LOKANG

Swimming Venue Zero-Carbon Intelligent Energy System

- 100% solve power supply issues in off-grid and weak-grid areas.
- Triple power supply seamless switching, achieving 99.9% power supply reliability
- Reduce the electricity cost of swimming venues by 90%
- -80% carbon emission response to the 2030 carbon neutrality strategy

Provide sustainable green energy support for the global popularization of swimming sports

1. Industry Status Quo and Market Pain Points

730 million people have no access to electricity at all.

Sub-Saharan Africa accounts for more than 75% (of the global electricity shortage), with only 56% of its population having access to stable electricity supply, making it the region most severely affected by power shortages in the world.

Over 2 billion people are trapped in weak power grids

Concentrated in underdeveloped regions of Asia, Africa, and South America, as well as remote/offshore areas in North America and Europe.

High emergency power supply costs

The cost of diesel power generation in remote areas is as high as $3 per kWh, which is 5 times the price of regular grid electricity, restricting infrastructure development.

The data is sourced from the 2025 report of the IEA (International Energy Agency).

Distribution of non-electric/weak-electric areas

01 Africa

Sub-Saharan Africa as a whole and remote rural areas in North Africa: The number of people without access to electricity exceeds 550 million, accounting for 75% of the global population without electricity; it is the region with the lowest electricity accessibility in the world.

02 Asia

In remote rural areas of South Asia, mountainous regions of Central Asia, isolated islands in Southeast Asia, and desert areas in the Middle East, there are approximately 120 million people without access to electricity and over 800 million people living in areas with weak power grids. In Southeast Asia, more than 17,000 islands have no stable power grids, and in the isolated islands of Indonesia and the Philippines, diesel-only power generation accounts for over 90%.

03 Europe

The Balkan Peninsula, remote rural areas in Eastern Europe, Mediterranean islands, and remote polar regions in Northern Europe have a population of approximately 15 million living with weak power grids. In some areas, the annual power outage duration exceeds 800 hours; 90% of the electricity supply for Mediterranean islands relies on imported diesel, and the electricity price is four times that of mainland Europe.

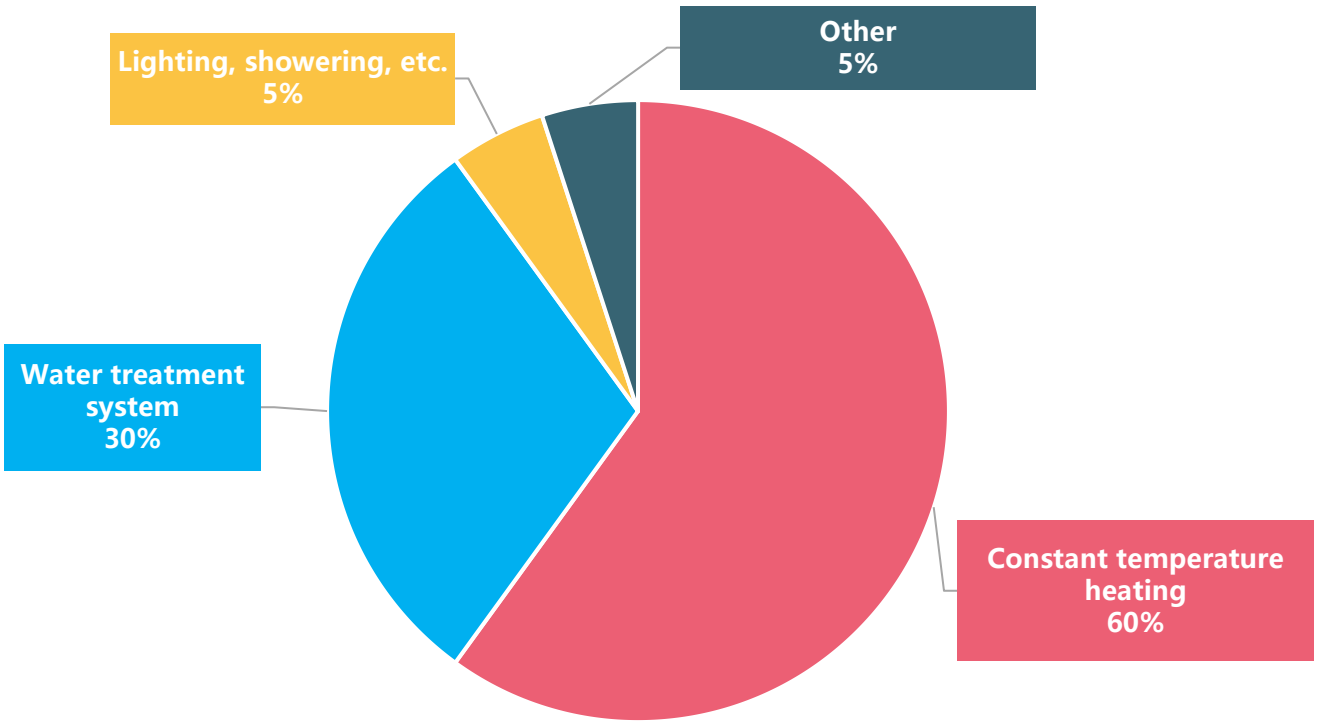
04 South America

In the Amazon rainforest area, the Andes Mountains, and remote areas of Caribbean South American countries, there are approximately 35 million people without access to electricity, with a rural electrification rate of only 68%. Over 60% of remote communities rely entirely on diesel power generation, and the cost per kilowatt-hour exceeds 2 US dollars.

