



Acrel-Prepaid System

Energy measuring and charging of user sides



Author: Aaron
E-mail: aaron@acrel.cn
Web: www.acrel-electric.ke

Energy measuring and charging

Energy measuring and charging is mainly aimed at measuring electricity consumption of consumers and charging based on energy consumption and the corresponding unit price.

Enterprises, industrial parks and others purchase electricity from the Grid, then allocate, measure and charge energy consumption to internal rented shops, factories and employees, etc, according to relevant policies and norms.

Our scope of application is mainly for **internal energy consumption measurement analysis and charging service** of enterprises, industrial parks, commercial management properties, etc., such as commercial real estate groups, rental apartments, supermarket chains, etc.



Application — Commercial real estate groups

Commercial complex



Industrial parks



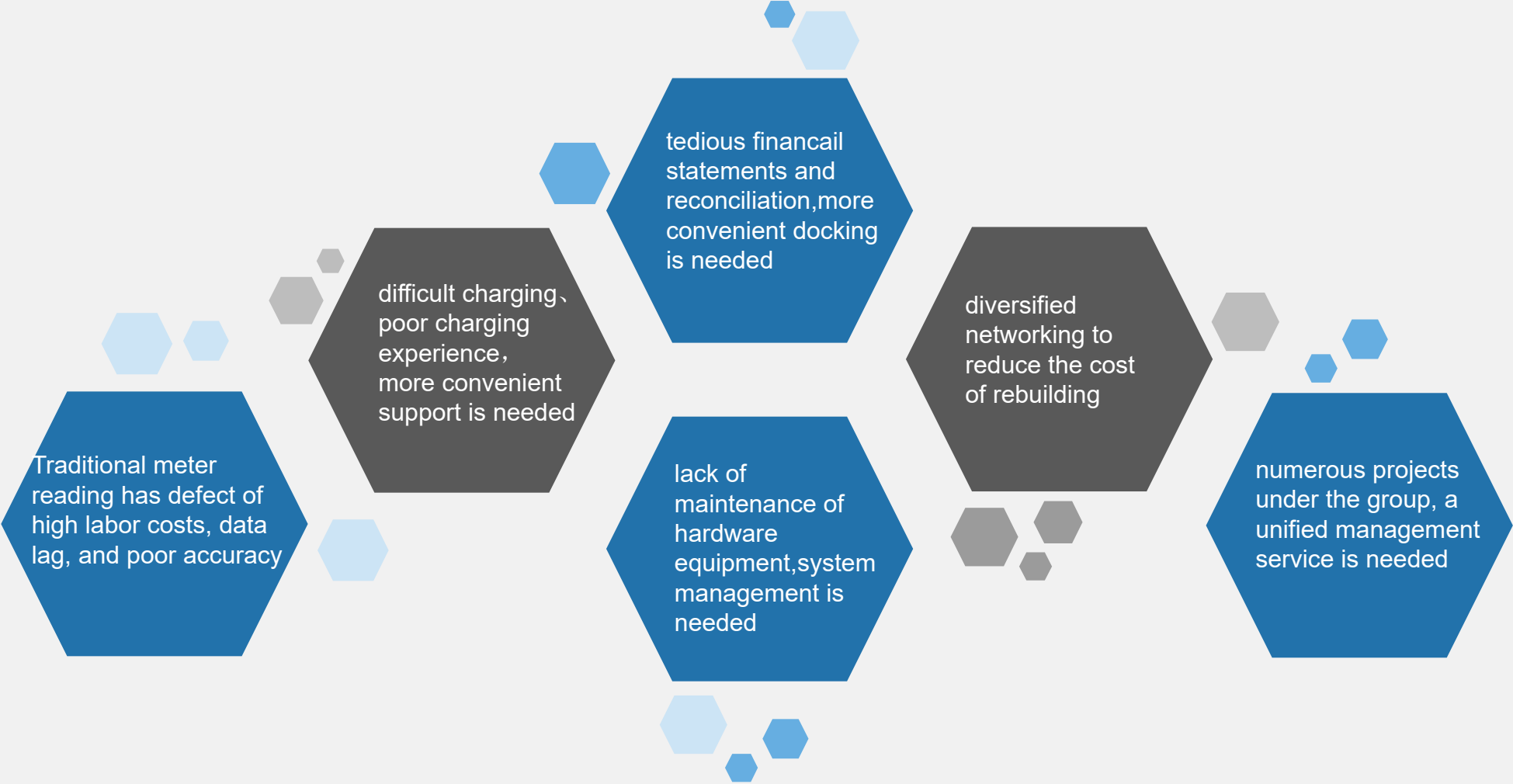
Office building



Farmers Market & Trading Market



Scenarios requirements—Commercial real estate groups



Scenarios requirements—rental apartments



Rental apartments

charging for water and electricity

Convenient for landlords to charge tenants for water and electricity



Renting

Debugging-free,
deployment-free,
managed services

Diversified networking

Wired, WIFI

Our solutions



Prepaid Cloud Platform

4G/WIFI/Wired



AWT100

RS485



ADL100-EY
ADL300-EY



ADF400L



ADL100-EY/WF



ADL300-EY/WF

Wired

Wireless

Main features of the program

- diversified networking, diversified device access, diversified deployment
- group management, project classification, hierarchical topology;
- role management, authority assignment;
- energy measurement, analysis and charge;
- financial reconciliation, property management;
- portable payment, various options;
- equipment supervision, abnormality warning;
- function extension: electricity distribution monitoring, electrical safety, charging piles and so on.

Main Functions

CONTENTS

01 Item management

Item classification、 adding devices、
user management

02 Device supervision

device inspection、 abnormality feedback、
text message settings

03 User monitoring

shop monitoring、 circuit monitoring、
monitoring details

04 Financial/Property management

order overview、 financial statement、
property settings

05 System settings

role assignment、 authority management、
operating log

01

Item management

Item classification、 adding devices、 user management

Item classification

For cross-regional group programs or large-scale park partition management item, each partition can be managed as a sub-item.

Edge gateways, terminal devices, and user information in each sub-item are managed separately without influencing each other.

The screenshot displays the 'IoT EMS Platform' interface. At the top, there is a navigation bar with a search icon, status indicators for 'Low' (99+), 'Middle' (0), and 'High' (75), and a user profile for 'administrator'. Below the navigation bar is a breadcrumb trail: 'Welcome > Project Management >'. A toolbar contains buttons for '+ Add', 'Edit', 'Delete', 'Import', 'Download import template', 'Price setting', 'Picture Management', 'Coefficient setting', and 'Export'. A search box on the right is labeled 'Project Name/Customer Name/Address'. The main content is a table with the following columns: 'Project Name', 'Customer Name', 'Address', 'Principal', 'Phone', and 'Create time'. The table lists 18 items, including schools like 'Agang thuto primary school', 'SAITEX4 EMS', 'CHAU AU FILM EMS', 'Khosis primary school', 'Vaalpenskraal primary school', 'Vaalppenskraal', 'Vaalppenskraal primary school', '1', 'อุตมพลาตติก', 'Sekgweng Primary School', 'Maroi combined school', 'test nam', 'ADplsatic', 'Kranenburg primary school', and 'test'. At the bottom right, there is a pagination control showing 'Total 273', '15/page', and a page number '1'.

