CYG长园 股票代码 | 600525.SH Stock Code

# PRS-7012-NCM New Energy Centralized Control Management System Introduction


Reported by:

2 April, 2024

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# CONTENTS

# PART.

## Background

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# Background

Wide geographical distribution, difficult to inspect, inconvenient operation and maintenance

Scattered power plants and stations, poor data integration, heavy burden on enterprises

Heavy workload of operation and maintenance, insufficient carrying capacity of operation and inspection work

The data analysis relies on manual labor, and it is difficult to guarantee the quality and efficiency

# PART. 02

## Solutions

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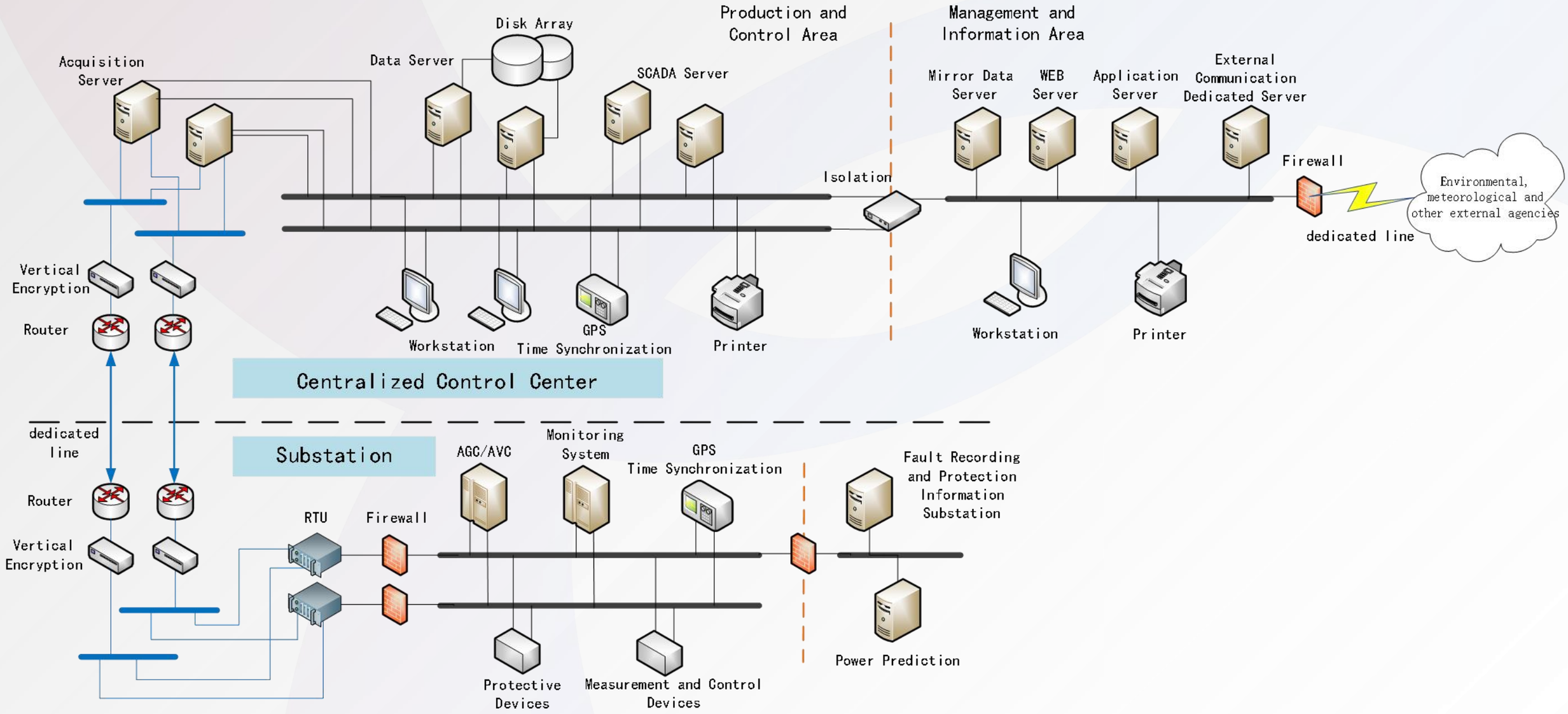
# System Framework




Typical network topology of centralized control center

# Build a new energy centralized control center to realize "centralized operation and maintenance, regional maintenance" and enhance the efficiency and value of operation and maintenance.

## Remote monitoring reduces the difficulty of operation and maintenance

Remote monitoring reduces the frequency of personnel visiting the station, reduces the difficulty of operation and maintenance, and reduces work intensity.

## Centralized monitoring improves work efficiency

Integrated information of decentralized power plants and stations, centralized monitoring and centralized management, which is conducive to reasonably planning the ratio of personnel.

## Intelligent warning reduces operation risk

Automatic alarms and information push for abnormal items, active warning using threshold alarms and trend analysis.

## Automatic analysis improves the accuracy of analysis

Monitor equipment status, automatically analyze power generation efficiency, establish expert knowledge base, and locate faulty equipment for intelligent diagnosis.

# PART. 03

## Key Technologies

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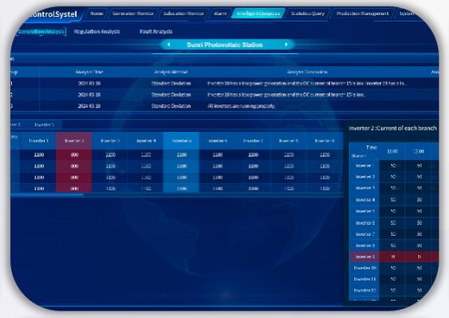
# Key Technologies

- Step up station operation monitoring
- Remote control operation order, anti-maloperation block
- Post disturbance review
- …

## Substation monitoring



## Statistics inquire

- Historical alarm query
- Real-time/historical curves
- Customized reports
- …


## Generation monitoring

- Comprehensive power generation data monitoring
- Equipment index monitoring
- Remote control / remote setting batch operation
- …

## Intelligent diagnostics

- Abnormal power generation analysis
- AGC/AVC regulation tracking
- Device fault diagnostics
- …

## Production management

- Mobile APP
- Web Publishing
- Operation and maintenance work order management
- …


# Generation monitoring

- Integration of data from multiple sources such as PV, energy storage, wind power, etc., centralized monitoring
- Intuitively reflect the important working condition information of the power plants under its monitoring.

- Comprehensive power generation data monitoring
- Equipment index monitoring
- Remote control / remote setting batch operation
- Alarms on equipment conditions and abnormalities
- Power plant- PV array-equipment hierarchical monitoring

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# Key Technologies


▲ Power plant important information monitoring

- Summarize and display the key information of the power plant, such as daily power generation, active power, environmental data, equipment fault analysis, etc., to improve the monitoring efficiency.
- The curve shows the real-time tracking situation of AGC/AVC regulation commands of the plant, and the tracking abnormality can be alarmed.
- Calculate and display the number of inverter operation status and the power generation data of the array.

- The curve shows the real-time curve of the array's inverter active sum and irradiance on the same day.
- Summarize and display power generation data and equipment operating conditions of inverters in the array.

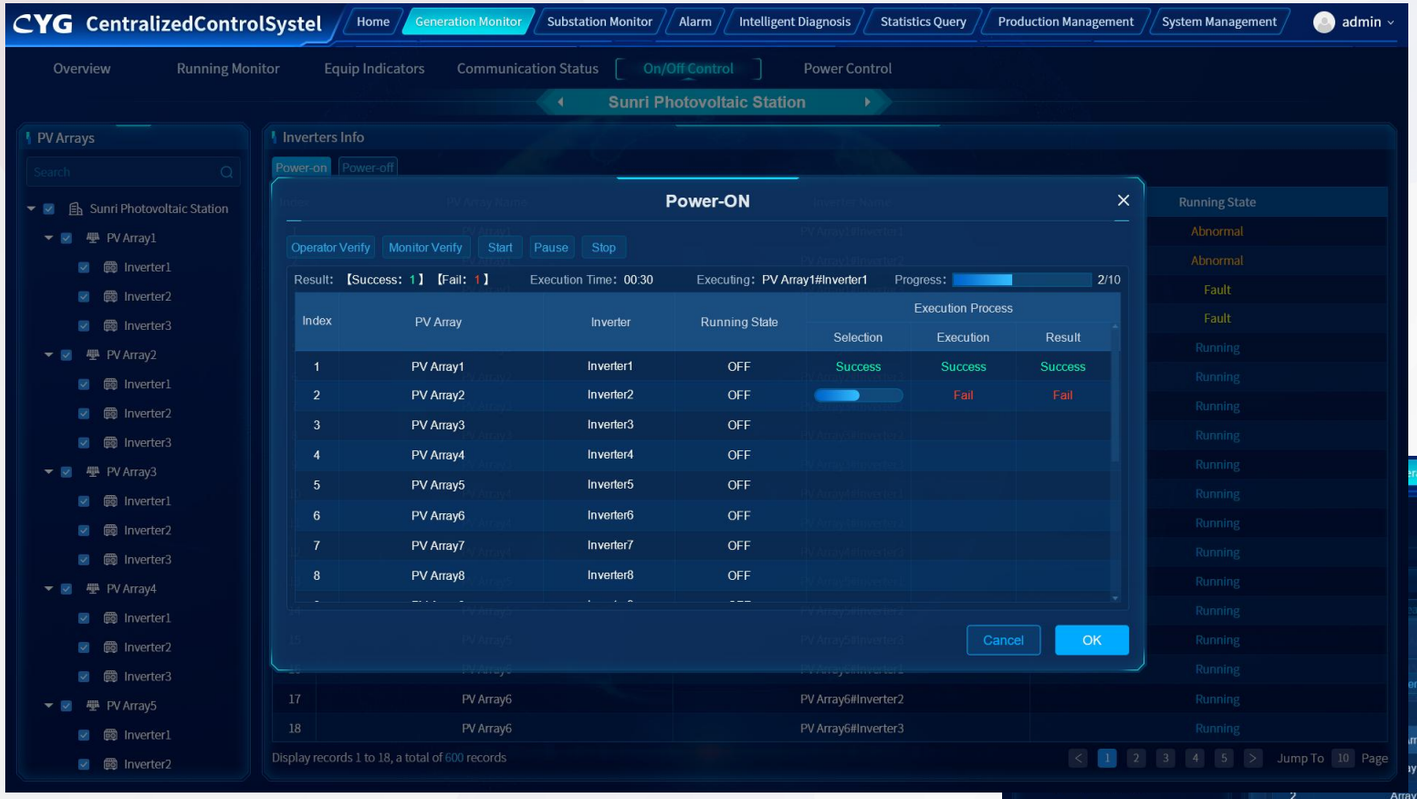
▼ PV array data monitoring


▲ Inverter data monitoring

- Highlights important power generation data such as real-time active/reactive power, power generation efficiency, and daily power generation of inverters.
- The bar graph displays the current value of each branch of the inverter, which is easy to find abnormal branches.
- The curve graph displays the real-time active power of the inverter for the day.
- Other telesignal/telemetering information is fully displayed in the module.

