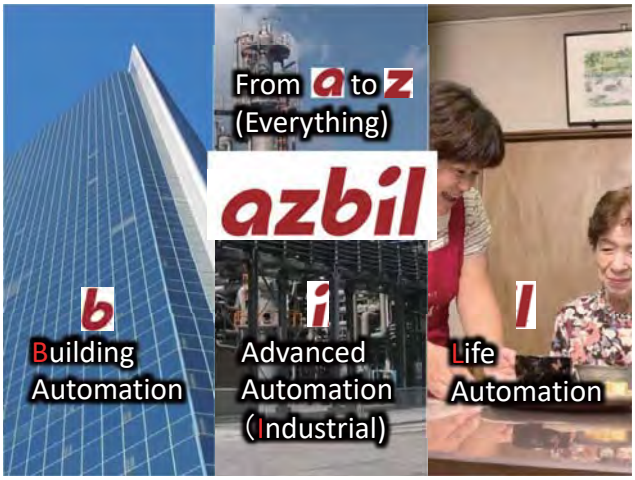
Training on applicable low-carbon technologies in Thailand.

14th, Nov.2018

Azbil(Thailand)Co.,Ltd.

azbil
Human-centered automation



Profile

5

Building Automation

azbil

Profile

6

Building Automation

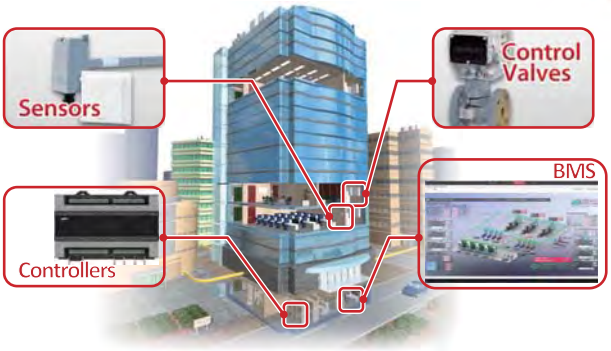
Air Conditioning
Lighting ON/OFF
Security
Ventilation
Fire Safety

azbil

Profile

7

Building Automation



azbil

Profile

8

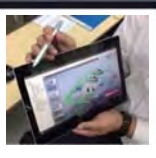
Building Automation

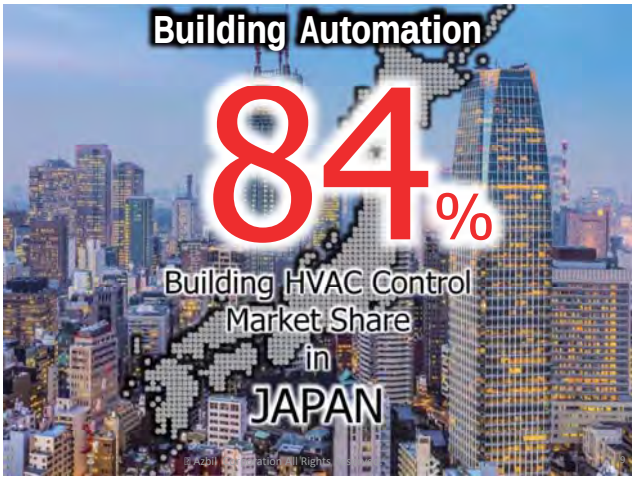
azbil Building Management System

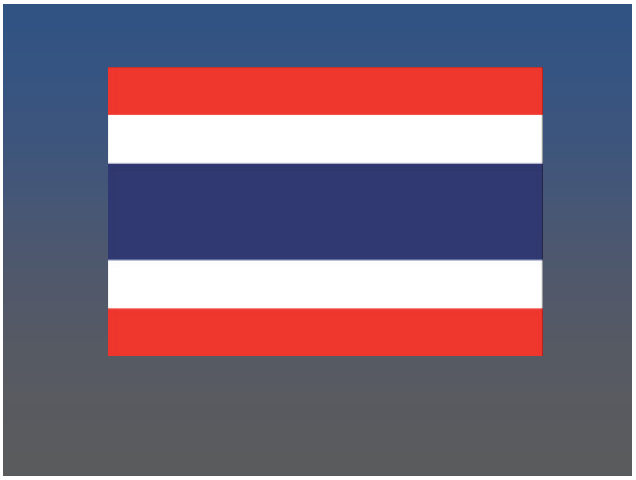
savic-net™G5

Brand New Building Management System

Open System
Full BAC-net



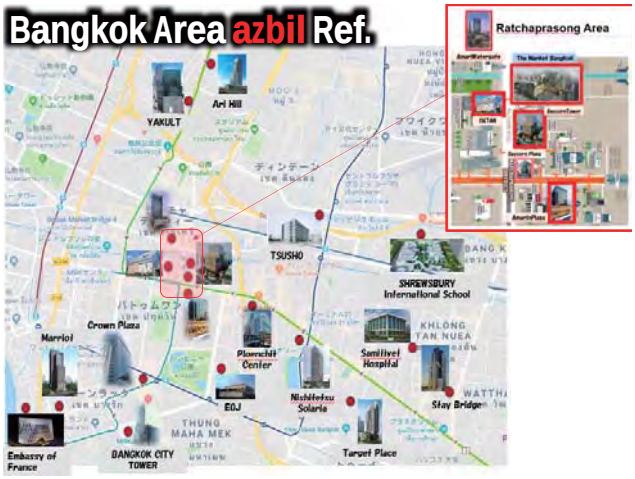

Building Automation
84%
Building HVAC Control
Market Share
in
JAPAN




Public Building azbil Ref. in Thailand
Chakree Maha Prast
การไฟฟ้านครหลวง
Metropolitan Electricity Authority
MEA Watriap Bldg.
Embassy of France
Embassy of Japan


Recent azbil PJ. in Thailand
Mae -Sot Airport
Ari Hill
Arize
Shiracha
Marriott
Surawon
Boonthavon
× 8 shops
Burapa
University
Shwsberry
International School

Bangkok Area azbil Ref.



