Introduction of Energy Data Analysis Center(EDAC)

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KOREA ENERGY AGENCY

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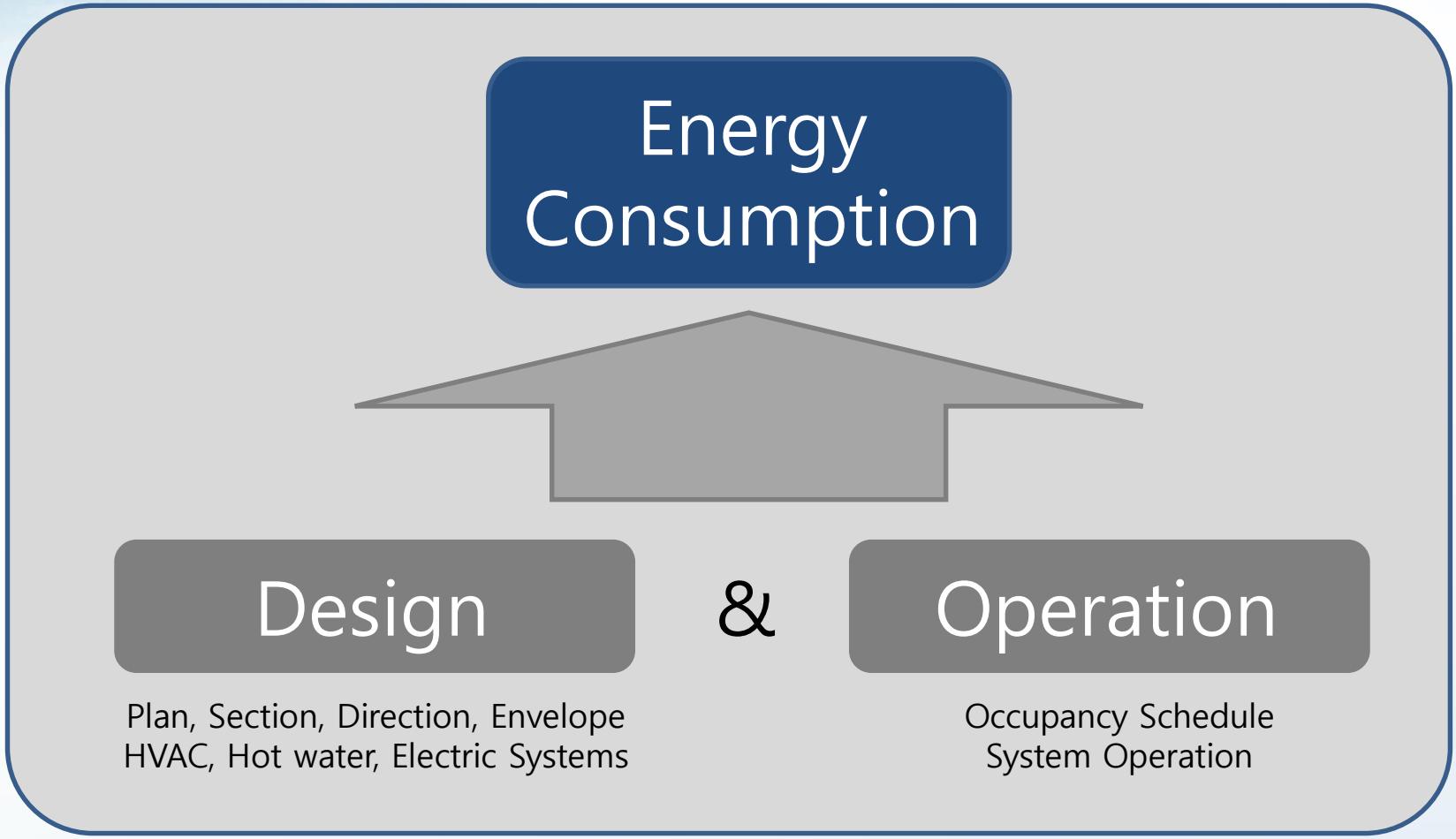
KOREA ENERGY AGENCY

Building Energy Data ?

