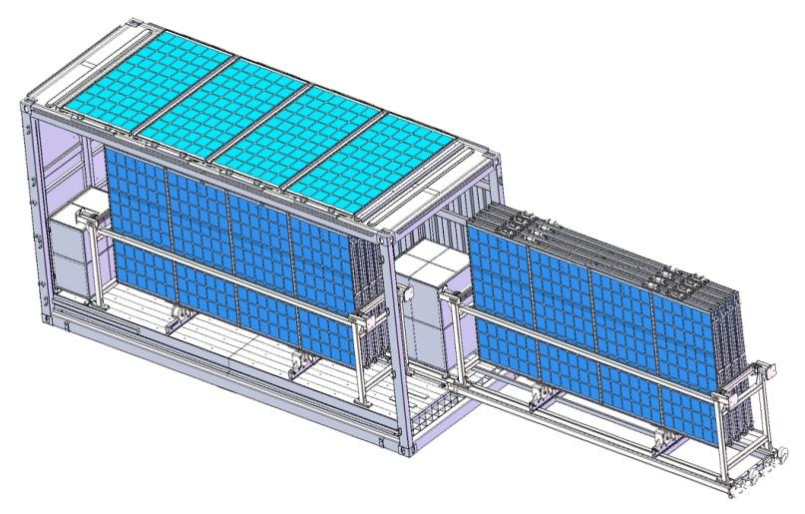
As a fast transportable solar ground power station, solar-power containers can realize rapid deployment and installation with high efficiency(23%), light weight and flexible photovoltaic modules.
The photovoltaic array is grouped by the lightweight PV modules and the common single crystal silicon lightweight PV modules that are integrated at the top of the container.

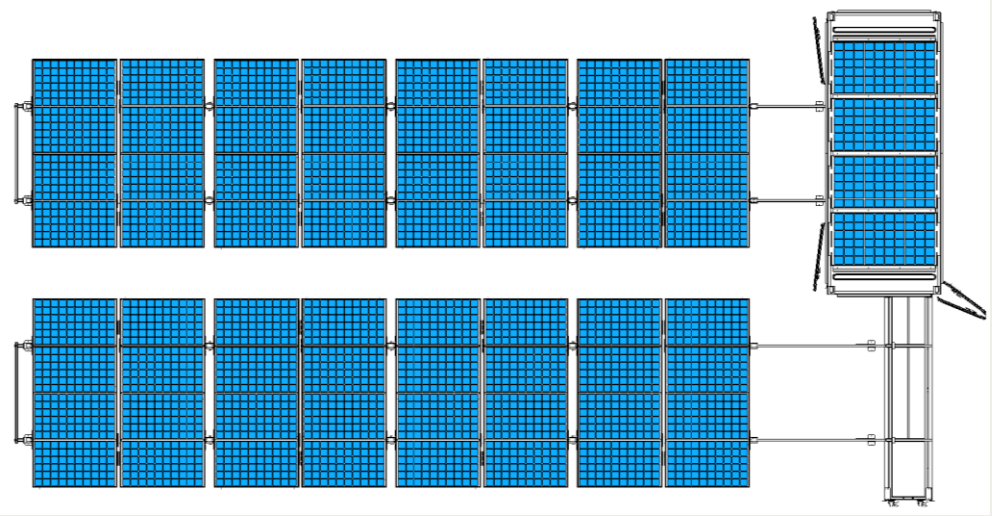
Performance parameters of lightweight PV Module

Product performance	Parameter
Power	330W
Voltage	33V
Conversion efficiency	20%（AM1.5, 1000W/m^2, 25℃）
Size	1645mm*1000mm*3mm
Weight	8kg
Operating temperature range	-40℃ ~ +65℃

Performance parameters of common PV Module

Product performance	Parameter
Power	560W
Voltage	43V
Conversion efficiency	20%（AM1.5, 1000W/m^2, 25℃）
Size	2279mm*1134mm*35mm
Weight	28kg
Operating temperature range	-40℃ ~ +65℃





蓝天太阳 Lantian Solar Tech.

