

Energy Audit

----- Scheme and Results

Feb-14, 2003

Audit Department, ECC

Contents

- ❖ Audit for Factories
- ❖ Audit for Buildings
- ❖ Guidelines by the Law
- ❖ Energy Management
- ❖ ECC's Activities for Factories
- ❖ Q/A Service through e-mail
- ❖ ECC's Web-site (through LAN)



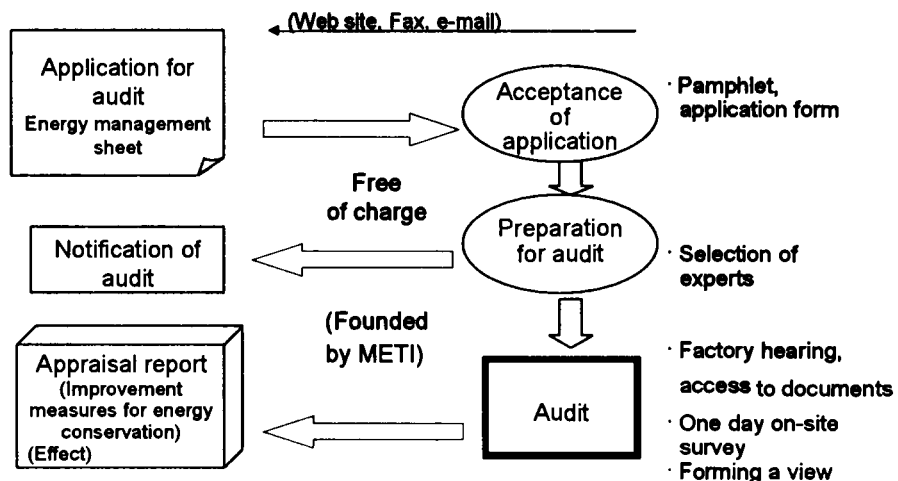
01/2003/1/2

Energy Audit by ECC

- Scheme of Factory Audit
- Contents of Audit
- Audited Factories by Industry
- Audit Results - Energy Saving Rate
- Energy Cost Ratio
- Proposals by the Auditor - 1
- Proposals by the Auditor - 2
- No. of Factories audited
- Basic Scheme of Audit

Scheme of Factory Audit

for medium sized factories



Contents of Audit

- Basic data survey
 - Energy management
 - Energy consumption

Electric facilities

- Lighting
- Water / waste
- Loading facilities
- Power receiving stations
- Air compressors

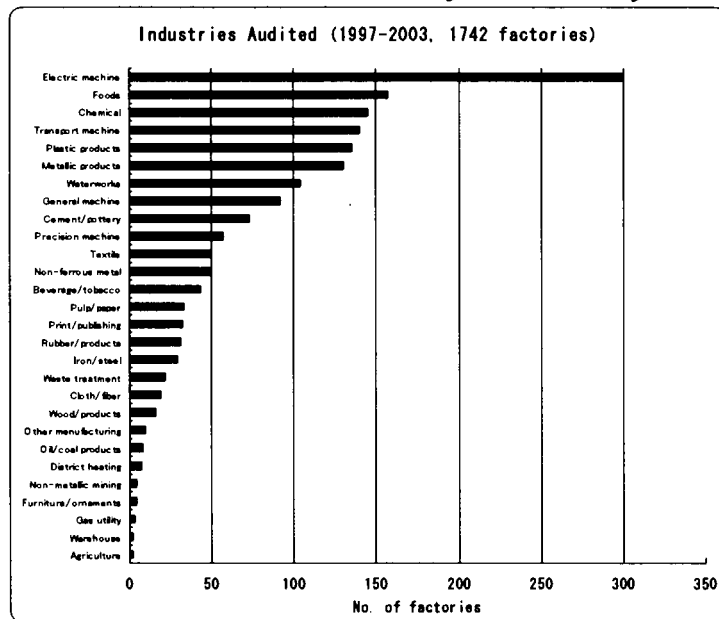
Utilities

- Heat pump system
- Co-generation system
- Air conditioning
- Process facilities improvement / development

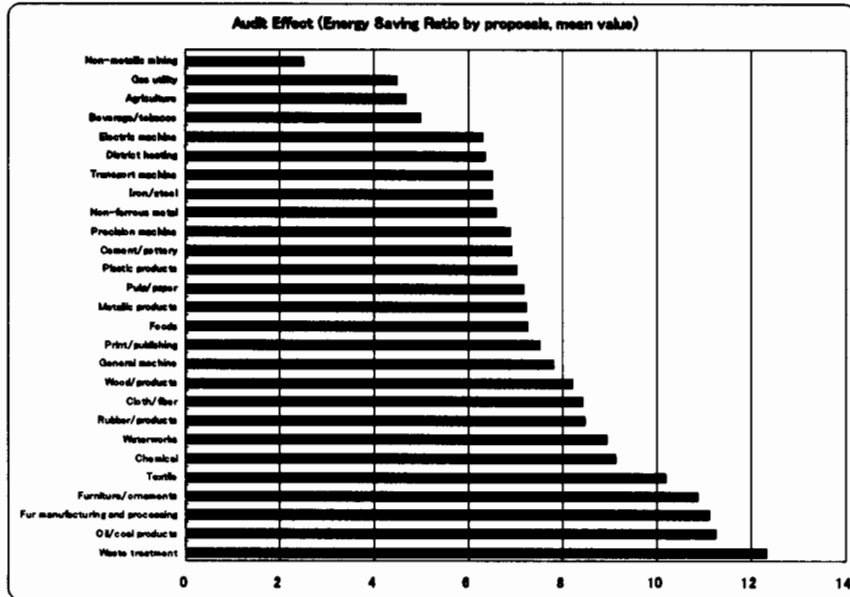
Heat facilities

- Heat insulation
- Heat emission reduction
- Steam system
- Fuel combustion / waste gas
- Exhaust heat recovery

