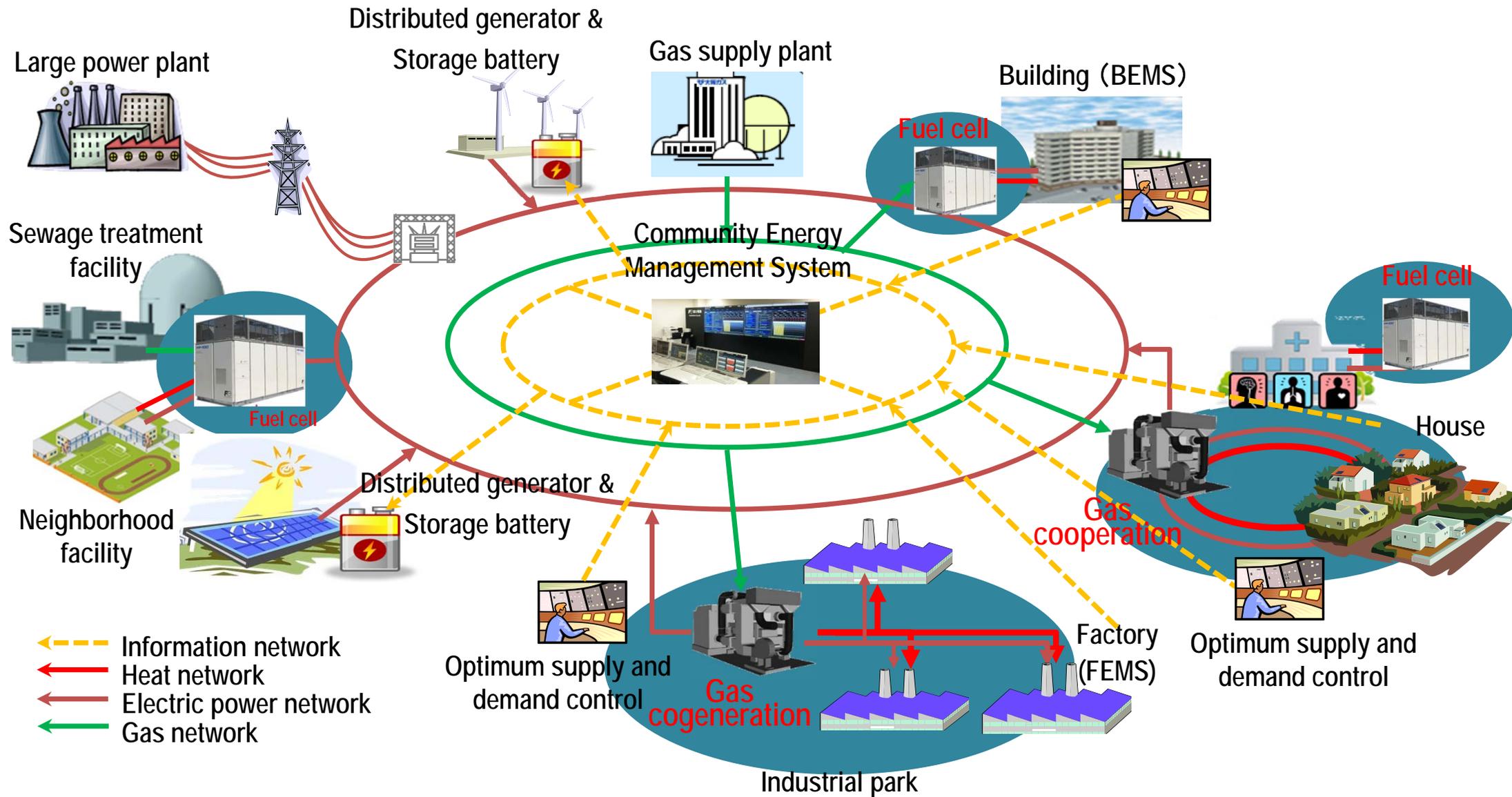


# **Solutions of Electric Power System Stabilization**

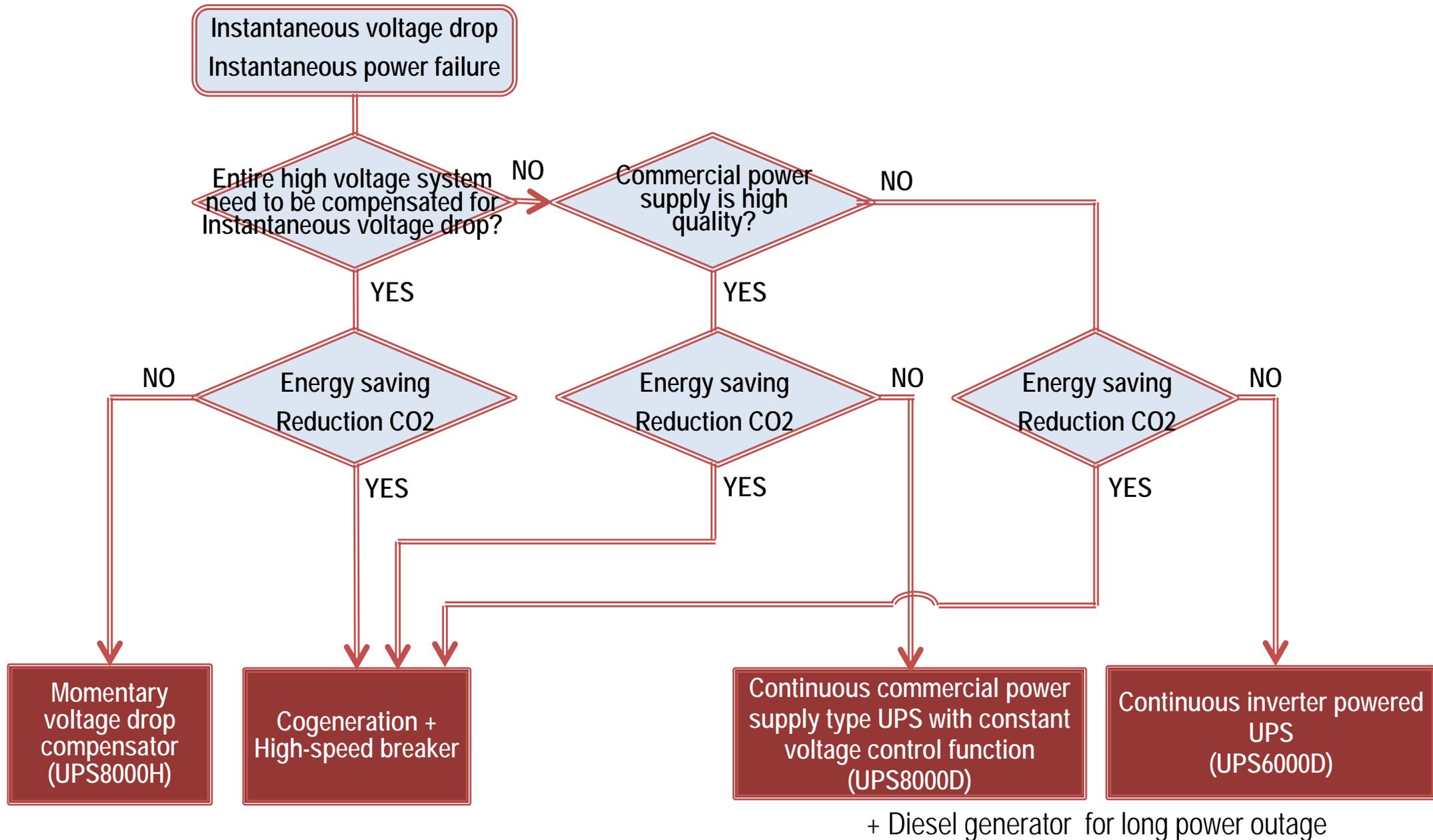
September 15, 2015

**Fuji Electric Co., Ltd.**

# Overview of Fuji Electric's Power System Stabilization

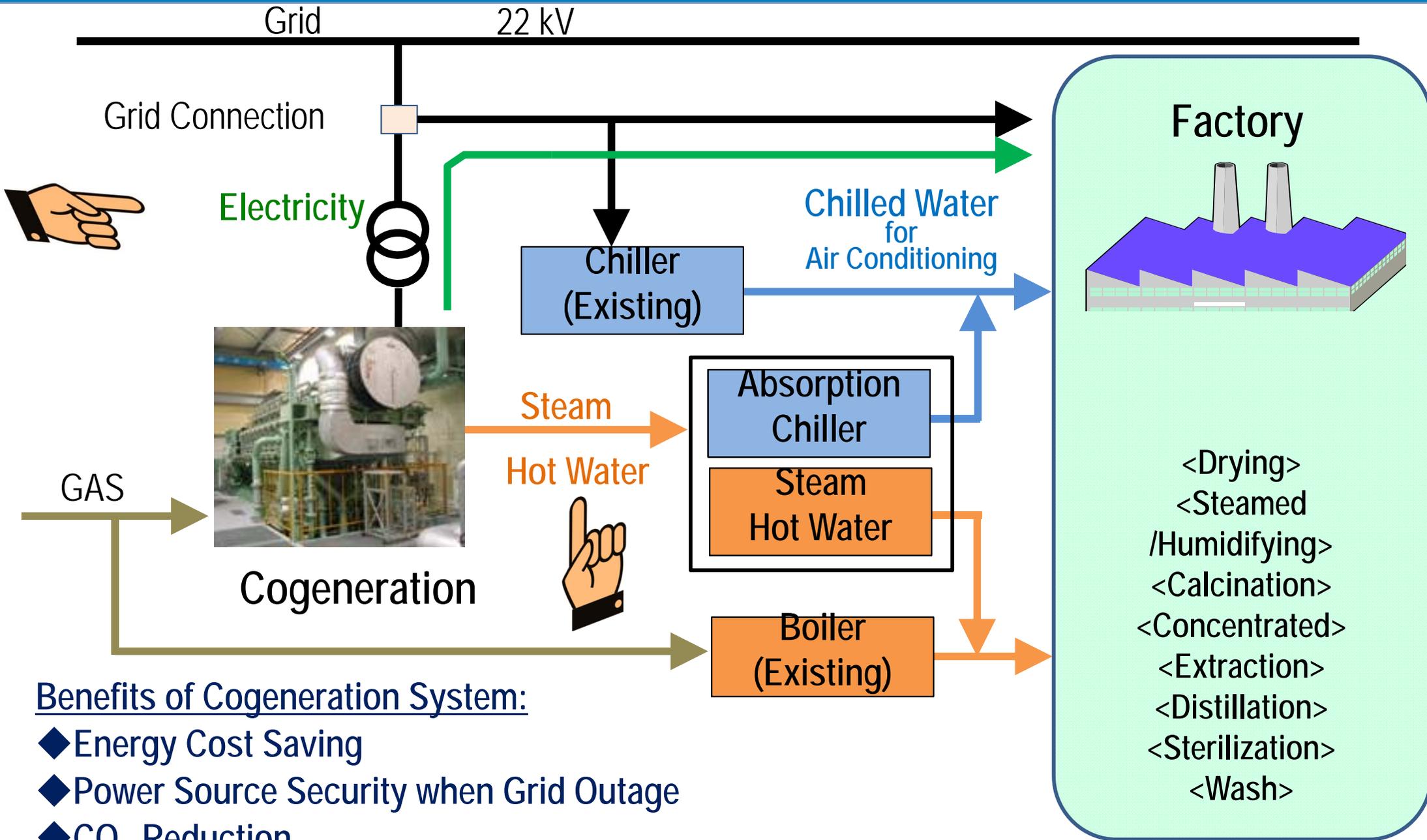


# Types of power failure and counter measure



- ▶ **Save customers' energy cost by highly efficient heat & power generation system to supply electricity, air-conditioning, and hot water, from various fuel sources.**
- ▶ **Provide optimal power source such as fuel cell, gas engine, gas turbine, or diesel engine, depending on customers' situation (installation environment, electricity & heat demand, etc.).**
- ▶ **Improve customers' power quality (outage, voltage drop, etc.) by various power stabilization technology.  
Provide total solution to not only supply side problems such as voltage fluctuation but also demand side problems such as harmonics.**
- ▶ **Realize optimal balance of demand and supply, by high level operation control of integrated energy management system (heat and power supply optimal control system + energy management system).**