<input type="checkbox"/>	Project Name	Customer Name	Address	Principal	Phone	Create time
<input type="checkbox"/>	Agang thuto primary school	Agang thuto primary school	Agang Thuto Primary School			2022-12-06 04:58:33
<input type="checkbox"/>	SAITEX4 EMS	Saitex 4	Amata IP, Long Binh Award, Bien Hoa City	Oanh Nguyen	0989173858	2022-12-05 11:57:17
<input type="checkbox"/>	CHAU AU FILM EMS	CHAU AU FILM	Loi Binh Nhon IP, Tan An City, Long An Pr	Mang Chau Au	0909008016	2022-12-05 09:46:28
<input type="checkbox"/>	Khosis primary school	Khosis primary school	Khosis (Met) Primary School			2022-12-03 02:07:52
<input type="checkbox"/>	Vaalpenskraal primary school	Vaalpenskraal primary school	Vaalpenskraal Primary School			2022-12-02 17:06:25
<input type="checkbox"/>	Vaalppenskraal	Vaalppenskraal	1340 Iephalale			2022-12-02 16:23:54
<input type="checkbox"/>	Vaalppenskraal	Vaalppenskraal primary school	C2Q23222+F2			2022-12-02 16:09:58
<input type="checkbox"/>	1	1	1			2022-12-01 15:48:00
<input type="checkbox"/>	อุตมพลาตติก	อุตมพลาตติก	สามโคก			2022-12-01 14:54:27
<input type="checkbox"/>	Sekgweng Primary School	Sekgweng Primary School	Sekgweng Primary School			2022-12-01 13:51:25
<input type="checkbox"/>	Maroi combined school	Maroi combined school	Maroi Combine School			2022-11-29 19:48:43
<input type="checkbox"/>	test nam	n	az	nbr	546546544	2022-11-29 17:48:40
<input type="checkbox"/>	ADplsatic	Ad	Cukod			2022-11-29 10:31:12
<input type="checkbox"/>	Kranenburg primary school	Kranenburg primary school	KRANENBURG PRIMARY SCHOOL			2022-11-28 19:09:44
<input type="checkbox"/>	test	1234	1234			2022-11-28 16:10:58

Gateway management/Meter management/User management (engineering manager)

The management in the item is classified through
Project-->gateway-->meter-->user.

Each project is connected to multiple gateways, each gateway is connected to multiple meters, and each meter corresponds to a user.(multiple meters can also correspond to a user.)Property management personnel can easily manage users.

The screenshot shows a web interface for 'Meter Management' within an 'Energy IoT Cloud Platform'. The interface is divided into two main sections: 'Electric Meter' and 'Room'. The 'Electric Meter' section includes fields for Project Name (江阴微电网研究院), Gateway ID (02122042700210), Meter Address (3_21), Meter Type (ADF400L-SY[预]), Circuit name (311), PT Ratio (1), CT Ratio (1), and Offline alarm (Yes/No). There is also an 'Installation picture' field with a plus sign icon and a 'Remark' field (0/200). The 'Room' section includes Room Number (311), Owning topology (3楼), Room size(m²), and Remark. The 'Open account' section includes Username (311-632be3f8e4b09b2f36eE), Password (masked), Phone, Contact address, Combined measurement (Yes/No), Remark (0/50), Alarm amount A(¥) (100), Alarm amount B(¥) (0), Initial amount(¥) (0), Model (Force), Multi tariff (Yes/No), Tariff price (Yes/No), and Allowable amount of credit(¥) (0). At the bottom, there are 'Save' and 'Cancel' buttons.

02

Device supervision

equipment self-inspection、abnormity feedback、text message settings

Alarm information (engineering manager)

Alarm information shows all the abnormal status of devices. For example, if the equipment is disconnected, or the balance is insufficient, or the state of pressure loss and reverse flow caused by wrong wiring is monitored, it can be quickly screened and checked, and it can be configured to actively send SMS alarms.

The screenshot displays the 'Alarm Information' page of the 'Energy IoT Cloud Platform'. The interface includes a navigation bar with 'Welcome', 'Meter Management', and 'Alarm Information'. Below the navigation bar, there are filters for 'Event type' (Undervoltage, Overpressure, Overcurrent, Overload, Money, Energy, Residual Current, Overtemperature, Fault, Electric arc, Short circuit, Blackout, Lowtemperature, Common, Offline), 'Alarm level' (High, Middle, Low), and 'Working order status' (Untreated, Distributed, Processed). There are also search and reset buttons, and a date range selector (2022-01-01 to 2022-12-06). The main content area shows a list of alarms with columns for location, time, status, and details. The list includes five entries, all marked as 'Untreated'. The first four entries are 'Overcurrent' alarms, and the fifth is an 'Overpressure' alarm.

Location	Time	Status	Event Type	Gateway ID	Device Model	Meter Address	Circuit Name	Detailed Description
江阴微电网研究院	2022-12-06 07:55:04	Untreated	Overcurrent	70100001001	ADF400LS	T001032	4AL05-2备用	Ic is out of limit , settingValue : >1 , currentValue : 1.12 , unit : A
江阴微电网研究院	2022-12-05 09:10:00	Untreated	Overcurrent	70100001001	ADF400LS	T001032	4AL05-2备用	Ic is out of limit , settingValue : >1 , currentValue : 1.1 , unit : A
江阴微电网研究院	2022-12-02 08:00:02	Untreated	Overcurrent	70100001001	ADF400LS	T001032	4AL05-2备用	Ic is out of limit , settingValue : >1 , currentValue : 1.17 , unit : A
江阴微电网研究院	2022-12-01 07:55:00	Untreated	Overcurrent	70100001001	ADF400LS	T001032	4AL05-2备用	Ic is out of limit , settingValue : >1 , currentValue : 1.12 , unit : A
江阴微电网研究院	2022-11-30 12:40:31	Untreated	Overpressure	02122042700210	ADF400L-SY	2_5	210	Abnormal meter reading and fee deduction

Text message settings (engineering manager/financial staff)

Text message can be set according to abnormal information or alarming status. For example, it can be set to send **SMS alarming** to rentants for **insufficient balance** or to engineers for **abnormal wiring or abnormal energy consumption**.

能源物联网云平台

Welcome | Meter Management | Alarm Information

Event type: Undervoltage Overpressure Overcurrent Overload Money Energy Residual Current Overtemperature Fault Electric arc Short circuit Blackout Lowtemperature Common Offline

Alarm level: High Middle Low Working order status: Untreated Distributed Processed

Other options: 江阴微电网研究院 - Choose 2022-01-01 ~ 2022-12-06 Detailed description Search Reset

Export Untreated Distributed Processed

江阴微电网研究院	2022-12-06 07:55:04	Untreated	Details
Overcurrent	Gateway ID: 70100001001 Device model: ADF400LS Meter Address: T001032 Circuit name: 4AL05-2备用	Detailed description: Ic is out of limit, settingValue : >1, currentValue : 1.12, unit : A	
江阴微电网研究院	2022-12-05 09:10:00	Untreated	Details
Overcurrent	Gateway ID: 70100001001 Device model: ADF400LS Meter Address: T001032 Circuit name: 4AL05-2备用	Detailed description: Ic is out of limit, settingValue : >1, currentValue : 1.1, unit : A	
江阴微电网研究院	2022-12-02 08:00:02	Untreated	Details
Overcurrent	Gateway ID: 70100001001 Device model: ADF400LS Meter Address: T001032 Circuit name: 4AL05-2备用	Detailed description: Ic is out of limit, settingValue : >1, currentValue : 1.17, unit : A	
江阴微电网研究院	2022-12-01 07:55:00	Untreated	Details
Overcurrent	Gateway ID: 70100001001 Device model: ADF400LS Meter Address: T001032 Circuit name: 4AL05-2备用	Detailed description: Ic is out of limit, settingValue : >1, currentValue : 1.12, unit : A	
江阴微电网研究院	2022-11-30 12:40:31	Untreated	Details
Overpressure	Gateway ID: 02122042700210 Device model: ADF400L-SY Meter Address: 2_5 Circuit name: 210	Detailed description: Abnormal meter reading and fee deduction	

