Looking to the Most Environmentally-advanced City in the World

– Climate Change Strategies of Large Facilities in Tokyo –
**Tokyo**

**Data (2011)**
- Population: 13,000,000
- Area: 2,200 km²
- GDP: US$1,169 billion
- GHG: 65,000,000 tons

**CO₂ emissions from energy sources in Tokyo**
- 64,300,000 tons

*Excerpts of major countries (top 8 CO₂-emitting countries as far as Canada)*
Outlook for Energy Consumption in Global Cities

Urban Population and Greenhouse Gas Emissions

- Population concentration into the cities
  World’s 54% → 66% (2050)
  (World Urbanization Prospects (United Nations))

- Share of greenhouse gas emissions from energy sources
  71% → 76% (2030)
  (World Energy Outlook 2008 (IEA))

Energy Consumption and CO₂ Emissions in Building Sector

- Final energy consumption in the building sector
  32% of the world’s energy use
  (AR5 WG III, 2014)

- CO₂ emissions from the building sector
  Expected to increase by 50 to 150% by the middle of this century.
  * In case of a baseline scenario (AR5 WGIII, 2014)

* The building sector includes housing, commerce and public services.
Formulation of Tokyo Metropolitan Long-term Vision (December 2014)

**Urban Strategy 7**
“Realization of a city passing a rich environment and full infrastructure onto the next generation”

**Policy Guideline 20 “Creation of Smart Energy City”**

- Promotion of energy conservation and energy management
- Promotion of introduction of renewable energy
- Expansion of use of hydrogen energy

Smart energy city simultaneously realizing three items

- **Low carbon** (Pioneering response to climate change)
- **Amenity** (Higher intellectual productivity in office)
- **Disaster preventive capabilities** (Realization of advanced disaster preventive city)

- (1) Smart energy conservation and power saving by maximum use of energy conservation technologies and know-how
- (2) Expanded use of low-carbon self-distributed energy
- (3) Optimum supply-demand control by energy management
Setting of New Energy Conservation Goal

(Future vision)
Continuously reduced energy consumption by further progress of energy conservation and diffusion of energy management in Tokyo.

(Policy goal)
Reduced energy consumption 20% by 2020 and 30% by 2030 (compared with 2000).
Tokyo Metropolitan Programs Focused on Energy Consumption of Buildings

- **New building**
  - Effective energy use in large-scale development
  - Incentive in urban development

- **Existing building**
  - Cap-and-Trade Program
  - Tokyo Carbon Reduction Reporting Program

**Building size**
- Large
- Small

**Phase of building (planning to improvement)**
- Planning, Design, Construction
- Operation, Adjustment, Improvement
Introduction of Cap-and-Trade Program

- **Target:**
- **Planning period:**
  - 1\(^{st}\) planning period: From FY2010 to FY2014
  - 2\(^{nd}\) planning period: From FY2015 to FY2019
- **Mandatory reduction rate:**
  - 1\(^{st}\) planning period: 6 or 8% 
  - 2\(^{nd}\) planning period: 15 or 17%

\[\text{CO}_2\text{ emissions shares of the industrial and commercial sectors in Tokyo}\]

The Cap-and-Trade Program targets 1,300 facilities, covering approx. 40% of the industrial and commercial sectors in Tokyo.

Illustration of the emission trading

- Deficient reduction
- Surplus reduction
- Trade
- Building with higher reduction than mandatory reduction rate
- Building with deficient reduction
Program Results:
Total CO₂ Emissions of Target Facilities

• Continued FY 2011 reduction just after the Great East Japan Earthquake.

• Higher reduction than the previous year at approx. 60% facilities.

• Total surplus reduction in the 1st planning period (estimation): Approx. 9,500,000 tons.
Comparison between the annual reduction rate and mandatory reduction rate of each facility:

*Ninety percent* of the target facilities reduced more than their mandatory reduction rate.