Photovoltaic Energy Storage System Solution to Inspection Team

Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

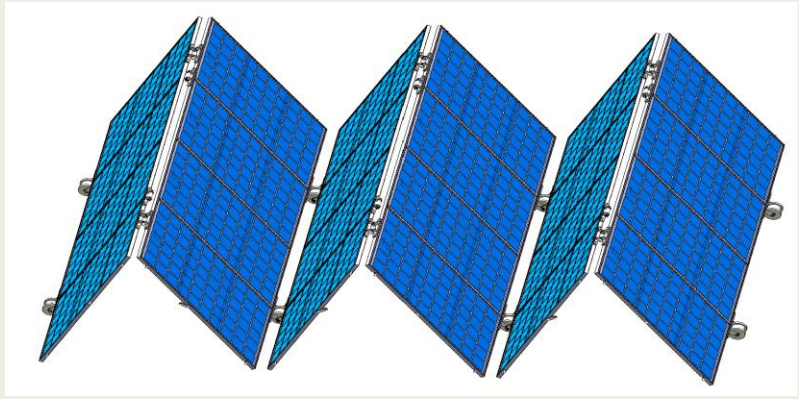
T4.2-48

Methods/data

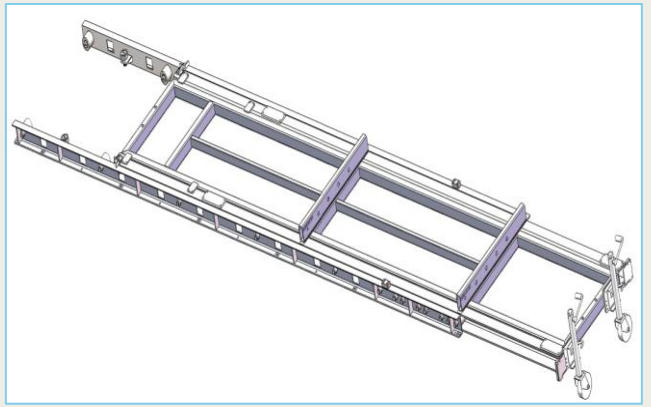
The solar power container is used to carry photovoltaic modules and mechanical structures. The system adopts the dimensional transition folding mechanical structure, prefabricated rail, brake lock to realize the rapid deployment installation and the rapid receiving. It adopts the structure of modular container to facilitate rapid transport.

Performance parameters of PV modules

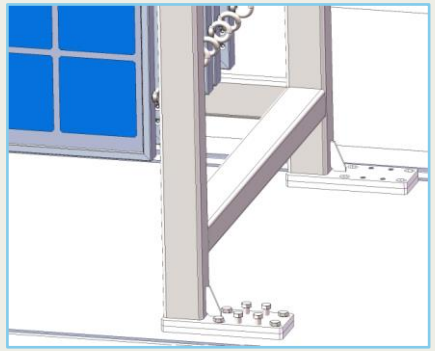
Product performance	Parameter
Solar Power	20kWp~200kWp
Voltage	500VDC~800VDC
Technology of PV modules	Single crystal HIT sillicon
Number of PV modules	60~90
Protection level	IP56
Wind resistance	≯9.4m/s Folding&unfolding ≯20.7m/s operating
Operating Size	L41600*W5035mm
Fold Size	L6058×W2438×H2896mm
Weight	< 10 t
Operating temperature range	-25℃ ~ +45℃



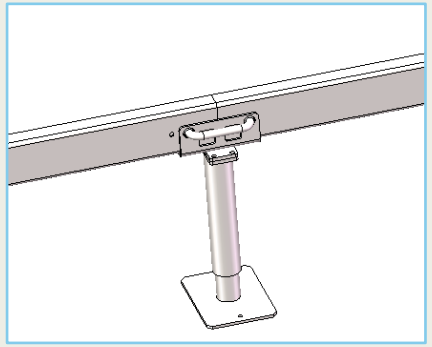
Dimensional transition folding mechanical structure



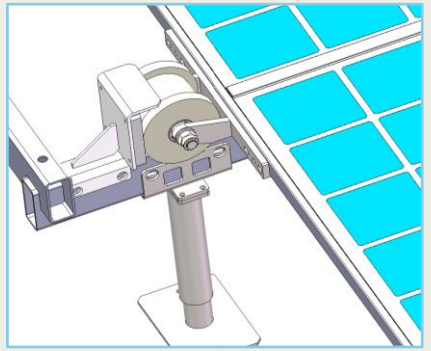
Push rail



Leveller



Unfolding Rail



Brake lock

蓝天太阳 Lantian Solar Tech.