03

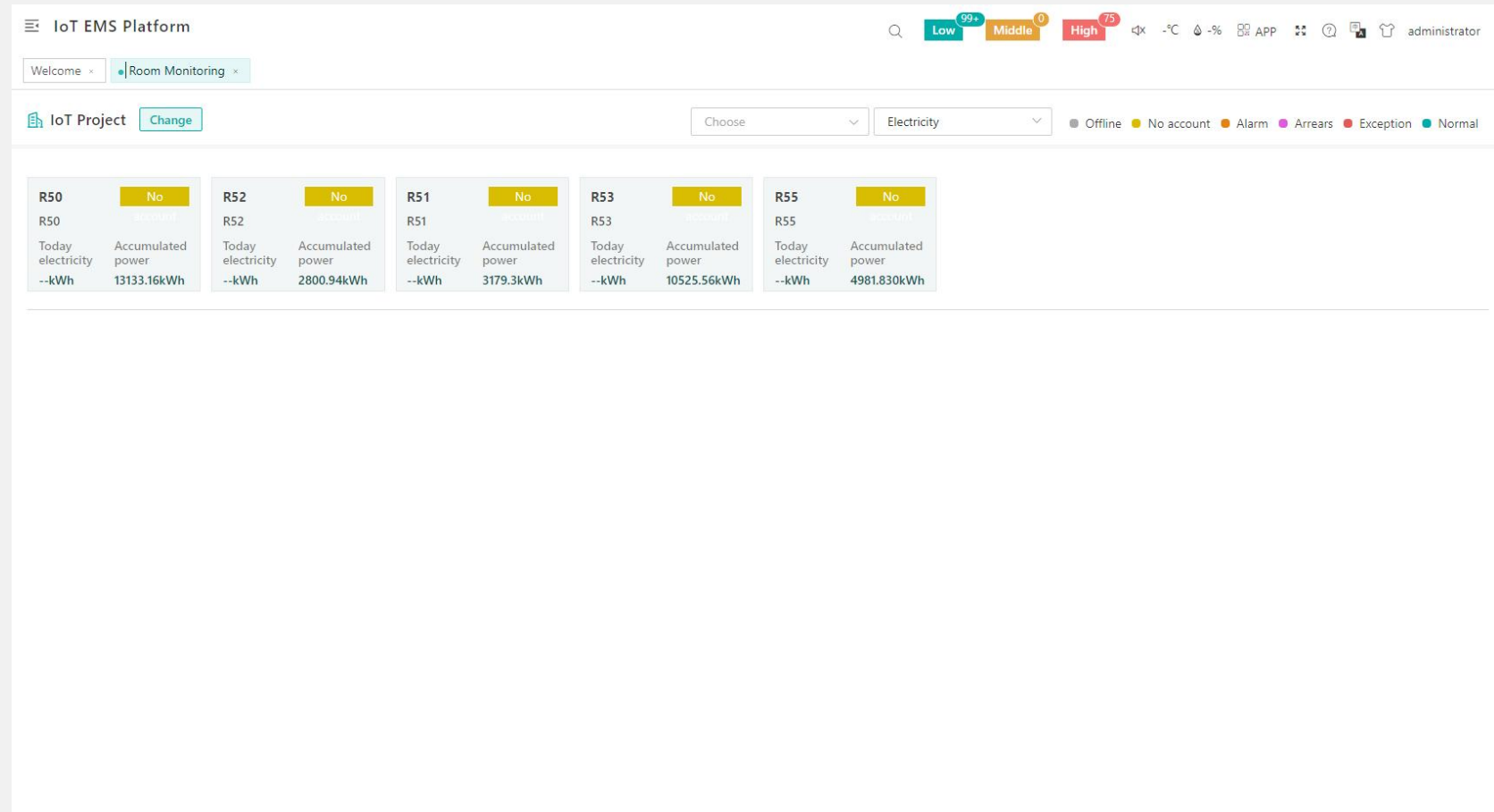
User monitoring

shop monitoring、circuit monitoring、monitoring details

User monitoring (financial staff)

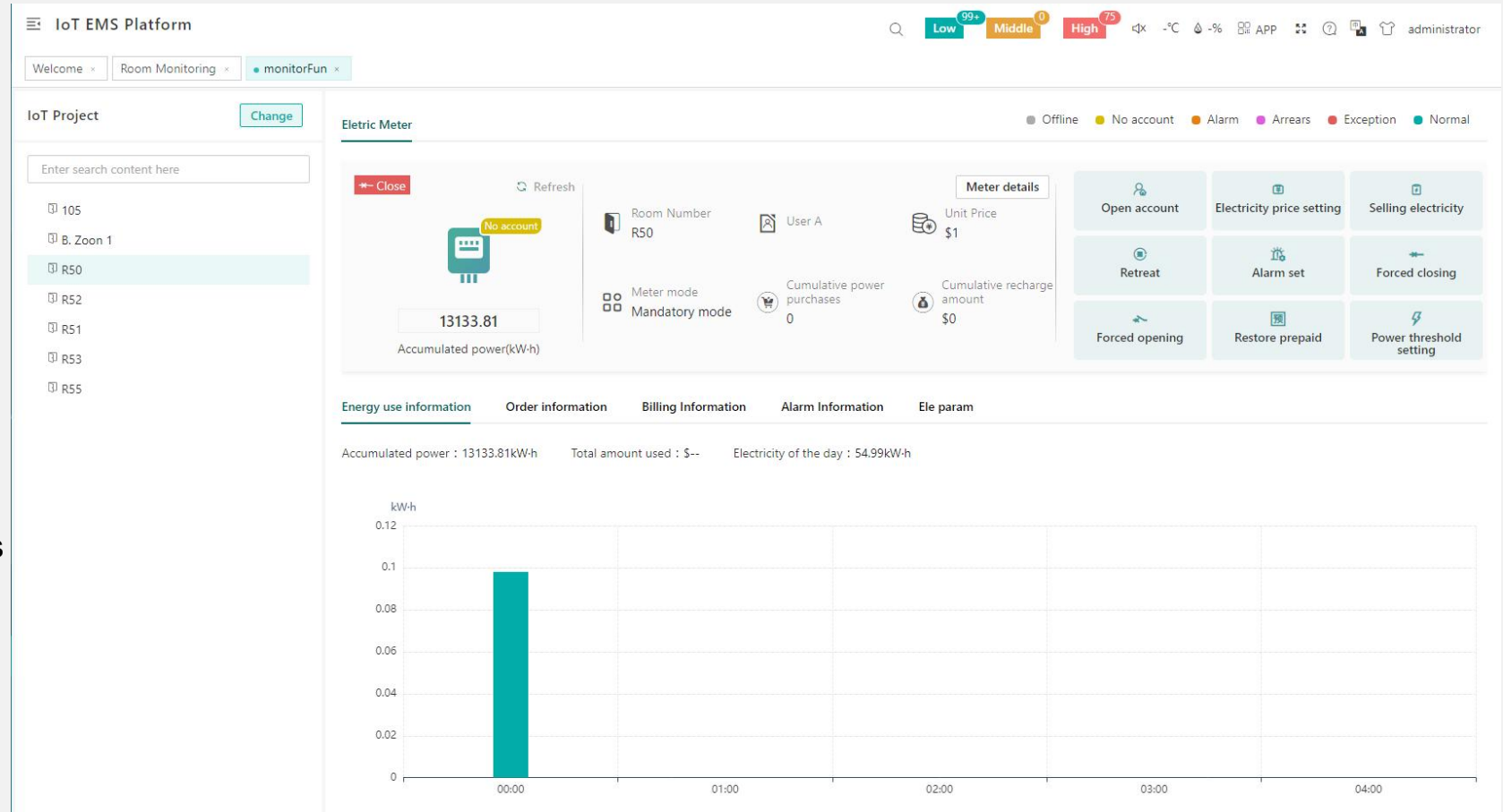
User monitoring can quickly view the status of commercial tenants and public circuits. Abnormal rooms or circuits are marked with abnormal colors, which can be quickly located.