Recent azbil PJ. in Thailand

Gaysorn Tower
30th Floor,63,000m2, LEED GOLD
Azbil BMS, VAV, Air conditioning

Latest Service

15

Beyond Building Automation

Energy Saving
Remote Maintenance
Area Management
BOSS (Operation)

Air Conditioning
Lighting ON/OFF
Security
Ventilation
Fire Safety

Azbil focuses;
building performance to
make value maximize !

azbil

Latest Service

16

Building Automation +a Energy Saving

Amari Watergate	Amarin Plaza (Gaysorn Gr.)	Crown Plaza HOTEL (RAMALAND)	Yakult HQ	Ploenchit Center (Erawan Gr.)
2012	2013	2014	2015	2015
Bldg. Total Save 15%	Pump System Save 58%	Pump System Save 40%	Pump System Save 30%	Pump System Save 40%

BEMS

Building Energy Management System

azbil

BEMS
has
Visualization
&
Optimization
Control

BEMS
has
Visualization
&
Optimization
Control

lose your weight

Running?

Muscle training?

Profile

23

Building Automation

azbil Building Management System

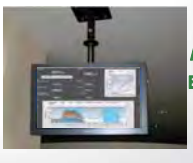
savic-net™ G5

Brand New Building Management System

Open System
Full BAC-net

Compare
Today's & Yesterday
consumption

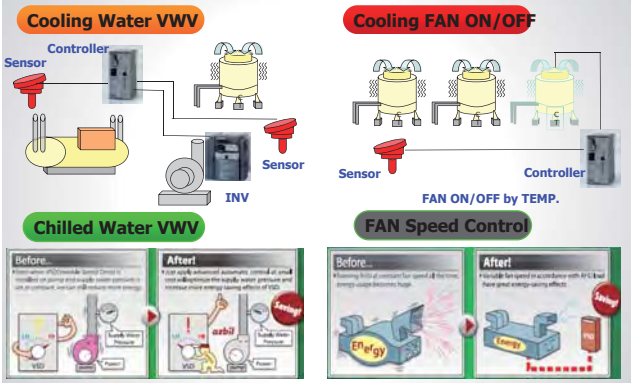
From Anywhere
-Staff PC-
-Mobile-
-From JPN HQ-



@Reception
Always show
Energy Trend

BEMS has Visualization & Optimization Control

Example of Energy Saving Menu



But Key is How to use BEMS Data

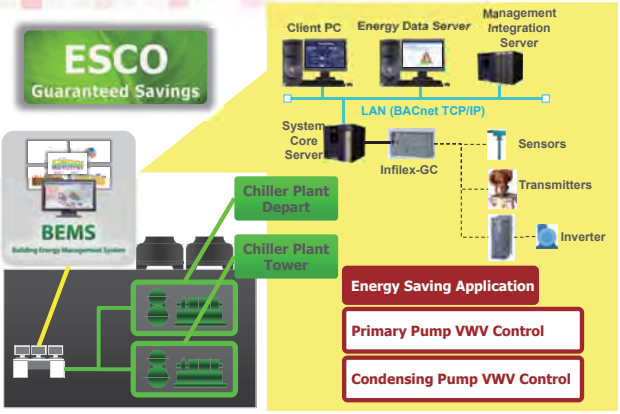
Energy Saving Reference in Thailand

Amarin Plaza

Building Type	Shopping Center
Floor Size	48,600 m2
Location	Bangkok, Thailand
Completed	Dec. 2013
Energy Saving Applications	BEMS CHP VWV Control CDP VWV Control CT Fan VSD Control

For Amarin Plaza

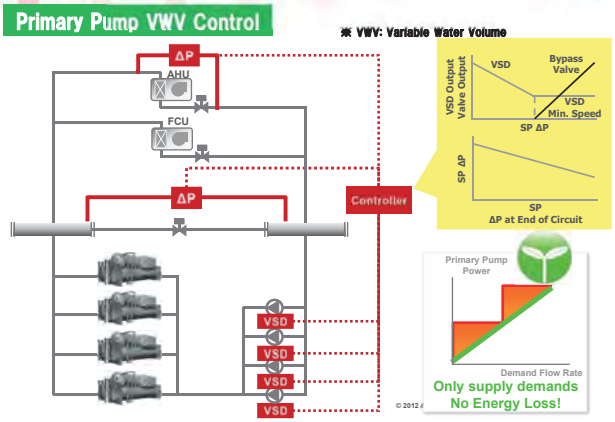
azbil



For Amarin Plaza

azbil

Primary Pump VWV Control

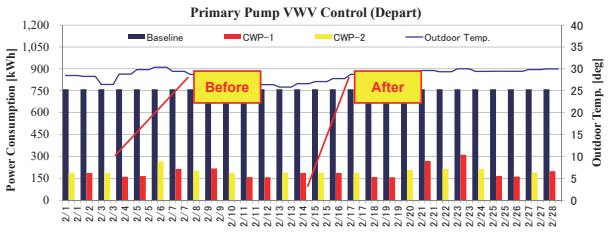


For Amarin Plaza

azbil

Primary Pump VWV Control

Saving
▲74% saved



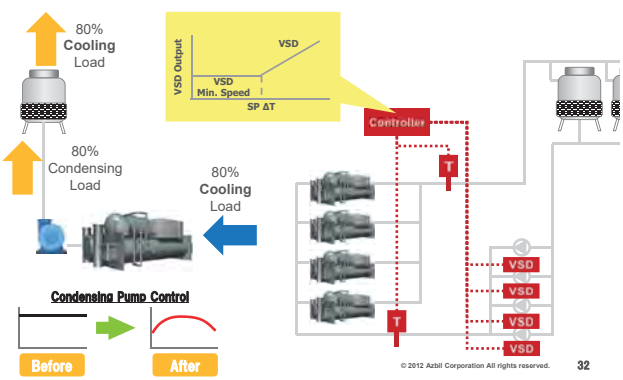
Actual Data Month	Before (kWh)	After (kWh)	Saving (kWh)
Feb-2017	21,286	5,460	15,826