- Overview the communication status of all inverters in the station by array.

▼ Inverter communication status monitoring

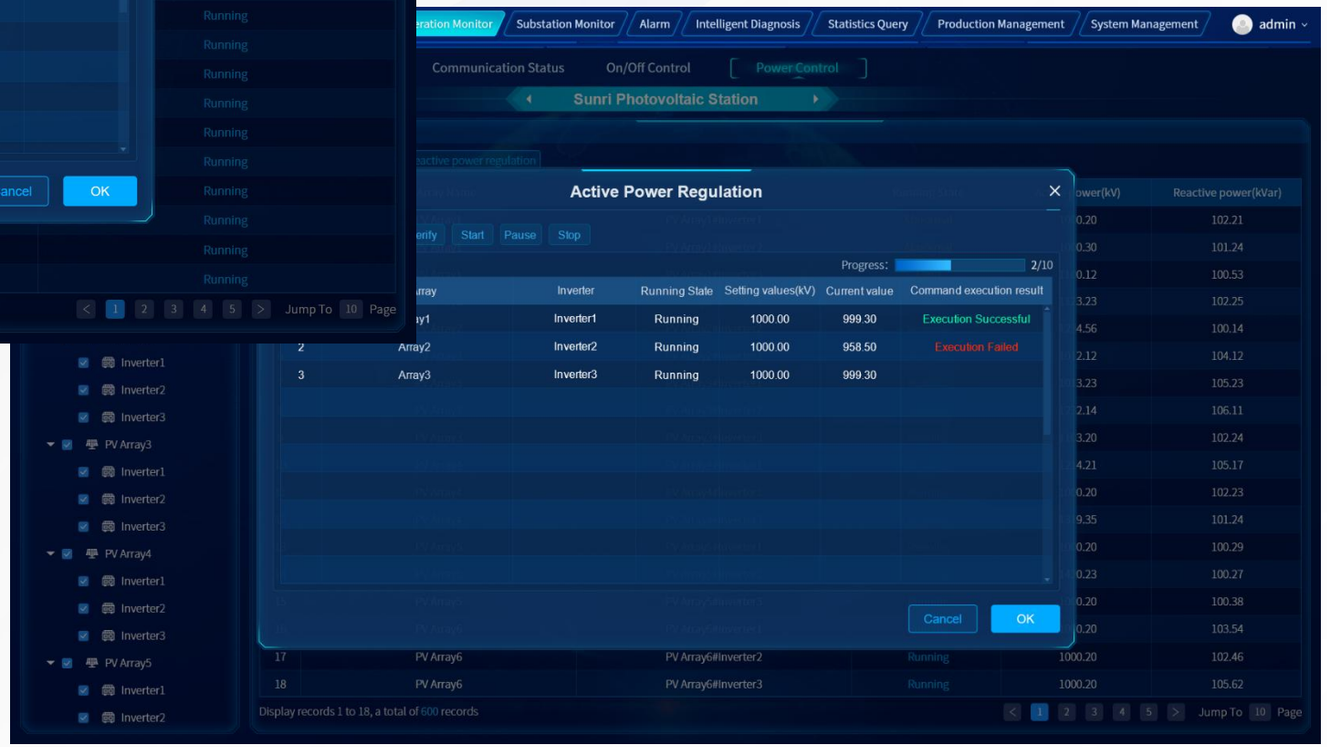


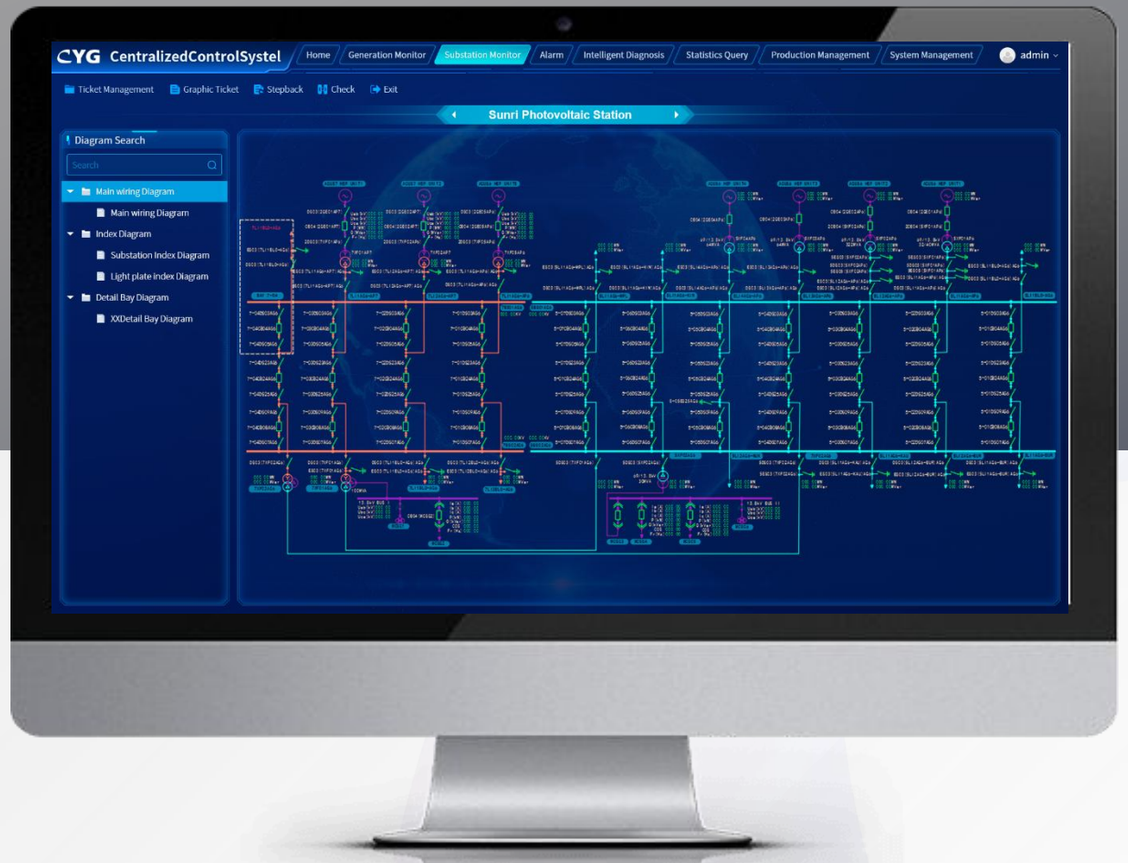

▲ Remote control inverter power on/off in batch

- Support to select devices in batch and remote control them to turn on/off with one key.
- Detailed feedback on the remote control execution result of each device.
- The operation is subject to double confirmation by the operator and the guardian to improve safety.
- Support suspension and termination of execution.

- Set the active/reactive power of inverter in batch. The function is the same as batch remote control.
- It can be used in scenarios such as inverter regulation test and temporary remedy when AGC system regulation fails.

▼ Set inverter active power in batch.