- **Building Energy Data** = Design Data + Operation Data + Energy Consumption Data



Building Energy Data & BEMS

Building Energy Management System

Consumption	Operation	Design
Energy Bills & short term measurement	Operation Note	Blueprint

Through Building Energy Audit

Intermittently and Manually by Auditors

Through **Building Energy Management System**

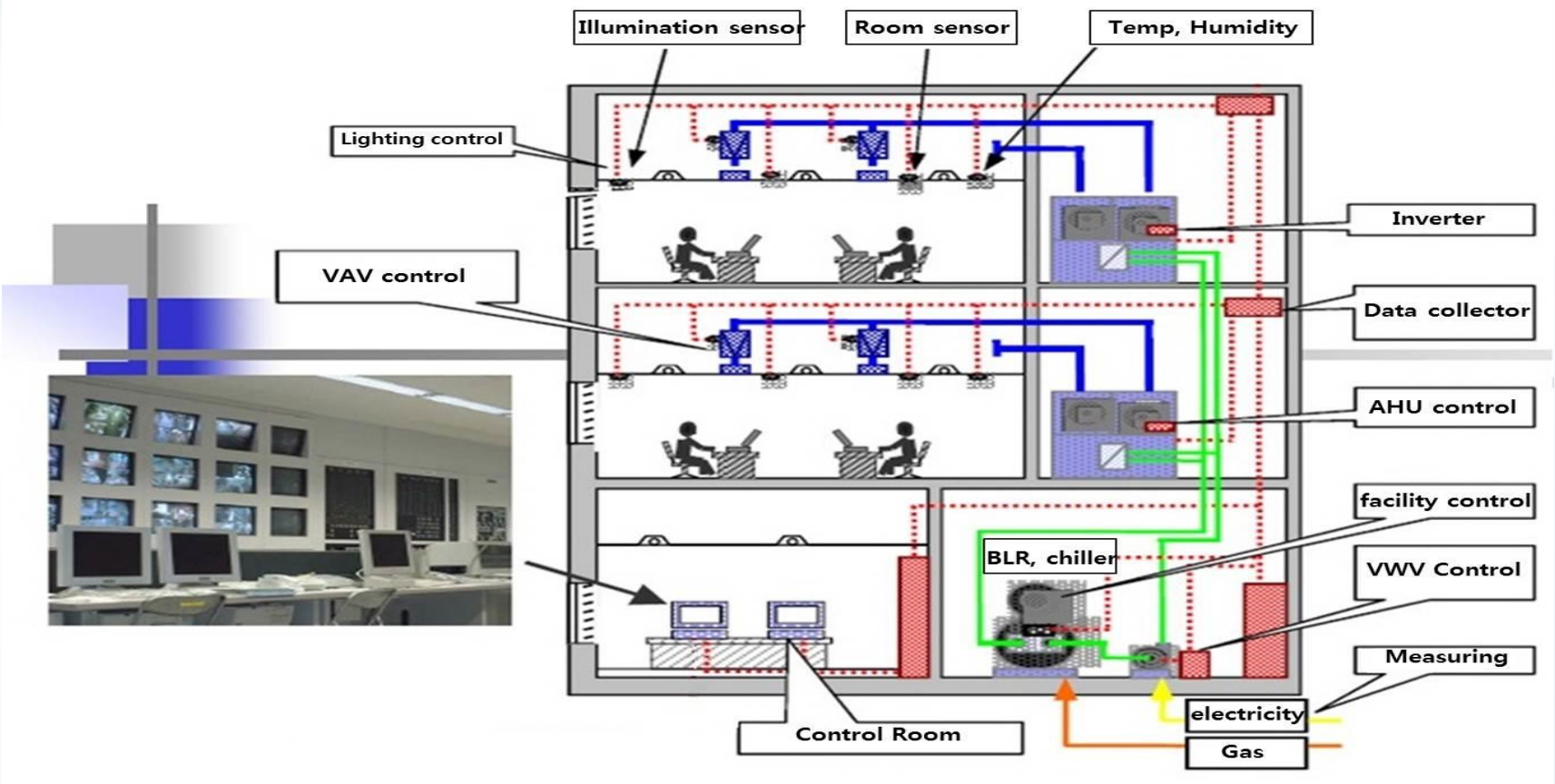
Consistently and Automatically by Software

Smart Meter Data	BAS/ IoT Data	BIM Data

* BAS : Building Automation System / IoT : Internet of Things / BIM : Building Information Modeling

Building Energy Management System

- **Building control, management, operating system for supporting efficient energy use and maintaining pleasant indoor condition**