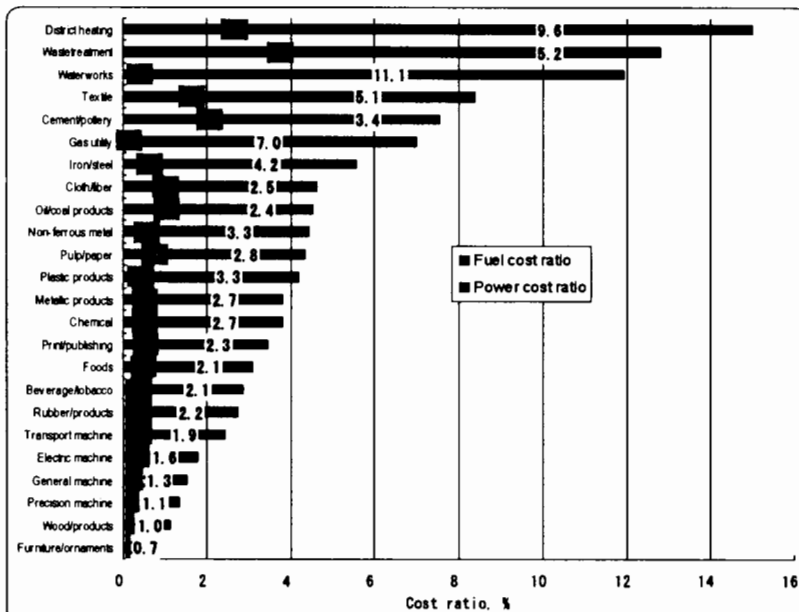
Audit Factories by Industry



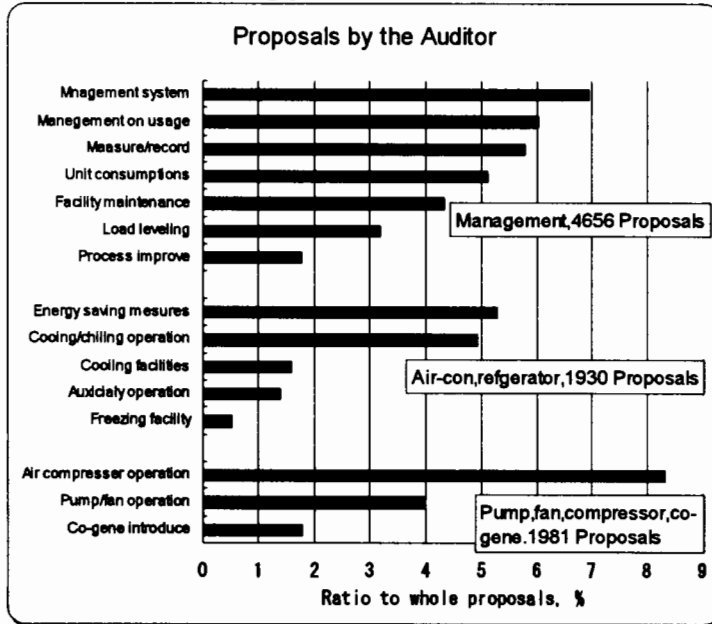
Average energy-saving rate by industry



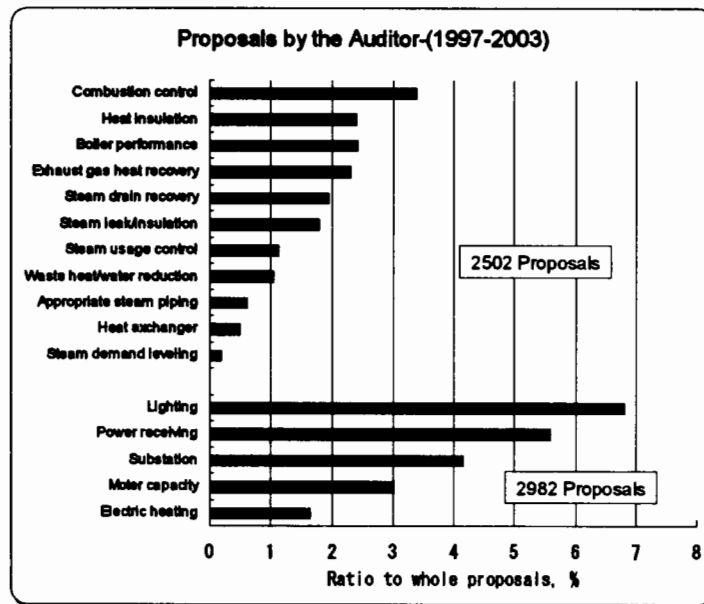
Energy Cost Ratio, audited factories



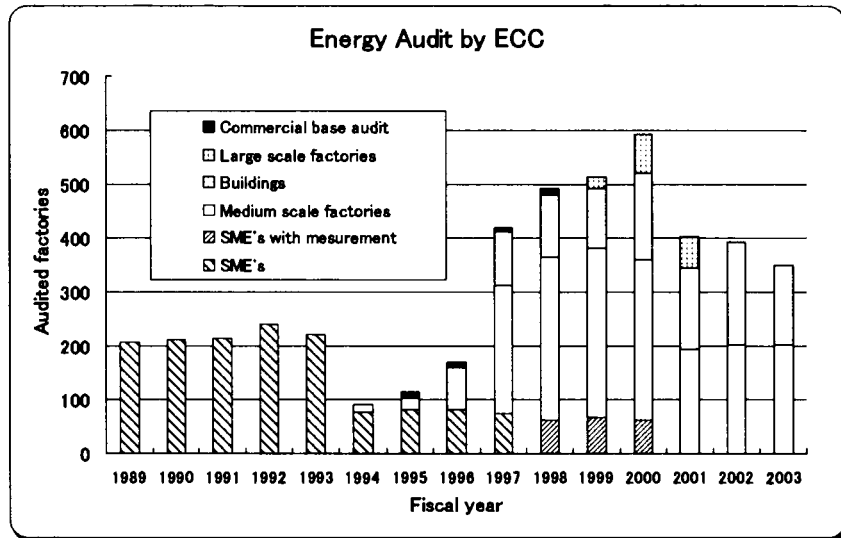
Energy Audit, Proposals - 1



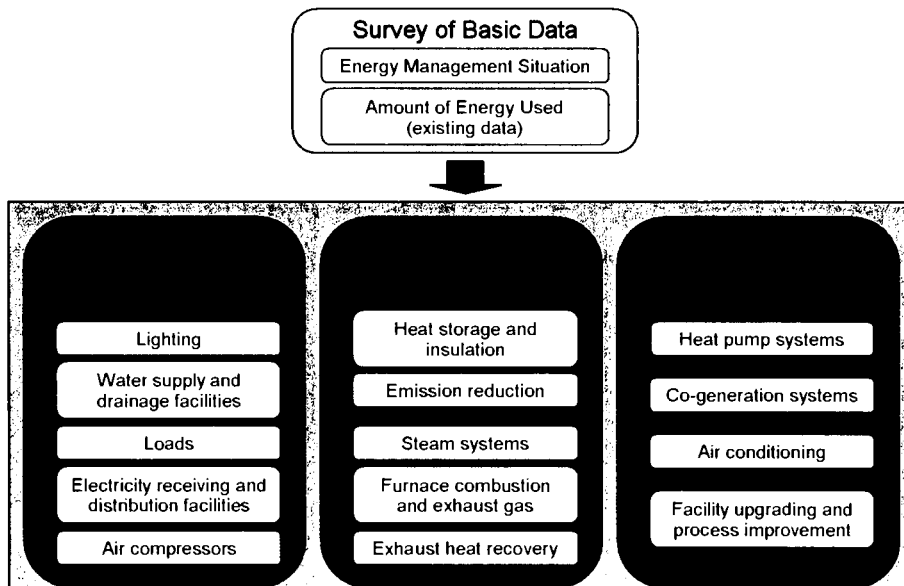
Energy Audit, Proposals - 2



No. of Audit



Basic Composition of Audit



Building Audit

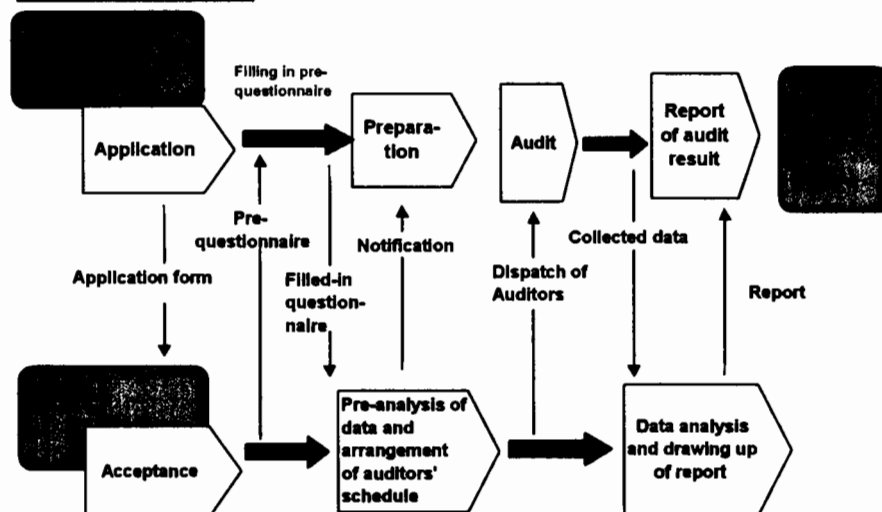
- Building Audit Scheme
- Energy Consumption in Commercial Sector
- Energy Indicators of Public Buildings
- Energy Consumption in Commercial Buildings
- Energy Intensity by Building Use
- Consumption Share by Building Use
- Proposals to Improve Energy Efficiency
- Proposals to Heating, Ventilation, Air-conditioning
- Proposals to Lighting, Electricity, Elevator
- Example 1 - Air Conditioning 1
- Example 2 - Air Conditioning 2
- Example 3 - Ventilation
- Example 4 - Lighting



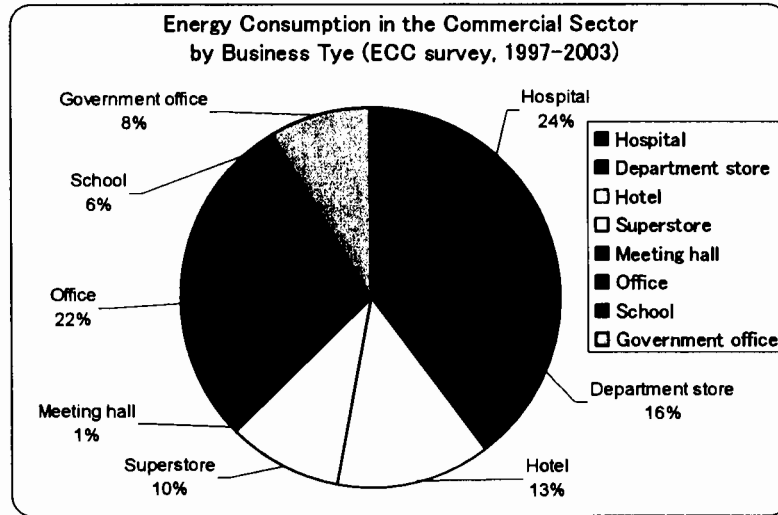
Building Audit Scheme

(Free Charge Audit by ECCJ)