# Substation monitoring

- Grid operation information monitoring of the step up station
- Follow the grid monitoring standard to prevent maloperation

- Customized and flexible drawing of grid monitoring screen
- Remote control operation order management
- Grid topology anti-maloperation, anti-maloperation rules
- Primary connection diagram topology coloring
- Post disturbance review and re-enactment
- Signage management

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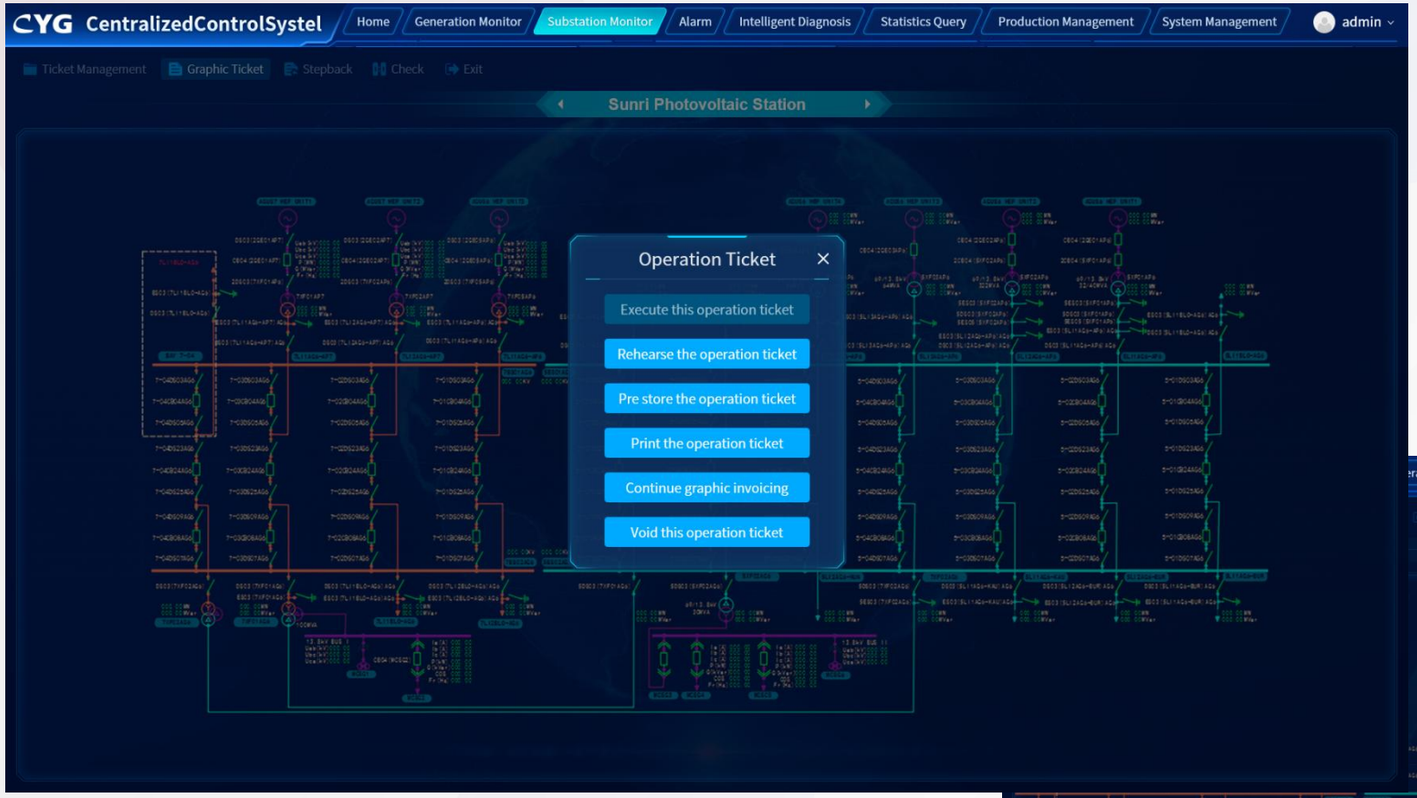
# Key Technologies

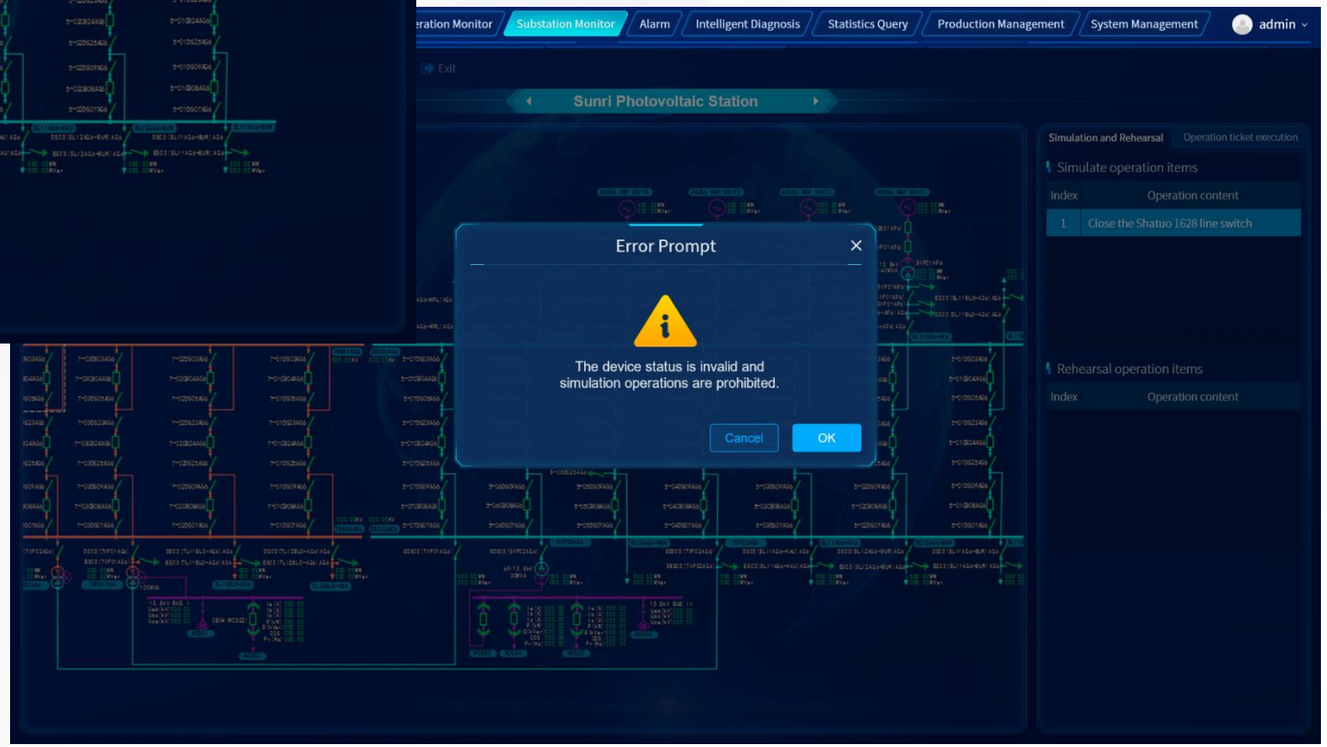



▼ Remote control operation order- order simulation

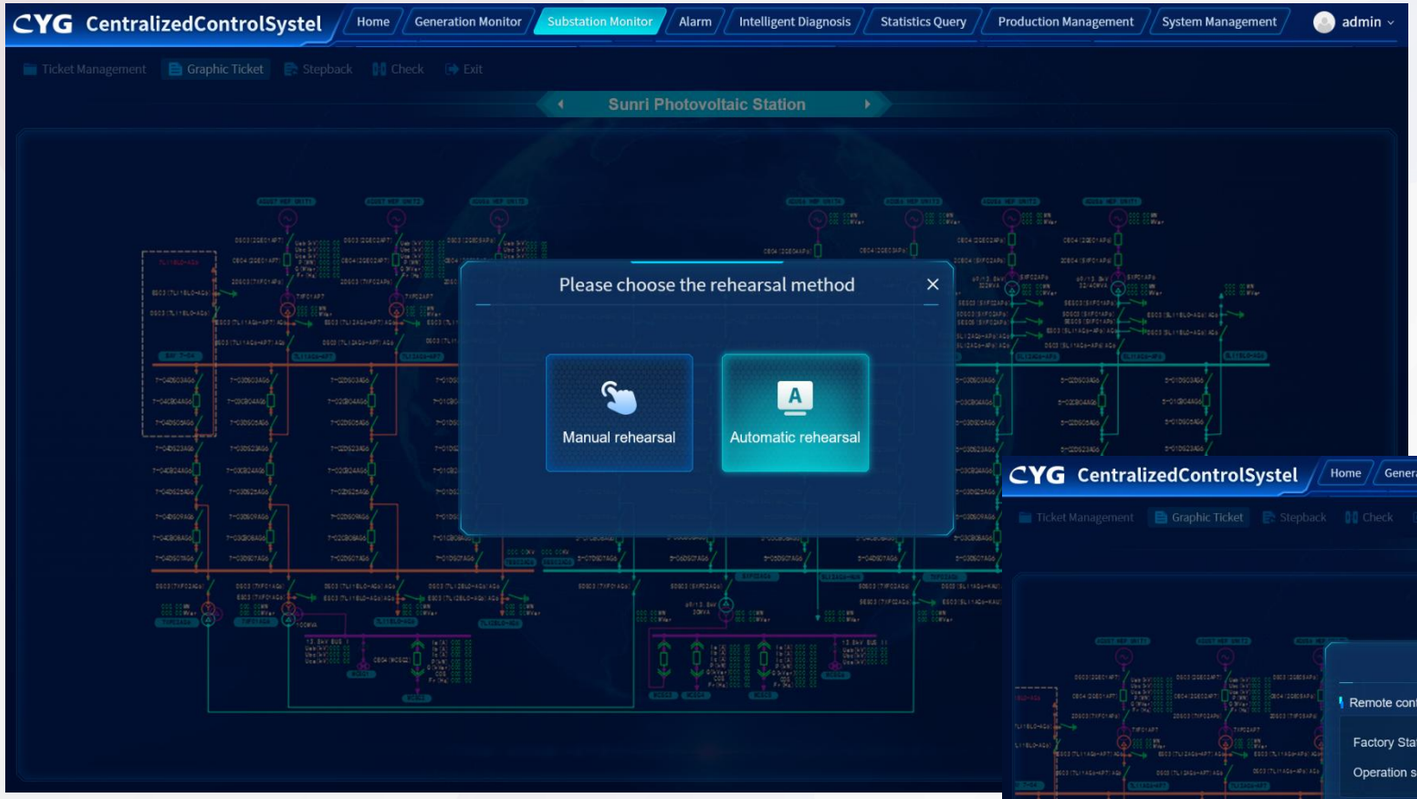
- The remote control process of primary equipment: order simulation - rehearsal - execution.
- The system provides a library of commonly used typical operation orders and supports customized operation order storage.
- In the interval subgraph, by clicking the primary equipment, remote control operation items can be automatically generated according to the current equipment status, which improves the order efficiency.
- One operation order can contain multiple operation items to realize programmed operation of multiple devices.