05 North America

Caribbean island countries, remote areas of Alaska in the United States, and indigenous regions in northern Canada have a population of approximately 12 million people without electricity or with weak power grids; the cost of diesel transportation is three times that of inland areas, and pure diesel power generation is as high as 3.5 US dollars per kilowatt-hour.

Energy Demand and Gap of Swimming Venues



Energy consumption composition of the natatorium

Imbalanced distribution

Ninety-two percent of the world's standard swimming venues are concentrated in high-income countries with stable power grids. Underdeveloped regions have an average of only 1.1 standard swimming pools per 10 million people, which is less than one-tenth of the global average.

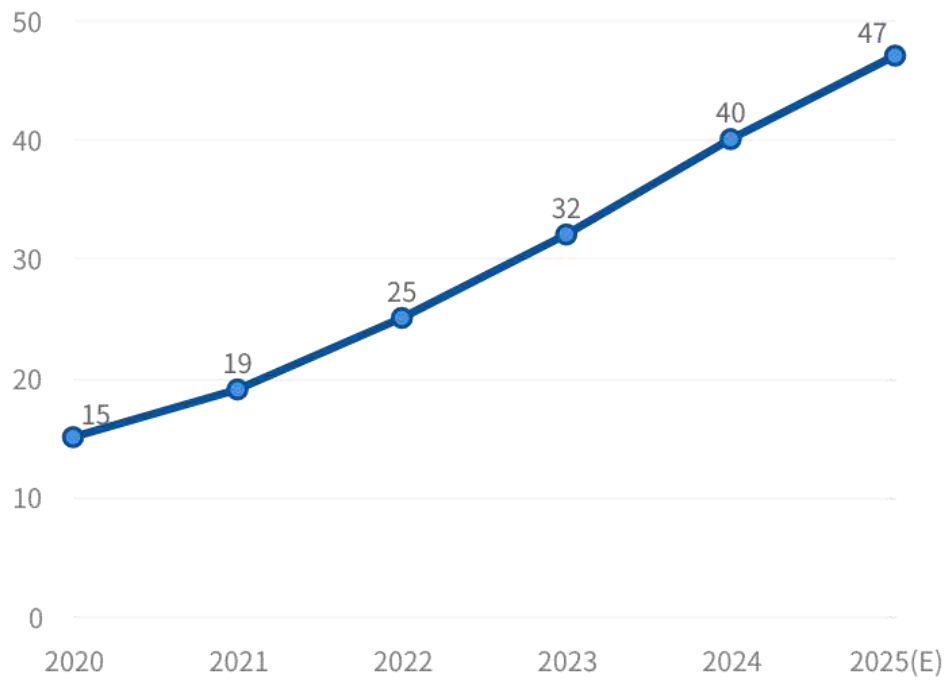
Operational difficulties

More than 80% of the aid-built swimming venues globally cannot operate regularly after completion due to unstable power supply and high electricity costs. Energy supply has become the primary limiting factor in fulfilling the global mission of "everyone having the survival skill of swimming".

Development Trends of Off-Grid Renewable Energy

- ✓ In 2025, the global installed capacity of off-grid renewable energy exceeded 47GW, with a compound annual growth rate of over 29%, indicating huge market potential.
- ✓ The penetration rate of the integrated smart microgrid solution combining photovoltaic, energy storage, and diesel generators increases by 35% annually, making it the most cost-effective choice at present.
- ✓ The cost of photovoltaic and energy storage has dropped by more than 90% in the past 10 years, laying an economic foundation for large-scale commercial promotion.

Growth Trend of Off-Grid Renewable Energy Installed Capacity (2020-2025)



Pain points of power supply in swimming venues

Lack and Instability of Power Grid Coverage

Insufficient capacity in non-electric/weak-electric areas and frequent power outages directly result in the inability to construct venues or their long-term shutdown.

High operating costs make it difficult to sustain

In remote areas, the cost of diesel power generation is as high as $ 3 per kWh, and the annual electricity bill for a standard training swimming pool exceeds $250,000, making it a case of "affordable to build but unaffordable to operate."

Defects of traditional power supply

Pure diesel power generation causes heavy pollution; pure photovoltaic power cannot guarantee 24-hour continuous power supply; power supply in weak power grid areas is unstable and lacks emergency capacity.