# Overview of Cogeneration System



## Benefits of Cogeneration System:

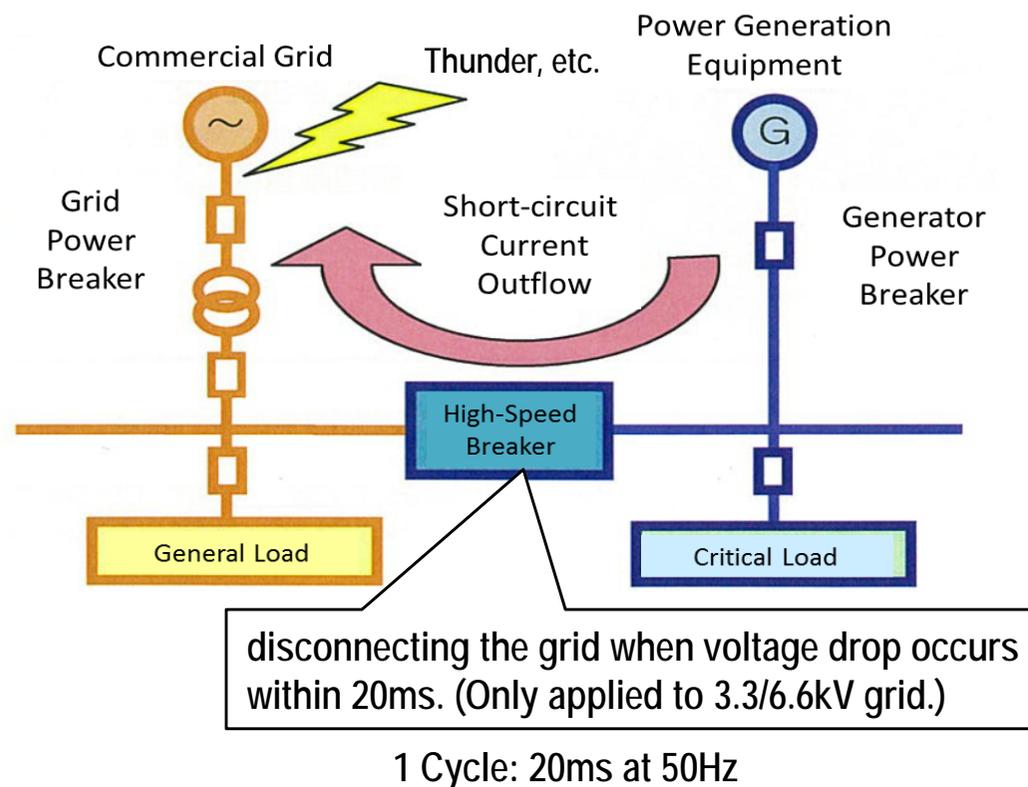
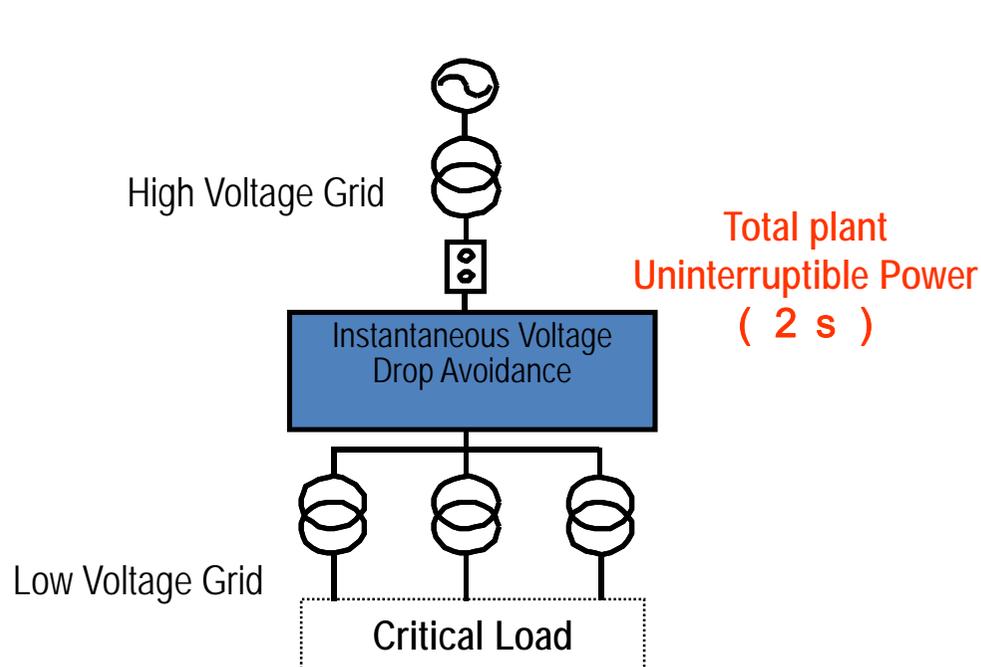
- ◆ Energy Cost Saving
- ◆ Power Source Security when Grid Outage
- ◆ CO<sub>2</sub> Reduction

# Power Stabilization Example (instantaneous voltage drop)

When instantaneous voltage drop (outage) in the commercial power network from thunder occur, PC or control devices are affected such as suspension.

Therefore, clients such as semiconductor industry who do not allow instantaneous voltage drop traditionally take measures such as to install UPS to individual loads.