For Amarin Plaza

azbil

Condensing Pump VWV Control

※ VWV: Variable Water Volume

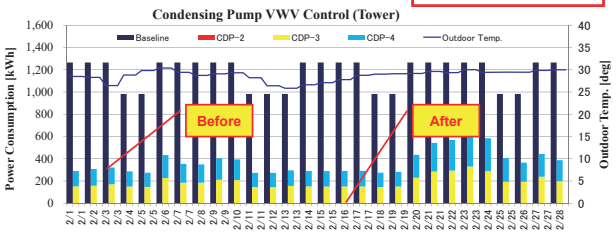


For Amarin Plaza

azbil

Condensing Pump VWV Control

Saving
▲68% saved



Actual Data Month	Before (kWh)	After (kWh)	Saving (kWh)
Feb-2017	32,867	10,334	22,533

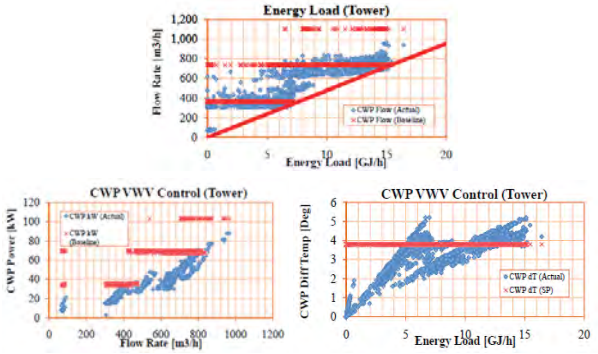
Monthly report

azbil

Detail Analysis by Plant

azbil

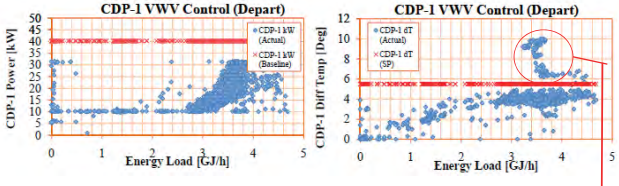
Primary Pump VWV Control for Tower Plant (as of September 2014)



Detail Analysis by Plant

azbil

Condensing Pump VWV Control for Department Plant



Power consumption of CDP pumps were more than baseline consumption because pump speed was fixed 50Hz caused by CT trouble.

Monthly Report &PDCA Activity

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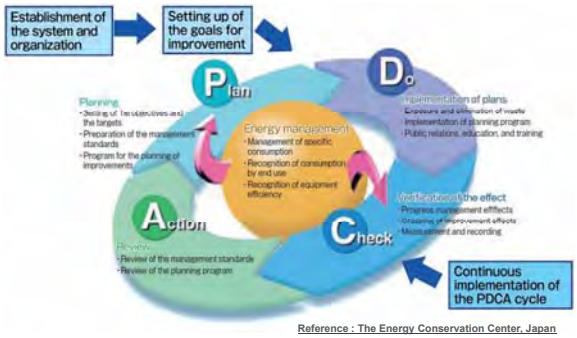
Cooling Tower Efficiency Improvement

For Successful Effective Energy Savings

azbil

PDCA's activities have to be kept executing continually in order to achieve the energy savings. Building Energy Management System "BEMS" helps you to manage not only your building facilities but also energy and environment in your building.

Energy Management System



Reference : The Energy Conservation Center, Japan

lan : Identify & Analyze Problem

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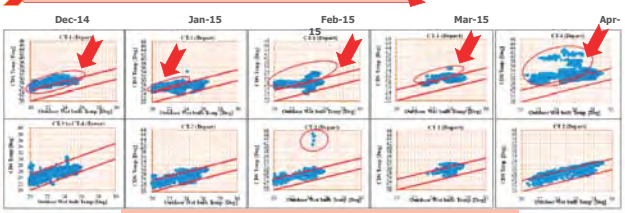
Cooling Tower Problem : LOW efficiency



Actual data from Amarin Plaza Monthly Report collected by BEMS

- From December 2014 : The report was indicated about low cooling tower efficiency. It could not reduce water temperature in between approach temperature of design spec (red line).

It need repairing

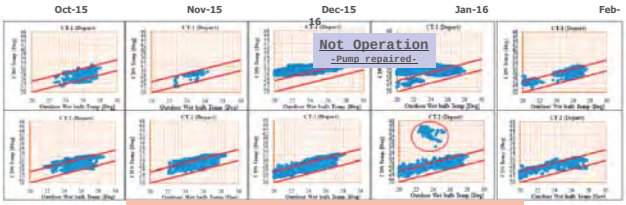
. o : Develop & Implement solution

azbil

Actual data from Amarin Plaza Monthly Report collected by BEMS

- Until JUNE 2015 : Cooling Tower (CT-1) was fixed by Amarin staffs.
- On JULY 2015 : Cooling Tower (CT-1) was normally operated. Its efficiency was in the range of the design spec.