<table>
<thead>
<tr>
<th>Year</th>
<th>Reduction Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2010</td>
<td>66%</td>
</tr>
<tr>
<td>FY2011</td>
<td>93%</td>
</tr>
<tr>
<td>FY2012</td>
<td>92%</td>
</tr>
<tr>
<td>FY2013</td>
<td>90%</td>
</tr>
</tbody>
</table>

Fig. Ratio of Facilities Successful in Reducing More than Mandatory Reduction Rate (8 or 6%) in 1st Planning Period
CO₂ emission intensity also decreased greatly. © From 103 kg-CO₂/m² to 75 kg-CO₂/m² (Offices)

Secular change of CO₂ emission intensity (Offices)
Energy Conservation by Facilities Such as Specified Tenants

- At the facilities such as specified tenants, FY2013 energy consumption intensity was improved 23% over FY2009.

Fig. Change of Energy Consumption Intensity at Facilities Such as Specified Tenants

* Values assuming change of FY2009 energy consumption intensity to be 100.
Comparison of Secular Change with Entire Nation and Tokyo

◎ The target facilities realized reduction continuously and greatly.

Secular change of CO₂ emissions, etc. (Comparison with entire nation)

Change assuming FY2005 to be 100

- Secular change of national final energy consumption (industrial and commercial sectors) (FY 2005 value = 100)
- Secular change of Tokyo’s final energy consumption (industrial and commercial sectors) (FY 2005 value = 100)
- Secular change of CO₂ emissions at the target facilities of the Cap-and-Trade Program (FY 2005 value = 100) (CO₂ emission factor fixed)
Tokyo Climate Change and Sustainable Energy Strategy

Further Promotion of Climate Change Strategy for Creation of Smart Energy City


Tokyo Metropolitan Government Bureau of Environment Website: www.kankyo.metro.tokyo.jp
Tokyo Metropolitan Government Bureau of Environment Facebook: www.facebook.com/Environment.TMG
The following slides are used for a panel discussion.
As a Familiar Existence to the Facility Owners, What Policy Should the Tokyo Metropolitan Government Take for Promotion of the Energy Conservation Measures of the Large Facilities in Tokyo?
Evolution of Large Facility Measures

Stepping up the system in light of the reality of the facilities

2002-2004

Hop
Start a plan submission system

- Plan submission system
- Voluntary goal
- Many facilities have difficulty preparing effective energy conservation measures
- Many facilities have no effective promotion structure
- Publication by the facility owners

2005-2009

Step
Add an assessment and publication mechanism

- Plan submission system + Assessment and publication mechanism
- Voluntary goal
- Tokyo Metropolitan Government suggests the measures and helps raise the level of basic measures through guidance and advice
- Structure mainly centering around the equipment personnel
- Publication by the facility owner and Tokyo Metropolitan Government

2010-

Jump
Introduce the Cap-and-Trade Program

- Total emissions reduction obligation and emission trading scheme
- Reduction obligation
- Realization of energy conservation measures from a medium- and long-term viewpoint
- Structure integrating the management, equipment personnel, tenant facility owners, etc.
- Publication by the facility owner and Tokyo Metropolitan Government

Interview survey of the target facility, exchange of opinions and analysis of reality
What Developed the Energy Conservation Measures for the Target Facilities?
(Introduction Results of the Cap-and-Trade Program)

• Awareness, sense of values, etc. of the target facilities
Program Results

Awareness of management is enhanced by introduction of the Cap-and-Trade Program.

Q: Has the management’s concern about change of CO₂ reduction been enhanced?
- Enhanced very much: 10%
- Enhanced: 62%
- Already enhanced: 16%
- Unchanged (not enhanced): 12%

Program introduction encouraged more than 70% of the facilities to actively adopt high-efficiency equipment.

Q: When renewing the equipment, has the management been more active in adopting high-efficiency equipment?
- Very much more active: 18%
- More active: 54%
- Already active: 26%
- Inactive (does not adopt): 3%

Source: Questionnaire on total emissions reduction obligation and emission trading scheme (conducted in 2014)
Program Results

New energy conservation measures are annually planned and implemented by the target facilities.