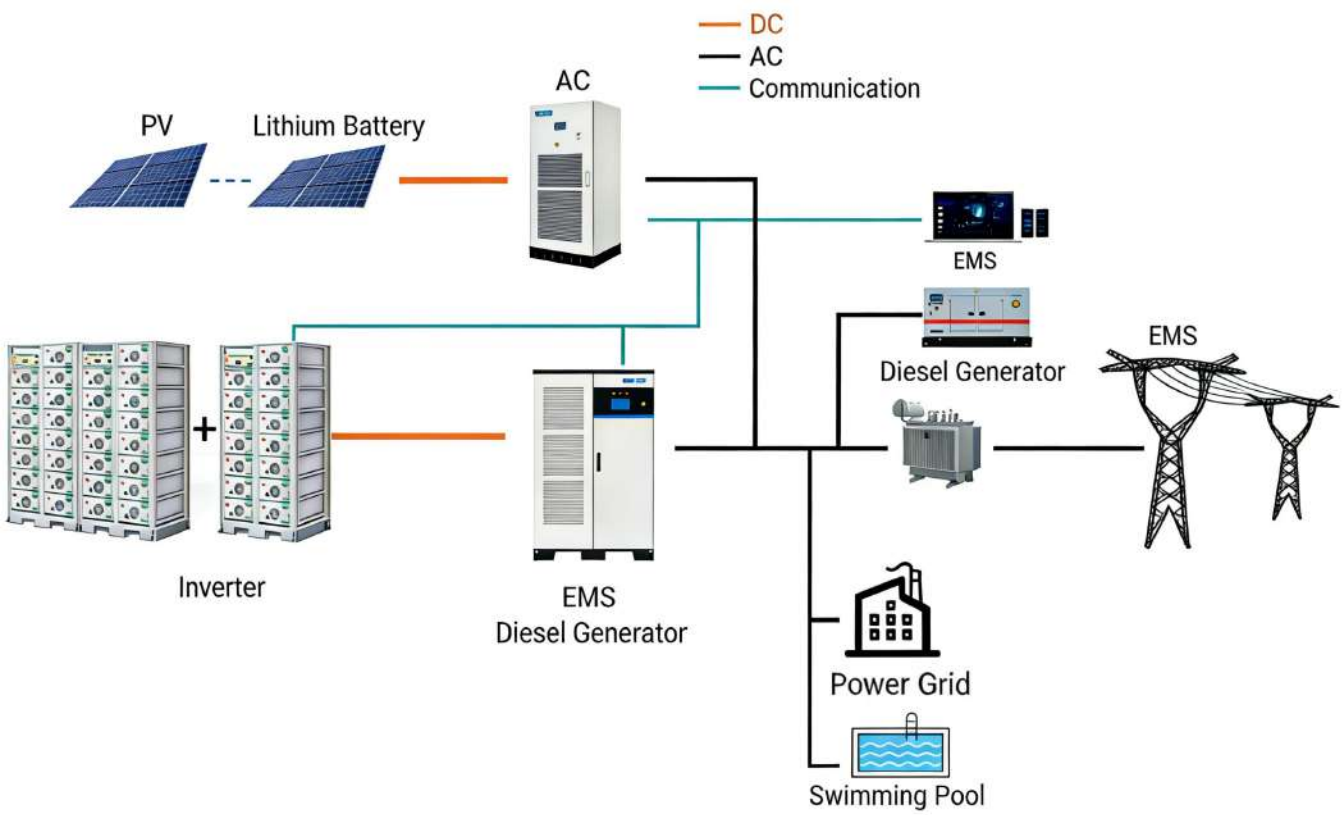
Conflict with carbon neutrality

Traditional high-carbon emission schemes do not meet the carbon neutrality requirements of the IEA and ICO, making it difficult to obtain support from global green funds.

2. Solution: AI Integrated Energy System

With photovoltaic power as the core main power source, energy storage as the core of energy regulation, and diesel power generation as the emergency backup power source, integrated with an AI intelligent energy management system (EMS), it can realize three modes: off-grid independent operation, grid-connected two-way interaction, and seamless off-grid switching in case of grid failure.

It fully meets the 24-hour continuous, stable, low-cost, low-carbon and environmentally friendly power demand of swimming venues, and perfectly adapts to all scenarios and environments across the five continents of the world.



4 Core Systems

Photovoltaic power generation subsystem

High-efficiency N-type double-sided double-glass photovoltaic modules are adopted to maximize the use of solar energy, meet the real-time load of the venue and charge the energy storage system; the equipment has IP54+ protection, which is suitable for all scenarios such as high humidity, high salt spray, and high sand and dust.

Energy storage subsystem

A high-safety, long-life lithium iron phosphate energy storage system is adopted to smooth out photovoltaic fluctuations and stabilize system voltage; store surplus electricity to ensure continuous power supply at night and on rainy days; and achieve millisecond-level seamless switching in case of grid failures to ensure uninterrupted operation of critical loads.

Diesel generator system

Low-fuel-consumption and silent generator sets are adopted, which are only started under extreme working conditions. They serve as backup power sources to ensure the power supply for key loads in the venue during extreme weather and power grid failures, thereby reducing operating hours, fuel consumption, and carbon emissions.

AI Intelligent EMS System

Achieve fully automatic intelligent scheduling through AI algorithms to maximize photovoltaic absorption, minimize diesel generator operation, and optimize charging and discharging strategies; support global remote monitoring, fault early warning, and unattended operation to solve the problem of operation and maintenance in remote areas.