Building Energy Data & BEMS

Energy Data for Building Owner

- **Reduce building operation cost and improve property value**

Optimize Building Operation

To reduce energy cost

To improve indoor environmental quality

To manage building equipments efficiently

Energy Data for Government

- **Provide benchmark index and predict future energy consumption**

Provide Benchmark Index to the Public

To motivate energy reduction by owners

To promote technology development by industry

Predict Future Energy Consumption

To make policy to support market

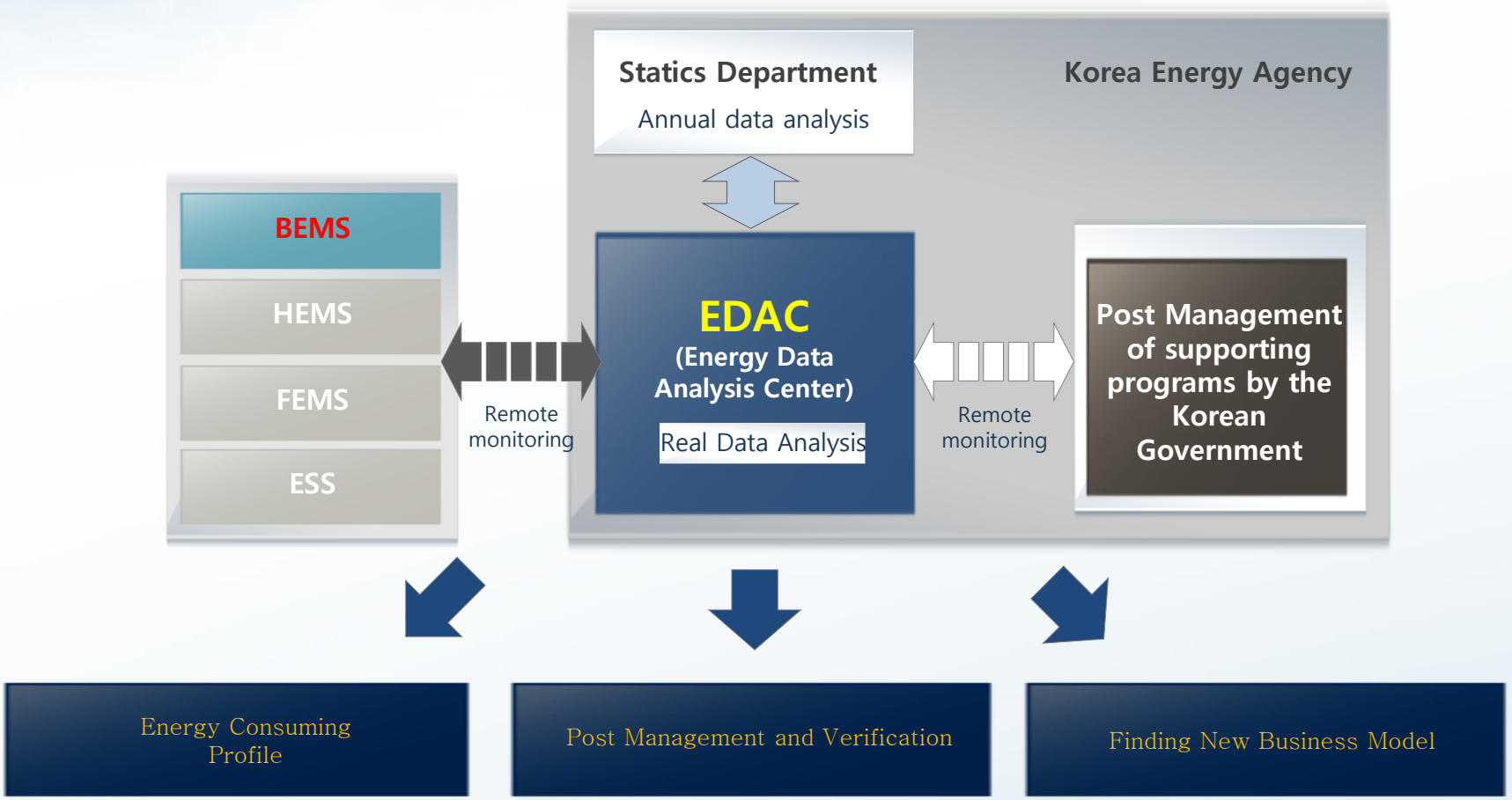
To manage energy demand and supply

2 BEMS Dissemination Scheme(KEA's EDAC)

BEMS Dissemination Scheme(KEA's EDAC)