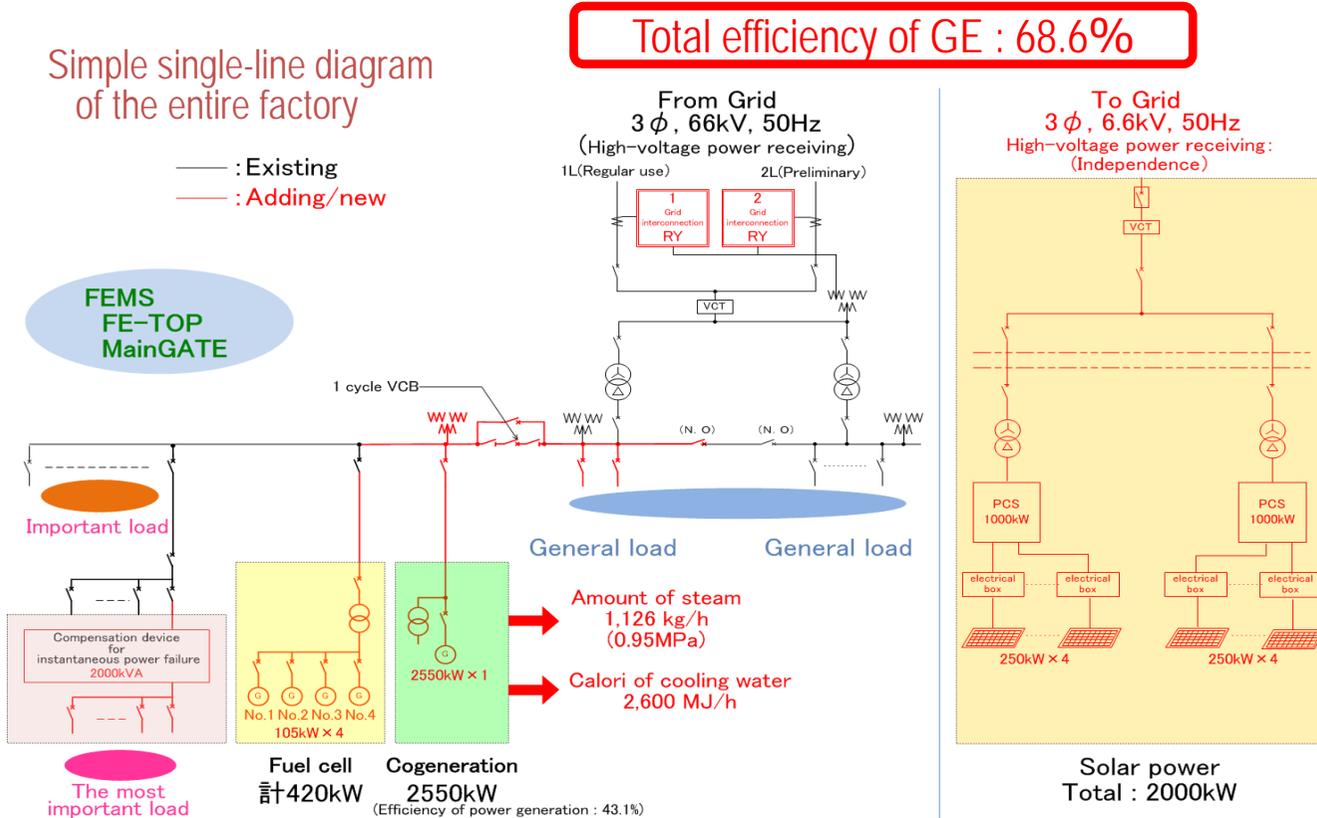
Recently, such cases are increasing as to introduce Instantaneous Voltage Drop Avoidance Device to protect total plant, or to introduce Cogeneration + High-speed Breaker for critical loads.



# Reference Site: Fuji Electric Yamanashi Factory

Customer benefits : Avoidance of power risk (productivity improvement)

- ◆ Achieving visualization, analysis, and optimization of energy by introducing FEMS
- ◆ Drastically saving the power cost by optimizing the integrated operation and self-sustained operation of the grid power and cogeneration system
- ◆ Drastically saving the fuel cost of the existing boiler system (for air conditioning) by utilizing effectively heat (steam) and electricity