The interface of room monitoring and circuit monitoring can quickly filtrate the corresponding users and circuits by program area and floor distribution, and it can return to the interface of monitoring details by clicking tripping.



Monitoring details (financial details)

Monitoring details are the interface of shop management details. It can perform functions such as **opening an account** for the initial room, **recharging** check-in stores, **detailing energy usage**, **recharging records**, and **viewing abnormal alarms**. It can also perform operations such as **issuing electricity price and alarm**, **opening and closing control**.



Monitoring details (financial staff)

Easy account opening: Opening an account is the process of binding the program store information with specific equipment, and making the first recharge.

In the program management stage, the corresponding relationship can be sorted out according to the information provided by the property, and it can be automatically substituted when opening an account.

Open account

Basic Information

Project Name: IoT Project

Owning topology: Shop name: R50

Account opening information

* User A

Phone

Room Number: R50

Electricity price plan: Select

Multi tariff: Yes No

Tariff price: Yes No

Allowable amount of credit(\$): 0.00

Unit Price(\$): 1

Accumulated power: 13133.81

Balance(\$): -13133.81

* Initial amount(\$): 0

* How to deal with the amount of electricity (Before opening an account): Zero clearing Add up Generate bill of payment

Ok Cancel

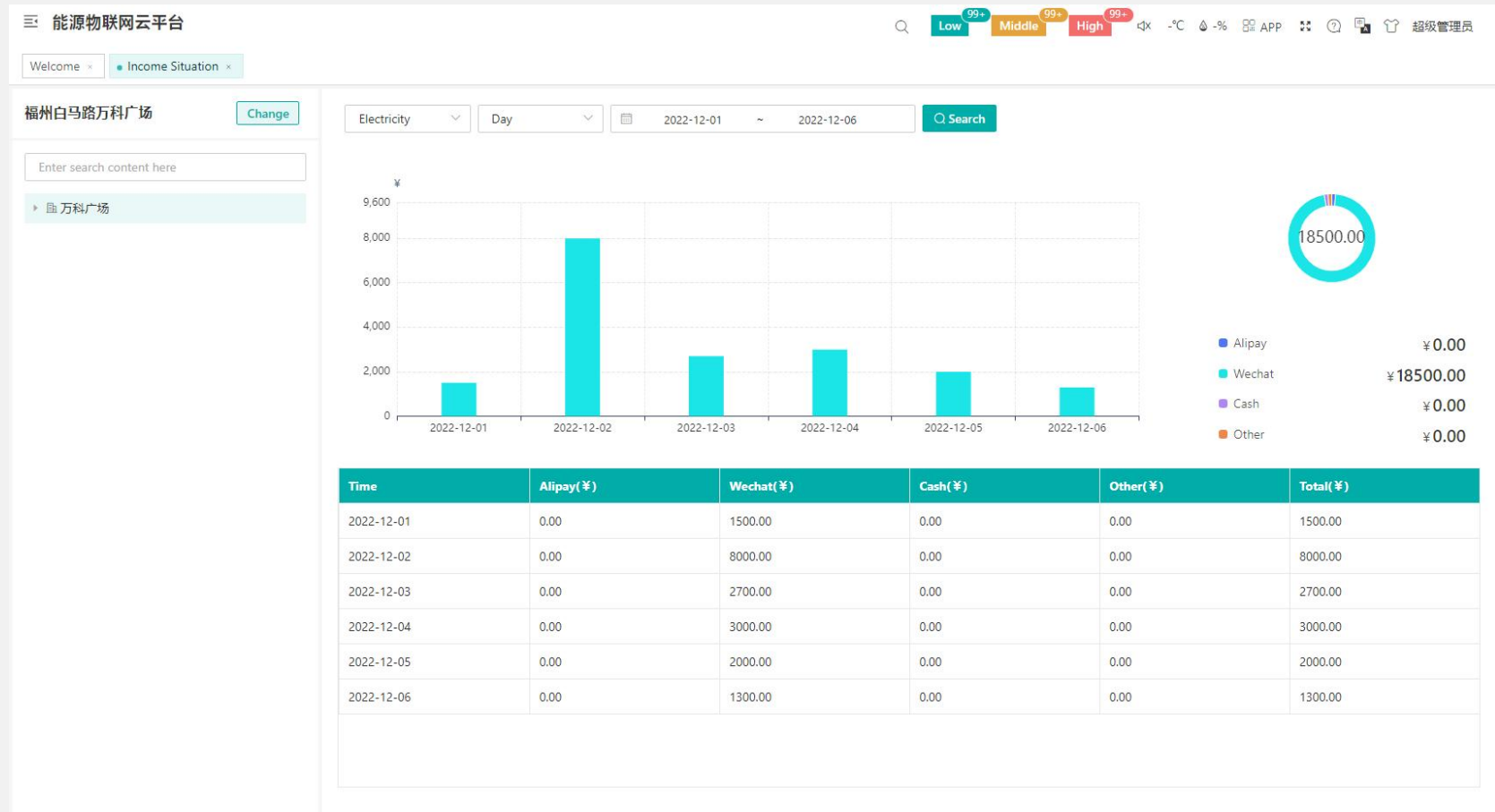
04

Financial/Property management

order overview、 financial statements、 property settings

Financial management (financial staff)

In order to facilitate the daily settlement and reconciliation of financial personnel, the system provides the **order overview** of all the order details. It can calculate **income statistics** by day, month and year and then query the **comprehensive report** of energy consumption and electricity charges of shops by time period. It can also specifically respond to the **electricity fee refund function** of the new electricity price policy and so on.



Property management (property management personnel)

Property management is mainly set up for the electricity price scheme, alarming scheme, property fee, shared expenses and other functions of the stores, which will be operated by personnel with higher authority.

能源物联网云平台

Welcome | Income Situation | Batch Issued

江阴微电网研究院 Change

Electric Meter | Electricity price s | 2022-01-01 ~ 2022-12-06 | Delivery status | Search

Electricity price setting | Selling electricity | Rush | Retreat | Alarm set | Forced closing | Forced opening | Restore prepaid | Power threshold setting | Set the multiple rate period

TimeControl | Strong control

Meter type	Commond Type	Room Number	Delivery method	Timing	Operator	Status	Create time	Operation
Eletric Meter	Electricity price setting		Direct delivery			Delivered successfully	2022-04-24 13:51:42	Details

Total 1 | 15/page | 1 | Go to 1

05

System settings

role assignment、 authority management、 operating log

Property management (property management personnel)

Role assignment/authority management:

Assign different authority to personnel of different functions in groups, which is convenient for the internal management and system application.