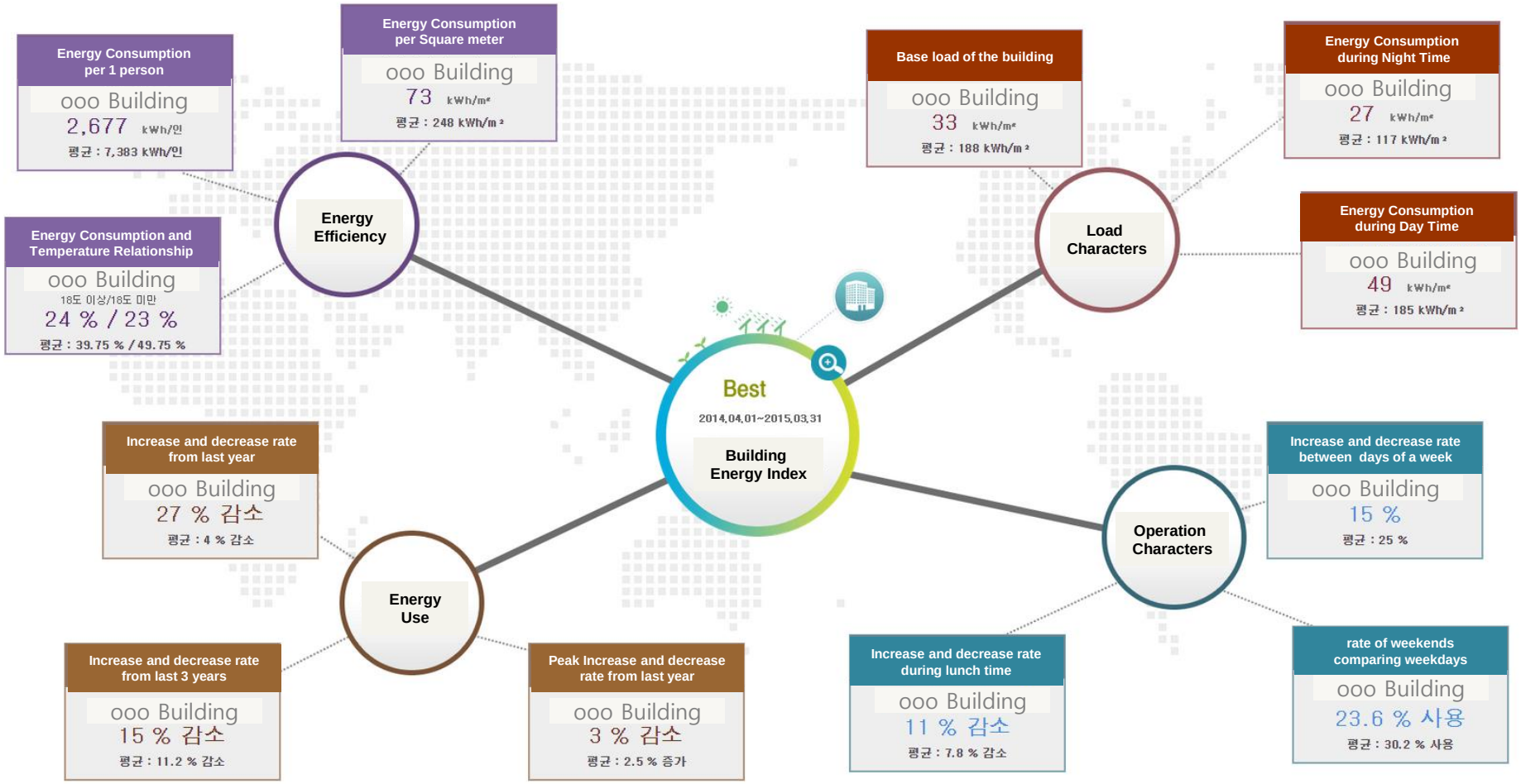
(EDAC) Energy Data Analysis Center ?

- to analyze new kind of energy data through ICT



BEMS Dissemination Scheme(KEA's EDAC)

Basic Building Energy Index Analyzing System



BEMS Dissemination Scheme(KEA's EDAC)

Comparing Energy Index

- Listed in an ascending or a descending order of energy index

건물유형 전체 | 정렬 오름차순 | 기간 2014-04-01 ~ 2015-03-31 | 에너지원 ◉ 전체 ○ 전기 ○ 연료 ○ 열 | 단위 ○ MJ ○ Mcal ○ kgoe ◉ kWh | 조회

단위면적당 에너지 사용량

73 kWh/㎡

	73 kWh/㎡
	85 kWh/㎡
	86 kWh/㎡
	94 kWh/㎡
	99 kWh/㎡
	100 kWh/㎡
	105 kWh/㎡
	119 kWh/㎡
	127 kWh/㎡
	136 kWh/㎡
	702 kWh/㎡
평균	150 kWh/㎡