● System Flow



Energy Use in Commercial Sector



3

SURVEY RESULTS

ENERGY INDICATORS OF BUILDINGS

SURVEYED FOR FOUR YEARS SINCE 1997

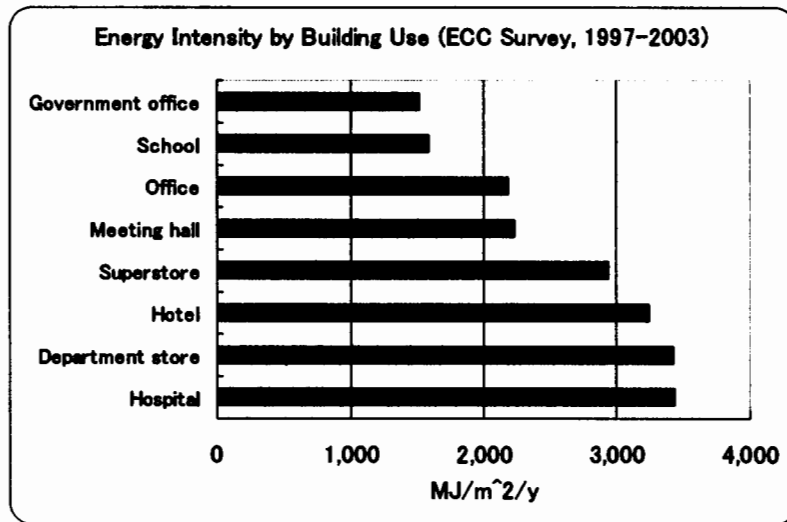
- **Energy Indicators for Various Buildings**
Government Offices, Offices, Commercial Buildings, Hotels, Hospitals, Halls, Schools, Laboratories, and others.
- **Surveyed throughout the Country**

| | |
|-----------------------|-----------------------|
| 80 buildings in 1996 | 99 buildings in 1997 |
| 116 buildings in 1998 | 112 buildings in 1999 |
| 162 buildings in 2000 | 152 buildings in 2001 |
| 189 buildings in 2002 | 147 buildings in 2003 |

Total 1057 Buildings
- **Surveyed by 200 Inspectors, team (Elec. x 1, Heat x 1)**

4

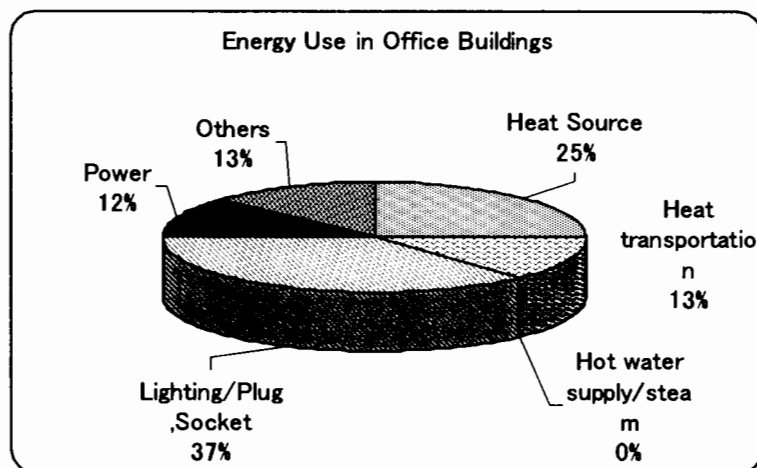
SURVEY RESULTS



Energy Intensity

5

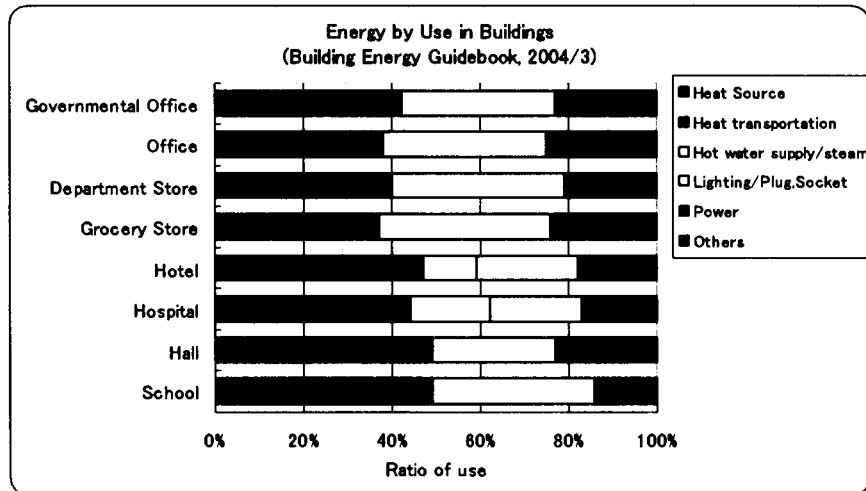
SURVEY RESULTS



Energy Use in Office Buildings

6

Consumption share by building use

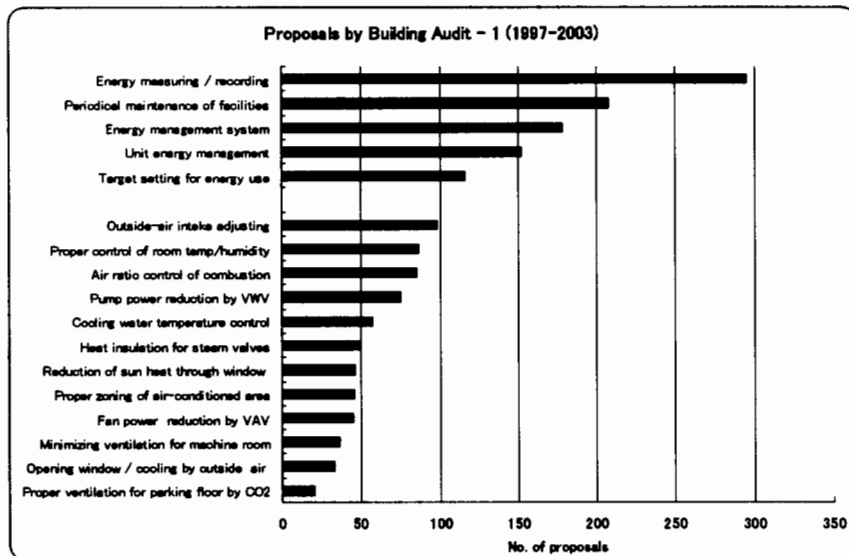


SURVEY RESULTS

Proposals to Improve Energy Efficiency

| | No. of proposals |
|--|------------------|
| ● General management; | |
| Energy management system, energy intensity evaluation | 949 |
| ● Air conditioning units & heat sources; | |
| Optimum operation, periodical measures for efficiency analysis | 675 |
| ● Water supply & drainage; | |
| Exhaust fan control, water supply, pump control, drainage pump control | 76 |
| ● Electrical facilities ; | |
| Optimum lighting, power receiving panel control, transformer control | 466 |
| ● Electrical load peak shaving; | |
| Peak shaving, introduction of co-generation | 74 |