heck : Evaluate the results

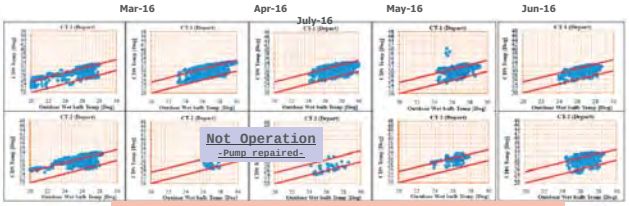


Actual data from Amarin Plaza Monthly Report collected by BEMS

Continued evaluate the result

- All data are recorded by Building Energy Management System
- It can provide central automatic control and monitoring
- Easy to analyze and check back data

ction : Standardize the solution



Actual data from Amarin Plaza Monthly Report collected by BEMS

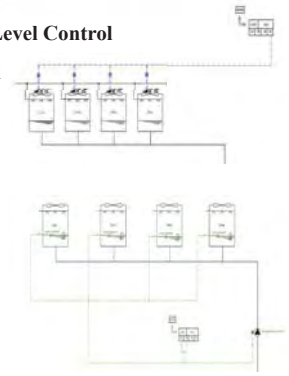
That why we need to continuously implement PDCA cycle

Benefits

- Monitoring the whole system
- Record all necessary data and easy to check back
- Recognition of equipment efficiency

Phase 2 : Cooling Tower

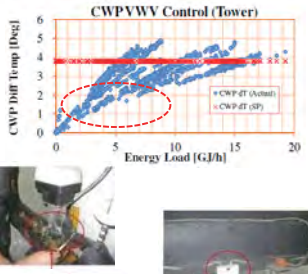
1. Cooling Tower Make-up Water Level Control
2. Cooling Tower Fan VSD Control



Phase 3 : AHU Temp Control

As The Year 2016

Before



Phase 3 : AHU Temp Control

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After

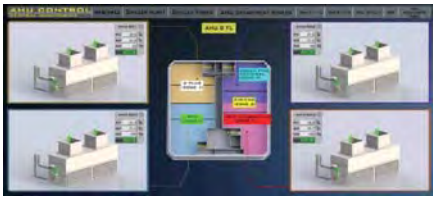



Phase 3 : AHU Temp Control

azbil







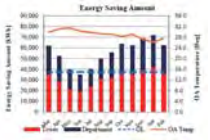
Summary of Total Energy Saving

azbil

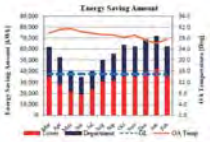
Total Energy Saving Amount : 2,322538 [kWh] as of Dec 2017.

Aproximately THB 9,29,152 (Unit Rate: 4.0THB/Kwh)

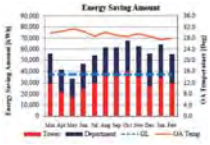
2014



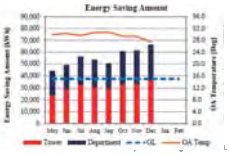
2015



2016



2017



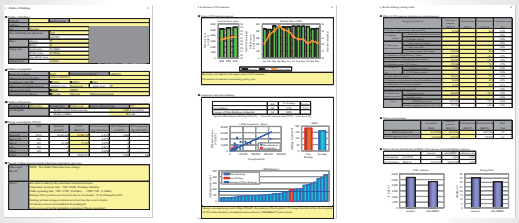
Site Survey Activities

Plan

Example of Energy Health Check Repor

Plan

Output Image



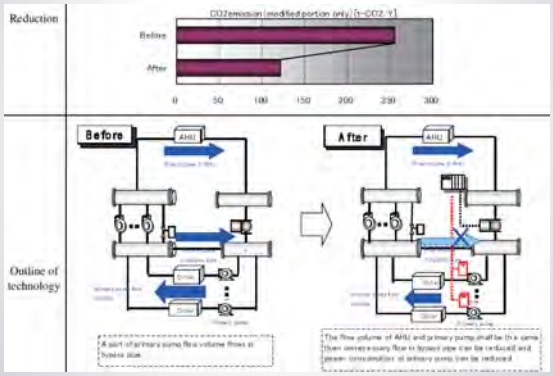
Including

- **ANALYSIS OF ENERGY USAGE**
- **MENU OF ENERGY SAVING OPTIONS**
- **SIMULATION OF ENERGY SAVING IMPACTS AND INITIAL COST BUDGET**

The Energy Health Check report will serve as a good reference for your preventive maintenance and energy saving activity!