1인당 에너지 사용량

938 kWh/인

	1,048 kWh/인
	1,164 kWh/인
	1,463 kWh/인
	2,383 kWh/인
	2,677 kWh/인
	3,552 kWh/인
	4,612 kWh/인
	5,622 kWh/인
	6,864 kWh/인
	17,681 kWh/인
	19,676 kWh/인
평균	5,640 kWh/인

외기온도 상관관계

18↓ / 18~24 / 24↑(℃)

40 / 11 / 34(%)

	23 / 47 / 24(%)
	71 / 18 / 23(%)
	73 / 34 / 18(%)
	63 / 11 / 51(%)
	70 / 31 / 26(%)
	78 / 11 / 46(%)
	51 / 59 / 29(%)
	78 / 33 / 31(%)
	63 / 28 / 52(%)
	62 / 56 / 54(%)
	62 / 57 / 54(%)
평균	61 / 31 / 34(%)

전년대비 증감률

27 % 감소

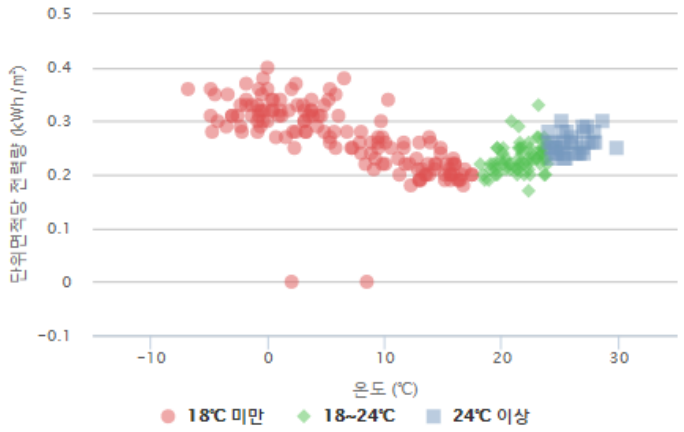
	24 % 감소
	20 % 감소
	17 % 감소
	10 % 감소

전년대비 Peak 증감률

25 % 감소

	20 % 감소
	18 % 감소
	10 % 감소
	4 % 감소

한솔동주민센터



BEMS Dissemination Scheme(KEA's EDAC)

Each Building Energy Consumption

- Describe energy use by energy source, zone, equipment, Etc.

건물유형 업무시설 | 기간 2014-04-01 ~ 2015-03-31 | 에너지원 ◉전체 ○전기 ○연료 ○열 | 단위 ○MJ ○Mcal ○kgoe ◉kWh | 조회