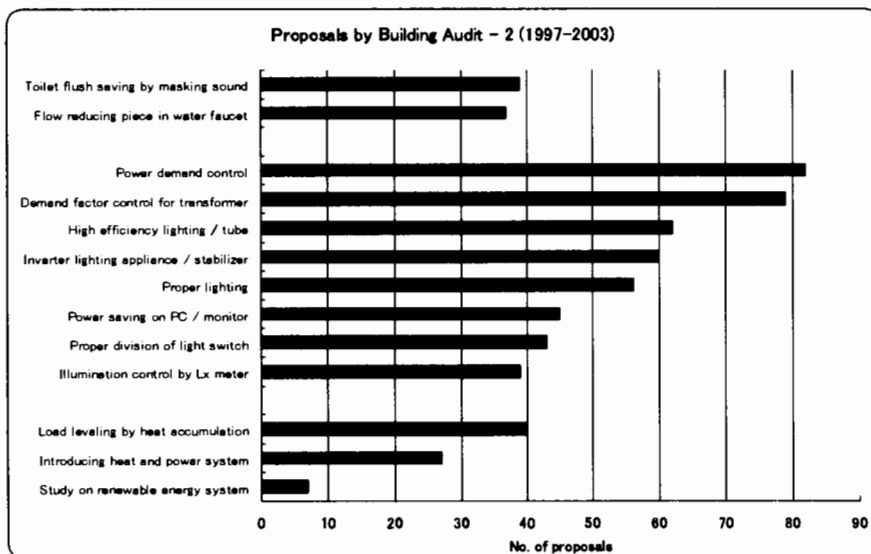
SURVEY RESULTS --- Proposals - 1



1000000

9

SURVEY RESULTS --- Proposals - 2

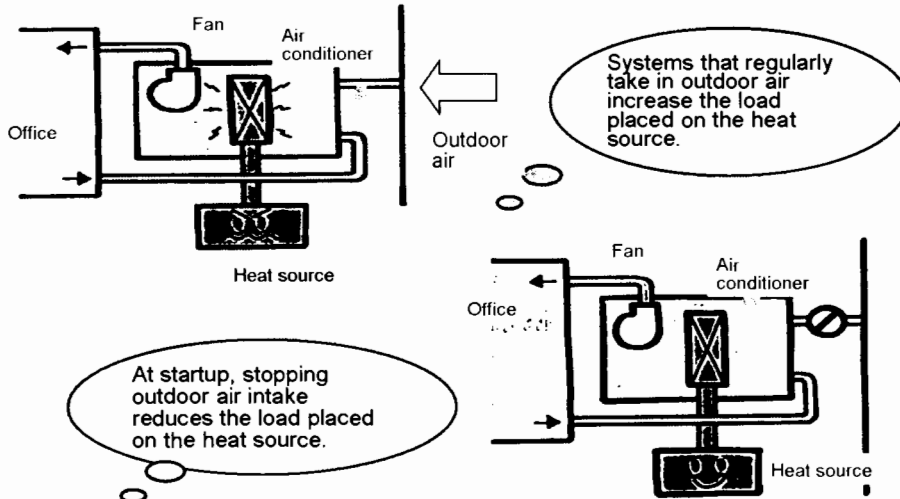


1000000

10

Example - 1: Air Conditioning-1

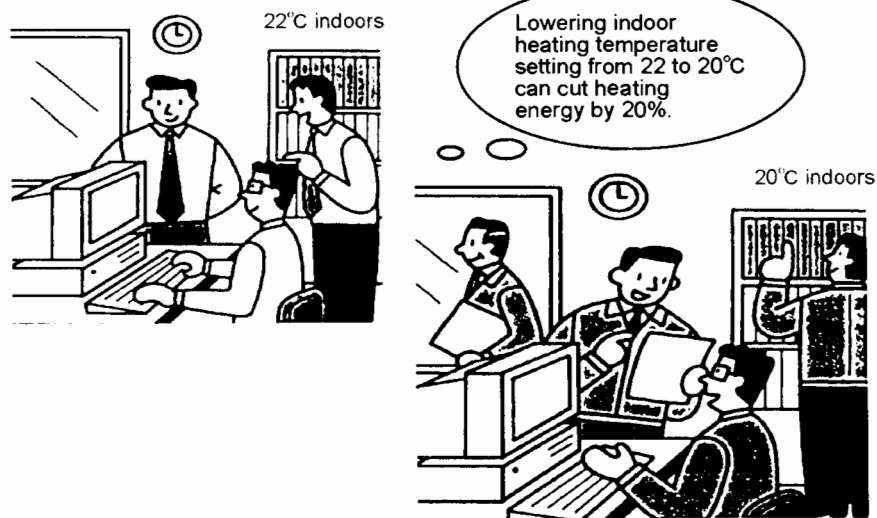
Preventing outdoor air intake at air conditioner startup



11

Example - 2: Air Conditioning-2

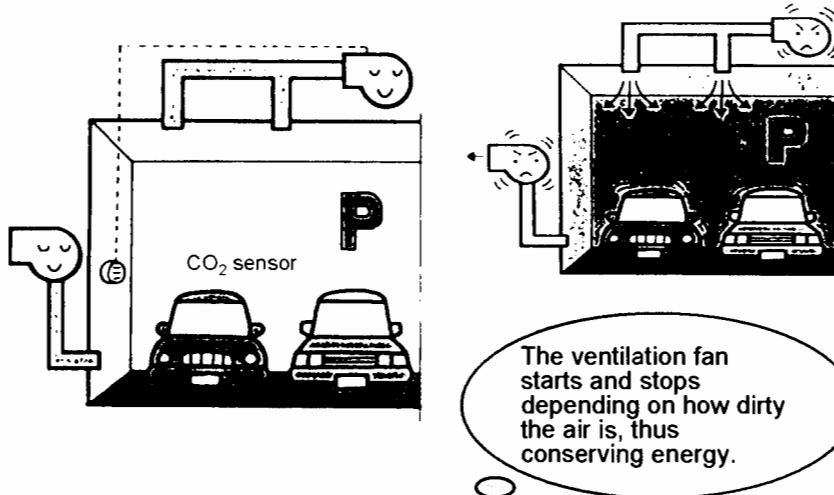
Changing Indoor temperature setting



12

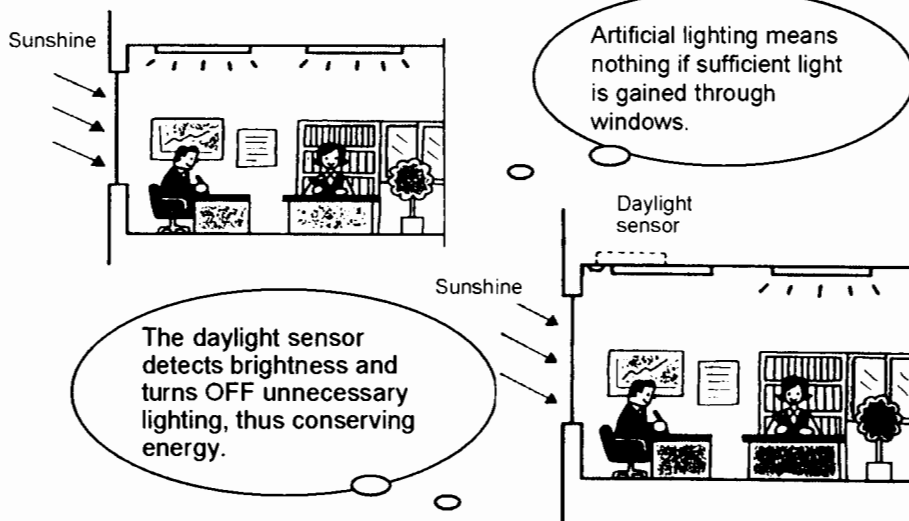
Example - 3 : Ventilation

CO₂ Reduction in underground parking garage ventilation system



Example - 4 : Lighting

Flicker Control for Lighting Using Daylight Sensor



Guidelines by The Law

| | |
|--|----------|
| ☆ Items & Numerical Expression | <u>2</u> |
| ☆ Air Ratio for Boiler | <u>3</u> |
| ☆ Air Ratio for Furnace | <u>4</u> |
| ☆ Heat Recovery for Furnace | <u>5</u> |
| ☆ Waste gas temp. / Boiler, Wall temp. / Furnace | <u>6</u> |
| ☆ Power Factor | <u>7</u> |
| ☆ Motor Efficiency | <u>8</u> |



Guideline Items

Items of Standard

1. Rationalization of combustion of fuels
2. Rationalization of heating, cooling, heat transfer
3. Elimination of heat loss by emission, conduction
4. Waste heat recovery
5. Rationalization of heat-to-power conversion
6. Elimination of electricity loss by resistance
7. Rationalization of electricity-to-power/heat conversion
8. Utilization of surplus steam

Numerically Expressed Items among Standard

1. Air ratio of boilers
2. Air ratio of furnaces
3. Wall surface temperature of furnaces
4. Exhaust gas temperature of boilers
5. Waste heat recovery ratio of furnaces
6. Electric power factor at receiving point : 95% or more



Guideline --- Combustion / Boiler

Air Ratio Standard for Boilers by the Law

| Purpose of use | Load ratio % | Solid fuel | | Liquid fuel | Gas fuel | Blast furnace gas & others |
|-----------------------|--------------|------------|-------------|-------------|----------|----------------------------|
| | | Fixed bed | Fluid'd bed | | | |
| Power utfy | 75-100 | - | - | 1.06-1.2 | 1.05-1.1 | 1.2 |
| Others (Capacity t/h) | | | | | | |
| 30- | 50-100 | 1.3-1.45 | 1.2-1.45 | 1.1-1.25 | 1.1-1.2 | 1.2-1.3 |
| 10-30 | 50-100 | 1.3-1.45 | 1.2-1.45 | 1.15-1.3 | 1.15-1.3 | - |
| 5-10 | 50-100 | - | - | 1.2-1.3 | 1.2-1.3 | - |
| -5 | 50-100 | - | - | 1.2-1.3 | 1.2-1.3 | - |