Operating Mode 1: Off-grid operation (areas without electricity)

Applicable scenarios: Regions with no power grid coverage at all, such as the entire African region, offshore islands in Southeast Asia, the Amazon region in South America, and the Caribbean islands in North America.

Operation effect: The annual operating hours of diesel generators can be controlled within 100 hours, which is only 1.2% of the pure diesel generator solution, and the proportion of renewable energy can reach more than 90%.

Daytime periods with sufficient sunlight

Photovoltaic power generation operates at full capacity, and all excess electricity is stored in the energy storage system until the energy storage is fully charged, achieving self-consumption of photovoltaic power and full storage of surplus electricity.

Periods of insufficient nighttime lighting

The energy storage system automatically discharges to meet the 24-hour rigid load demand of the venue throughout the day. There is no need to start the diesel generator during the entire process, achieving zero carbon emissions and zero fuel cost operation.

Periods of extreme operating conditions

For more than 3 consecutive rainy days with insufficient photovoltaic output, when the energy storage SOC drops below the 20% safety threshold, the AI intelligent EMS system automatically starts the diesel generator set to ensure the uninterrupted operation of the equipment.

Operating Mode 2: Grid-connected Operation (Weak Power Area)

Applicable scenarios: Weak grid areas with power grids but poor stability and high electricity prices, such as the Balkan/Mediterranean islands in Europe, remote areas in South Asia/Central Asia in Asia, the edge of towns in South America, and remote rural areas in North America.

Operation effect: Zero-perception switching during power grid failures, annual power supply availability ≥ 99.99%, electricity cost reduced by 80%, and the proportion of renewable energy can reach more than 85%.

Daytime periods with sufficient sunlight

Photovoltaic power generation meets the real-time load of the venue, and the surplus electricity is stored in the energy storage system; the power grid automatically charges at low load and discharges at peak load, significantly reducing electricity costs.

Grid failure/power outage period

Millisecond-level seamless switch to off-grid mode with PV and energy storage power supply, ensuring uninterrupted operation of venue core loads and avoiding power outage risks.

Periods of extreme operating conditions

In case of prolonged grid outage and continuous rainy days, when energy storage SOC drops below 20% safety threshold, the AI-powered EMS automatically starts the diesel generator as backup power to ensure uninterrupted operation of venue core loads and completely eliminate downtime risks.

Customized energy system for swimming pools

Intelligent Scheduling of Load Priority

Under extreme operating conditions, priority should be given to ensuring first-level core loads such as water circulation and constant temperature, adhering to the safety bottom line, and ensuring the basic stability of venue operations.

Swimming pool constant temperature linkage

When there is sufficient sunlight during the day, raise the pool water temperature to the upper limit of the standard, utilize the natural heat storage of the water body, and reduce the energy consumption for keeping the temperature constant at night by more than 12%.

Global environmental adaptation and optimization

Customize equipment protection solutions for different environments across the five continents, including dust prevention, salt spray resistance, mildew prevention, and low-temperature protection, to ensure that the equipment operates stably in extreme environments.

Operation and maintenance optimization

Modular design for easy installation. The fully automatic EMS enables unattended operation, supporting global remote monitoring, fault pre-warning and remote commissioning, perfectly addressing the shortage of professional O&M personnel in underdeveloped regions.

All-dimensional security guarantee system

Electrical safety protection

It integrates three-level lightning protection, professional grounding, islanding effect protection, and overvoltage, overcurrent, and short-circuit protection mechanisms, complying with international electrical safety standards.

Energy storage safety protection

Deploy the BMS to monitor real-time overcharging, over-discharging, and over-temperature statuses, and equip it with a fire warning and extinguishing system to strictly prevent thermal runaway of batteries.

Operational safety protection

A triple power supply redundancy design is adopted to ensure no power supply interruption under extreme working conditions; an intelligent water quality monitoring mechanism is established.

Data security protection

It adopts encrypted data transmission, supports global remote operation and maintenance, ensures user data security, and complies with global data security compliance requirements.

3. Core Advantages and Value of the System

Breaking the energy barriers

It is completely independent of the power grid and can be implemented in any area with no electricity or a weak power grid around the world, allowing the construction of swimming venues to break through geographical restrictions. It breaks down the geographical barriers of swimming and narrows the gap in global sports development.

Ultimate power supply reliability

Triple power supply redundancy, millisecond-level seamless switching, annual power supply availability ≥ 99.99%, completely solving the problem of frequent shutdowns in the venue, and ensuring the continuity of swimming training, anti-drowning education, and event hosting.

Reduce costs and increase efficiency

The cost per kilowatt-hour is as low as $0.15/kWh, which is only 1/10 of the pure diesel generation solution. The total life cycle saves more than 80% of electricity costs. It completely solves the industry problem of "affordable to build but unaffordable to use".

Green and low-carbon

Renewable energy share reaches up to 95%, with annual carbon reduction exceeding 500 tonnes per venue, fully aligned with World Aquatics' carbon neutrality strategy. It enhances World Aquatics' global ESG influence and brand power.