Finance: Account opening, user recharging, financial reconciling and other functions.

Engineer: Device inspection, alarm to be checked, device maintenance and other functions.

Business: Water and electricity price distributing, role authority assigning and other key functions.

The screenshot displays the 'IoT EMS Platform' interface for 'Role Management'. The top navigation bar includes a search icon, status indicators for 'Low' (99%), 'Middle' (0), and 'High' (75%), and system icons for temperature, humidity, and APP. The user is identified as 'administrator'. The main content area is divided into two panels. The left panel, titled 'Role Management', shows a list of roles: 'Super administrator', 'Manager', 'demo account', 'school demo', 'Energy Manager', 'Photovoltaic Manager', and 'test'. The 'Super administrator' role is selected and highlighted. The right panel, titled 'Role details', shows the configuration for the 'Super administrator' role. It includes a search bar with the role name 'Super administrator (Don't delete)' and a 'Save' button. Below this, there are two tabs: 'Web menu' and 'APP menu'. The 'Web menu' tab is active, showing a list of menu items with checkboxes: 'All', 'Cascading', 'Welcome', 'Power Monitoring', 'Data Visualization', 'Prepaid Management', 'Lighting', 'Energy Quality', 'Demand Analysis' (highlighted), 'Energy Analysis', 'Alarm Management', 'Operation Management', 'Wireless temperature', 'Financial', 'User Report', 'Basic Data Management', 'System Setting', 'Log Management', and 'Help'.

06

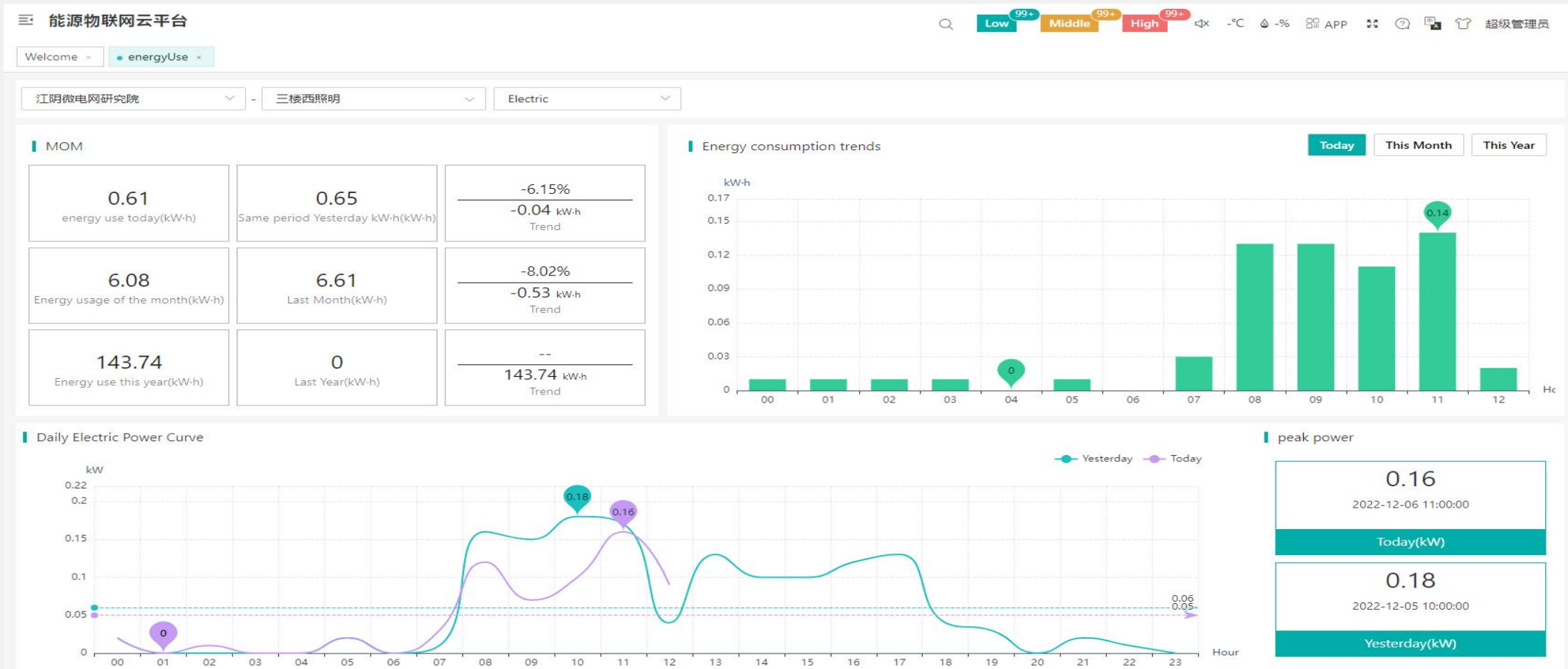
Energy consumption statistics

additional function

Energy consumption statistics

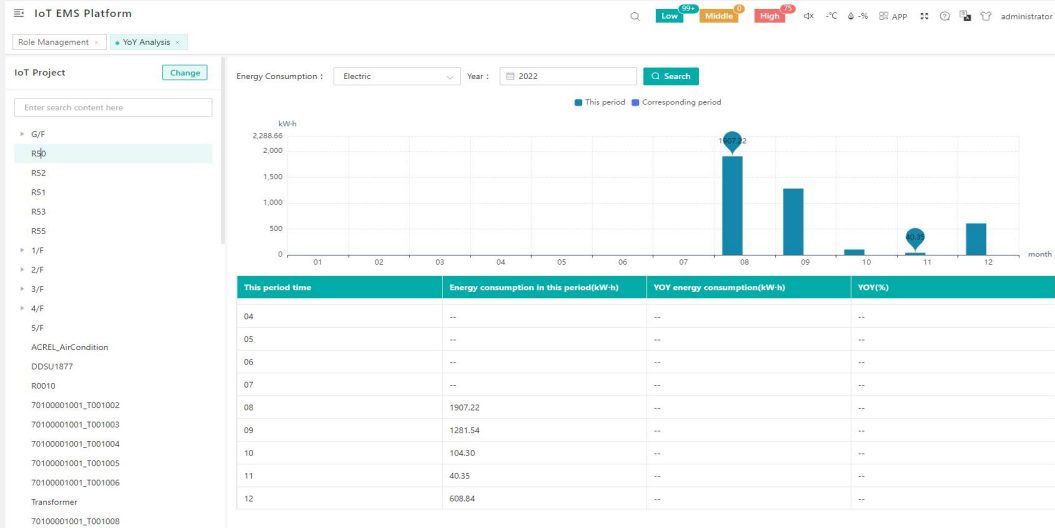
Our platform can provide abundant energy consumption statistics report, which can realize the statistics of energy consumption classification, sub-item, partition.

Such as energy consumption overview、 year-on-year analysis, energy consumption trend analysis, multi-rate report, energy consumption ranking statistics, loss analysis, energy flow diagram, etc.