전체사용량 (kWh)
1,776,102
◉전기 ○연료 ◉열 ○신

전기	1,490,404 kWh
연료	0 kWh
열	285,698 kWh
면적당	73 kWh/m²
1인당	3,552 kWh/인

열 16.1% / 전기 83.9%

전체사용량 (kWh)
4,778,771
◉전기 ○연료 ◉열 ○신

전기	4,119,469 kWh
연료	0 kWh
열	659,302 kWh
면적당	99 kWh/m²
1인당	5,622 kWh/인

열 13.8% / 전기 86.2%

전체사용량 (kWh)
2,677,044
◉전기 ○연료 ○열 ○신

전기	2,043,382 kWh
연료	633,662 kWh
열	0 kWh
면적당	119 kWh/m²
1인당	2,677 kWh/인

연료 23.7% / 전기 76.3%

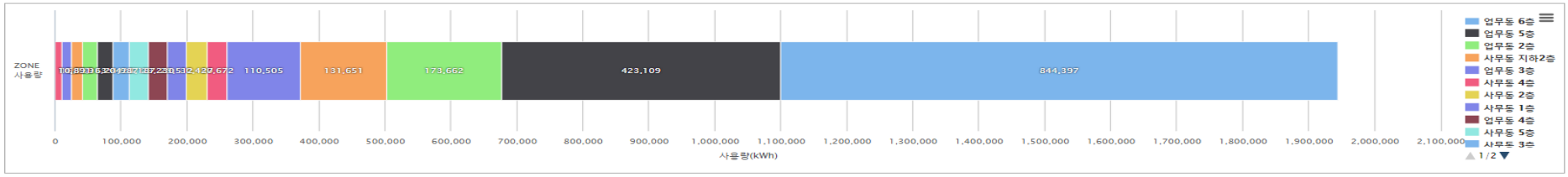
전체사용량 (kWh)
8,840,695
◉전기 ○연료 ○열 ○신

전기	8,840,695 kWh
연료	0 kWh
열	0 kWh
면적당	702 kWh/m²
1인당	17,681 kWh/인

전기 100.0%

ZONE 별 사용량

건물유형 업무시설 | 건물 | 조회구분 ○일 ○월 ◉년 | 조회기간 2015 | 조회 | 엑셀



▪ ZONE 별 사용 현황

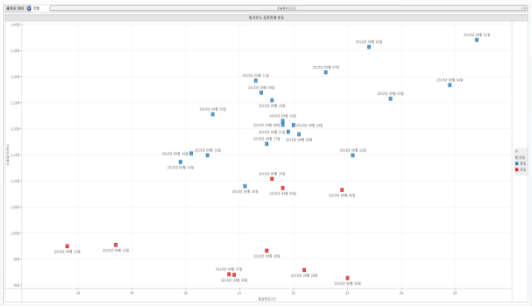
구분	사용량(kWh)												
	1	2	3	4	5	6	7	8	9	10	11	12	합계
업무동 6층	286,194	269,066	285,197	0	0	0	0	0	0	0	0	0	844,397

BEMS Dissemination Scheme(KEA's EDAC)

Report and Alarm Service (The early stage of Biz model)

- **Provide analysis report about monthly energy consumption and alarm service to connected buildings**
  - Average hourly energy consumption profile in a day
  - Daily energy consumption and ambient temperature
  - Daily peak demand
  - Energy consumption by zone
  - Comparison with same month of last year

  - Energy consumption alarm(SMS Service)
  - Peak demand alarm(SMS Service)



- **This service can vary from possible data of each building**

- **This service targets small buildings which have no professional energy manager**

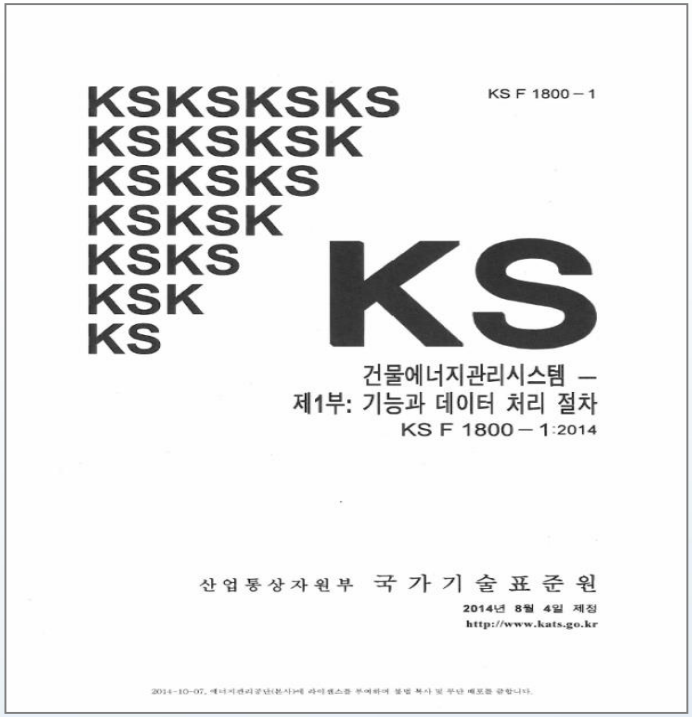
BEMS Dissemination Scheme(KEA's EDAC)

Korean Standard of BEMS

- To make building owners and managers understand clearly about BEMS and to make providers manage data more easily

- KS F 1800-1 Building Energy Management System
  Part 1 : Function and data processing procedure (Aug. 2014)

- Developing related standard
  - Estimation of Implementation Effect
  - Monitoring and Control Points Management
  - Tag Information Management
  - Database Management



BEMS Dissemination Scheme(KEA's EDAC)

Incentives and Example of BEMS

Tax Incentives

- reducing income tax or corporate tax (1~6% of BEMS installation cost)

Size of Company	Small	Middle	Large
Reducing Rate(%)	6	3	1

Relaxing regulations of mandatory energy audit

- subject : buildings that install BEMS
- period of audit : Once every 5 years ➔ Once every 10 years

Example of BEMS

- (Name of the building) SK chemical ECOLAB
- (Year of BEMS installation) 2010
- (Contents of installation) display of energy usage, lighting control, AHU control etc.
- (Saving effect) 5% of annual energy usage ($90,000)

BEMS Dissemination Scheme(KEA's EDAC)

Energy Use Intensity(EUI) Database

- **Make detailed EUI by building type, subsystems***
  * heating, cooling, ventilating, lighting, hot water, electric appliances
- **Gather data from 200 apartment units and 85 office buildings until 2017**