Advantage 1: Full regional coverage + extreme reliability

Completely solve the power supply problem

Core Advantages

The off-grid mode establishes stable and reliable power supply systems in electroless areas worldwide, enabling the construction of standardized swimming venues in regions that previously lacked the conditions, such as African deserts, South American rainforests, Southeast Asian islands, and North American polar regions.

The modular design meets the full range of needs from small swimming pools in rural communities to international competition-level venues in over 100 countries around the world, fulfilling the mission of everyone having access to swimming pools.

Triple redundancy guarantee, reliable power supply

Core Advantages

Triple power supply redundancy of photovoltaic + energy storage + diesel generator ensures that any single power supply failure will not affect the power supply for the core load of the venue;

Seamless switching between grid-connected and off-grid modes in milliseconds, achieving zero-perception operation when the power grid fails, with no power supply interruption at all;

Under extreme working conditions such as extreme weather, continuous rainy days, and long-term power grid failures, the diesel generator provides a guaranteed support, ensuring an annual power supply availability rate of ≥99.99%, thus completely solving problems such as water quality deterioration, equipment damage, and safety accidents caused by power outages.

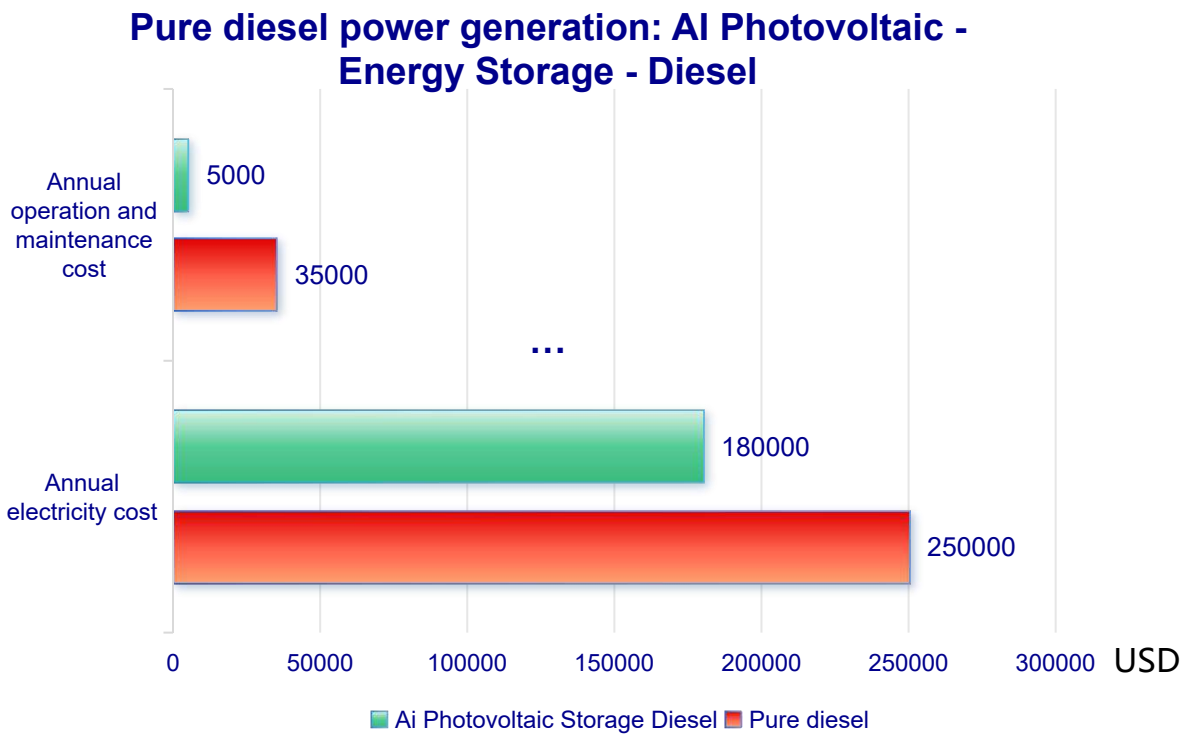
Advantage 2: Low cost of green energy

In line with the global trend of carbon neutrality

Each venue reduces carbon emissions by more than 500 tons annually on average, with a total carbon reduction of over 12,500 tons throughout its 25-year life cycle, fully complying with the FINA Carbon Neutrality Strategy and the carbon-neutral hosting requirements for international events; it perfectly aligns with the United Nations Sustainable Development Goals (SDG7: Clean Energy, SDG10: Reduced Inequalities, SDG13: Climate Action).

Low-cost long-term sustainable operation

Photovoltaics provide free and renewable energy with an ultra-long service life of 25 years. Energy storage enables the spatial and temporal transfer of electricity, which can reduce diesel consumption by 80% to 95%. Diesel generators are only used as backup power sources, with their annual operating time reduced from 8,000 hours to less than 500 hours, and their service life extended by more than three times, completely solving the cost problem of venue operation.



