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Electric Power Miraiz

Development of Compressor Optimized Operations Service Utilizing IoT and Launch of Demonstration Project in Kingdom of Thailand (Co-Innovation Project 2019)

Chubu Electric Power Miraiz

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About Chubu Electric Power Miraiz

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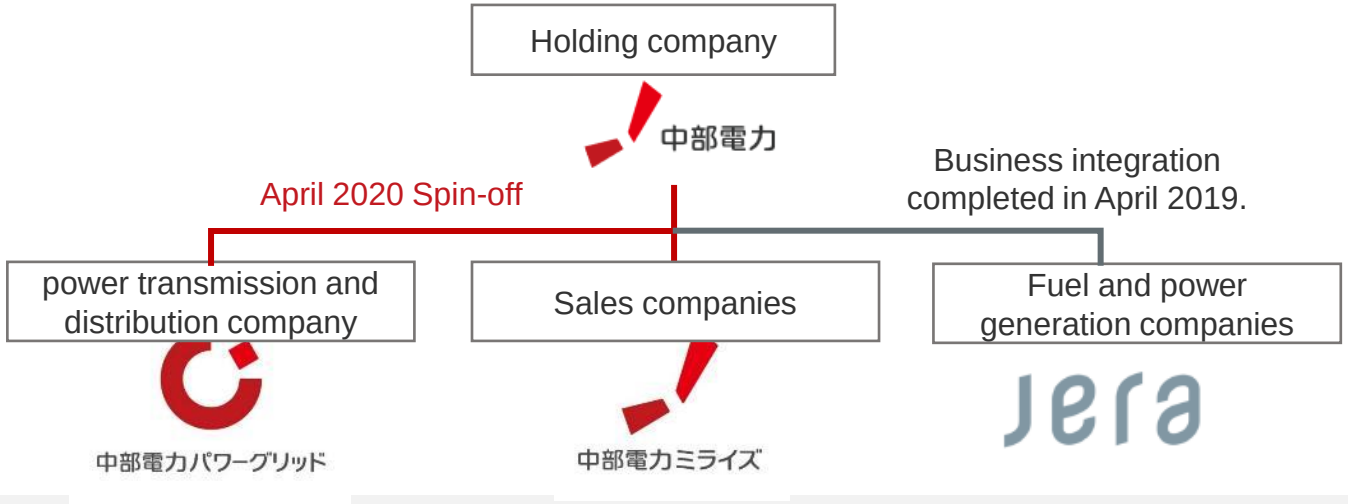
Company name	**Chubu Electric Power Miraiz Company, Incorporated**
Address	1 Toushincho, Higashi-ku**,** Nagoya, Japan, 461-8680 Tel：+81(0)52-951-8211
Representative	Shinya Ohtani, President and Chief Executive Officer
Capital	4,000 million yen
Establishment	April 1, 2020 (spin-off from Chubu Electric Power Co., Inc.)
Power sales	117.2 billion kWh (FY2019 result) No.2 in Japan