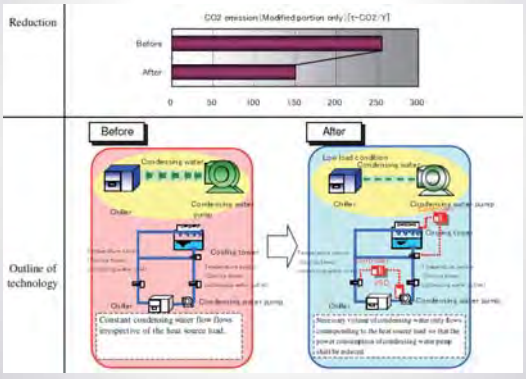
Project In Thailand

Primary Pump VWV Control



Project In Thailand

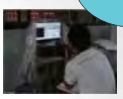
Condensing Water Pump VWV Control



Installation

Do





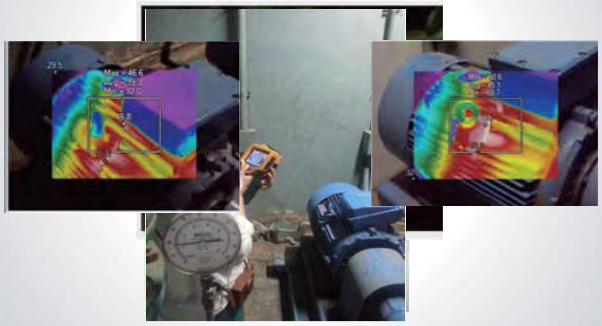





Test & Commissioning

Do

Thermal, Noise and vibration

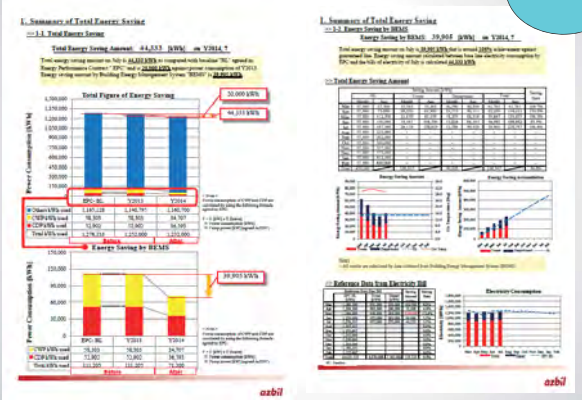


Monthly report

azbil

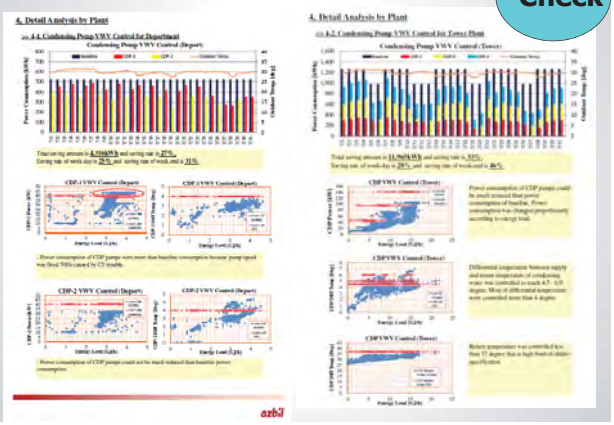
Analysis Report

Check



Analysis Report

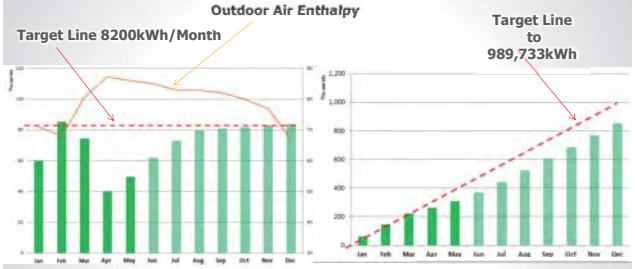
Check



Operation Advice

Action

Result Jan-May



Jun-Dec is Forecast
Monthly Energy Saving Amount

Jun-Dec is Forecast
Accumulation of Energy Saving Amount

Solution

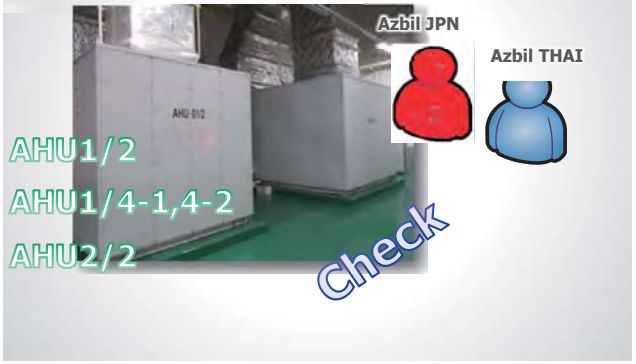
Data of 26th,May.

Solution

Data of 26th,May.

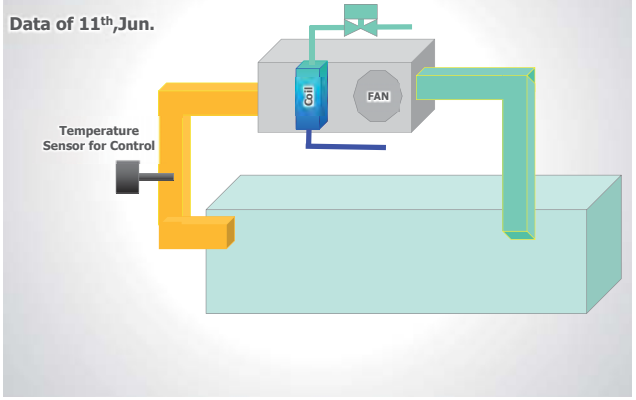
Solution

Data of 11th,Jun.



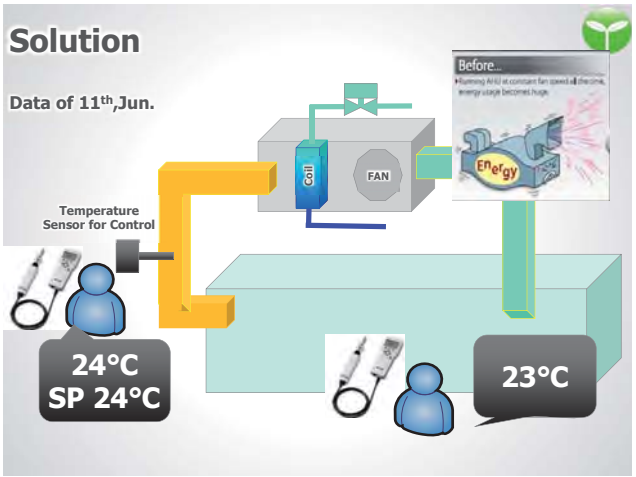
Solution

Data of 11th,Jun.