4. Equipment Selection

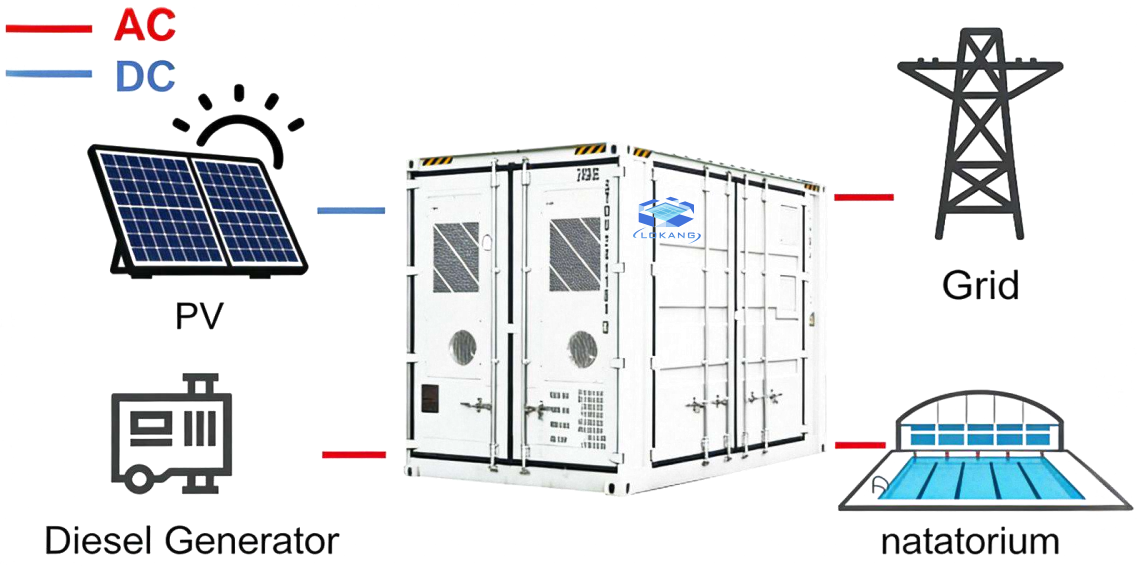
4.1 natatorium - Ai Energy System

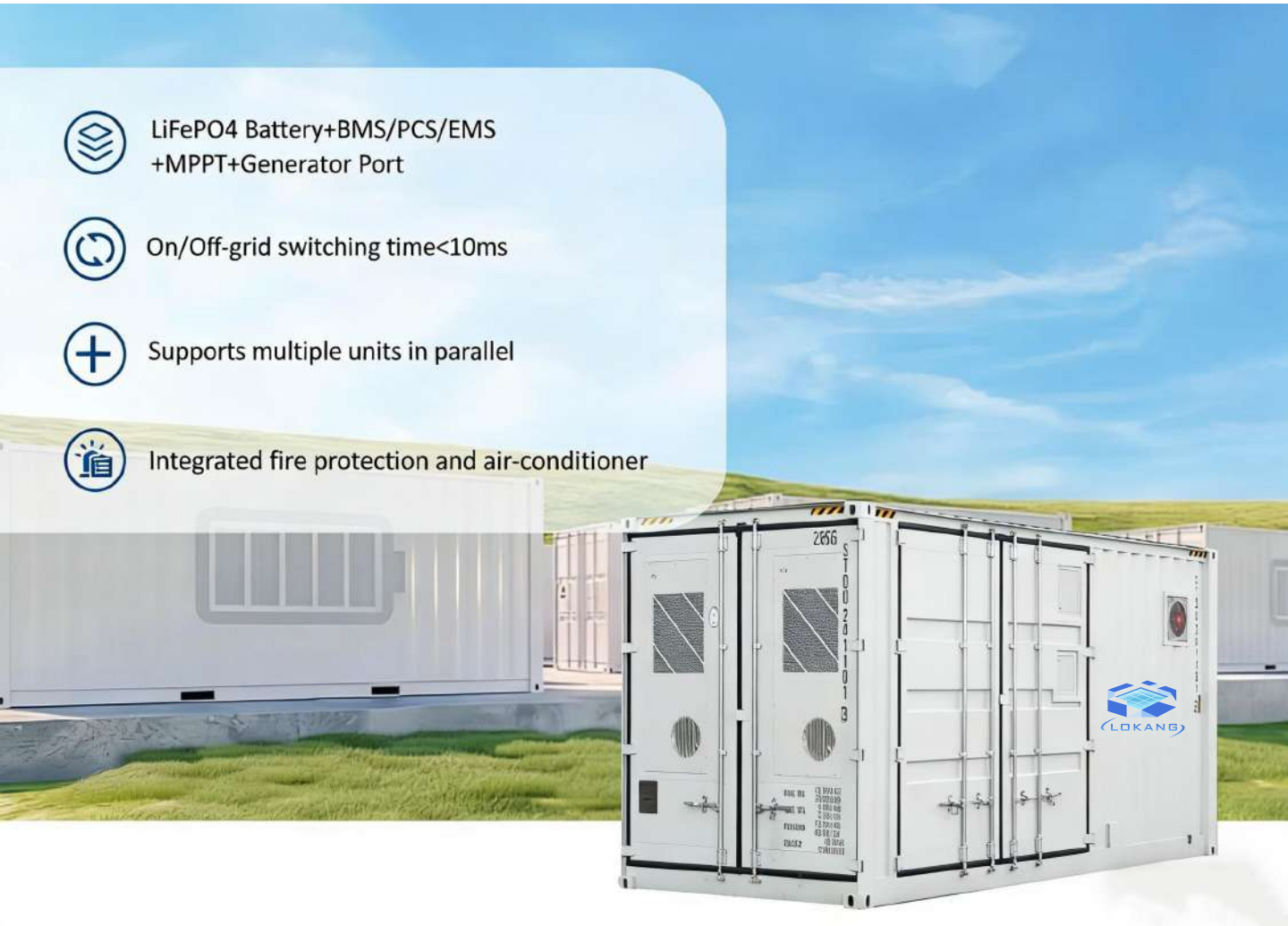
50m*25m Olympic competition natatorium,

50m*25m training natatorium.

25m*20m Olympic competition natatorium,

25m*20m training natatorium.





Configuration parameters (1.5MW~3.1MW)

- Integrated LiFePO4 Battery, BMS, PCS, EMS, Solar and Diesel Generator
- Individual cluster management for enhanced reliability
- On/off-grid switching time <10ms

Battery Model	20GP A/C (1.5MWh+0.75MW)	20GP A/C (2MWh+1MW)	20GP A/C (2.6MWh+1.25MW)	20GP Liquid cooling (3.1MWh+1.5MW)
Battery Energy	1.5MWh	2MWh	2.6MWh	3.1MWh
Rated AC Power	750kW	1000kW	1250kW	1500kW