Planning and implementation of energy conservation measures

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction of high-efficiency lighting and energy conservation control</td>
<td>1,154</td>
<td>71,700</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction of high-efficiency air-conditioning pump and energy conservation control</td>
<td>349</td>
<td>28,100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction of high-efficiency heat source equipment</td>
<td>312</td>
<td>133,100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction of outdoor air cooling system</td>
<td>288</td>
<td>19,900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

New measures implemented every year

Reduction (In 10,000 tons-CO₂)

Installation of lighting equipment in commercial areas

Introduction of high-efficiency equipment and energy conservation improvement → Emphasis on running
Program Results

Comparison between Top-level Turbo Refrigerator Installed Facilities and Other Facilities

<table>
<thead>
<tr>
<th>Turbo refrigerator</th>
<th>1993</th>
<th>2002</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>COP [ ]</td>
<td>7.00</td>
<td>6.50</td>
<td>6.00</td>
</tr>
<tr>
<td>6.50</td>
<td>6.00</td>
<td>5.50</td>
<td>5.00</td>
</tr>
<tr>
<td>6.00</td>
<td>5.50</td>
<td>5.00</td>
<td>4.50</td>
</tr>
<tr>
<td>5.50</td>
<td>5.00</td>
<td>4.50</td>
<td>4.00</td>
</tr>
<tr>
<td>5.00</td>
<td>4.50</td>
<td>4.00</td>
<td>3.50</td>
</tr>
<tr>
<td>4.50</td>
<td>4.00</td>
<td>3.50</td>
<td>3.00</td>
</tr>
</tbody>
</table>

*Other than top-level facilities, etc.*

<table>
<thead>
<tr>
<th>FY2002</th>
<th>FY2008 onward</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (quantity)</td>
<td>73</td>
</tr>
</tbody>
</table>

Top-level and semi-top-level facilities
n = 65

High-efficiency heat source equipment level

No. of high-efficiency equipment
FY2002 to FY2007 | FY2008 onward
---|---
23 | 95
32% | 58%

Top-level facilities, etc.

No. of high-efficiency equipment
FY2002 to FY2007 | FY2008 onward
---|---
40 | 20
53% | 70%

<Totalization conditions>

* Of the Division-I check lists (FY2012 results) submitted in FY2013, totalization of 925 facilities which had a description of a heat source rating COP (boiler efficiency), etc.
* Taking account of the installation FY, the values considered abnormal are excluded.
* The years 1993, 2002, when the “Tokyo Carbon Reduction Reporting Program” was introduced, and 2008, when the “Tokyo Cap-and-Trade Program” was introduced, are indicated with broken lines as 20-year-lapse timings after equipment installation.
Program Results

Response to Power Saving (Max. Power Demand) after Great East Japan Earthquake

[Reduction Ratio of Max. Service Power Compared with 2010 Summer]

Max. service power was “reduced by 15% or more” at 80% of the facilities.
(* There are some facilities beyond the scope of Article 27 of the Electricity Business Act.)

- 30% or more: 17%
- 20%: 26%
- 15%: 27%
- 10%: 14%
- 5%: 11%
- 0%: 4%

(Survey results by Tokyo Metropolitan Government (December 2011))

Owing to “preparation of the promotion structure” and “participation by the tenant facility owners”;
“Power saving went smoothly because there was already a cooperative addressing structure before the Great East Japan Earthquake, holding a tenant meeting twice annually.” (Voice of a tenant building owner)

Because a “list of devices, etc. had been prepared” in order to respond to this program;
“An accurately calculated effect of reduction greatly helped planning of power saving measures, resulting in smooth power saving.” (Voice of a plant owner)

Building of Good Power Saving Relations between the Owner and Tenants
Certified Top-level Facilities

Facilities with excellent promotion structure, equipment introduction and operation management

FY2014 certified facilities

- Eitai Diamond Building
- Nihonbashi Muromachi Nomura Building
- Muromachi Higashi Mitsui Building
- Daiichi Sankyo Company, Limited, Shinagawa R & D Center
- Sumitomo Mitsui Banking Corporation, Main Office Building

Look to the top level when newly building or reconstructing.