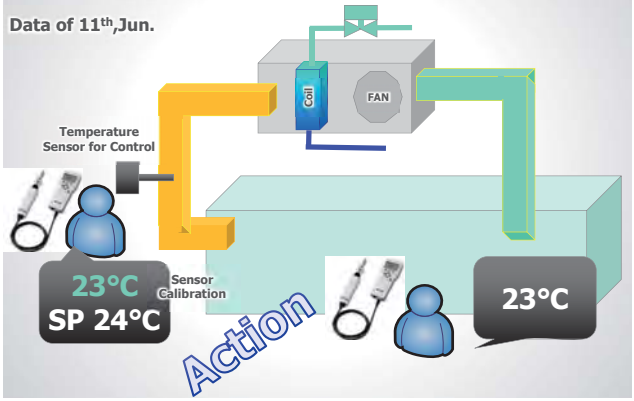
Solution

Data of 11th,Jun.



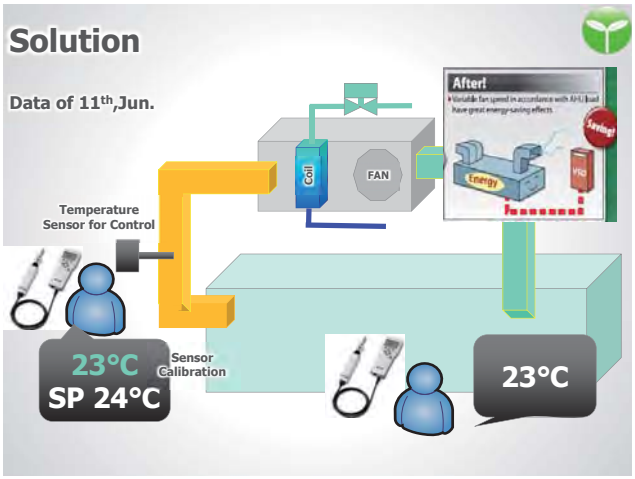
Solution

Data of 11th,Jun.



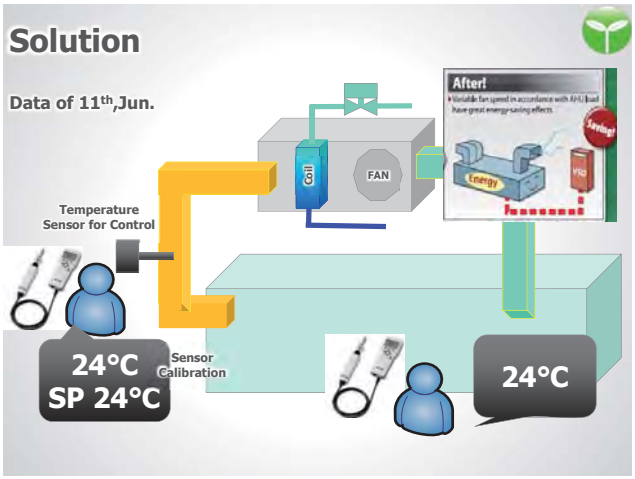
Solution

Data of 11th,Jun.



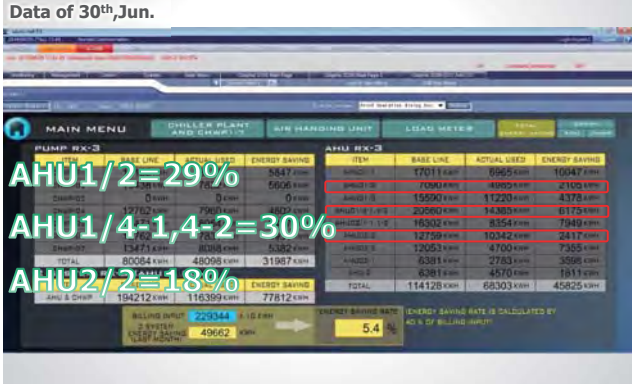
Solution

Data of 11th,Jun.

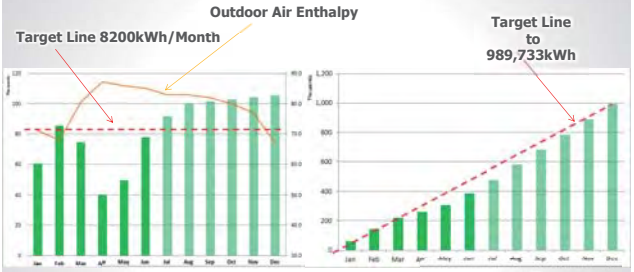


Solution

Data of 30th,Jun.



Summary Energy Saving



Jul-Dec is Forecast
Monthly Energy Saving Amount

Jul-Dec is Forecast
Accumulation of Energy Saving Amount

Recent Trend for Building

WELL Standard need

Monitoring Air Quality :CO, CO2, VOC,PM2.5, PM10 etc

Azbil have sensor & monitoring system.

Control

* Demand Control Ventilation
*Temperature Control
*Humidity Control

Azbil have DDC & Control method

Evaluation

* Comfortableness

Azbil have Radiation Temperature Sensor & PMV analysis

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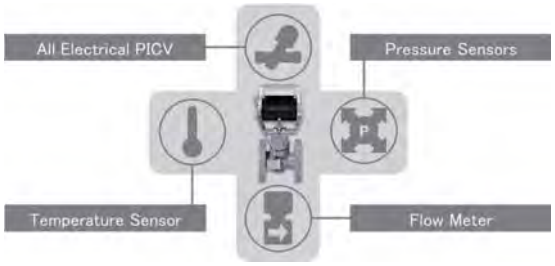
Recent Trend for Building

azbil



"ACTIVAL +" is combination of PICV, sensors, and flow meter. So "ACTIVAL +" is far beyond the PICV.