- The order simulation is subject to multiple verification of the anti-maloperation rules, equipment status signals, and so on.
- The operation order rehearsal can be performed only after the verification is correct.

▼ Remote control operation order- simulation error



# Key Technologies

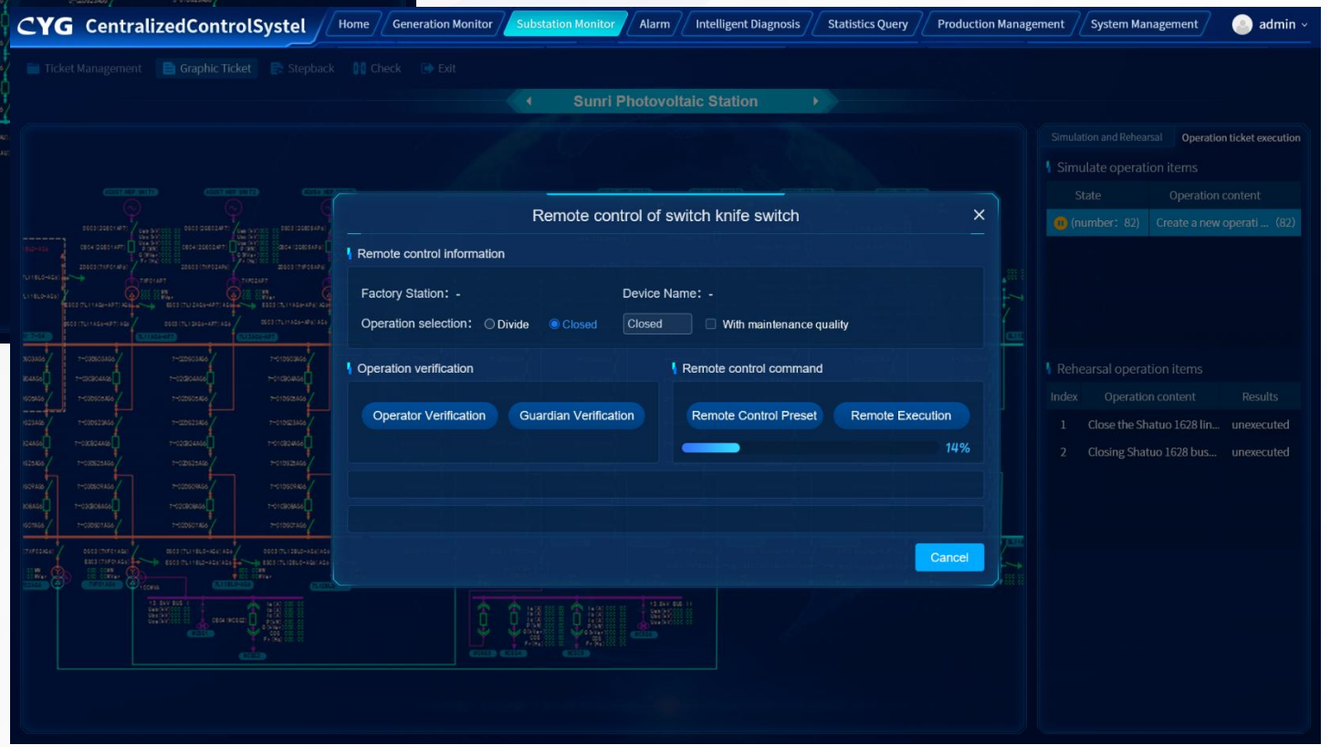



▲ Remote control operation order- rehearsal

- A rehearsal is required before execution, and execution is possible only after the rehearsal is completed without errors.
- Confirm that the remote control conditions are met through the rehearsal.
- Support manual rehearsal and automatic rehearsal.

- The execution is subject to double verification by the operator and the guardian to improve safety.

▼ Remote control operation order- execute



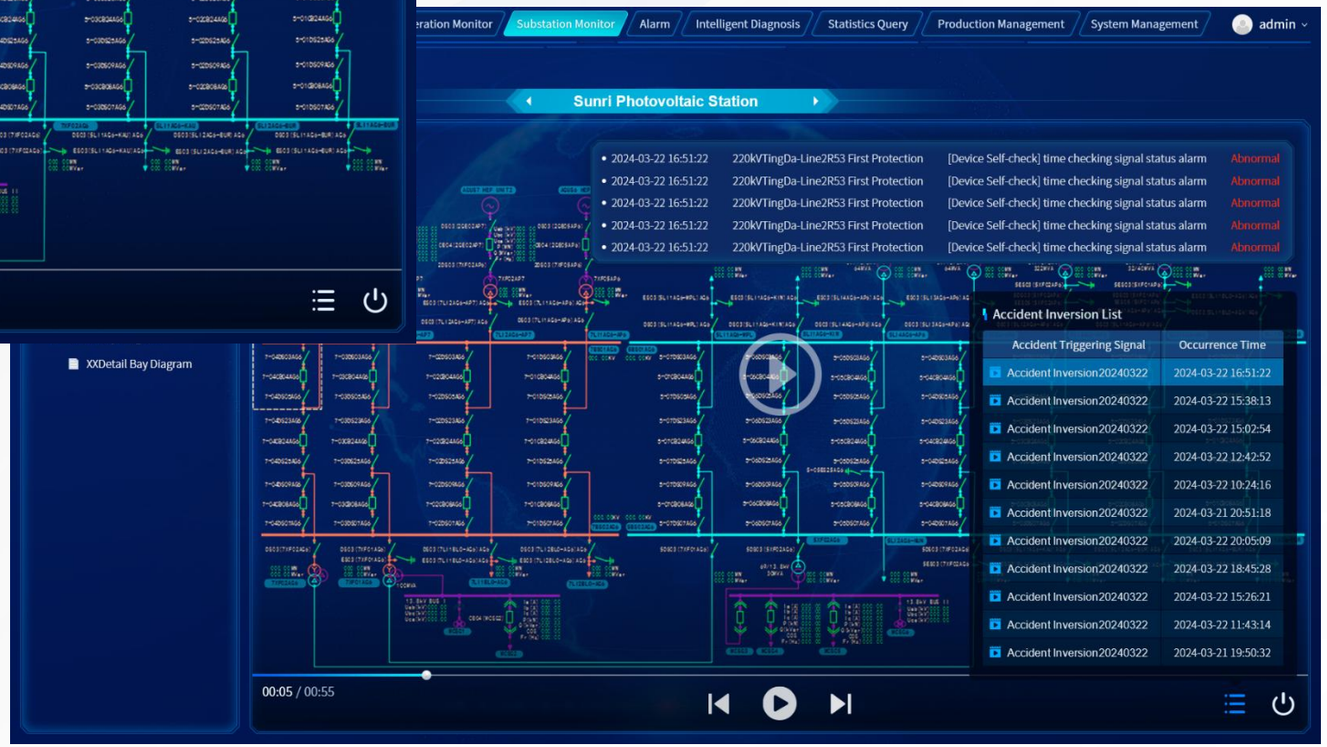
# Key Technologies

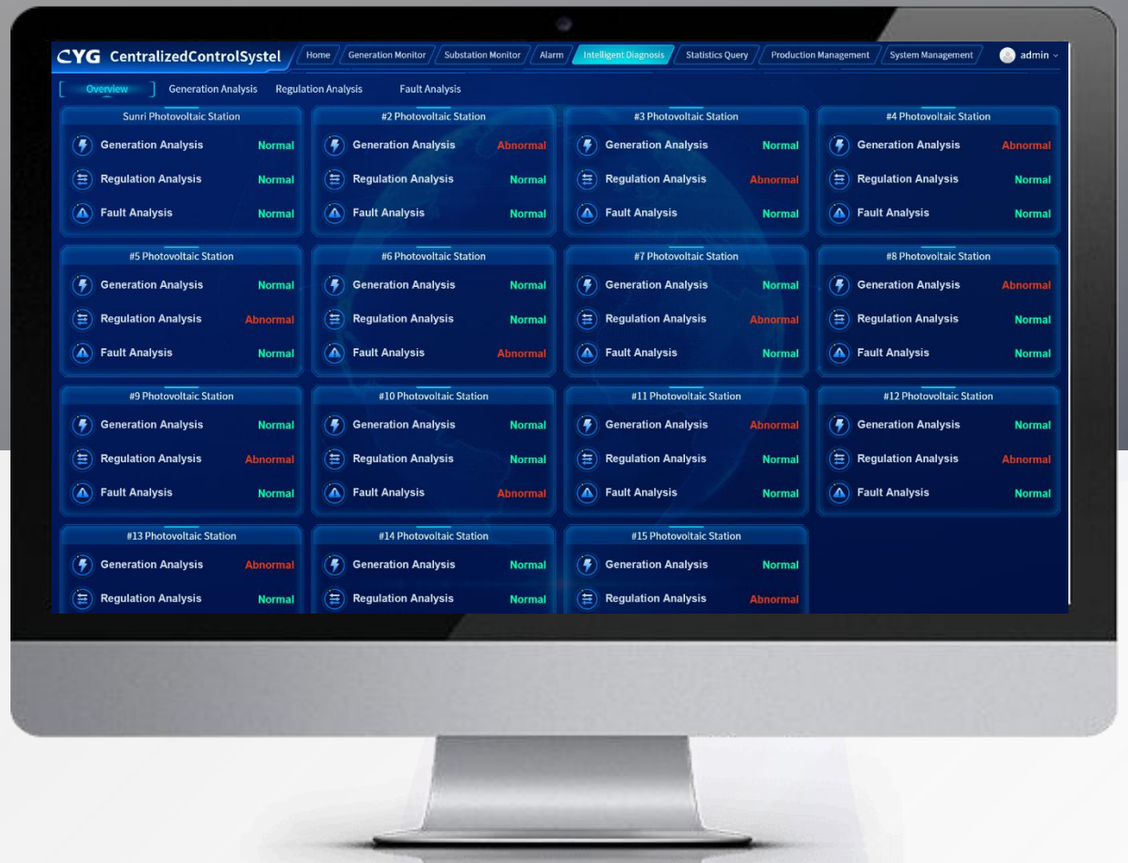

▲ Fault re-enactment play/pause

- Support post disturbance review triggered by signals or customized events, and record the whole station's data information before and after the fault.
- Analyze the cause of the fault and determine the impact range of the fault through the fault re-enactment video.