Air ratio (A.R.):

$$A.R. = \frac{21}{21 - O_2}$$

O₂ = Oxygen(%)
in Exhaust Gas

Air Ratio Target for Boilers by the Law

| Purpose of use | Load ratio % | Solid fuel | | Liquid fuel | Gas fuel | Blast furnace gas & others |
|-----------------------|--------------|------------|-------------|-------------|-----------|----------------------------|
| | | Fixed bed | Fluid'd bed | | | |
| Power utfy | 75-100 | - | - | 1.05-1.1 | 1.05-1.1 | 1.15-1.2 |
| Others (Capacity t/h) | | | | | | |
| 30- | 50-100 | 1.2-1.3 | 1.2-1.25 | 1.05-1.15 | 1.05-1.15 | 1.2-1.3 |
| 10-30 | 50-100 | 1.2-1.3 | 1.2-1.25 | 1.15-1.25 | 1.15-1.25 | - |
| 5-10 | 50-100 | - | - | 1.15-1.3 | 1.15-1.25 | - |
| -5 | 50-100 | - | - | 1.15-1.3 | 1.15-1.25 | - |

Guideline --- Combustion / Furnace

Air Ratio Standard / Target for Furnaces by the Law

| Categories | Type of furnace | | | | Remarks |
|---|---------------------|------------------|--------------------|------------------|------------------------------|
| | Gaseous fuel firing | | Liquid fuel firing | | |
| | Continuous | Batch | Continuous | Batch | |
| Melting furnace for metal casting | 1.25 / 1.05-1.20 | 1.35 / 1.05-1.25 | 1.30 / 1.05-1.25 | 1.40 / 1.05-1.30 | |
| Continuous reheating furnace for steel | 1.20 / 1.05-1.15 | | 1.25 / 1.05-1.20 | | |
| Metal heating furnace except continuous steel reheating | 1.25 / 1.05-1.20 | 1.35 / 1.05-1.30 | 1.25 / 1.05-1.20 | 1.35 / 1.05-1.30 | |
| Metal heat treatment furnace | 1.20 / 1.05-1.15 | 1.25 / 1.05-1.25 | 1.25 / 1.05-1.20 | 1.30 / 1.05-1.30 | |
| Petroleum heating furnace | 1.20 / 1.05-1.20 | | 1.25 / 1.05-1.25 | | |
| Heat cracker, reformer | 1.20 / 1.05-1.20 | | 1.25 / 1.05-1.25 | | |
| Cement kiln | 1.30 / 1.05-1.25 | | 1.30 / 1.05-1.25 | | Liquidal for pulverized coal |
| Lime kiln | 1.30 / 1.05-1.25 | 1.35 / 1.05-1.35 | 1.30 / 1.05-1.25 | 1.35 / 1.05-1.35 | Liquidal for pulverized coal |
| Dryer | 1.25 / 1.05-1.25 | 1.45 / 1.05-1.45 | 1.30 / 1.05-1.30 | 1.50 / 1.05-1.50 | Only for burner |

Guideline --- Heat Recovery

Waste Heat Recovery Ratio Standard & Target for Furnaces

| Exhaust gas temperature (deg.C) | Capacity class | Exhaust heat recovery ratio | | (Reference for target) | |
|------------------------------------|-------------------|-----------------------------|---------------|-----------------------------|-------------------------------|
| | | Standard (%) | Target (%) | Waste gas temperature(C) | Preheat air temperature(C) |
| 500 & under | A & B | 25 | 35 | 275 | 190 |
| 500 & over, under 600 | A & B | 25 | 35 | 235 | 230 |
| 600 & over, under 700 | A | 35 | 40 | 365 | 305 |
| | B | 30 | 35 | 400 | 270 |
| | C | 25 | 30 | 435 | 230 |
| 700 & over, under 800 | A | 35 | 40 | 420 | 350 |
| | B | 30 | 35 | 460 | 310 |
| | C | 25 | 30 | 505 | 265 |
| 800 & over, under 900 | A | 40 | 45 | 435 | 440 |
| | B | 30 | 40 | 480 | 395 |
| | C | 25 | 35 | 525 | 345 |
| 900 & over, under 1,000 | A | 45 | 55 | 385 | 595 |
| | B | 35 | 45 | 485 | 490 |
| | C | 30 | 40 | 535 | 440 |
| 1,000 & over | A | 45 | 55 | | |
| | B | 35 | 45 | | |
| | C | 30 | 40 | | |

Notes: A: Rating capacity of over 20 Gcal/h (84 GJ/h)
 B: Rating capacity of 5 to 20 Gcal/h (21 to 84 GJ/h)
 C: Rating capacity of 1 to 5 Gcal/h (4 to 21 GJ/h)



01/2011/12/2



5

Guideline --- Waste & Wall Temperature

Standard & Target for Exhaust Gas Temperature of Boilers

| Purpose of use | Solid fuel | | Liquid fuel | Gas fuel | Blast furnace gas & others |
|--------------------------|------------|-------------|-------------|-----------|-------------------------------|
| | Fixed bed | Fluid'd bed | | | |
| Power utility | - | - | 145 / 135 | 110 / 110 | 200 / 190 |
| Others (Capacity t/h) | | | | | |
| 30- | 200 / 180 | 200 / 170 | 200 / 160 | 170 / 140 | 200 / 190 |
| 10-30 | 250 / 180 | 200 / 170 | 200 / 160 | 170 / 140 | - |
| 5-10 | - | - / 300 | 220 / 180 | 200 / 160 | - |
| -5 | - | - / 320 | 250 / 200 | 220 / 180 | - |

Standard / Target for Wall Surface Temperature of Furnace

| Furnace temperature | Standard / target wall temperature | | |
|--------------------------|------------------------------------|-----------|-------------------|
| | Roof | Side wall | Bottom facing air |
| Over 1,300 | 140/120 | 120/110 | 180/160 |
| 1,100 over & under 1,300 | 125/110 | 110/100 | 145/135 |
| 900 over & under 1,100 | 110/100 | 95/90 | 120/110 |
| Under 900 | 90/80 | 80/70 | 100/90 |



01/2011/12/2



6

Guideline --- Power Factor

Equipment for which power factor should be improved

| Equipment | Capacity (kW) |
|---|---------------|
| Cage-type induction motor | 75 |
| Coil-type induction motor | 100 |
| Induction heating furnace | 50 |
| Vacuum melting furnace | 50 |
| Induction heater | 50 |
| Arc furnace | - |
| Flush butt welder (excluding portable type) | 10 |
| Arc welder (excluding portable type) | 10 |
| Rectifier | 10,000 |

Notes: Exclude equipment for which application is difficult in terms of safety considerations, such as explosion-proof types.



Guideline --- Motor Efficiency

Target efficiency for high-efficient totally enclosed motors (0.2~160kW)

| Output (kW) | Standard of full load efficiency (%) | | | | | |
|----------------|--------------------------------------|------|---------|------|---------|------|
| | 2 poles | | 4 poles | | 6 poles | |
| | 50Hz | 60Hz | 50Hz | 60Hz | 50Hz | 60Hz |
| 0.2 | 70.0 | 71.0 | 72.0 | 74.0 | - | - |
| 0.4 | 76.0 | 77.0 | 76.0 | 78.0 | 73.0 | 76.0 |
| 0.75 | 77.5 | 78.5 | 80.5 | 82.5 | 78.5 | 80.0 |
| 1.5 | 83.0 | 84.0 | 82.5 | 84.0 | 83.0 | 84.5 |
| 2.2 | 84.5 | 85.5 | 85.5 | 87.0 | 84.5 | 86.0 |
| 3.7 | 87.0 | 87.5 | 86.0 | 87.5 | 86.0 | 87.0 |
| 5.5 | 88.0 | 88.5 | 88.5 | 89.5 | 88.0 | 89.0 |
| 7.5 | 88.5 | 89.0 | 88.5 | 89.5 | 88.5 | 89.5 |
| 11 | 90.0 | 90.2 | 90.2 | 91.0 | 89.5 | 90.2 |
| 15 | 90.0 | 90.2 | 90.6 | 91.0 | 89.5 | 90.2 |
| 18.5 | 90.6 | 91.0 | 91.7 | 92.4 | 91.0 | 91.7 |
| 22 | 91.0 | 91.0 | 91.7 | 92.4 | 91.0 | 91.7 |
| 30 | 91.4 | 91.7 | 92.4 | 93.0 | 91.7 | 92.4 |
| 37 | 92.1 | 92.4 | 92.4 | 93.0 | 91.7 | 92.4 |
| 45 | 92.4 | 92.7 | 92.7 | 93 | 90.8 | 93 |
| 55 | 92.7 | 93 | 93.3 | 93.6 | 92.4 | 93.6 |
| 75 | 93.6 | 93.6 | 94.1 | 94.5 | 92.3 | 94.1 |
| 90 | 94.3 | 94.5 | 94.1 | 94.5 | 93.6 | 94.1 |
| 110 | 94.3 | 94.5 | 94.1 | 94.5 | 94.5 | 95 |
| 132 | 94.8 | 95 | 94.5 | 95 | 94.5 | 95 |
| 160 | 94.8 | 95 | 94.8 | 95 | 94.5 | 95 |

Notes: Efficiency test subjects to JIS C4212 7.3.