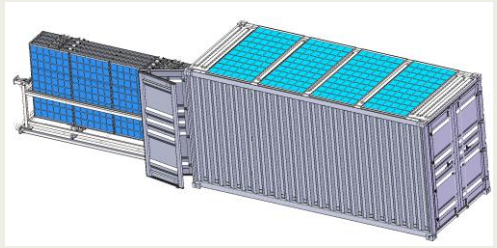
Photovoltaic Energy Storage System Solution to Inspection Team

Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

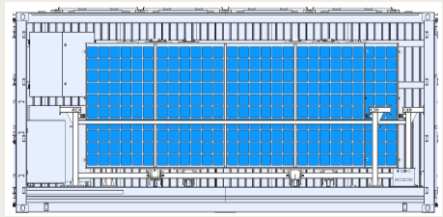
T4.2-48

Methods/data

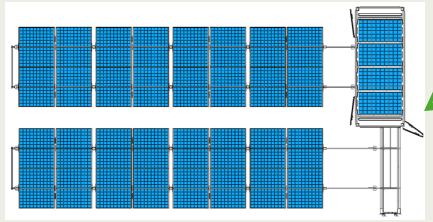
The solar power container is flexible and the installation can be used in multiple venues. It can be used directly for the uneven field,and after simple and smooth treatment for the very rough area. After unloading the container, the rails should be laid and the leveller should be adjusted, and the PV array will unfolding to the operating state.



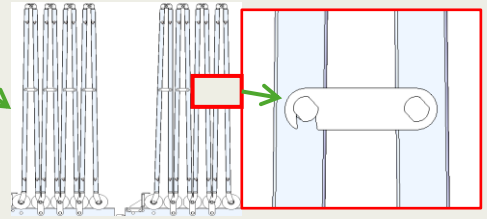
STEP5: Fold The Frames Into Container



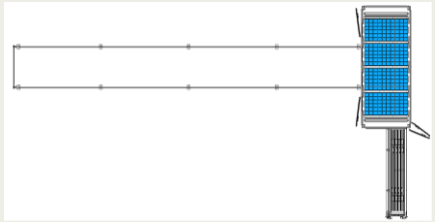
STEP1: Container Install



STEP4: Unfold All The Frames



STEP2: Open the Container & Unpack



STEP3: Install the Tracks

Installation process of solar power container

蓝天太阳 Lantian Solar Tech.

Photovoltaic Energy Storage System Solution to Inspection Team

Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

T4.2-48

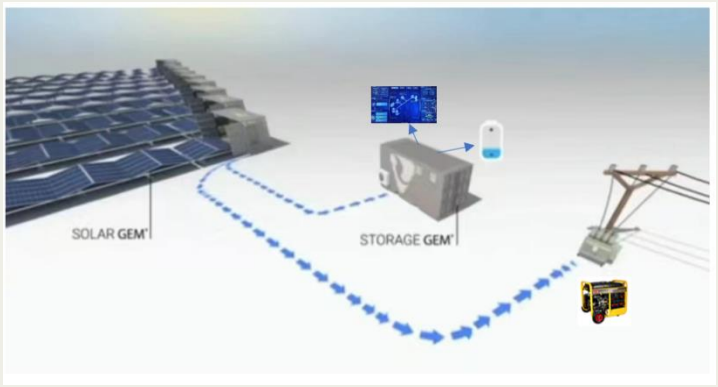
Methods/data

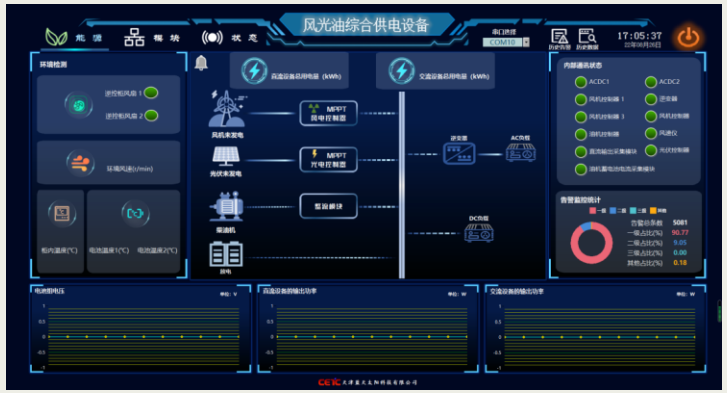
The storage-control container integrates energy storage system, intelligent energy management system, energy storage hybrid inverter, emergency backup power supply and other equipment systems.