 azbil

Recent Trend for Building

azbil

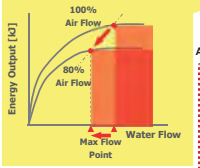
 azbil

Recent Trend for Building

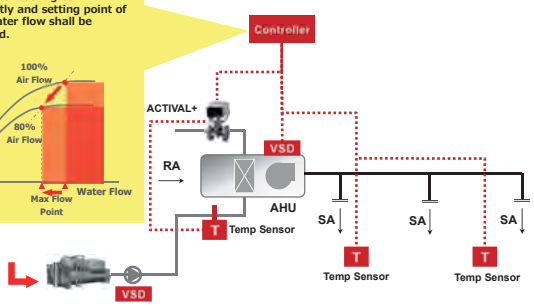
azbil

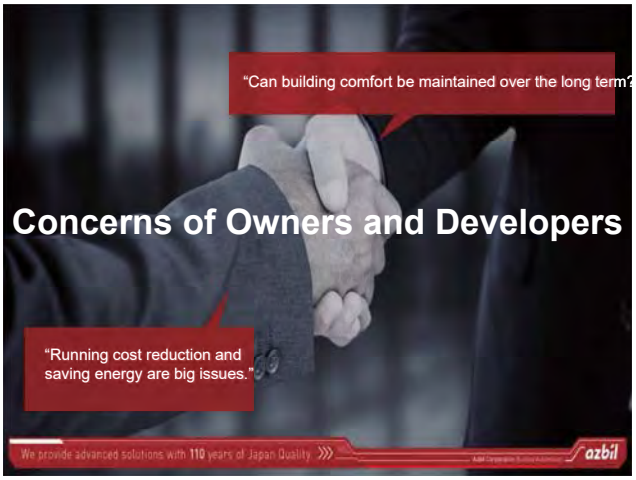
Improvement of a differential temperature

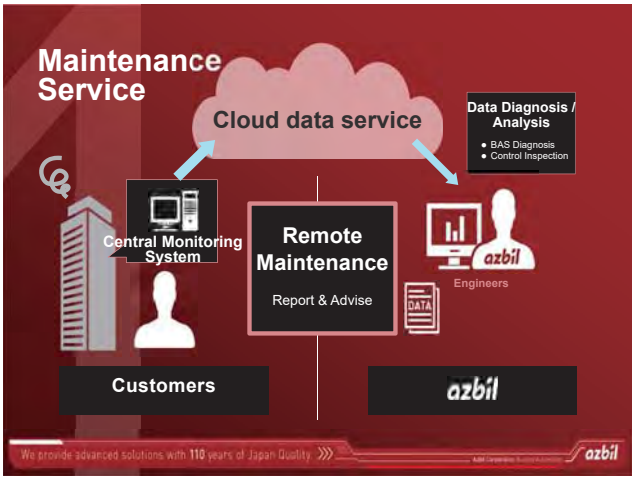
Max water flow volume shall be decided to control water flow volume of cooling coil efficiently and setting point of max water flow shall be changed.

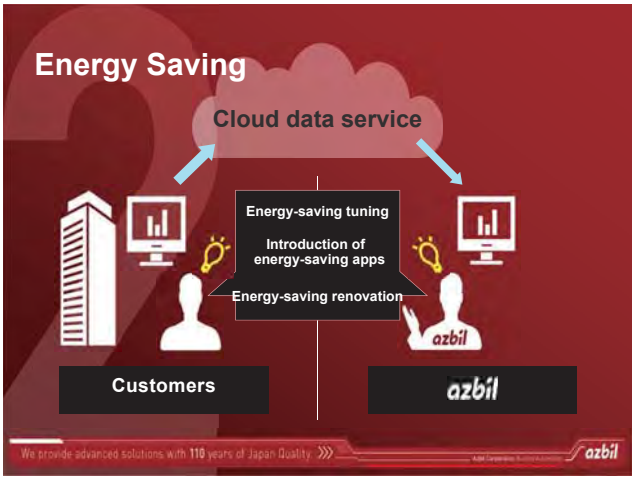


Max flow limit control









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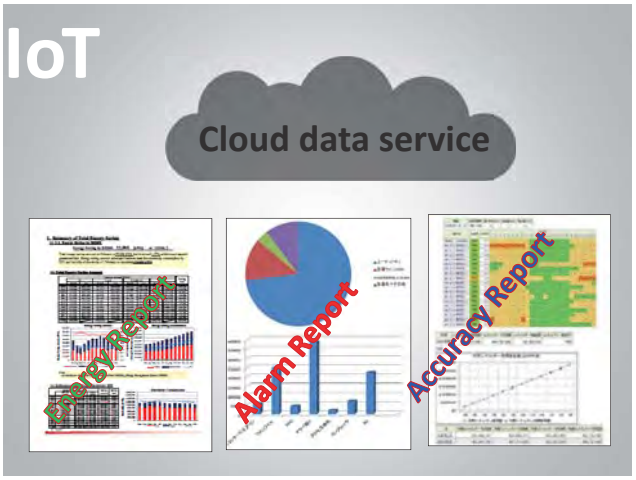
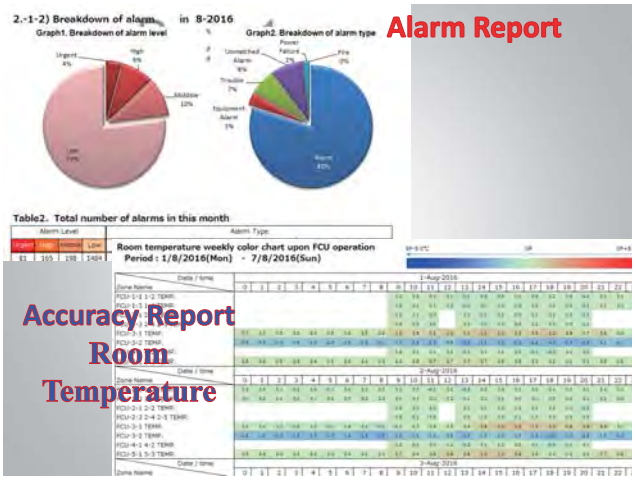