Methods for Promoting Energy Conservation

To institutionally promote energy conservation in factories and buildings:

- Create an energy conservation organization
- Implement daily energy management
- Specify energy base unit
- Perform base unit analysis
- Identify proposals for improving energy consumption
- Base Unit Plan for Following Quarter
- Energy management promotion method - 1
- Energy management promotion method - 2

1

Create an Energy Conservation Organization

- Create an energy conservation committee
- Committee Chairman is head of relevant company subdivision (plant manager, division manager, etc.)
- Nominate persons in charge of each subdivision within the company as committee members
 - Also ensure participation by indirectly related subdivisions (such as development, clerical, and purchasing departments)
- Appoint energy specialist as General Secretary (reports directly to Chairman)
- Specify authority of committee
 - Responsibilities of each subdivision, system for implementing energy conservation, medium-term energy conservation targets, annual plans, summary and evaluation of energy conservation performance



2

Implement Daily Energy Management

- Energy usage plan
 - Include targets in base units for each quarter and each process
- Ascertain actual energy usage figures
 - Do this for each main process
 - Install measuring instruments such as flowmeters
- Analyze discrepancy between plan and actual figures (base unit analysis)
 - Make this the responsibility of direct users
 - Identify and analyze problems and improvement measures
 - Don't consider only technical problems
 - Reflect results when drawing up usage plan for next quarter



01/2014 15/27



3

Specify Energy Base Unit

- Base unit is (amount of energy used) / (amount of production)
- Mesh for base unit calculation is set in accordance with target for entire plant / individual process / person responsible for usage / etc.
- Amount of energy used (numerator) is:
 - Heat and electricity converted to a crude oil basis (expressed in units of heat from amount of crude oil)
 - Classified into fuel, steam, water, pressurized air, electric power, etc. (in appropriate units for each)
- Amount of production (denominator) is amount of manufacture, amount of processing, value of items handled, etc.
 - Use an index directly related to amount of energy used
 - Tons / items / m² / lots / number of users / operation time / floor area



01/2014 16/27



4

Perform Base Unit Analysis

- Comparison with other cases
 - Same quarter of previous year / Other similar plants / Values in plan / etc.
- Relationship with amount of production (Use a graph to view)
 - Track down and eliminate fixed energy uses unrelated to production
 - Do not exclude changes in amount of production and quality composition as external causes
- Correlation with non-technical causes such as product composition and number of operational days
 - Is energy used even on non-operational days?
 - Need to develop energy conservation measures that can also cope with non-technical causes
- Comparison with theoretical necessary amount
 - Is improvement possible through changes in equipment, processes, etc.?
 - Investigate the requirements leading to the theoretical necessary amount (What are the purposes? Have requirements been minimized in terms of temporal and spatial extent, temperature, etc.?)



01/20/11 12:27



5

Identify Proposals for Improving Energy Consumption

- Energy conservation starts from end usage
 - First, rationalize end consumption of energy
 - Optimize transmission and supply systems
 - Conserve energy in systems where demand and purchase occur
- Technical staff and contractors should take part in consideration
- Enable response to future changes in load (changes in amount of production, days of operation, and quality)
- Also consider relationship with preceding and following processes
- Also consider application (extension) to similar processes



01/20/11 12:27



6

Base Unit Plan for Following Quarter

- Incorporate results of energy conservation improvement when drawing up base unit plan for next quarter
- Also include changes in production (due to market trends) and changes in equipment (stoppages due to repair, etc.) in base unit plan
- Targets in base unit plan should be agreed between management and operational sides



01/20/11 15:27



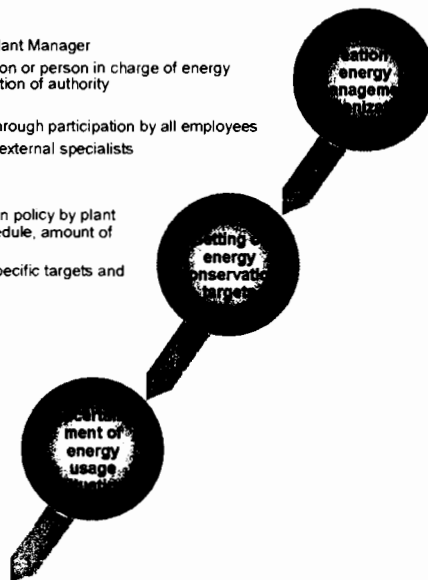
7

Energy Management Promotion Method - 1

1. Leader is President or Plant Manager
2. Appointment of subdivision or person in charge of energy conservation and delegation of authority
3. Employee education
4. Improvement activities through participation by all employees
5. Requesting advice from external specialists

1. Clarification of energy conservation policy by plant operator (targets, attainment schedule, amount of investment)
2. Creation and implementation of specific targets and plans by related subdivisions

1. Installation of necessary measuring instruments (flowmeters, thermometers, pressure gauges, meters for O₂ content of exhaust gas, ammeters, voltmeters, wattmeters, etc.)
2. Quantitative determination of energy flow (origin, transport, consumption)
3. Analysis of relationship between operation conditions and amount of energy used
4. Recording, organization, and graphing of measured values



01/20/11 15:27



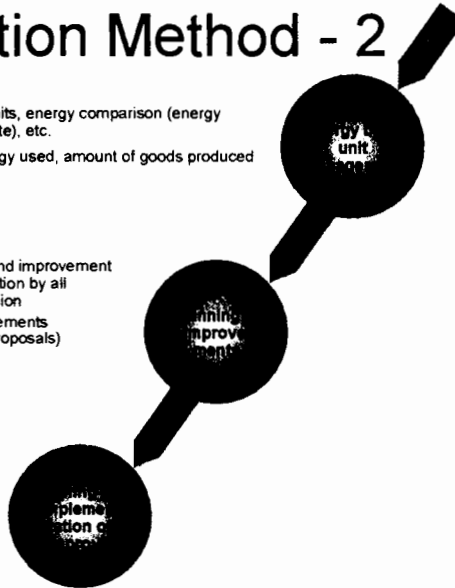
8

Energy Management Promotion Method - 2

Energy base units, energy comparison (energy consumption rate), etc.
Amount of energy used, amount of goods produced

1. Identification of problems and improvement measures through participation by all employees in each subdivision
2. Planning of specific improvements (elimination of unsuitable proposals)

1. Run improvements through PDCA (Plan, Do, Check, Act) management circle
2. Ensure that improvement proposals are known to all persons concerned
3. Comprehensively manage state of progress
4. After targets are attained, standardize the work involved



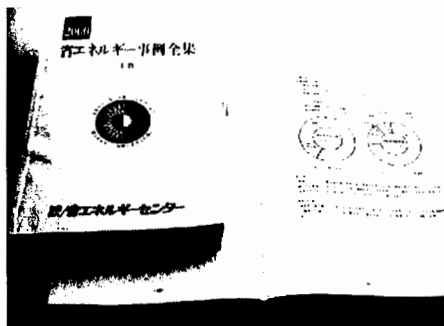
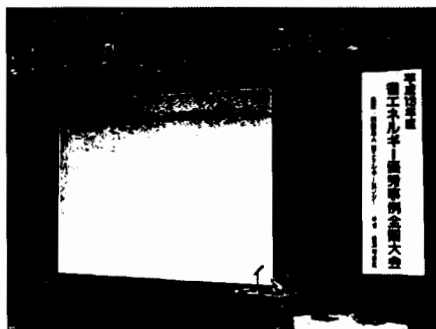
Energy Conservation Center

| | |
|---|----|
| • Case Presentation Activity of ECCJ | 2 |
| • Small Group Improvement Approaches | 3 |
| • Case Presentation Meetings | 4 |
| • Participation on Case Presentation Activity | 5 |
| • Rationalization of Air System | 6 |
| • Heat Insulation Improvement | 7 |
| • Hybrid Co-generation on Public Bath | 8 |
| • Energy Saving Pickup Strategy | 9 |
| • Practical Education Course | 10 |
| • Electricity Course | 11 |
| • Q/A Consulting Service of ECC | 12 |
| • Frequently Asked Questions | 13 |
| • Wide Variety of Questions | 14 |
| • Number of Questions is Increasing | 15 |
| • The Energy Conservation Center --- ECCJ | 16 |
| • Activities of Energy Conservation Center | 17 |
| • Overseas Activities of Energy Conservation Center | 18 |

Case Presentation Activity of ECCJ

Energy Conservation Improvements by Groups of Plant Operators

- ECCJ invites actual energy conservation cases through activities by small groups of plant operators and holds presentation meetings.
 - ECCJ has held presentation meetings each year since 1975. Participation in or attendance at the meeting and materials are free of charge.
 - Cases with great success are given prizes (57 cases in 2003F.Y.)