- The trigger signal and time of each fault are recorded and displayed in a list for viewing.

▼ Fault re-enactment list






# Intelligent diagnostics

- Analyze and diagnose the operation situation by comparison according to the index.
- Timely discover equipment hidden danger and reduce economic losses

- Abnormal power generation analysis
- AGC/AVC regulation tracking
- Device fault diagnostics

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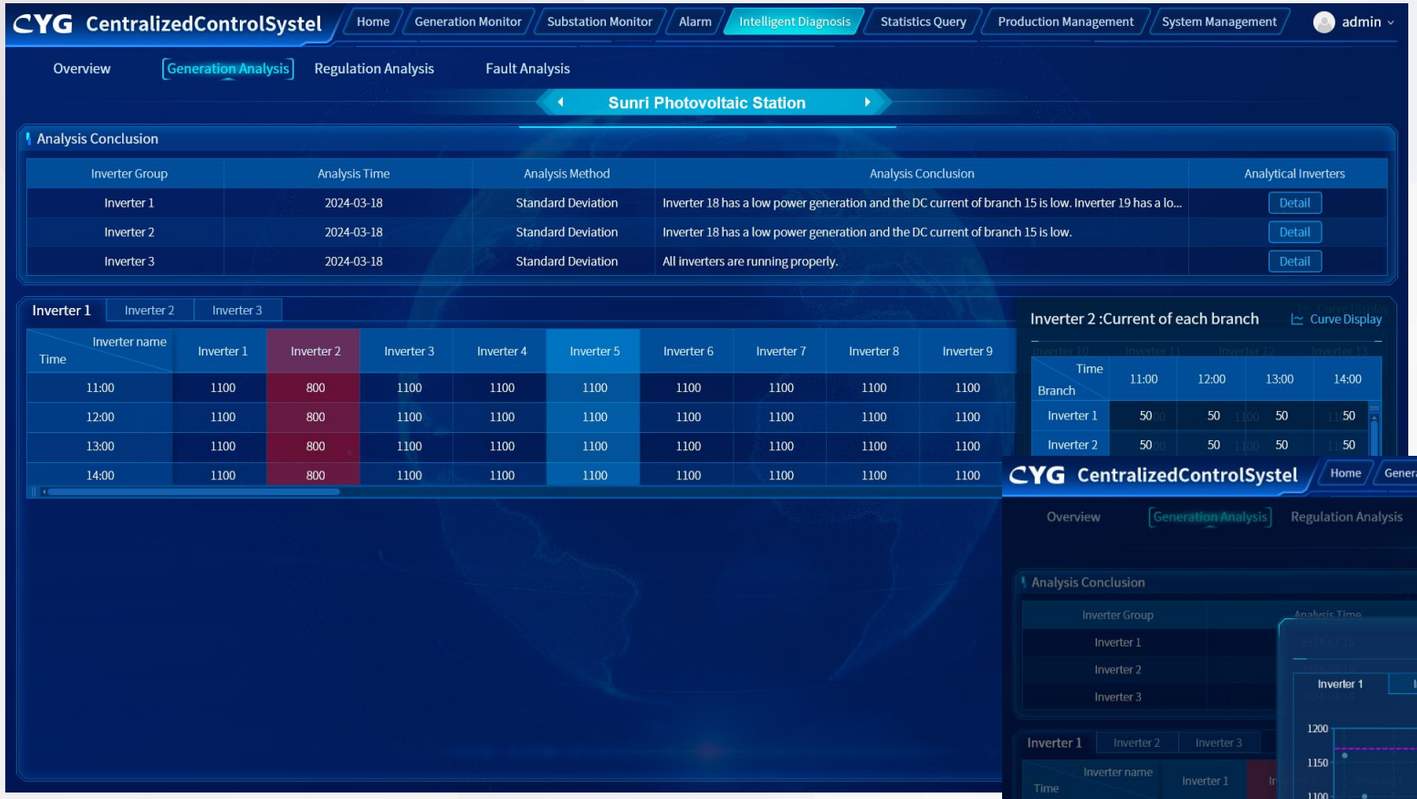
# Key Technologies

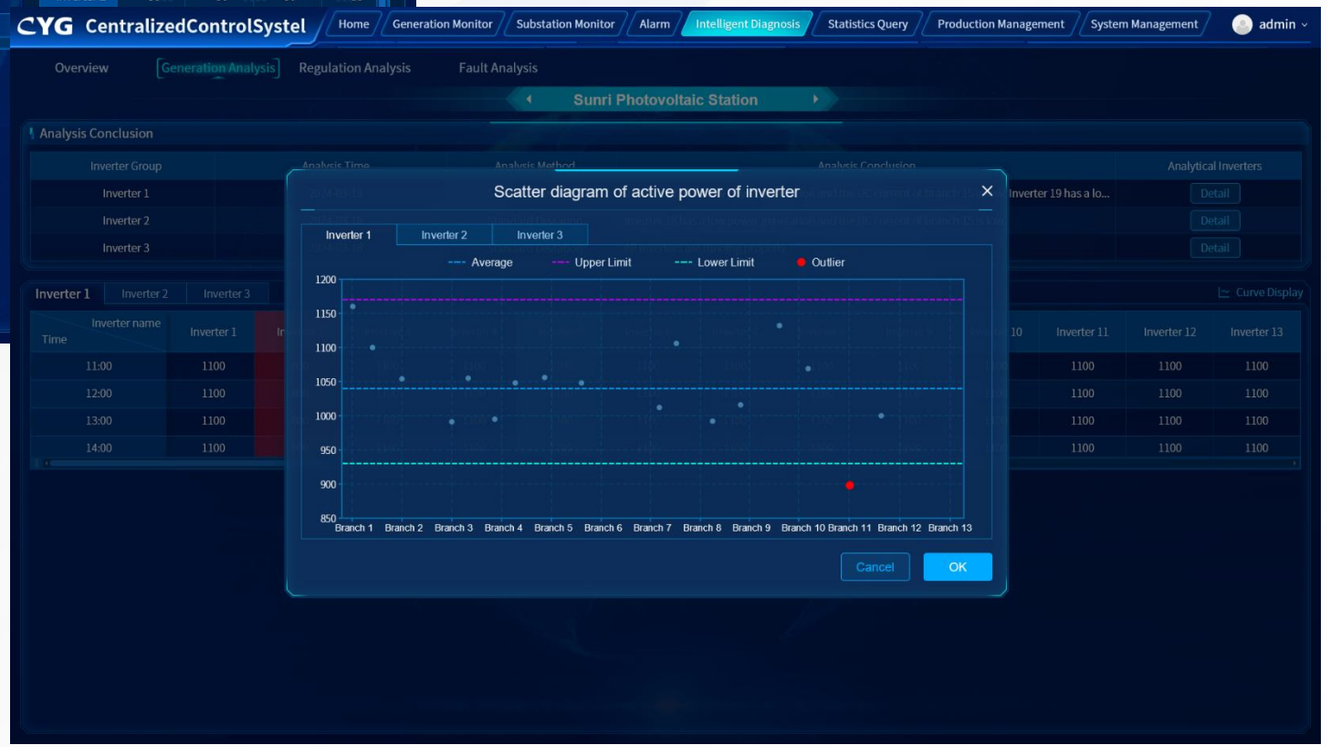



▲Inverter abnormal power generation analysis

- Analyze inverter power generation/power generation by standard deviation method and other analysis methods to detect abnormal inverters in a timely manner.
- Analyze the branch currents of abnormal inverters to find out the suspected points of faults, and guides the operation and maintenance personnel to investigate the hidden dangers.

- The inverter with significantly low power generation can be visualized through the scatter plot.
- Automatic alarms are provided for equipment with abnormal analysis results.