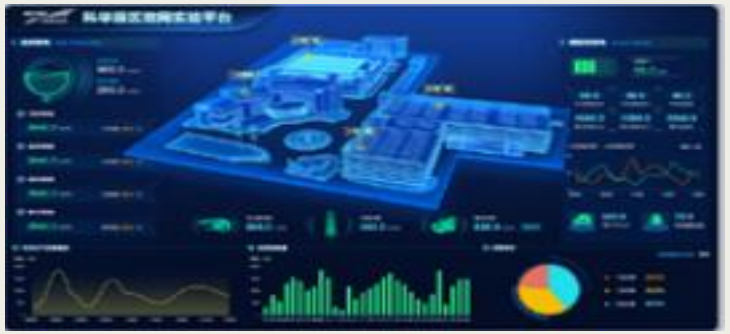
Energy storage system consists of LiFeO4 batteries and three-level BMS with cell balancing (module, rack, container).

Level 1: Information collection
Level 2: Data analysis and control
Level 3: System monitoring and management

Intelligent energy management system integrated control strategy to ensure the comprehensive protection of energy storage system and the coordination of various energy sources.







Performance parameters of storage-control container

Product performance	Parameter
Norminal Power	25kW~200kW
Norminal Energy	50kWh~400kWh
Voltage	220VAC、380VAC
Battery type	LiFeO4
Battery Module	280Ah
Energy Type	Solar/ Diesel/ Wind/ Grid
Protection level	IP56
Size	20Foot L6058×W2438×H2896mm
Weight	< 15 t

蓝天太阳 Lantian Solar Tech.

Photovoltaic Energy Storage System Solution to Inspection Team

Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

T4.2-48

Results

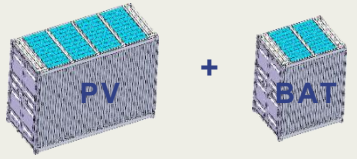
As a complete set of emergency power supply solutions, the photovoltaic energy storage system could provide continuous power support for off-grid areas quickly and solving the problem of power shortage at the place of nowhere for OSI exercises and missions. During day time, it would charge the energy storage by sunlight; during the night time, it would charge the OSI equipment for use of the next day. Photovoltaic energy is also a kind of green energy. It's application to the OSI mission is also in line with the United Nations' SDG goals.

Recommend solution

Option 1

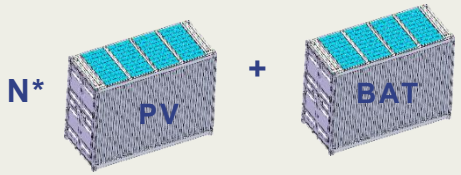
10~20 person basic electricity needs
PV 10 kWp + BAT 50kWh
10-foot CNTR*2

Option 2



20~30 person basic electricity needs
PV 20 kWp + BAT 50kWh
20-foot CNTR*1+10-foot CNTR*1

Option …



Over 30 person basic electricity needs
PV 20 kWp*N + BAT 100kWh
20-foot CNTR*(N+1)

PV 20 kWp*N + BAT 200kWh
20-foot CNTR*(N+1)

Options can be customized by actual electricity demand

蓝天太阳 Lantian Solar Tech.