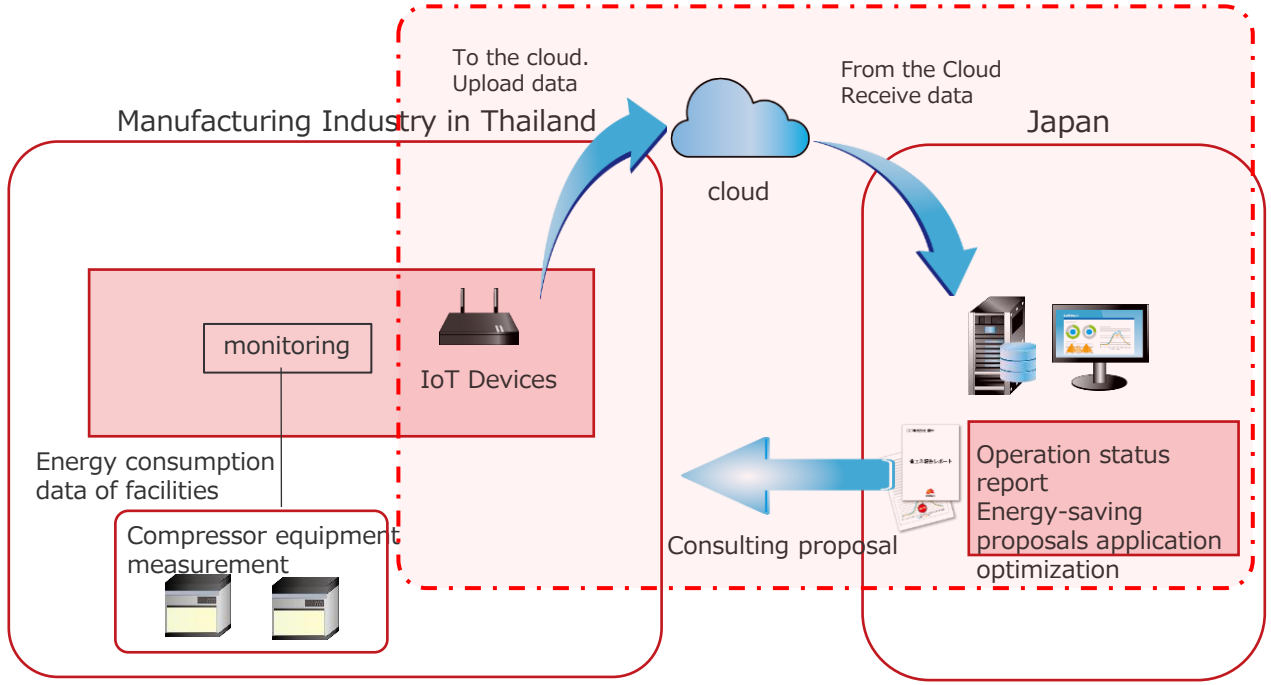


Main business areas

- Electricity business, gas business
- Heat supply business
- Energy-related engineering and consulting business, etc.

Business Overview

- This project is the renovation and demonstration evaluation of devices necessary to develop an IoT-based compressor optimization operation service in Thailand, which has a proven track record in Japan.
- The renovated IoT devices will be installed in the compressor facilities of the factories in Thailand, and the operation status will be uploaded to the cloud for analysis in Japan, with the aim of not only saving energy and reducing CO2 emissions by proposing operational optimization, but also improving the energy-saving capabilities of facility managers.