- R&D project focusing Seoul area (2014.09~)


Hallway calorimeter | Living room A/C | Room 1 A/C | Ventilation fan unit


Kitchen entrance panel board | Room2 / storage | Livingroom thermo-hygrometer | Wireless calorimeter


Wireless hotwater-meter | Wireless meter | Living room - data collector


B1F parking lot lights | elevators | Parking lot fan room | B1F parking lot


B2F Engine room circulating pump | B2F Engine room circulating pump | B2F Electric room lighting | B2F parking lot

<Apartment>

Measuring and Transporting System


Engine room panel board | B1F panel board | 1F panel board | 2F panel board


3F panel board | 4F panel board | 5F panel board | 3F Thermo-hygrometer


B1F engine room | B1F Machine room | B1F Machine room - wireless


5F data collector | 3F data collector | B1F data collector

<Office Building>

Collecting Server

↓

Analyzing Server with Algorithm

↓

Standard EUI Database

3 Current Status and Future Plans

Analyze building energy management characteristics

Now

- **Develop analytical method**
  - Energy consuming patterns of 15 buildings connected to BEMS are analyzed
  - Big data is analyzed though OLAP(Online Analytical Processing)


<remote control on buildings>

- **City energy management**
  - Energy consuming patterns of buildings are provided(5 in Sejong City)
  - Real-time alarming services are provided

Plan

- **Provide data analysis to more buildings**
  - To hotels, hospitals and other energy guzzling buildings
- **Develop energy management service model**
  - Sign MOU with Hyundai heavy industries (connect data with two hotels and one hospital)
  - Expand services to public facilities which are obliged to install BEMS

Measuring energy consumption (universal service)

Now

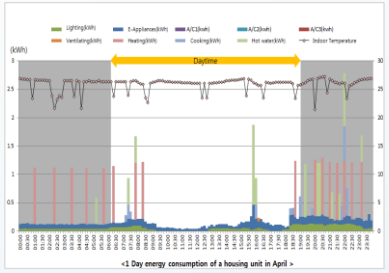
- **Install measurement to monitor energy consumption by usage in households and buildings. (heating and cooling, cooking etc.)**

<measurement installation status>

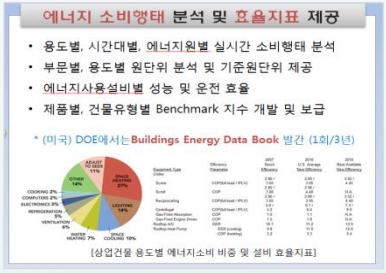
<energy consumption monitoring by usage>

Plan

- **Provide standard unit (energy efficiency standard for detailed comparison) online**
  - Encourage households to save energy voluntarily



<energy consumption by usage>



<energy efficiency index (the US, DOE) >

BEMS based energy management service (On-Line BEMS)

Now

- **Develop BEMS based On-Line energy management analysis services**
  - Provide energy management analysis reports (weekly/monthly/annually)
    → Change in energy consumption can be easily checked
    → Specific data can be checked online in real time