Sample measures of certified facilities:

- Introduction of high-efficiency heat source equipment
- Improvement of operation by commissioning
- Solar power generation system
- Light duct system utilizing natural lighting
- High-efficiency cogeneration
What Measures Were Taken by the Tokyo Metropolitan Government to Help Large Facilities Promote the Energy Conservation Measures?

- Obligation
- Standardization (Base)
- Index (Benchmark)
- Disclosure of information (Publication)
- Support of the target facilities, and so on
Overview of Cap-and-Trade Program

- **Planning period:**
  - 1st planning period: From FY2010 to FY2014
  - 2nd planning period: From FY2015 to FY2019

- **Mandatory reduction rate:**
  - 1st planning period: 6 or 8%
  - 2nd planning period: 5 or 17%
Responsibilities of Tenant Facility Owners

- To promote effective reduction of greenhouse gas, both the owner and tenant facility owner are requested to address the issue.

Considering the owner as mainly responsible for the obligation, the tenant is subjected to the following duties.

- All the tenants are obligated to cooperate with the facility owner’s reduction measures.
- The facility owners such as specified tenants* are obligated to prepare and submit their original strategic plans and promote the measures based on the plans.

* Requirements for the facility owners such as specified tenants

- Facility owners using a floor area of 5,000 m² or more as of the end of the previous fiscal year
- Facility owners whose electric consumption for the previous one fiscal year (from April to the end of March) was 6,000,000 kWh or more.
Certification Criteria for Top-level Facilities

- The currently feasible highest-level energy conservation measures are set based on the results of surveying the latest energy conservation buildings and interviewing the manufacturers.
- The criteria is to be utilized as a reference index for design when constructing new buildings or implementing large-scale improvement.
- Energy conservation tuning in the operation phase, such as the promotion structure and the operation management, is also a requirement.

### Design Phase

- **Load control** → “Improved building skin performance (high-performance glass Low-e, etc.)”
  “Internal load control (high-efficiency lighting LED, etc.)”
  “Outdoor air load control (outdoor air rate control, etc.)”

- **Utilization of natural energy** → “Natural lighting, natural ventilation, outdoor air cooling, etc.”

- **High-efficiency equipment system** → “Introduction of high-efficiency system (radiation heating-cooling system, etc.)”
  “Introduction of high-efficiency equipment (high-efficiency heat source, high-efficiency motor, etc.)”
  “Adequate capacity division of equipment”
  “Introduction of energy conservation control (variable flow rate control, etc.)”

- **Utilization of renewable energy** → “Utilization of solar power generation and solar heat, and so on.”

### Operation Phase

- **High-efficiency operation** → “Implementation of commissioning and tuning, and so on”

- **Building of the energy conservation measures promotion structure** → “Establishment and opening of CO₂ reduction promotion conference, and so on”
Illustration of Top-level Facilities

- **II3a.1** Introduction of high-efficiency heat source equipment (DHC installed)
- +II3a.23 Introduction of medium-temperature cold water based system
- +II3a.26 Introduction of regional use of energy
- +II3a.18 Introduction of high-efficiency cogeneration

- **II1.3** Introduction of renewable energy and unused energy system

- **II3c.1** Introduction of high-efficiency lighting equipment
- **II3c.3** Introduction of initial luminance correction control for lighting
- **II3c.4** Introduction of zoning control for lighting
- **II3c.8** Introduction of daylight based illumination control
- **II3c.9** Introduction of occupant detection control by motion sensor for lighting
- **III1c.1** Mitigation of luminance conditions for other than living room
- +III1c.5 Mitigation of luminance conditions for office

- **II2.1** Introduction of high-performance building skin
- +II2.4 Introduction of insolation control and schedule control for blind

- **II3b.1** Introduction of high-efficiency air-conditioner
- **II3b.2** Introduction of high-efficiency package type air-conditioner
- **II3b.8** Introduction of variable air volume system for air-conditioner
- **II3b.12** Introduction of outdoor air cooling system
- **II3b.13** Introduction of outdoor air volume control by CO₂ concentration
- +II3b.20 Introduction of total heat exchanger