▼ Inverter active power scatterplot



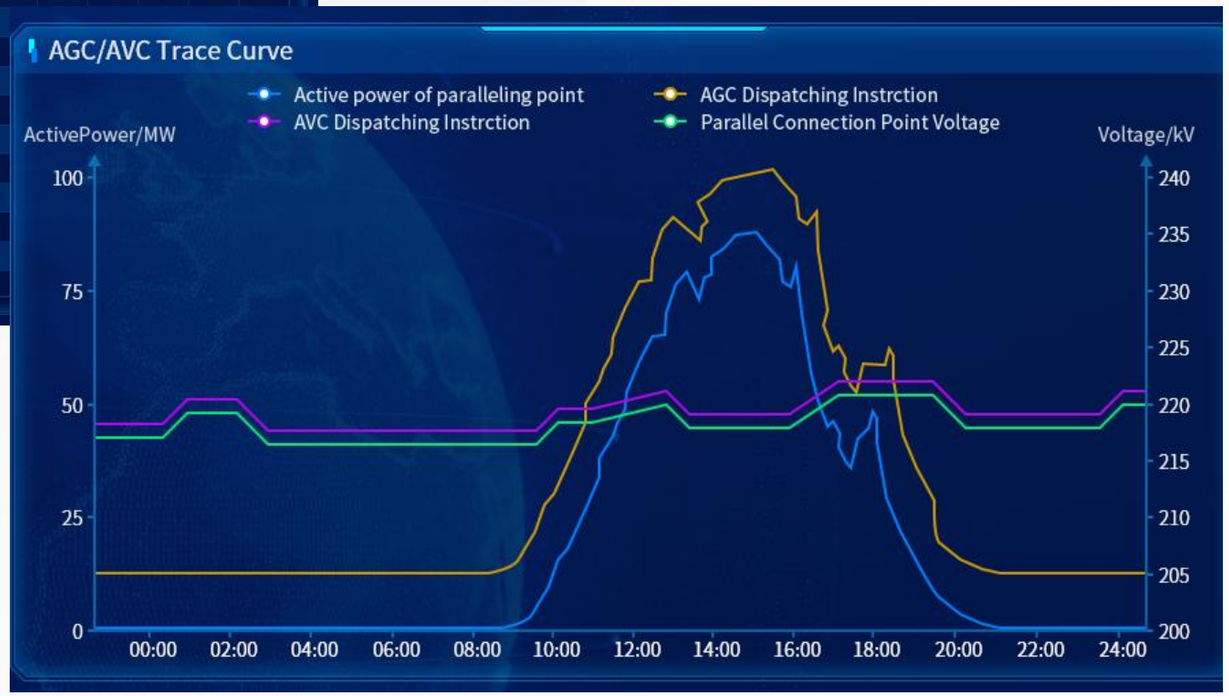

| Time | 08:00 | 08:05 | 08:13 | 08:14 | 08:15 | 08:16 | 08:17 | 08:18 | 08:19 | 08:20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Target Value (kW) | 1000.12 | 990 | 980.00 | 980.00 | 980.00 | 980.00 | 980.00 | 980.00 | 980.00 | 980.00 |
| c | 980.12 | 970 | 980.00 | 950.00 | 950.00 | 950.00 | 950.00 | 950.00 | 950.00 | 950.00 |
| Difference | 20 | 20 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

| Time | 08:00 | 08:05 | 08:13 | 08:14 | 08:15 | 08:16 | 08:17 | 08:18 | 08:19 | 08:20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Target Value (kW) | 1000.12 | 990 | 980.00 | 980.00 | 980.00 | 980.00 | 980.00 | 980.00 | 980.00 | 980.00 |
| Active Power (kW) | 980.12 | 970 | 980.00 | 950.00 | 950.00 | 950.00 | 950.00 | 950.00 | 950.00 | 950.00 |
| Difference | 20 | 20 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

▲ AGC/AVC regulation condition analysis

- Collect AGC/AVC subsystem data from the plant, monitor the data refresh status in real time, and discover abnormal situations such as system crash and communication interruption in a timely manner.
- Automatically sample and analyze the scheduling instructions and monitoring data, and carry out regulation abnormality alarm when the deviation is found to be too large to prevent being punished.

▼ AGC/AVC regulation tracking




# Statistics inquiry

- Conduct comprehensive management of equipment and record history in detail
- Provide data support for power plant index analysis and processing decision-making

- Historical alarm/event record query
- Real-time/historical curve query
- Customized reports

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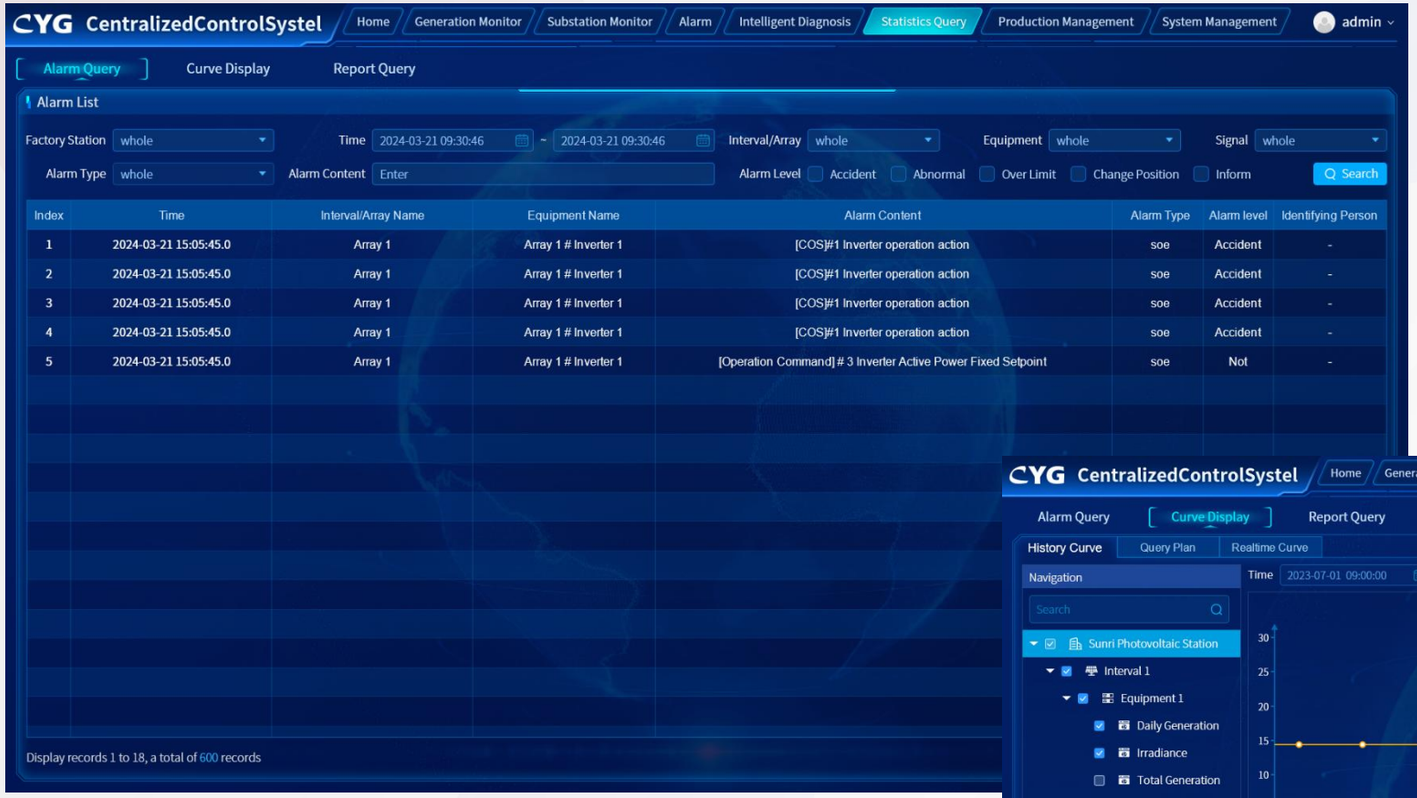
# Key Technologies

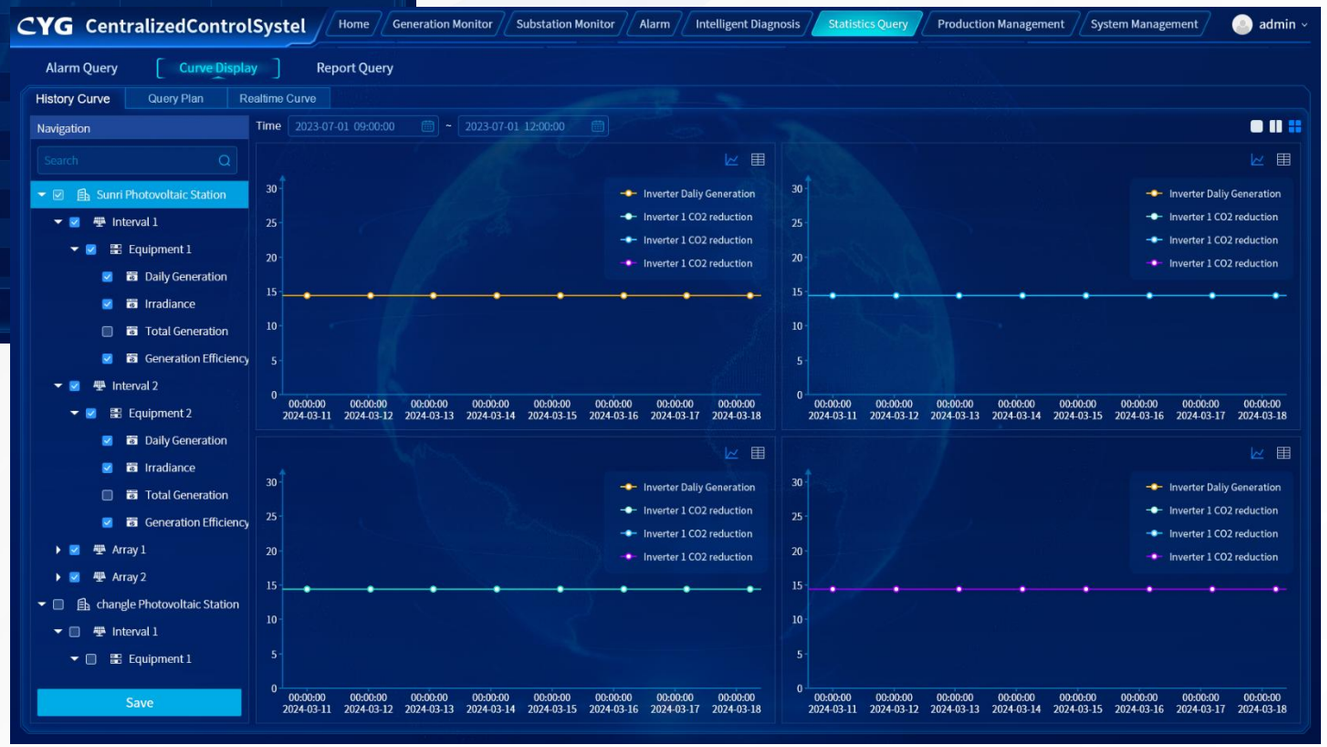



▲ Historical alarm inquiry

- Supports inquiring history records by multiple inquiry conditions such as power plants and stations, time, alarm level and so on.
- Support categorizing and counting history record entries.
- Support exporting inquiry results.

