Yokogawa Energy Management System

~”RENKEI” control
~Community Energy Management

Hiroyuki Ogata
Power & Water Sales Dept.
Yokogawa Electric Corp.
Plant Efficiency Improvement by “RENKEI” Control in Japan

“RENKEI” means “coordinated”
“RENKEI” Control outline

Ex.: Co-generation + freezing machine

Power load: Purchased electricity + generated power by Gas turbine
Heat load: Turbo freezing machine + Absorption freezing machine + Heat storage tank
Steam load: Exhaust heat recovery boiler + one through boiler

Before adoption of “RENKEI” control: Really multiple facilities and equipment operation depend on each operator’s own skill and/or knowhow.

Big issue!!

Control of multiple facilities that have contradictory conditions is “Expert hand”!
“Renkei” Control outline  Ex.: Co-generation + freezing machine

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“RENKEI” control computer system works on behalf of “Expert hand”.

- GT: Load setting
- Exhaust heat recovery boiler: Additional boiling
- Freezing machine selection
- Hear storage amount

Purchased electricity ➔ Power ➔ Gas turbine (+ Exhaust heat recovery boiler) ➔ one through boiler ➔ Cool heat ➔ Turbo freezing machine ➔ Absorption freezing machine ➔ Heat storage tank ➔ Load
Traditionally independent optimization at production plant, but overall optimization by “RENKEI” control.
In Summer, absorption freezing machine was operated whole day and GT blow was cooled.
Improvement sample

- Automatic scheduling of start/stop of absorption freezing machine.
  - (the best timing depends on the combination of power and steam demand.)
- In one day, merit should have been more if no operation until 11 AM.

The best way is to operate absorption freezing machine **only when both temp. outside & power demand high**
Optimized Co-generation plant control

Co-generation system

- Boiler
- Gas
- Control target
- Steam demand
  - Changes real time
- Power demand
  - Changes real time

Co-generation operated when high tariff and high steam demand!

All conditions considered such as
- generation cost
- equipment feature
- heat recovery efficiency
- generation efficiency
Community Energy Management System (CEMS)
Overall optimization by CEMS

CEMS is in the center of smart community and it is essential not only for energy saving, but for electricity sales/purchase and CO2 emission reduction.
Musashino clean center – Community Energy Management System

Waste-to-Energy plant

Operation start: April 2017
Waste incineration: 120 t/day
WTE steam turbine: 2.6 MW
Gas turbine: 1.5 MW

Yokogawa supplied Control system & Energy management system
Community Energy Management System

Efficient Usage of Energy in the community

Generation

Musashino Clean Center

Storage

Batteries

CEMS achieve efficient energy management by predicting energy demand and calculate Energy Supply Plan.

Consumption

Musashino City Hall

Musashino Sport Complex

Community Centre

Electricity Management - Remaining battery amount
Charge/discharge optimization

- Operation Plan
- Energy Demand Prediction
- Supply Plan - Energy Supply Plan

Optimization Control - Turbine Optimized Operation Control
Battery Optimized Operation

Historian Management - Supply & Demand result
Utilize Big Data

Waste Disposal Plan
Incineration Plan, No of Boilers in service
- Operation Plan

Optimized Operation
Remaining battery amount
Charge/discharge optimization

Efficient Usage of Energy in the community

CEMS for best optimized power generation & storage and local energy production & consumption.
Thank you for your attention!

Hiroyuki.Ogata @jp.yokogawa.com
Avnish.Garg@in.yokogawa.com