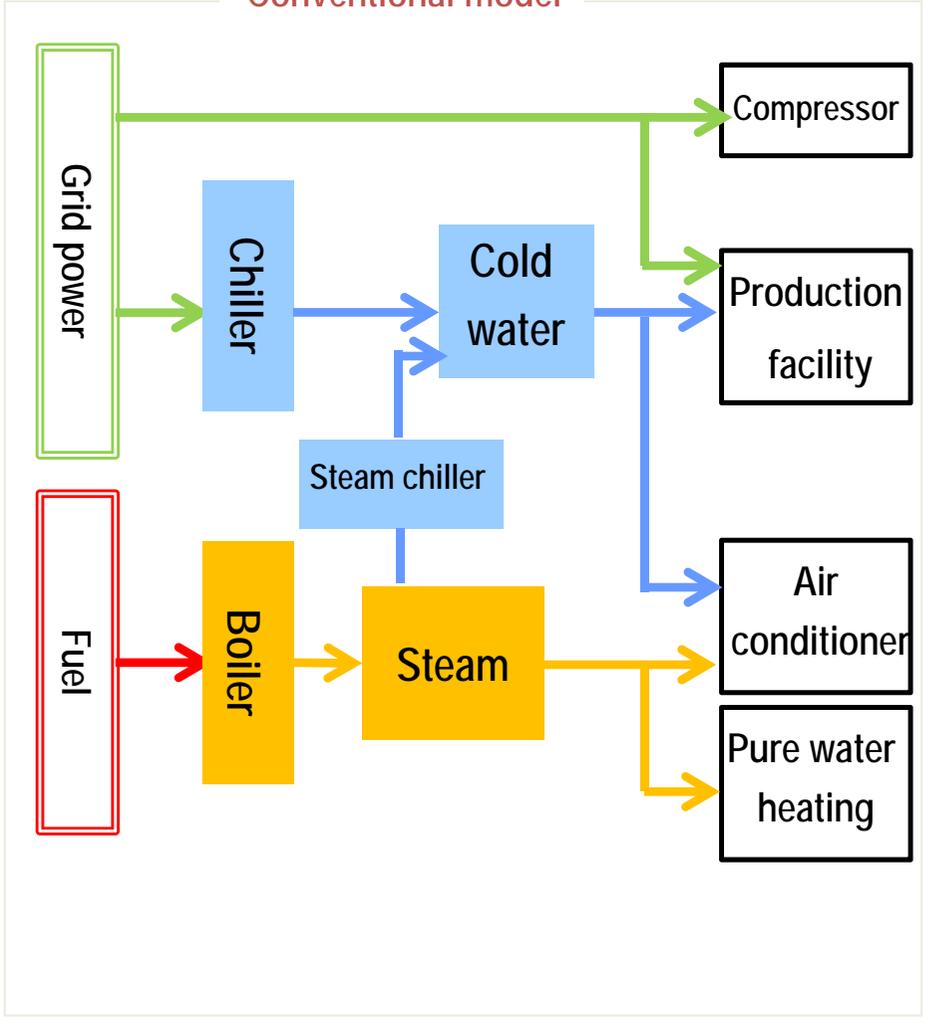


# Reference Site: Fuji Electric Yamanashi Factory

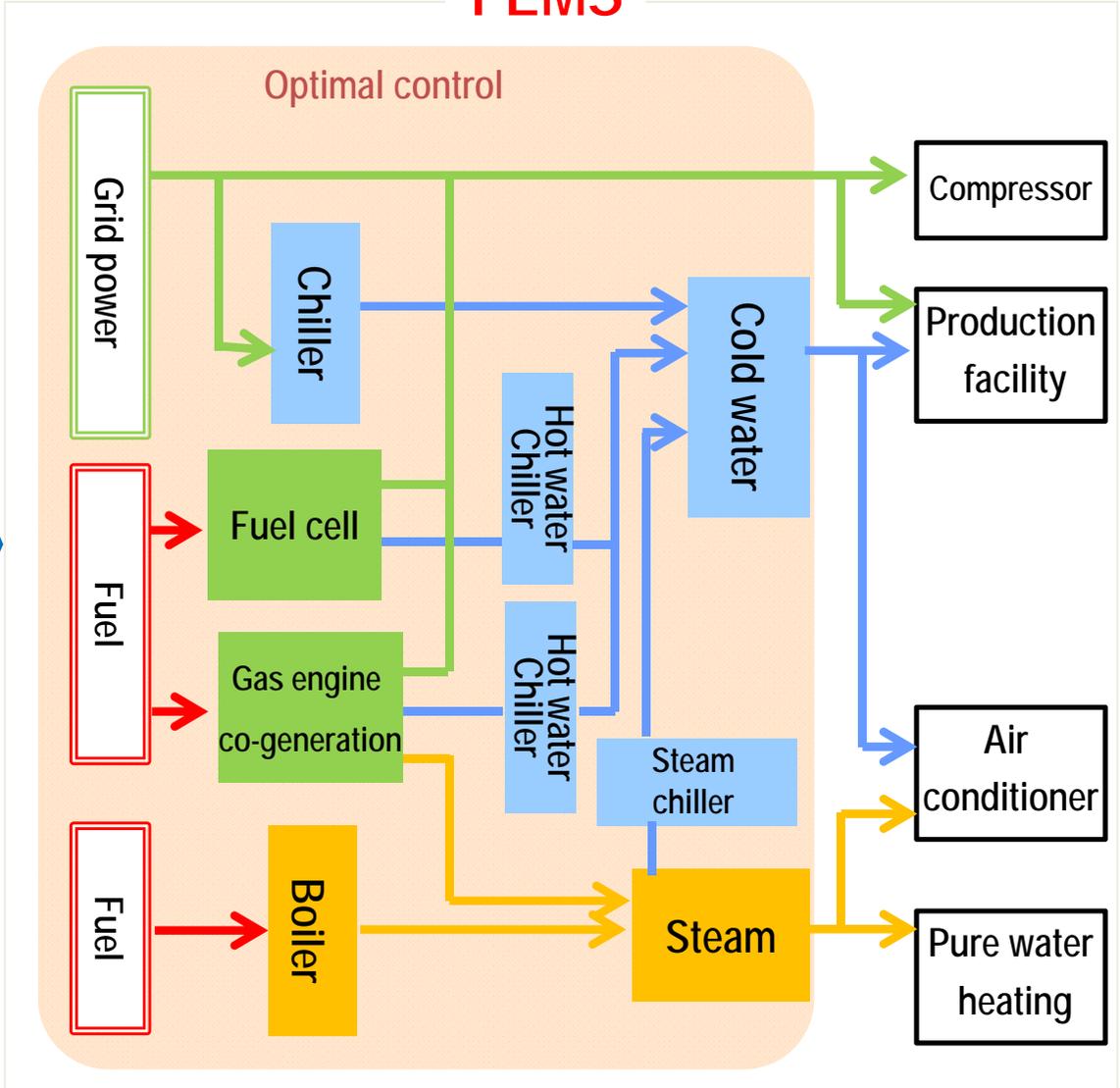
The FEMS (Factory Energy Management System) model by the best-mix of electricity and thermal energy