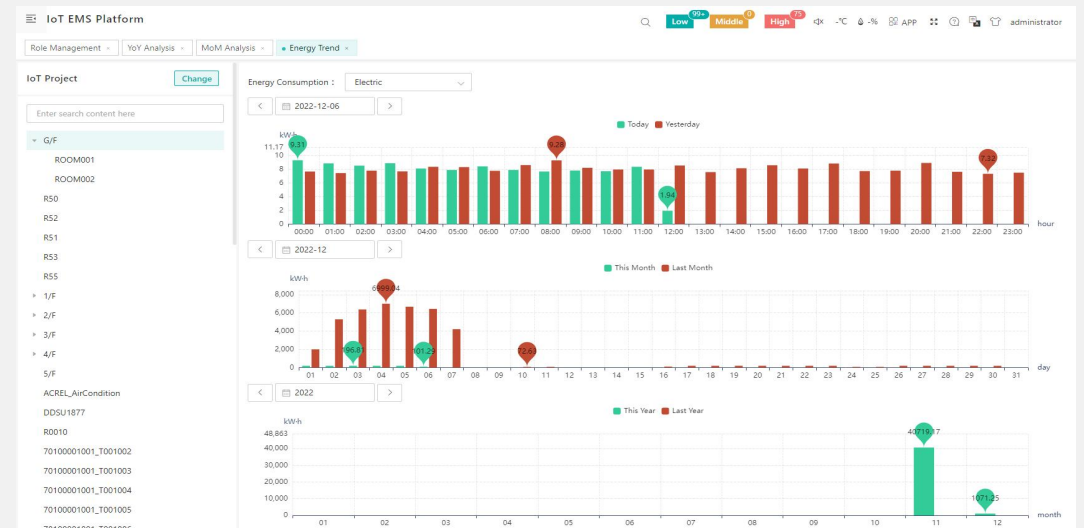


Energy consumption profile

Energy consumption statistics



year-on-year and month-on-month analysis



energy consumption trend

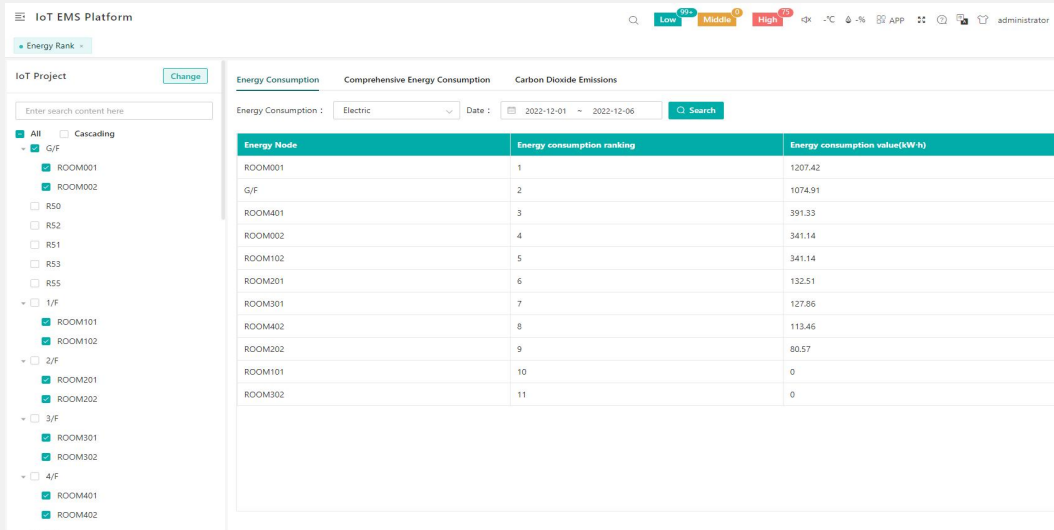
Energy Node	00:00		01:00		02:00		03:00		04:00	
	Cost(\$)	Consumption(kW-h)	Cost(\$)	Consumption(kW-h)	Cost(\$)	Consumption(kW-h)	Cost(\$)	Consumption(kW-h)	Cost(\$)	Consumption(kW-h)
G/F	0.00	9.32	0.00	8.86	0.00	8.52	0.00	8.87	0.00	8.87
ROOM001	0.00	9.32	0.00	8.86	0.00	8.52	0.00	8.87	0.00	8.87
ROOM002	0.00	3.36	--	--	--	--	--	--	--	--
1/F	--	--	--	--	--	--	--	--	--	--
ROOM101	0.00	0.00	--	--	--	--	--	--	--	--
ROOM102	0.00	3.36	--	--	--	--	--	--	--	--
2/F	--	--	--	--	--	--	--	--	--	--
ROOM201	0.00	0.00	--	--	--	--	--	--	--	--
ROOM202	0.00	2.87	--	--	--	--	--	--	--	--
Total	0.00	28.23	0.00	17.72	0.00	17.04	0.00	17.74	0.00	17.74

energy consumption report

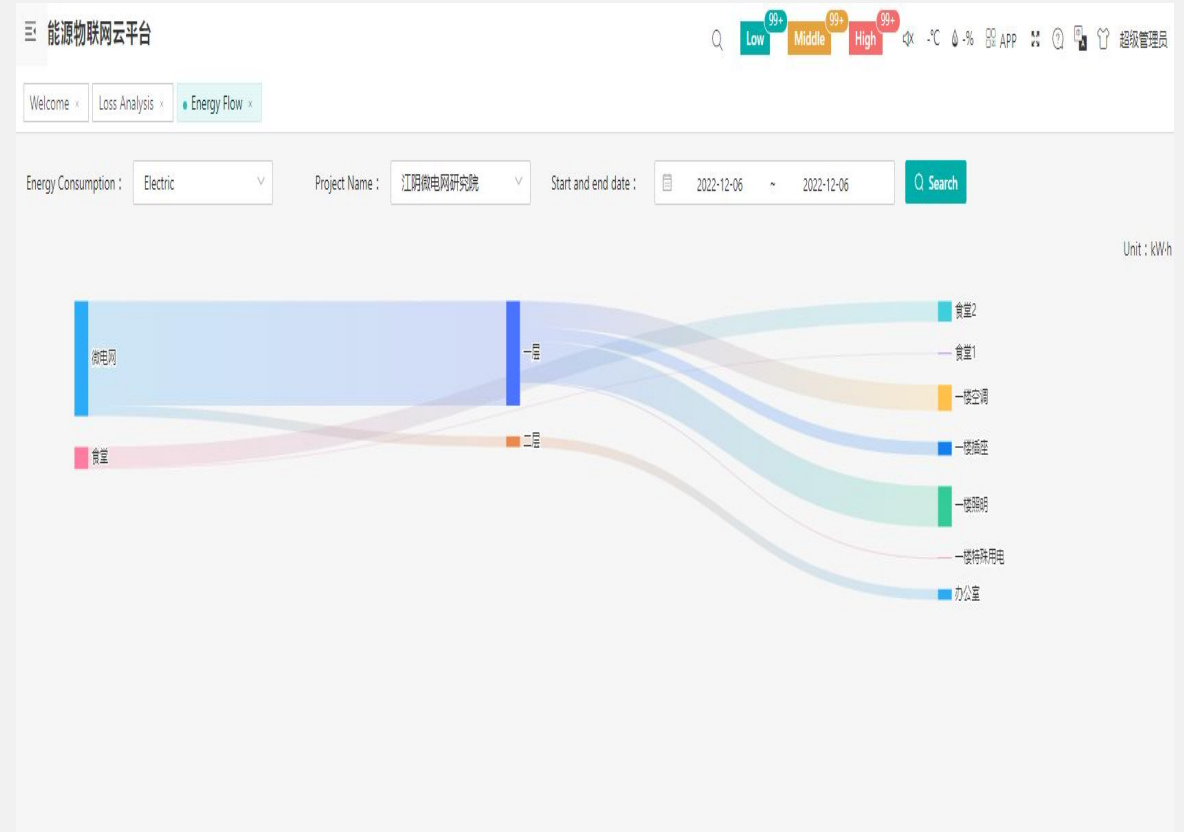
Energy Node	Sharp		Peak		Flat		Valley		Total	
	Electricity bill (\$)	Electricity(kW-h)	Electricity bill (\$)	Electricity(kW-h)	Electricity bill (\$)	Electricity(kW-h)	Electricity bill (\$)	Electricity(kW-h)	Electricity bill (\$)	Electricity(kW-h)
G/F	0.00	10.13	0.00	20.26	0.00	30.39	0.00	40.52	0.00	101.30
ROOM001	0.00	14.11	0.00	20.70	0.00	30.59	0.00	43.34	0.00	108.74
ROOM002	0.00	11.23	0.00	2.97	0.00	1.51	0.00	8.17	0.00	23.88
R50	--	--	--	--	--	--	--	--	--	--
R52	--	--	--	--	--	--	--	--	--	--
R51	--	--	--	--	--	--	--	--	--	--
R53	--	--	--	--	--	--	--	--	--	--
R55	--	--	--	--	--	--	--	--	--	--
ROOM102	0.00	11.23	0.00	2.97	0.00	1.51	0.00	8.17	0.00	23.88
1/F	--	--	--	--	--	--	--	--	--	--
2/F	--	--	--	--	--	--	--	--	--	--
ROOM201	0.00	3.98	0.00	0.44	0.00	0.20	0.00	2.82	0.00	7.44
ROOM202	0.00	2.90	0.00	1.79	0.00	0.87	0.00	2.04	0.00	7.60
3/F	--	--	--	--	--	--	--	--	--	--
4/F	--	--	--	--	--	--	--	--	--	--
5/F	--	--	--	--	--	--	--	--	--	--
ROOM301	0.00	4.36	0.00	0.70	0.00	0.44	0.00	3.31	0.00	8.81
ROOM302	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/F	--	--	--	--	--	--	--	--	--	--
ROOM401	0.00	11.71	0.00	1.56	0.00	1.65	0.00	10.78	0.00	25.70
ROOM402	0.00	3.59	0.00	0.69	0.00	0.50	0.00	3.42	0.00	8.20
Total	0.00	73.24	0.00	52.08	0.00	67.66	0.00	122.57	0.00	315.55