Rated AC Current	1130A	1500A	1890A	2270A
Rated Grid Voltage	400Vac/230Vac	400Vac/230Vac	400Vac/230Vac	400Vac/230Vac
MPPT Power	720kW(6 Channels)	Solar Inverter Outside	Solar Inverter Outside	Solar Inverter Outside
MPPT Max.Voltage	250~850Vdc	/	/	/
IP Grade	IP54	IP54	IP54	IP54
Generator	Yes	Yes	Yes	Yes
Size(mm)	6090*2438*2591mm	6090*2438*2591mm	6090*2438*2591mm	6090*2438*2591mm
Weight(kg)	24100kg(about)	26050kg(about)	28600kg(about)	33250kg(about)

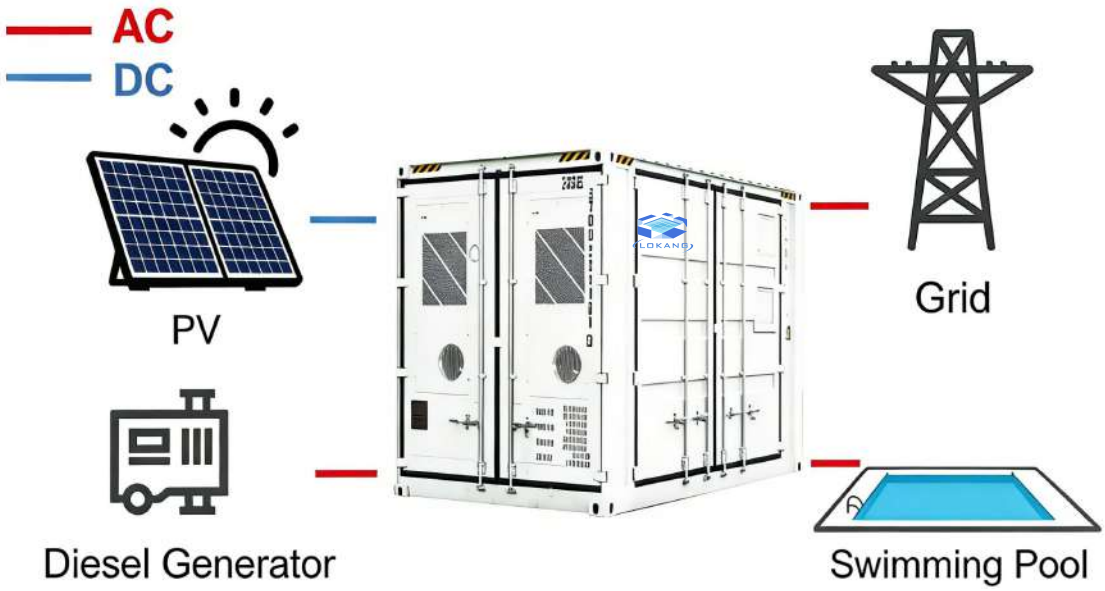
4.2 Swimming Pool - Ai Energy System

50m*25m Olympic competition swimming pool,

50m*25m training swimming pool.

25m*20m Olympic competition swimming pool,

25m*20m training swimming pool.