- Support inquiring the historical data curve of remote metering sampling.
- Support inquiring multiple telemetering at the same time.
- When inquiring multiple curves, it supports displaying the curves in multiple windows.

▼ Historical curve inquiry



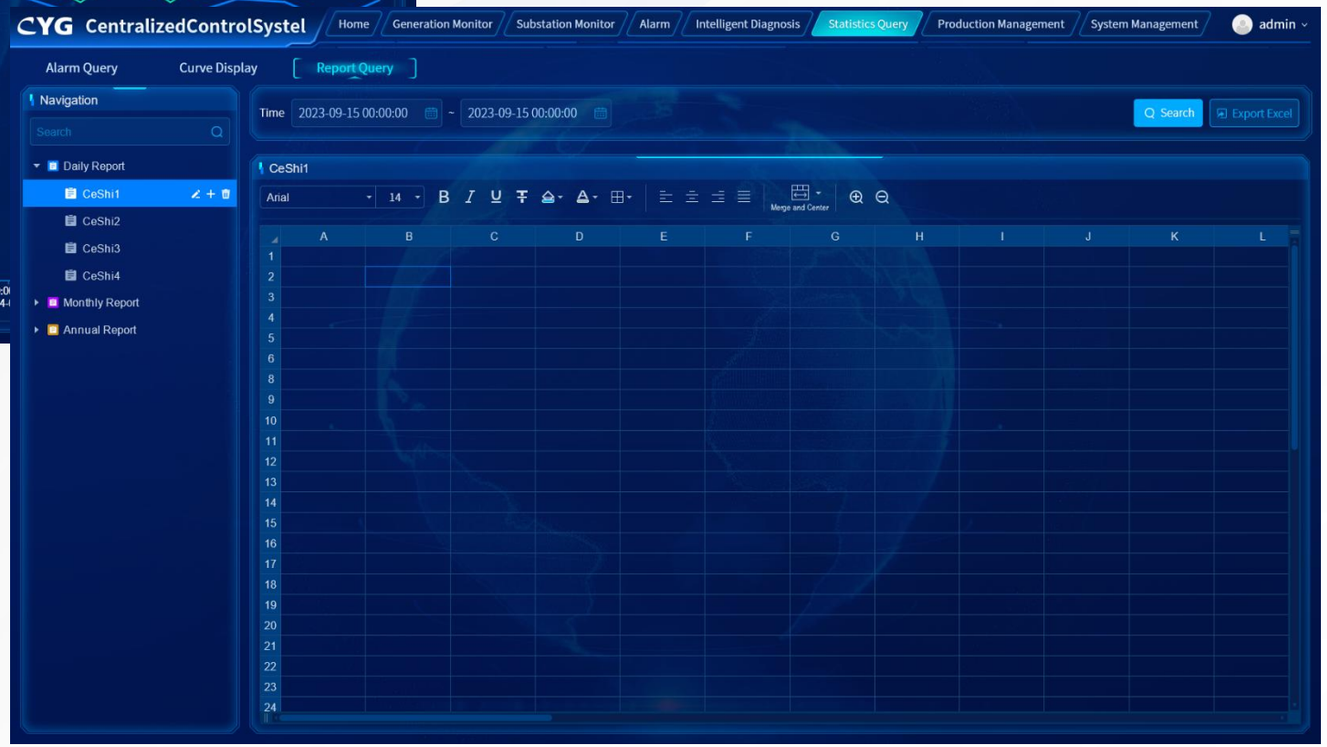
# Key Technologies

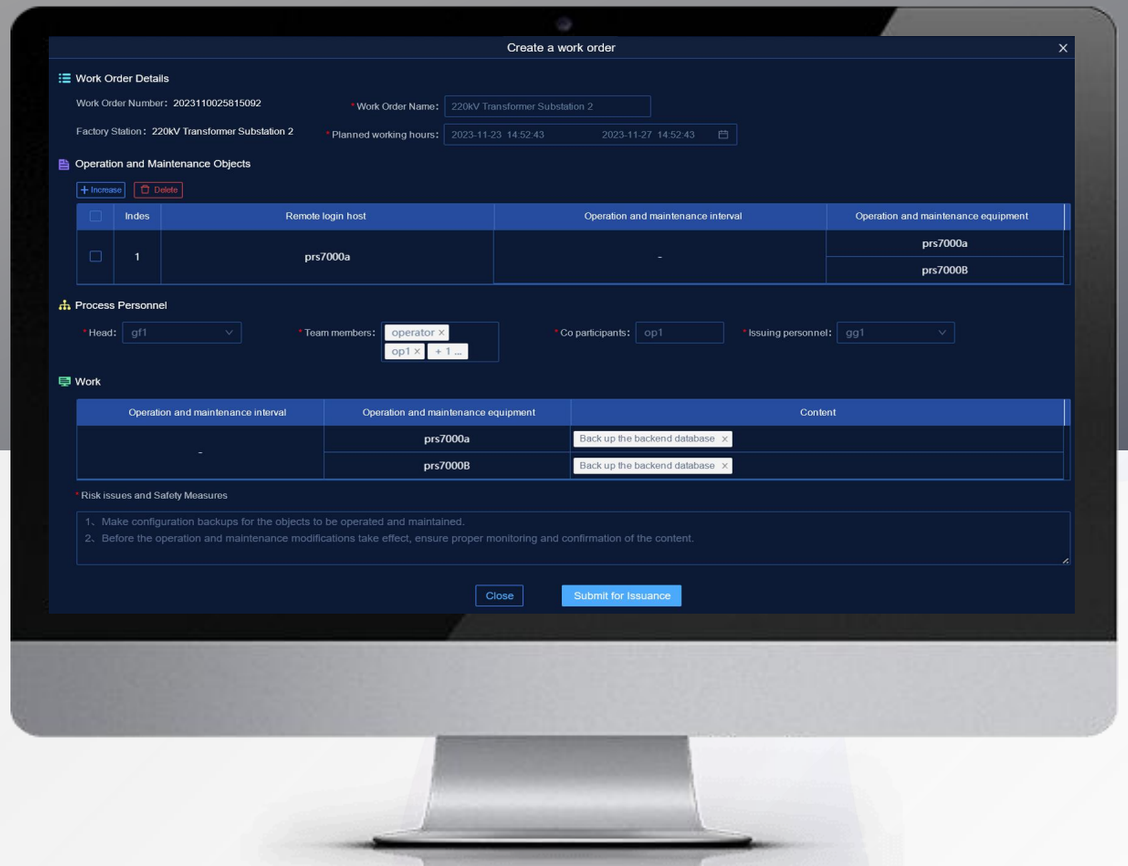

▲ Real-time curve inquiry

- Display the real-time changes of remote metering values visually in the form of curves.
- Support displaying multiple curves at the same time and distinguishing them by color.

- Support categorizing statistical reports by multi-level and multi-dimension, such as company level, plant level, equipment level, daily, monthly and yearly reports.
- Provide several commonly used report templates and support customizing templates according to requirements.
- Supports exporting and printing reports.

▼ Report query






# Production management

- Check the data anytime and anywhere through webpage/APP.
- Customize work order according to the operation and maintenance needs and control the workflow online.

- Mobile APP
- Web Publishing
- Operation and maintenance work order management

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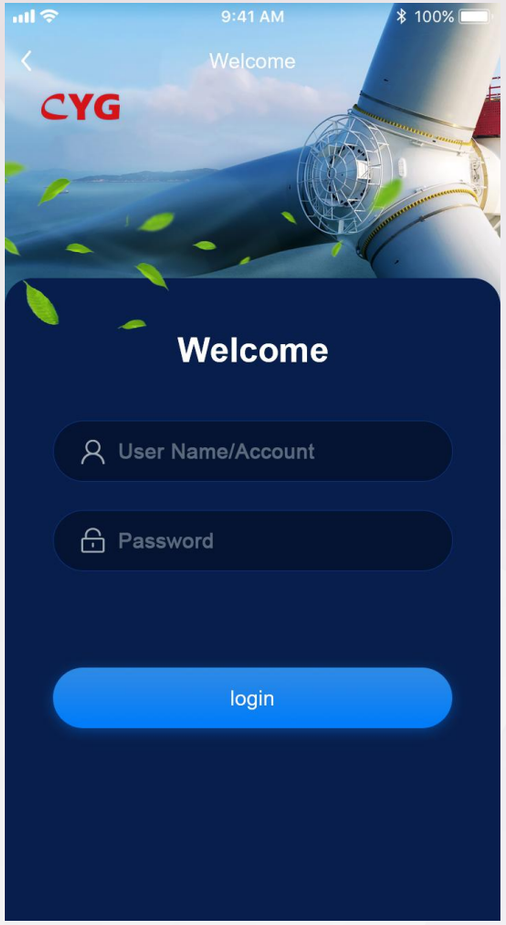
# Key Technologies