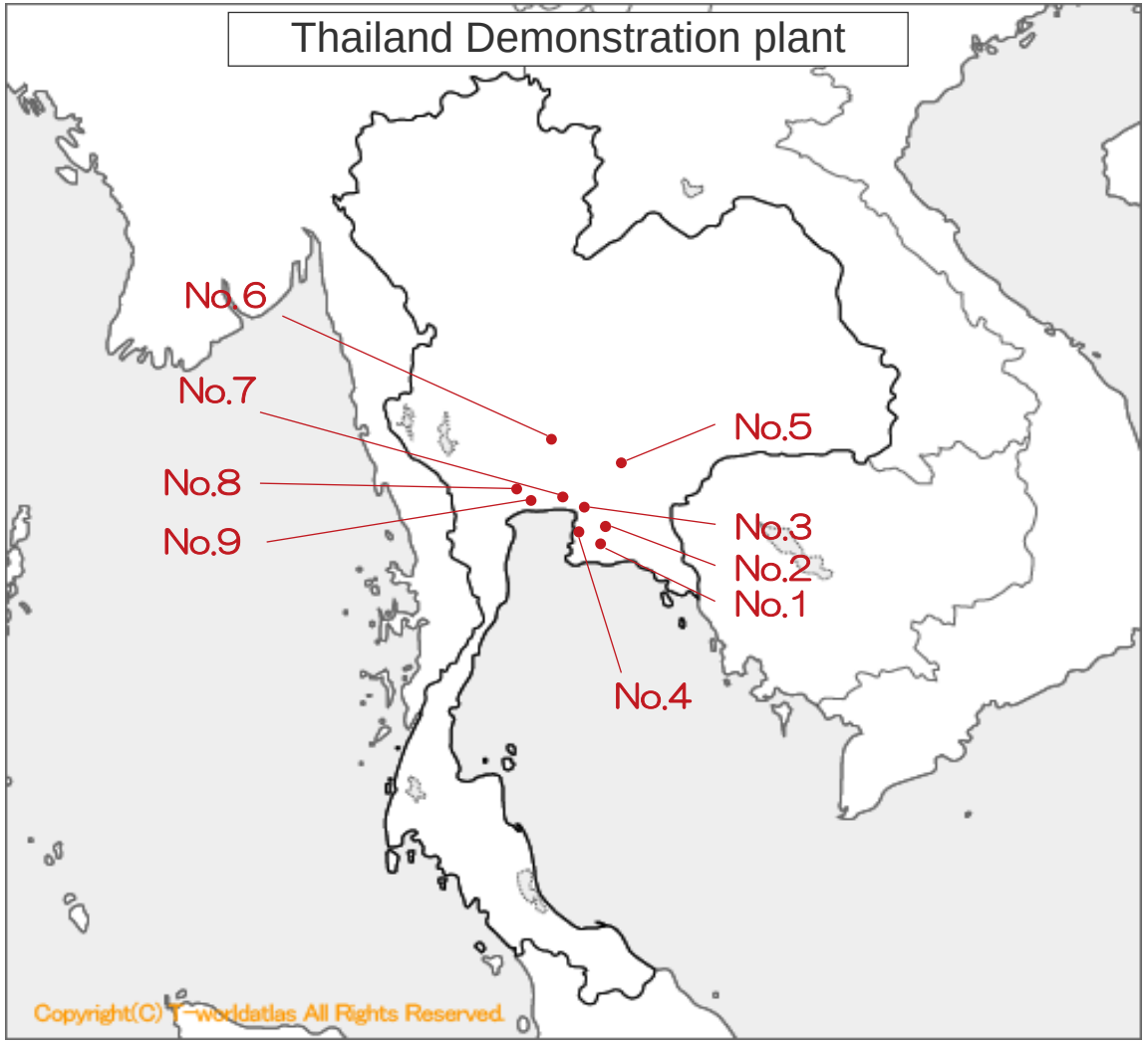
International patent pending

Location of demonstration

Installation period of measurement devices:
January to October 2020

Demonstration sites:
9 business sites (automotive parts industry, etc.)

- Select sites in the vicinity of Bangkok for the demonstration.
- In order to test the communication environment, the demonstration sites will be selected as far away as possible.



Demonstration step

Selection of demonstration sites	• Selection of factories in the vicinity of Bangkok for demonstration
Installation of measurement equipment	• Installation of measurement equipment at the demonstration site • Start monitoring
Effect calculation	• Data analysis and proposal remotely from Japan
Tuning and OJT training	• Optimal tuning of compressors was carried out on site at the demonstration sites where operational improvements were expected.
Effectiveness Verification	• Calculate the amount of electricity consumption and CO2 emissions that can be reduced by tuning.