IoT
Cloud data service
Energy Report
Alarm Report
Accuracy Report


2.-1-2) Breakdown of alarm in 8-2016
Graph1. Breakdown of alarm level
Graph2. Breakdown of alarm type
Alarm Report
Table2. Total number of alarms in this month
Room temperature weekly color chart upon FCU operation
Period : 1/8/2016(Mon) - 7/8/2016(Sun)
Accuracy Report
Room
Temperature


Recent Trend Digital Signage Connection
27
Digital signage
Gaysorn Tower G5 Connected Digital signage
Gaysorn Tower
Future
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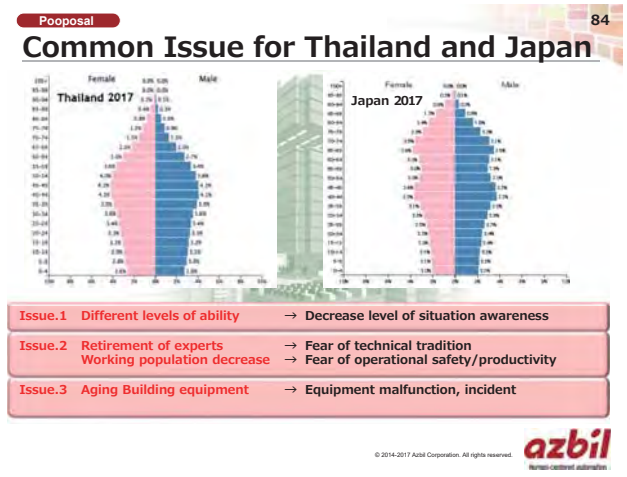
Pooposal
84
Common Issue for Thailand and Japan
Thailand 2017
Female
Male
Japan 2017
Issue.1 Different levels of ability → Decrease level of situation awareness
Issue.2 Retirement of experts → Fear of technical tradition
Working population decrease → Fear of operational safety/productivity
Issue.3 Aging Building equipment → Equipment malfunction, incident
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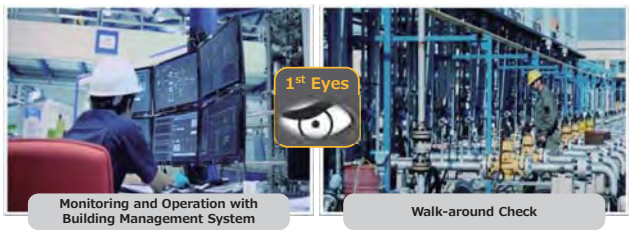
What we will do further in future

85

Common Issue for Japan and Thailand

e.g.: Building operation management

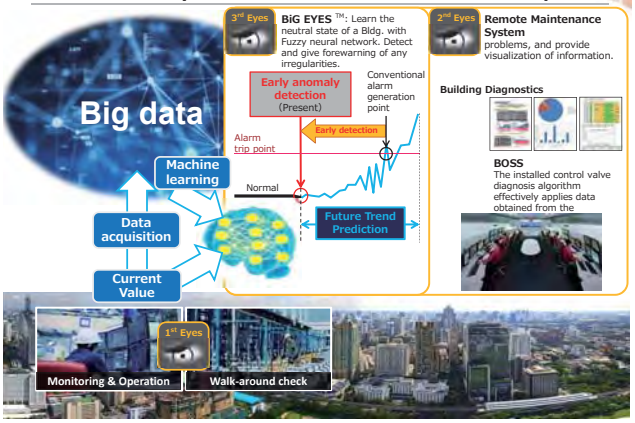


Issue.1	Different levels of ability	→ Decrease level of situation awareness
Issue.2	Retirement of experts Working population decrease	→ Fear of technical tradition → Fear of operational safety/productivity
Issue.3	Aging plant equipment (refinery)	→ Equipment malfunction, incident

What we will do further in future

86

The 2nd & 3rd Eyes inherit/transcend wisdom of experts



What we will do further in future

87

Contribution to Sustainable Growth of Thailand

- The 2nd/3rd Eyes work as powerful engines make the "Thailand 4.0" a won.

Efficiency & Safety for Chemical manufacturing facilities
Provide with Integrated Production Excellence
Utilizing Industrial IoT for manufacturing facilities

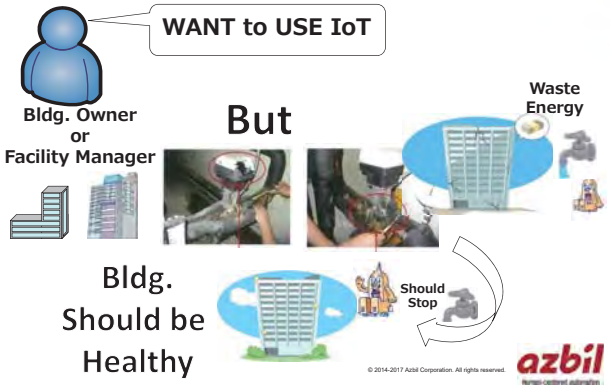
Efficiency & Environment for Factory groups
Supply energy saving technology to factory groups integrated as Clusters to optimize energy use

Efficiency & Environment for Buildings
Azbil Thailand will provide area management utilizing IOT through our savic automation network. Factory and commercial building can keep high skilled operation with experienced efficiency.

What we will do further in future

88

Contribution to Sustainable Growth of Thailand



Contribution to Sustainable Growth of Thailand

Bldg. Owner
or
Facility Manager

How to explain?

azbil
Human-centered automation

azbil

Thank you

for your attention