Small Group Improvement Approaches

- **Identifying and monitoring the current situation**
 - The small operations form a group.
 - Identify the actual energy consumption by group operations.
 - Perform measurement by operation condition and draw a graph of the tendency.
 - Operation conditions: Products, processes, etc.
 - Fuel, electric power, steam, compressed air, water, nitrogen
- **Detecting problems and reviewing improvements**
 - Discussion by group members
 - Improvement planning: Using engineering staff and external information (from manufacturers, etc.)
 - Evaluating improvement proposals: Reliability and operation- and quality-related performance of technology, cost, and effects
- **Implementing improvements**
 - The internal energy committee adopts and implements (carries out) improvements.
- **Confirming effects, standardizing operations, development of improvements to other departments**



01/2011 1-27



3

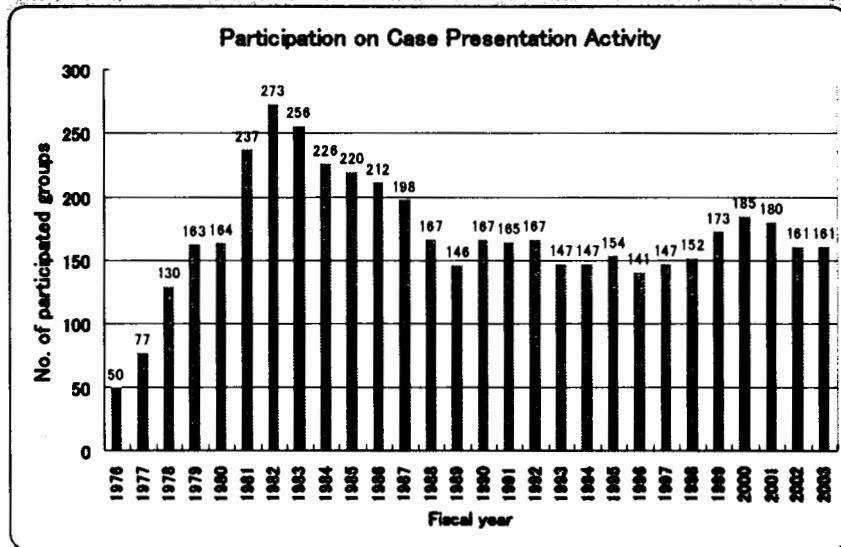
Case Presentation Meetings

- **Branch presentation meeting**
 - A branch presentation meeting is held at eight branches of the Energy Conservation Center in Japan.
 - All entrant groups present their activities, and judges and public audiences sit in on here meetings.
- **Central presentation meeting**
 - The central presentation meeting is held in each February, the energy conservation month.
 - Each presentation meeting is held for two days at the same location as ENEX (an exhibition) in Tokyo and Osaka.
 - Prize-winning cases (57 cases in 2003F.Y.) were presented (the Minister of Economy, Trade and Industry Prize and the Chief of the Agency of Natural Resources and Energy Prize are given in both locations, and others are given in only one location).
 - The total number of audience was 1,830 (1,030 in Tokyo, 800 in Osaka).
 - Attendance at the meeting and a question-and-answer session is free of charge.
 - Besides details of technology, approaches to and ideas for how to push forward with improvements can be obtained.
 - All cases can be seen on ECC's net-site (eccj.or.jp/dbenecon/search.jsp?MENU=1)



4

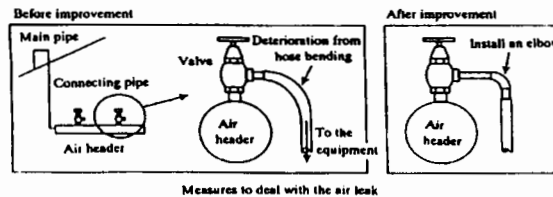
Participation on Case Presentation Activity



Example 1: Rationalization of Air System

Compressed air savings Car assemble plant, Employee of 6,900
 Annual energy consumption Power:436GWh, H.Oil:37,000kL, Buthane gas: 13,000ton

| Items and effect of measures | | Power saving (mill.yen/year) |
|---------------------------------------|---|---------------------------------|
| (1) Air reduction during operation | Leakage reduction | 40.0 |
| | Pressure optimization | 20.0 |
| (2) Reduction in non operation period | Improvement in air feed start on Monday morning | 4.0 |
| | Generating pressure reduction | 2.0 |
| (3) Compressor efficiency improvement | Controlling running units | 2.0 |
| | Air reduction in production process | 0.6 |
| (4) Others | | |



Example 2: Heat Insulation Improvement

Steam pipe insulation improvement in power plant

Annual energy & capacity LNG:731,000t, LPG:190,000t 220MW*3unit+500MW*1unit

Items and effect of measures (Heat emission, No.2 unit)

| Pipeline D-mm*L-meter | No. of layer Thickness | Heat emission (on ambient 20°C, kcal/(m*hr)) | | |
|--|------------------------------|--|----------------|---------------|
| | | Designed | Before renewal | After renewal |
| (1) Main steam 480 dia*60 mL | Double layer 150mm | 375 | 1403 | 367 |
| (2) High temp. reheat 682 dia*60 mL | Double layer 150mm | 494 | 1607 | 491 |
| (3) Low temp. reheat 616 dia*60 mL | Single layer 90mm | 318 | 1015 | 285 |
| (4) Cir.pumpe downcom 360 dia*60 mL | Single layer 90mm | 214 | 902 | 205 |
| Fuel saving, annual 1,590,000 yen | Investment 14,800,000 yen | P.B.P 9.3 year | | |



6/21/11 12:22



7

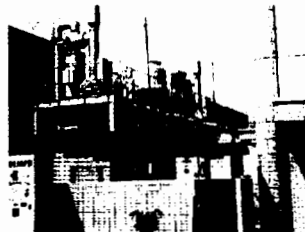
Example 3: Hybrid Co-generation on Public Bath

- Improvement: Co-generation is introduced into a composite facility of large-scale public bath and supermarket
- Annual energy consumption: heavy oil 284 kl, LPG 45 t, power consumption 247 MWH
- Before improvement: Bath facility and supermarket received power separately. Hot water boiler was installed in the bath facility.
- Improvements:
 - Common power reception for supermarket and bath facility
 - Diesel engine 170 kW x 2 units, micro gas turbine (MGT) 30 kW x 1 unit, heat from warm water retrieved for all
 - Operation: MGT is operated 24 hours (warm water stored at night), and the diesel is stopped at night (inexpensive power purchased)
- Effects:
 - Energy cost reduction (power, fuel, consignment to qualified person) 17,541,000 yen (32.9% reduction)
 - Reduction in energy consumption (power + fuel converted to crude oil) 131 kl (13.4%), overall efficiency 66%

MGT
1-30KW



Diesel
2-170KW



6/21/11 12:22



8

Example 4: Energy-saving Pick-up Strategy

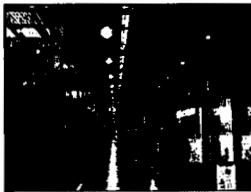
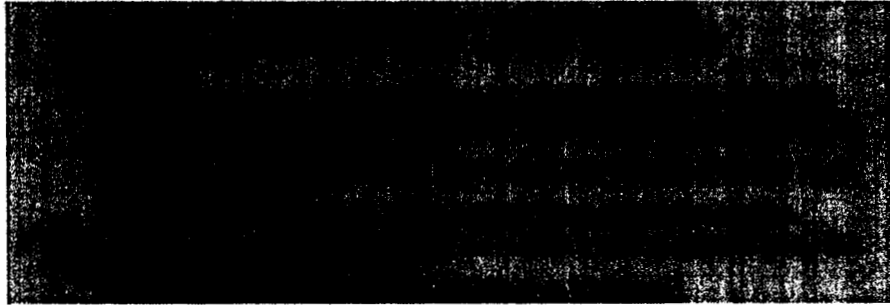


Fig-11 Factory before improvement



Fig-12 Factory after improvement

96 t/h water (equivalent to 2 mm/h precipitation)



Fig-7 Water being sprayed over roof

9

Q/A Consulting Section on Buildings & Factories

The Energy Conservation Center opens a consultation section to answer questions.

Designated experts answer questions.

The Energy Conservation Center answers questions through experts based on its accumulated know-how.

Answers are replied in writing within two days in principle.

Anybody can ask questions (not limited to Energy Conservation Center members).