Photovoltaic Energy Storage System Solution to Inspection Team

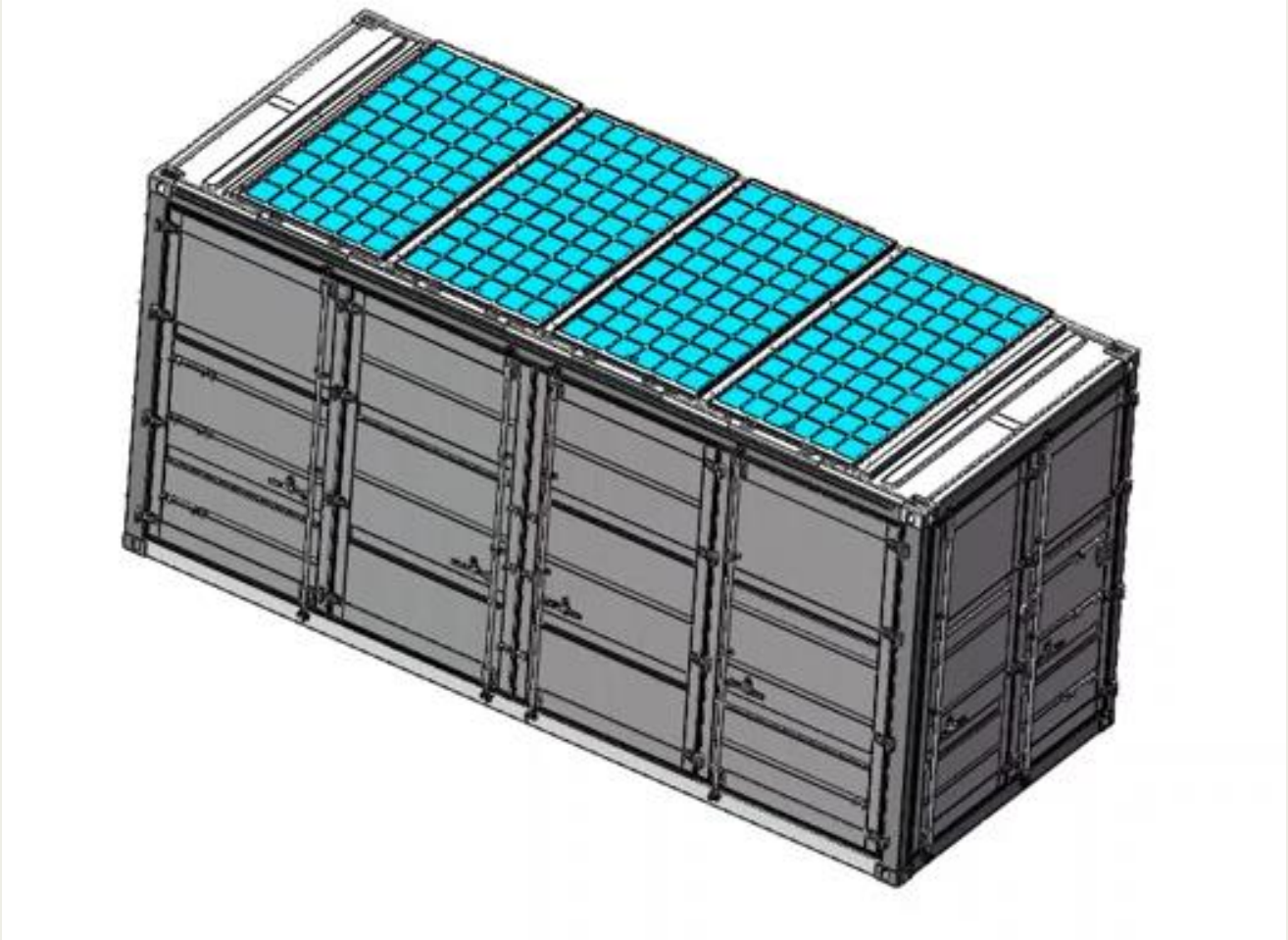
Mr ZHONG, Lin; Ms LI, Yumei; Mr SHI Jingli; Mr XUE, Hang; Ms YI, Chenyu; Ms YANG, Jing; Mr LI, Peng

T4.2-48

Conclusion

Photovoltaic Energy Storage System has the following characteristics:

- Quick setup/fold, no foundation,mobile transportation, deployment and retrieval time of less than 1 hour for 6 people.
- Sustainable electricity, self-maintenance, autonomous generation;
- Multi-Energy cooperative, Solar/ Storge/Grid highly integrated;
- Intelligent management, visual interaction platform, various work mode;
- Complete interface;
- Strong stability, highly environmental adaptability.



蓝天太阳 Lantian Solar Tech.