Configuration parameters (<1MW)

Supports DC and AC coupling

On/Off-grid switching time <10ms

PCS + LiFePO4 Battery+ MPPT + Generator Port

Battery Model	520kWh+375kW-A/C cooling	1MWh+500kW-A/C cooling	520kWh+375kW-Liquid cooling	1MWh+500kW-Liquid cooling
Battery Energy	520kWh	1MWh	520kWh	1MWh
PCS	375kW	500kW	375kW	500kW
MPPT Power	480kW(4 Channels)	480kW(4 Channels)	480kW(4 Channels)	480kW(4 Channels)
MPPT Voltage Range	250~850Vdc	250~850Vdc	250~850Vdc	250~850Vdc
AC Voltage	400Vac/230Vac	400Vac/230Vac	400Vac/230Vac	400Vac/230Vac
IP Grade	IP54	IP54	IP54	IP54
Parallel	3	3	3	3
Generator	Yes	Yes	Yes	Yes
Size (mm)	2500*2250*2400mm	2991*2438*2591mm	2500*2250*2400mm	2991*2438*2591mm
Weight (kg)	7700kg(about)	12000kg(about)	7690kg(about)	11980kg(about)

project case

C&I Energy Storage Projects

Project Details

This solar carport project in Kenya delivers a 200kW/430kWh power solution for a local factory. By integrating bifacial panels with two all-in-one energy storage cabinets, it creates a dual-purpose structure that generates clean electricity while providing shaded parking. The system significantly reduces grid dependency and energy costs, ensures backup power, and even enables revenue from surplus energy.

200kWp+200kW/430kWh | **Hotel**

- **Project:** 2025
- **Kenya**
- **PV**: 200kW Solar System
- **ESS:** 200kW/430kWh
- Backup Power
- Commercial Building and Solar Carport Project

C&I Energy Storage Projects

Project Details

Namkoo has delivered a solar-storage solution for an engineering base in Central Africa, where stable power is scarce. The system combines 360.12kWp of solar with a 250kW/1072.5kWh ESS in a single 40ft container, ensuring 24/7 power for over 400 daily loads.
It overcomes solar intermittency and is backed by a diesel generator, providing complete energy independence and reliable electricity for the base.

360kWp+250kw/1MWH | **Engineering Base**

- **Project:** 2024
- **Central Africa**
- **PV**:360kW Solar System
- **ESS:**250kW/1072.5kWh
- Self-consumption
- Engineering project base

project case

C&I Energy Storage Projects

Project Details

This solar and energy storage solution for a supermarket combines over 500kW of rooftop and carport solar panels with a 1MWh containerized ESS (500kW PCS + 1072.5kWh battery). Designed for plug-and-play installation, it ensures 24/7 power, reduces energy costs, and maintains refrigeration during grid outages—providing reliable, clean electricity at the heart of the community.

500kW+500kW/1MWH | **Supermarket**

- **Project:** 2025
- **Peru**
- **PV**: 500kW Solar System
- **ESS:** 500kW/1072.5kwh
- Power Supply
- Local Supermarket and Coummunity

C&I Energy Storage Projects

Project Details

This solar microgrid project provides clean, reliable power to five remote communities in Nigeria, replacing costly and unreliable diesel generators. The system consists of 11 all- in- one liquid- cooled energy storage units, integrating 1.2MW of solar panels with 2.4MWh of storage. Delivered in only 43 days, the plug- and- play solution offers a durable, sustainable energy source tailored for off- grid regions.

1.2MW+1.1MW/2.4MWH | **Micro-Grid**

- **Project:** 2025
- **Nigeria**
- **PV**: 1.2MW Solar System
- **ESS:** 1.1MW/2.4MWh
- Self consumption
- Local Coummunity

project case

C&I On Grid Solar Projects

Project Details

This 2.74MW on-grid solar system, designed and installed for a Huawei logistics and warehousing center, directly powers daily operations with clean energy. The turnkey EPC solution reduces electricity costs, enhances energy reliability, and supports Huawei's commitment to sustainable supply chain management.

2.7MW On Grid Solar | **Logistics Center**

- **Project:** 2023
- **China**

- **PV**: 2.74MW On Grid Solar System

- Power Supply
- Huawei Logistics and Warehousing Center

C&I Energy Storage Projects

Project Details

This project in the Philippines delivers a cleaner, quieter energy future for 4 islands in the Philippines. It features 4 modular 150kW/150kWh energy storage systems, forming a total 600kW/600kWh solution. Designed for flexible integration with the existing grid, this system provides stable and sustainable power, significantly reducing reliance on fossil fuels and their associated costs and environmental impact.

4 Sets 150kW/150kWh ESS | **Island**

- **Project:** 2025
- **Philippines**

- **PV**: 150kW Solar System
- **ESS:** 600kW/600kwh

- Self-consumption
- Off-grid Island Community

Swimming Venue Zero-Carbon Intelligent Energy System

WhatsAPP

WeChat

15 Years+
BMS & EMS R & D

50+
R & D team members

100+
Countries

120+
Cumulative energy storage styles

1000+
Energy storage clients

1500MWh+
Energy storage battery cumulative shipment






Guangdong Lokang Sports Technology Co.,Ltd

0757-22367821

39-42, Lintou Business Street, Beijiao Town Foshan, Guangdong, China