We accept questions relating to the following (both industry and private sector):

- 1. Energy conservation technology
- 2. How to promote energy conservation
- 3. About the modified Energy Conservation Law

E-mail us your questions at the following address. Our consultation service is free.

E-mail address: soudan@eccj.or.jp

(If you do not have any E-mail address, send your questions by facsimile at 03-5543-3021.)

<http://www.eccj.or.jp/factory/ask/index>

10

The Energy Conservation Center

Annual budget: 4,700 million yen for F.Y.2004, Employees: 224

History of ECC

- 1947 Government rule for heat energy control established — designated factory, heat manager, examination
- 1947 Local Heat-management Associations were established, independently, throughout Japan.
- 1951 The government rule was developed into "Heat Management Law".
- 1972 Local associations were united into "Heat Energy Technology Association of Japan".
- 1973 First oil crisis
- 1978 The association was reorganized into "Energy Conservation Center".
- 1979 Second oil crisis
- 1979 Law was developed into "Energy Conservation Law"
- 1999 The Law was reinforced, 2nd category of designated factory



0124A-122



11

Activities of Energy Conservation Center

Support from ECC to Factories

Energy audit to factories:

One-day audit to medium factory

For designated factory of 2nd class (202 factories, 2003).

One-day audit to building

Heat and electricity for 147 buildings (2003).

Survey visit to designated factory:

Energy management standards, for 428 factories of 1st category (2003).

Support to national examination:

Correspondence course for examinee. Participant: heat-531, electricity-538 (2002)

Short term training course for examinee. Participant: heat-311, electricity-267 (2002)

Conducting national energy manager examination:

Examination on every summer, one-day.

Applicants (2003): heat 5232, electricity 5633

Training course with final examination, every winter, 7 days.

Applicants (2003): heat 1250, electricity 1773

Presentation rally of small groups successful cases. 161 cases in 2003F.Y.

Publishing technical books, monthly magazine, software.

Q/A survive to membership through e-mail.



0124A-122



12

省エネeメール相談コーナー

1. eメール相談へ (cousan@eccj.or.jp)

主な相談内容は次のとおりです。

- 1 省エネルギー技術
- 2 省エネルギーの推進方法
- 3 改正省エネルギー法に関する事等

ご質問をeメール(cousan@eccj.or.jp)でお送り下さい。ご利用は無料です。
(eメールアドレスをお持ちでない方は、FAX:03-6549-9021へ)

Technology on Energy Saving
Promotion technique for Energy Saving
Legal regulation

2. FAQ(よくある質問) ※ただし、内容を見直し中です。

- | | | |
|--------------|----------------|----------------|
| A. 申請手続 | B. 管理標準作成 | C. 原単位係数 |
| D. 記録方法 | E. ナンパビル | F. 管理者(員)の外部委託 |
| G. 原油換算係数 | H. コーポネ設計 | I. 管理士試験・講習 |
| J. その他の法律解釈 | K. 省エネ効果検証 | L. 省エネ活動 |
| M. 原単位の比較値 | N. 診断と診断結果 | O. 省エネ技術 |
| P. 特定機器等 | Q. メーカー情報・製品評価 | R. 冷暖房温度設定 |
| S. 二酸化炭素排出係数 | T. 民生・家庭 | U. その他 |

Frequently Asked Questions:

- Legal application form
- Conversion to crude oil volume
- Energy intensity (unit consumption)
- CO2 emission coefficient
- Operation standard for industry
- Governmental subsidies
- Energy audit
- Energy manager examination
- Room temperature setting on air-conditioning

※お断り

この相談コーナーでの法令解釈に関する回答は、貴方の解釈を示したもので絶対的なものではありません。最終判断は貴省エネルギー対策課にご相談なさることを強くお勧めします。

3. 工場調査時の留意事項(その1)

- | | |
|-----------------------|-------------|
| △工場調査のスキームについて | ①事前調査書の発行 |
| ○管理標準の作成 | ②工場の考え方 |
| ①経路長の記録 | ③記入対象エネルギー |
| ②事前調査書作成のための原油換算係数の記録 | ④法定7項目の当てはめ |
| ③原単位の記録 | ⑤基準値の遵守 |
| ④計測・記録 | ⑥工場の評価点 |
| ⑤原単位の算化 | ⑦調査対象機器 |

Plant Survey for designated factories:

- Scheme
- Document preparation before visit
- Energy intensity evaluation
- Items on document
- Numerical standards
- Survey work period

平成13年度から第一種エネルギー管理指定工場に於いて、新入(スキーム)による工場調査が始まる。本年2月に香川県産業貿易局と香川県エネルギーセンターとの共同で「エネルギー管理省シンポジウム」を開催。本Q&Aは、そのシンポジウムの資料に添付された「質問紙」によって寄せられた質問、および当センター「eメール相談コーナー」に寄せられた質問のうち、読者の参考になるとと思われる内容についてとりまとめました。

工場調査に関するQ&A(その1)

- | | |
|-----------------------|-------------|
| △工場調査のスキームについて | ①事前調査書の発行 |
| ○管理標準の作成 | ②工場の考え方 |
| ①経路長の記録 | ③記入対象エネルギー |
| ②事前調査書作成のための原油換算係数の記録 | ④法定7項目の当てはめ |
| ③原単位の記録 | ⑤基準値の遵守 |
| ④計測・記録 | ⑥工場の評価点 |
| ⑤原単位の算化 | ⑦調査対象機器 |

Plant Survey for designated factories:

- Scheme
- Document preparation before visit
- Energy intensity evaluation
- Items on document
- Numerical standards
- Survey work period

平成13年度から第一種エネルギー管理指定工場に於いて、新入(スキーム)による工場調査が始まる。本年2月に香川県産業貿易局と香川県エネルギーセンターとの共同で「エネルギー管理省シンポジウム」を開催。本Q&Aは、そのシンポジウムの資料に添付された「質問紙」によって寄せられた質問、および当センター「eメール相談コーナー」に寄せられた質問のうち、読者の参考になるとと思われる内容についてとりまとめました。

工場調査に関するQ&A(その2)

- | | |
|------------------------------|-------------|
| △工場調査のスキームについて | ①管理標準の作成 |
| ②工場の考え方 | ③経路長の記録 |
| ③対象エネルギー | ④法定7項目の当てはめ |
| ④の枚数と原単位が「必ず省エネルギー使用量の割合」の遵守 | ⑤原単位の記録 |
| ⑥の評価点 | ⑦計測・記録 |
| ⑧他(石油化学製造) | ⑧原単位の算化 |

Energy saving on building

1. 省エネ Q&A

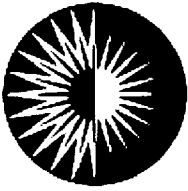
省エネ法

省エネ法の使用の合理化に関する法律等その一覧と解説です。

law & related regulations

省エネ法に関する各種補助制度(金融上、税制上、その他)の解説です。

Subsidies & incentives



ECC The Energy Conservation Center

The Energy Conservation Center contributes to the efficient use of energy, protection of the Global environment and sustainable development.



Result of Energy Conservation and CO₂ Exhaust Energy Conservation Measures in the Future

March 2003

June 2001

Energy Star Program

Voluntary program to promote reduction in stand-by power of office equipment
(Overview, Registration procedure, Specifications, and link to US/EPA)

Energy Conservation Performance

2000 Winter, 1999 Winter

What is the Top Runner Program

Top Runner Program

Grass-roots Activities of Energy Conservation

Ene Con Ambassador,

Energy Conservation of Factory, Building, Office

Successful Case,

Energy Conservation Handbook

DataBook (2002/2003, 2001, 1999/2000, 1998)

Policy and Law

Fundamental Policies for Rational Use of Energy
Law concerning the Rational Use of Energy (Energy Conservation Law)
Enforcement Ordinance for the Law
Enforcement Regulation for the Law
Evaluation Criteria for Specified Equipment
Partially Amending for the Law
Criteria for clients for buildings
Criteria for clients for houses
Design and construction guidelines for houses
Publication of heat-insulation performance values

International Cooperation

'03 IEA International Workshop
ECCJ International Chronicle, IEA Workshop

Presentations at Conferences

Summer Time

Outline Report, Reference 1, Reference 2, Reference 3, Reference 4

ECC Profile

Residence, Industry, Surveys, International, Publishing, Chart, Board, Map,

3-19-9 Hatchobori Chuoku Tokyo Japan 104-0032

Tel : Japan(81)-3-5543-3011 Fax : Japan(81)-3-5543-3022

Copyright(C) ECCJ 1996-2004, All rights reserved

What's new

3/15

What is the Top
Runner Program

2/6

IEA Workshop



Press Releases

Links

0

Form-mail

to Japanese page