multi-rate energy consumption statistics

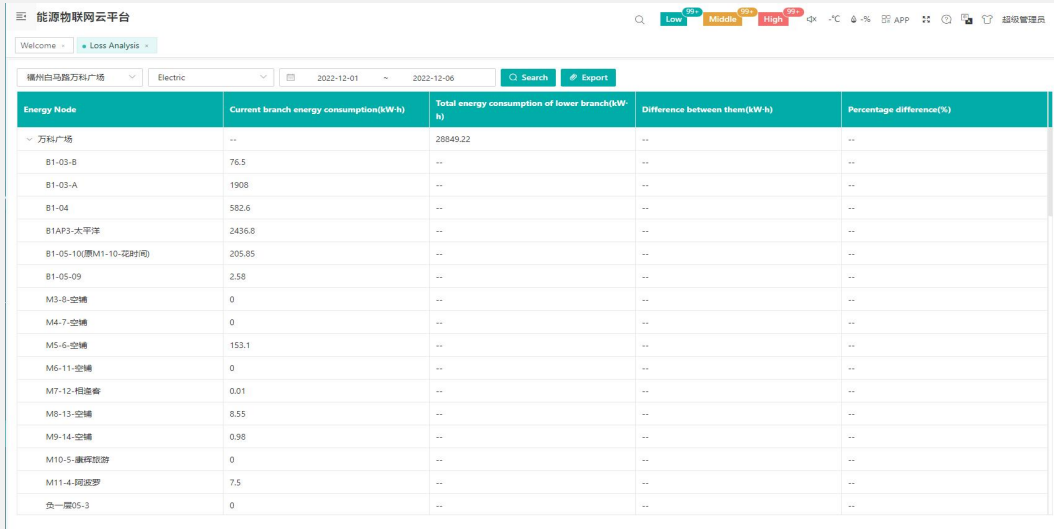
Energy consumption statistics



energy consumption ranking

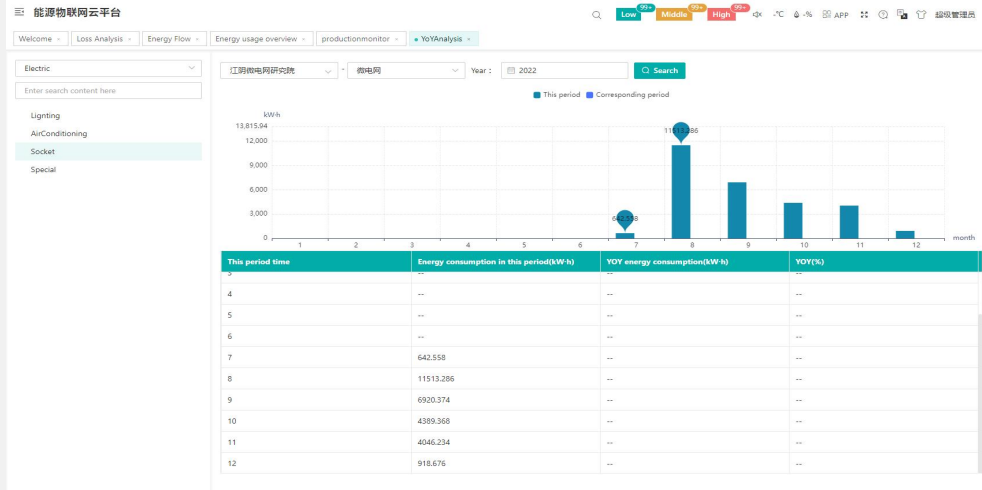


energy flow diagram

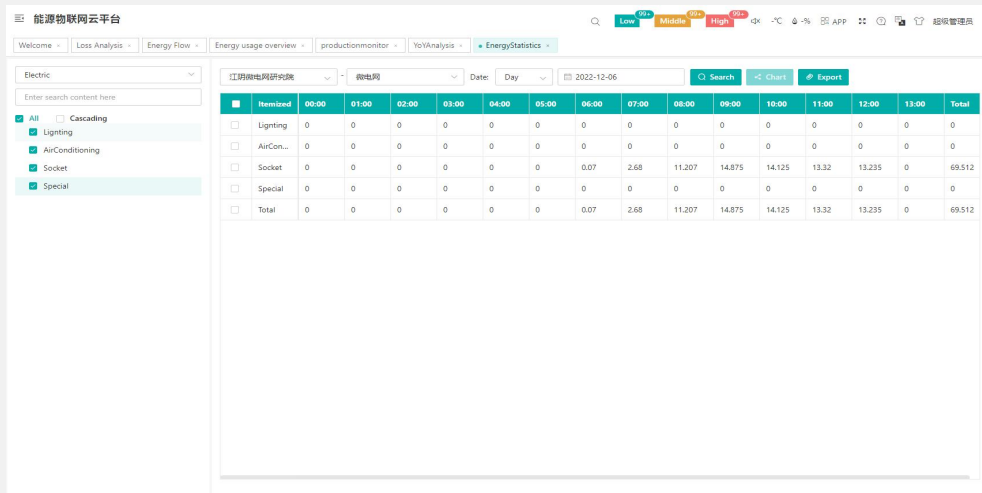


loss analysis

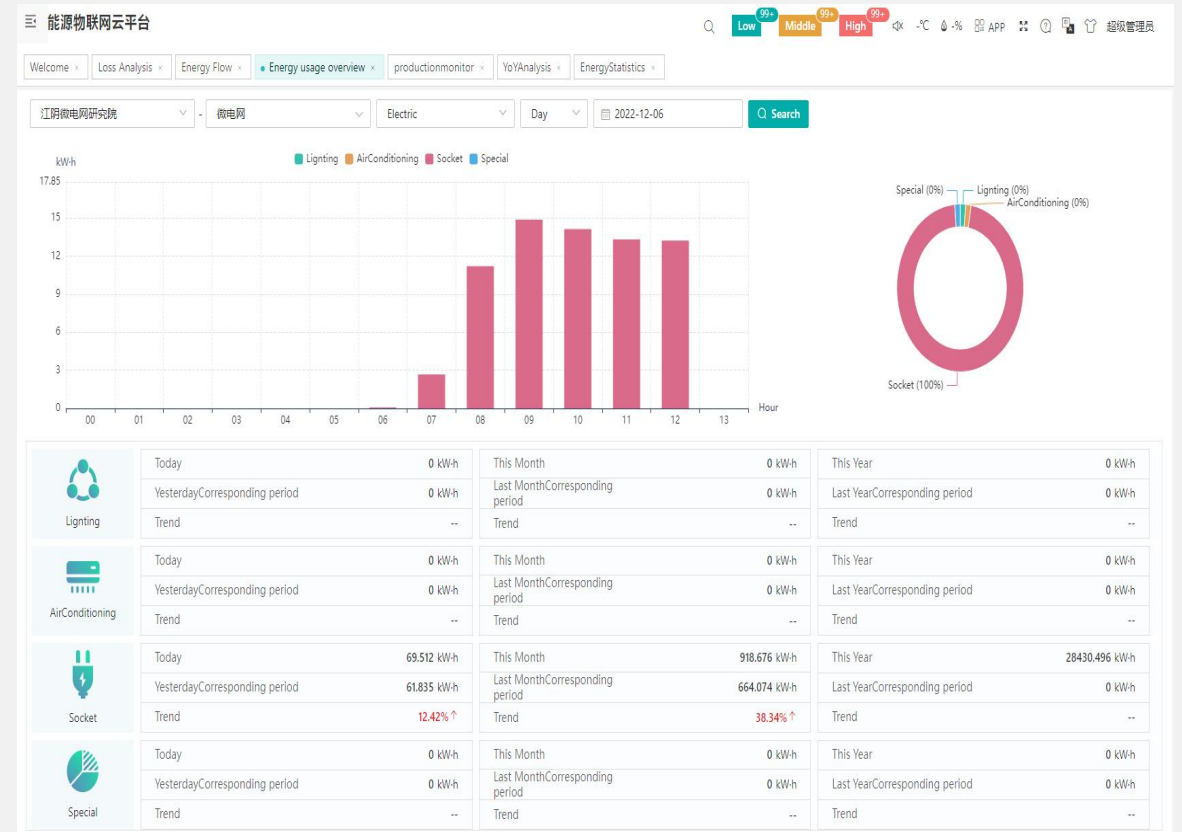
Energy consumption statistics



year-on-year analysis of sub-items



statistics of sub-items



overview of sub-items

07

Device selection

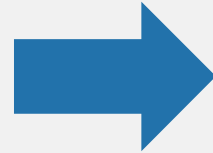
Device selection

device model	communication type	device type	support for accessible meter
AWT100-4GHW	4G/WIFI/wired	gateway	ADL100-EY,ADL300-EY,ADF400L
ADL100-EY	wired	energy meter	gateway is needed
ADL100-EY/WF	WIFI	energy meter	connect to platform directly
ADL300-EY	wired	energy meter	gateway is needed
ADL300-EY/WF	WIFI	energy meter	connect to platform directly
ADF400L	wired	energy meter of multiple circuits	gateway is needed

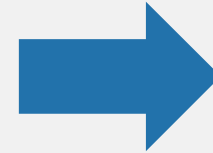
08

Debugging-free solution

Debugging-free solution



Loading...



Step 1

Power the device and then users scan the code to bind device information

Step 2

Device automatically uploads its type, serial number and electric parameter; middleground then stores and deals with the data.

Step 3

Meter data reading, energy consumption data, control strategy delivery, electricity recharging and selling, etc.

09

Hardware introduction

prepaid energy meter、 gateway

device accessible to the platform



ADL100 series single phase prepaid energy meter

- All-electric parameter measurement, accuracy class 1 of active electric energy;