Login

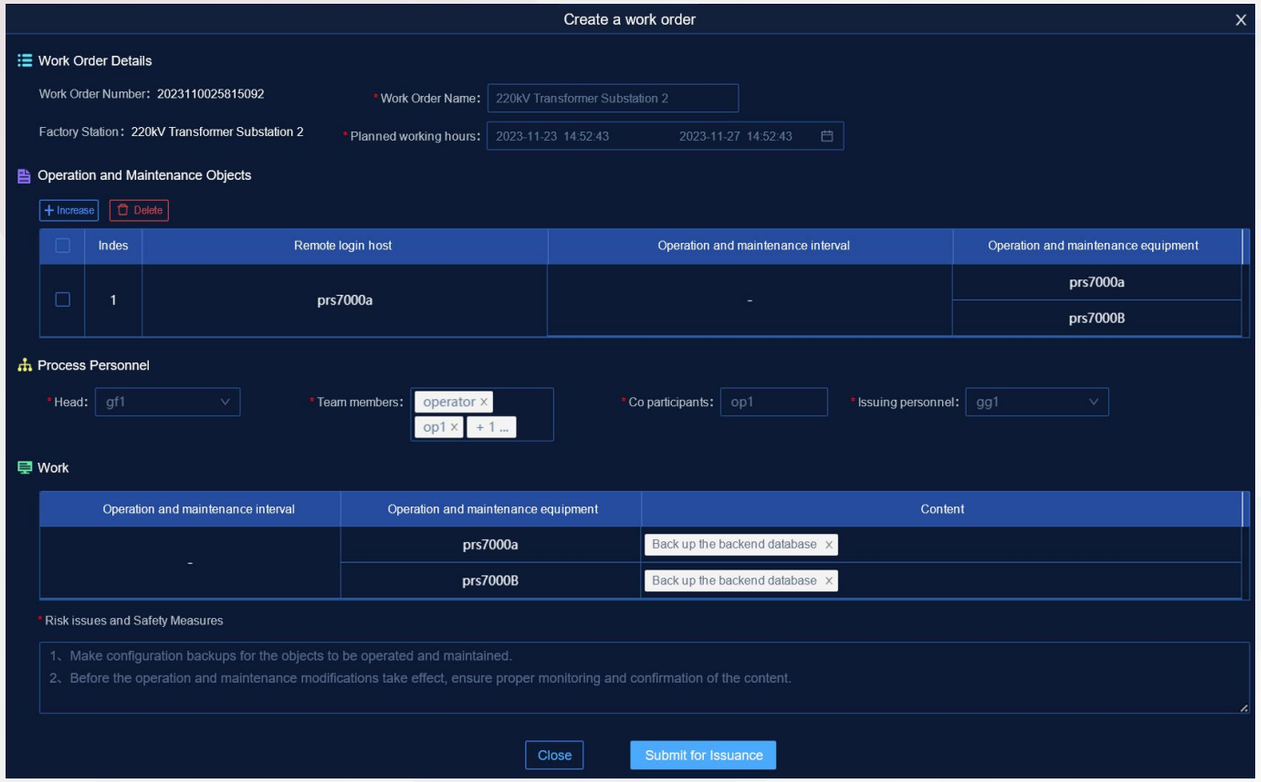

Home page


Environmental data


Array data

- Check all the real-time and historical data of the power plant anytime and anywhere through the mobile APP.
- Remote control in APP is not allowed to ensure the safety of power grid operation.
- Support customized development of function modules.

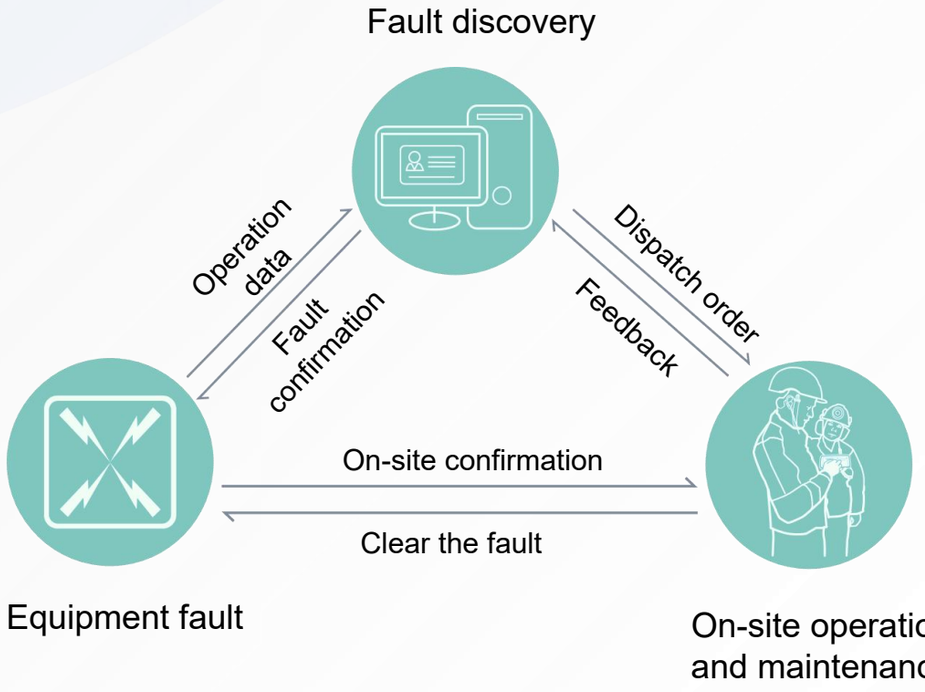
# Key Technologies

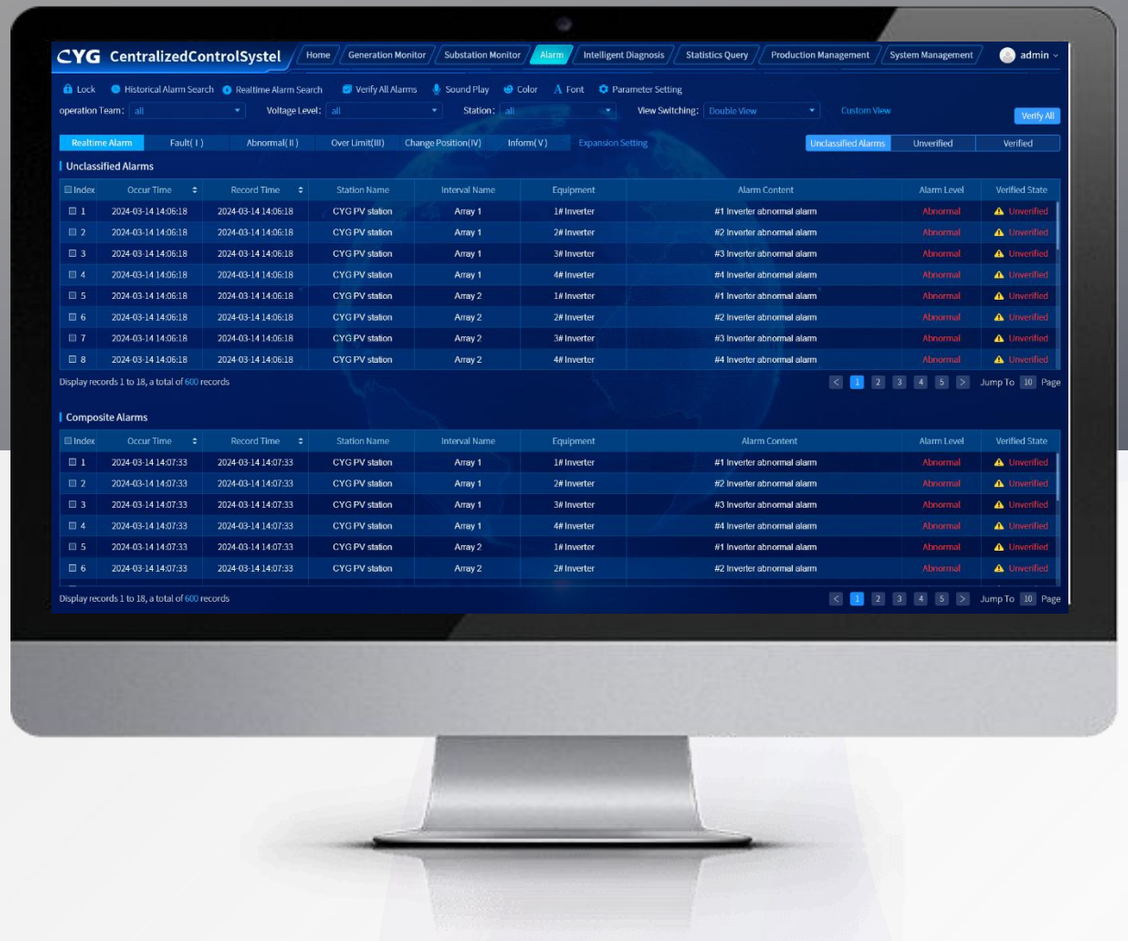



▲ Create operation and maintenance work order

- Work order process management includes the whole process of work order creation, issuance, authorization, receipt, termination, audit and evaluation.
- Provides operation and maintenance work order templates and supports customized templates.
- Automatically generate operation and maintenance reports after the work order is completed, which is convenient for statistical inquiries.
- Support work order information query, work order completion rate statistics, work order classification statistics summary.

▼ Process of operation and maintenance






# Overview of real-time alarm

- Display all alarms of the system and plants under its monitoring in real time.
- Alarms through color, sound, flashing and other effects.

- Alarms are categorized and displayed in different levels
- Important alarm is alerted by push screen/pop-up window
- Support alarm confirmation to avoid missing any alarms.
- Support customized interface display style
- Support detecting abnormal frequent signals and preventing flooding the screen with single-signal.

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