— : Electricity    — : Cold energy  
— : Hot energy

Conventional model

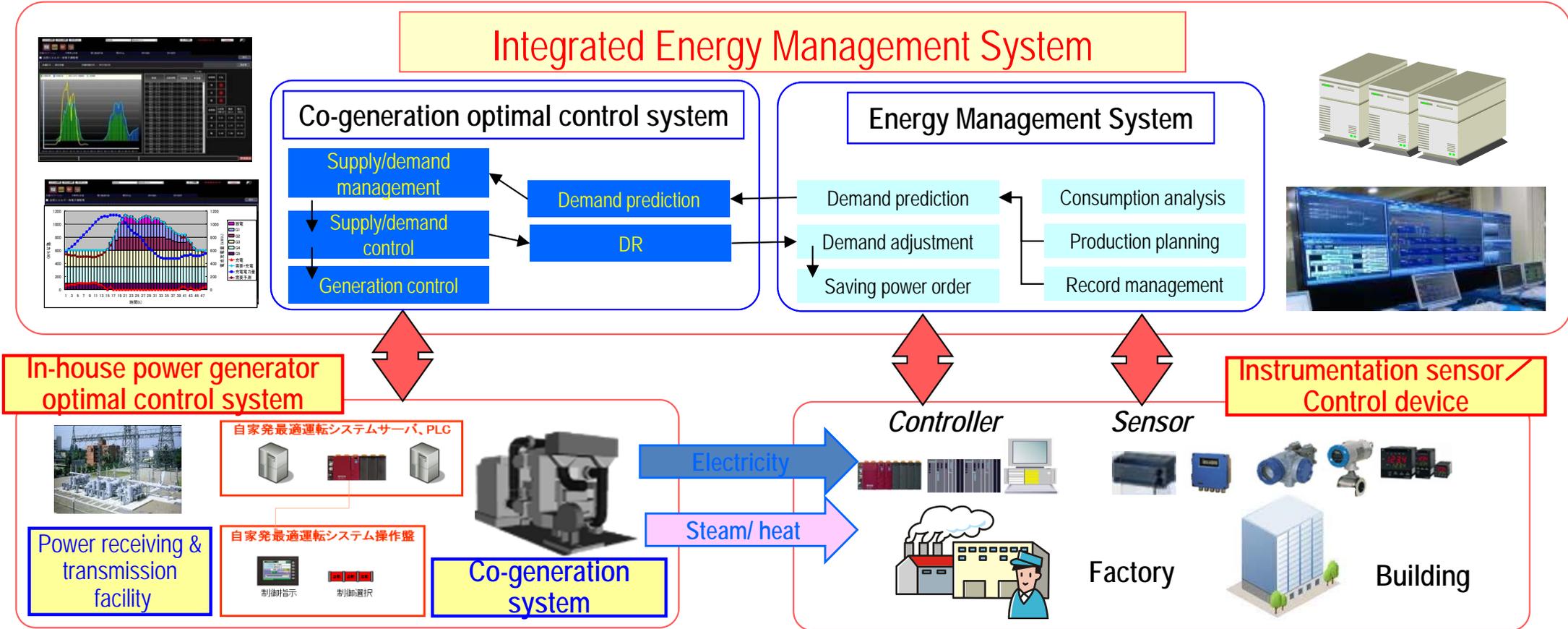


FEMS



# Integrated Energy Management System

Fuji Integrated Energy Management System utilizes our sensing technology, ITC technology, and data analyzing technology, and realizes minimization of energy consumption by its high level analyzing support and energy-saving control, and optimization of supply/demand balance by advanced operation control of energy supplying facility.



# Benefits of Cogeneration System

## ◆ Energy Cost Saving

The electricity purchased from Grid can be saved

- By using the electricity generated from the cogeneration system.
- By using the generated exhaust heat (hot water), and creating cold water for air conditioning through the absorption chiller, thus saving the electricity used in the existing chiller.

The gas used for the existing boiler can be saved

- By using the generated exhaust heat (hot water).

## ◆ Power Source Security when Grid Outage

The cogeneration can supply sustainable electricity,  
thus enhancing the business continuity of the Factory.

## ◆ CO<sub>2</sub>Reduction

Factory Promotion: Contribution to the environment

# Approach to Cogeneration Introduction

## Step1 Check Conditions

- (1) Estimate Load (Electricity / Chilled Water / Hot Water / Steam)
- (2) Purpose (Save Energy Cost / Secure & Stable Power Supply)

## Step2 System Settings

- (1) Check the Current System
- (2) Propose the New System  
(Capacity / Engine / Exhaust Gas Recovery Method)

## Step3 Simulation

- (1) Energy Revenue & Expense Calculation
- (2) Cost Calculation (Initial / Running / Fuel / Maintenance etc.)