Installation of measurement equipment

Main components

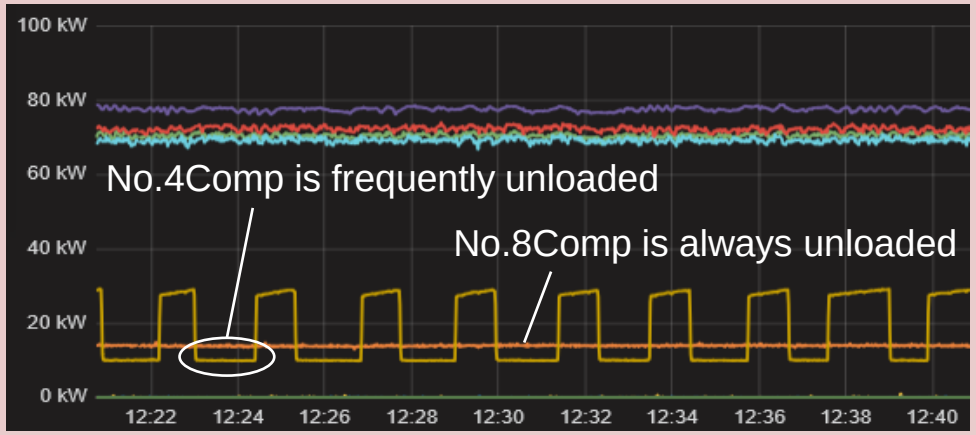
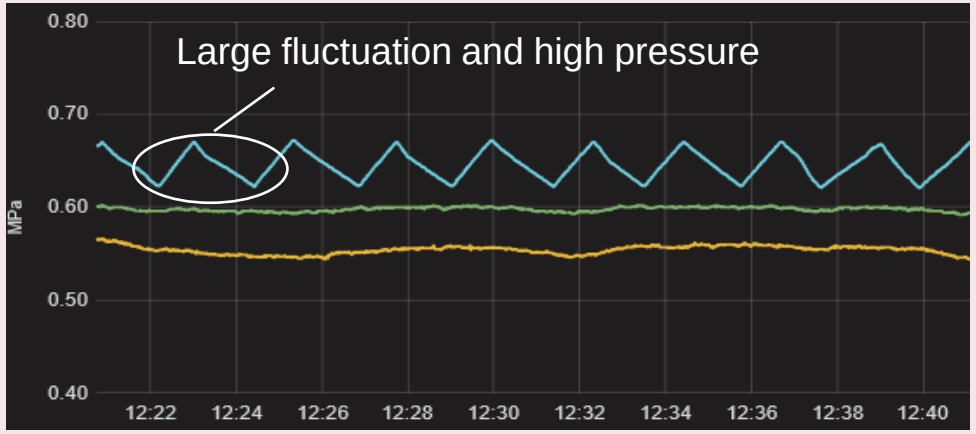
①MMCB Plus(IoT devices for data collection)
②Current sensor
③Pressure sensor
④Mobile router
⑤Power cable for MMCB Plus
⑥Cable for Current sensor
⑦Cable for Pressure sensor

Current sensor installation

Pressure sensor installation

IoT device installation

e.g. Points of improvement

Item	graph	Points for improvement
Power value of each compressor		• The No. 4 compressor is frequently unloaded (＝wasted operation), so there is room for improvement. • No8 compressor is always unloaded.There is room for improvement.
Pressure value for each air system		• There is room for improvement due to high pressure and large fluctuations in the three compressor chamber systems.

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Outline of the demonstration

Renovation content and goal	Details of implementation in 2019,2020	Achievement status
Realization of inexpensive remote maintenance from Japan through device modification	• Hardware modification of IoT devices and manufacture of prototypes (20 units) • Install and start testing at tests sites in Thailand	• Realized remote maintenance using 19 devices in 7 demonstration sites. Estimated energy conservation effects based on remotely acquired data. • In addition, we completed the installation of two additional devices (using the remaining one out of a total of 20 devices) at our own expense.
Dealing with unstable communication environment through software modification for communication error recovery	• Software modification of IoT devices • Start of communication evaluation using local SIM and SIM for maintenance	• Stabilization evaluation was conducted, and a long-term data loss event occurred. • Achieved an error rate of less than 5% by taking improvement measures.
Improve facility managers' ability to save energy related to compressors	• On-the-job training in tuning for optimal operation. (When the effect of operational improvement is expected)	• Conducted at two demonstration sites where tuning has been completed

Issues and measures

	Issues	Measures	Completed or Incomplete
2019	• Measurement stops due to blown protective fuse • Communication trouble of remote maintenance line	• Change or replace the fuse capacity • Fixed 3G communication line and software modification	Completed
2020	• Occurrence of long-term data loss	• Create follow-up charts for improvement measures • Addition of the mail notification function when data is missing.	Completed
Overall business	• Implementation of on-site installation of measurement equipment • Automation of analysis tasks • Perform tuning operations remotely	• Conducting installation work with remote assistance • Considering the use of AI for analysis work • To be considered in the future	Incomplete

Trial calculation of the effects of expanding this demonstration in Thailand in the future!

- 6,000 × 67,650 kWh/year/unit × 2 units = **811,800MWh/year**
- 6,000 × 38.29tCO2/year/unit × 2 units = **459,480tCO2/year**

【Trial calculation conditions】
- Two devices are used per factory.
- Number of target factories: 6,000(Energy Conservation and Promotion Act/Designated energy management factories)
- Assumed reduction per device
  67,650 kWh/year/unit 38.29tCO2/year/unit

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