Example

Heat-generating facility analysis

- **Measurement Installation**

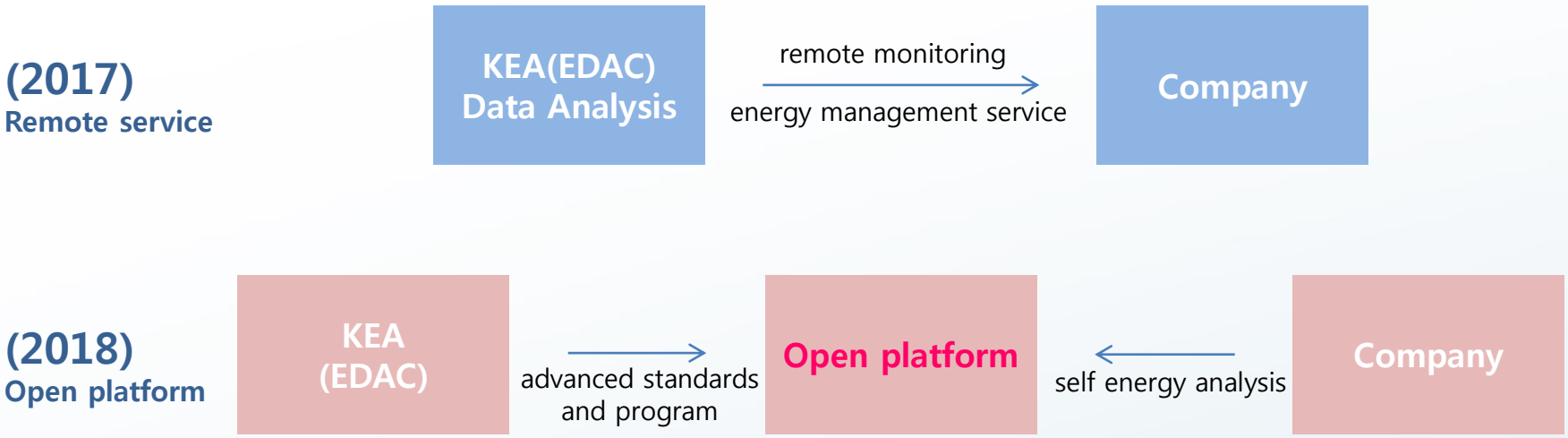
- **Capacity analysis system**

- **Remote management system**

BEMS based energy management service (On-Line BEMS)

Plan

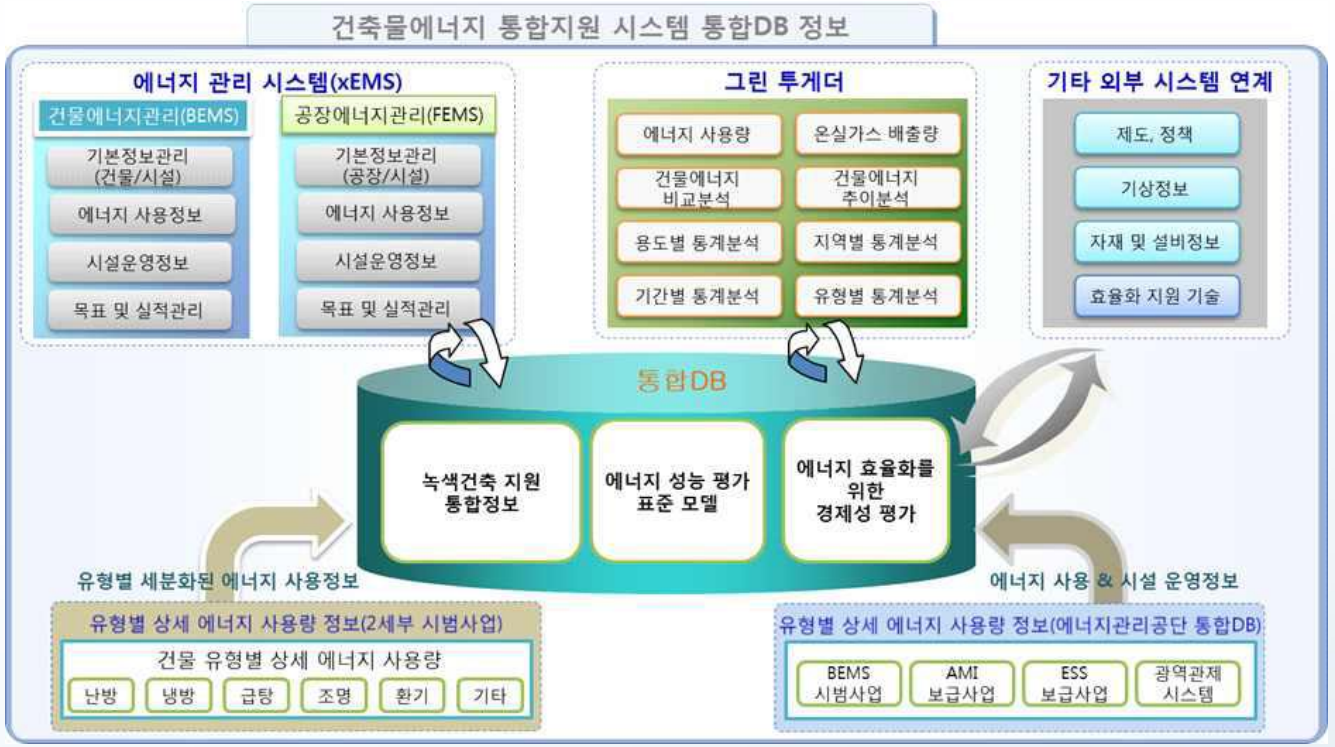
- **Develop and manage open platform for energy analysis service (2017~2018)**
  - Energy analysis tool ➔ Open platform



Universal energy information service for buildings (`2018~20`20)

(MOLIT* R&D project) * Ministry of Land, Infrastructure and Transport

Detailed information → **Profile Check-up service** → **Provide information about energy intensity and consuming patterns**



Thank you for your attention

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