## Step4 Evaluation

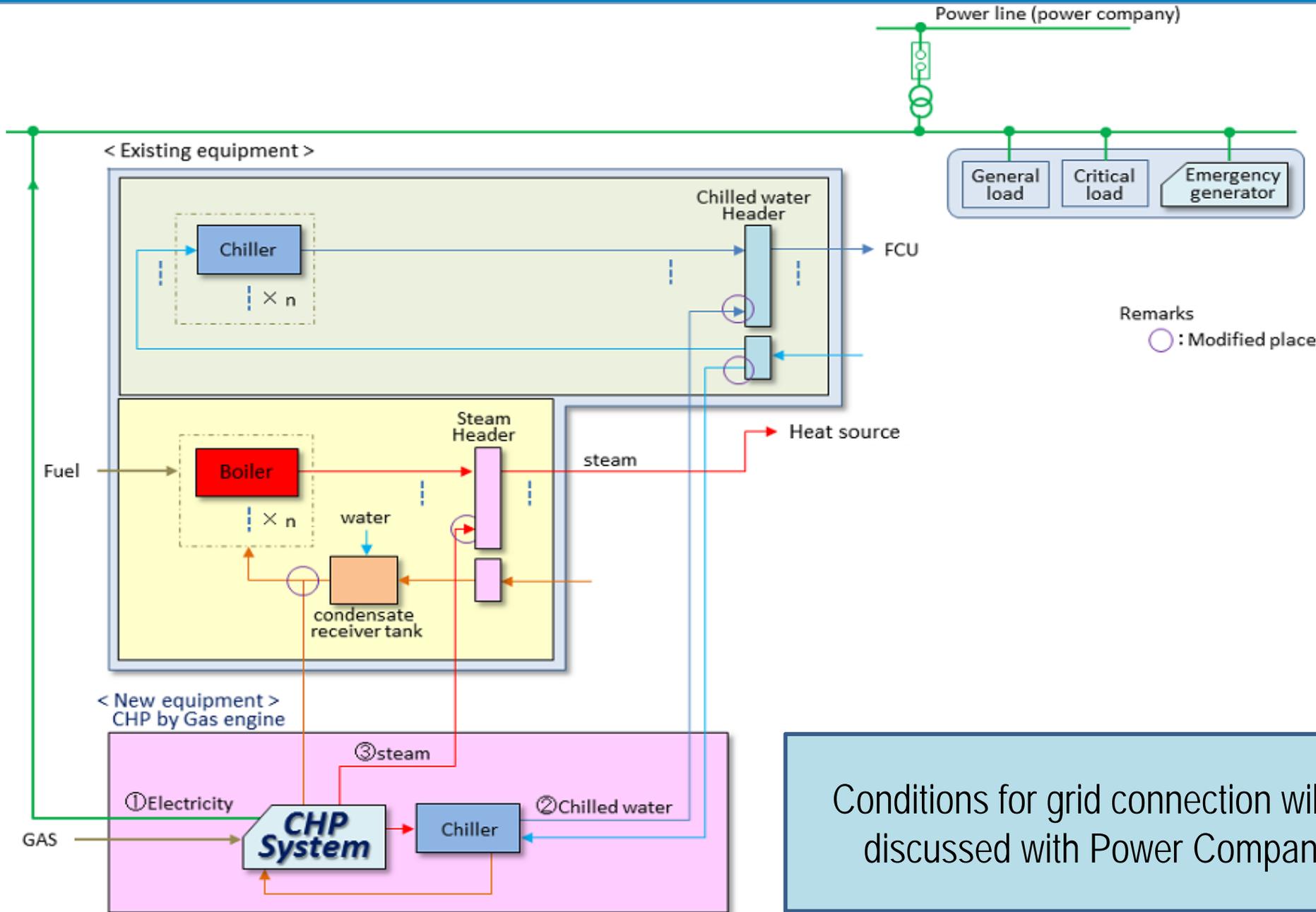
- (1) Energy Saving Amount
- (2) Environment Adaptation (NOx Regulation / Noise / CO2 Emission etc.)
- (3) Economics (Simple Payback Period)

## Step5 Introduction Decision

- (1) Finalization of the System
- (2) Cash Flow Calculation and Decision by the Customer



# Sample: CHP(Cogeneration) System



Conditions for grid connection will be discussed with Power Company.

# Cogeneration installation example



Gas engine



Container type



Easy to install



Multiple installation example

# Effective use of JCM

Reduction of the initial investment by the JCM (Ministry of the Environment)

**1/2 of the initial investment cost will be subsidized.**



- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions from Japan to GHG emission reductions or removals in a quantitative manner and use them to achieve Japan's emission reduction target.

Countries: Indonesia, Vietnam, Cambodia, Laos, Bangladesh, Ethiopia, Kenya, Maldives, Costa Rica, Palau



**FE** Fuji Electric  
*Innovating Energy Technology*