- Built-in large-capacity (100A) magnetic latching relay to realize on-off;
- Time-of-use charging, timing control, over-power protection
- RS-485、WIFI networking method;



ADL300 series three phase prepaid energy meter

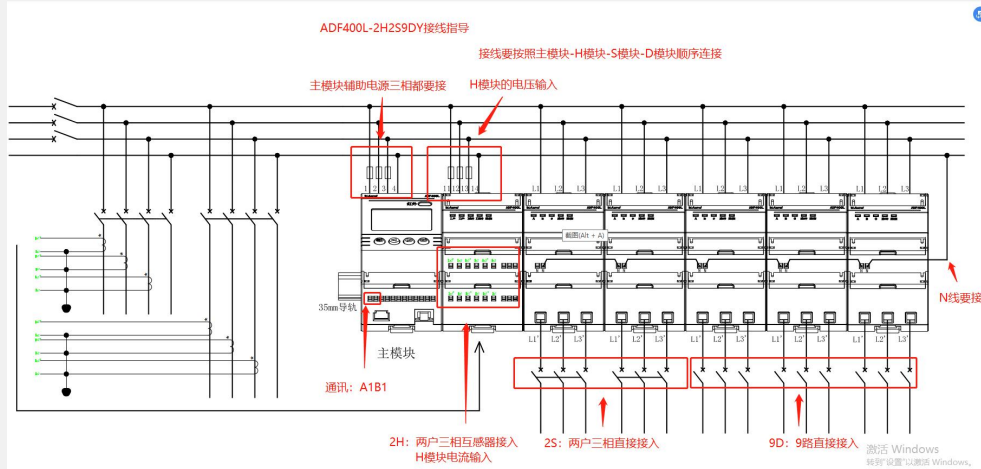
- All-electric parameter measurement, accuracy class 0.5S of active electric energy;
- directly connect to built-in large-capacity (100A) magnetic latching relay to realize on-off
- Time-of-use charging, timing control, over-power protection
- RS-485、WIFI networking method;

device accessible to the platform

ADF400L series multi-users energy meter



- All-electric parameter measurement, accuracy class 0.5S of active electric energy;
- directly connect to built-in large-capacity (100A) magnetic latching relay to realize on-off;
- mixed usage of various transformer specification, three phase directly connected, single phase directly connected;
- maximum connected to 12 circuits three phase or 36 circuits single phase ;
- RS-485;



AWT100 intelligent debugging-free gateway



AWT100 data conversion module collects the status information of the local device through RS485/Modbus-RTU, and then transmits the information to the terminal device, server, cloud platform, etc. and then realizes wireless inter-connection through wireless or wired transmission. The user does not need to re-establish the communication network structure, so it is more convenient for the users to use, and the cost is reduced at the same time.

communication type: 4G、WIFI、CE

advantages:

support debugging-free solutions

compact size, easy installation

low cost, affordable price

support second-level upload

THANKS