- **III1b.1** Optimization of air-conditioning start-up time when starting use of room
- **III1b.3** Optimization of temperature of living room
- **III1b.4** Intermittent operation of fan
- **III1b.8** Implementation of cool and warm business attire campaign
- **III1b.13** Discontinuation of fan operation in elevator machine room and electric room during summer

- **II1.2** Introduction of natural ventilation based system

- ◎ I4.3 Setting of CO₂ reduction goal, planning of CO₂ reduction measures, and summarization and assessment of results
- ◎ I4.6 Preparation and implementation of improvement measures, and verification of effect
- ◎ I4.7 Implementation of commissioning (verification of performance)

The above illustration mainly shows the scores as to assessment items of assessment score of 0.5 or higher. A bar under the assessment item shows a weighting factor by height and an assessment score (0 to 1) by length. (◎: Mandatory item, ○: General item, +: Score-adding item)
Tenant Assessment and Publication Program

In order to upgrade the energy conservation measures of the tenant facility owners;
(1) The measures for office, lodging, commercial and DC tenants are presented.
(2) The status of addressing the measures is scored.
(3) The tenant is assessed according to the obtained score and an assessment result is published.

* Assessment levels (example)

- High
- Low

Implementation status of reduction measures by tenant facility owner

Tokyo Carbon Reduction Reporting Program Check List for Specified Tenants, etc.

Degree of addressing the reduction measures and Greenhouse gas emissions result

[Scoring]

Dividing the assessment results into several levels*, excellent tenant facility owners are introduced.
Feeding Back Energy Conservation Record to All Facilities

The facility marked in red

Difference from average

Monthly energy consumption intensity

Change of average energy consumption intensity value by usage (Unit: MJ/m²)

<table>
<thead>
<tr>
<th>Usage</th>
<th>Base FY</th>
<th>2009*</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>2,577</td>
<td>2,241</td>
<td>2,186</td>
<td>1,853</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>15,279</td>
<td>16,554</td>
<td>16,741</td>
<td>16,997</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadcast station</td>
<td>6,029</td>
<td>4,829</td>
<td>4,767</td>
<td>4,326</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>3,635</td>
<td>3,292</td>
<td>3,200</td>
<td>2,719</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lodging</td>
<td>3,316</td>
<td>3,043</td>
<td>3,063</td>
<td>2,770</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>1,441</td>
<td>1,342</td>
<td>1,366</td>
<td>1,173</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td>3,351</td>
<td>3,061</td>
<td>3,132</td>
<td>2,808</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culture</td>
<td>2,314</td>
<td>2,100</td>
<td>2,053</td>
<td>1,814</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logistics</td>
<td>1,605</td>
<td>1,370</td>
<td>1,295</td>
<td>1,196</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat supply</td>
<td>679</td>
<td>556</td>
<td>585</td>
<td>505</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* FY 2009 is the previous year of starting the program (FY2010).
Providing Energy Conservation Assessment Notification for All Specified Tenants

(1) Capable of grasping the achievement status of energy conservation measures at one’s own facility.
(2) Capable of understanding which measure to begin with.
(3) Capable of comparing with other facility of the same trade.
Holding Presentation Session of Excellent Facility Cases, Various Seminars, etc.

- Sharing the information of excellent facility cases.
- Providing know-how of energy conservation process and operation improvement.
What are the Potential Fields for Energy Conservation at Large Facilities in Tokyo?
(1) Introduction status of the “heat source equipment” by model and installation year

The following has totalized the information on the heat source equipment mentioned in the check list in terms of “model,” “installation year,” “type of heat source,” “heat source capacity” and “quantity.” Cooling-heating combined heat source equipment is counted in both cold and hot heat sources for totalization (same as the entry method in the check list).

<Totalization results>

![Bar chart showing installed capacity (kW) for hot and cold heat sources over installation years from 1980 to 2011.]

* Of the Division-I check list (FY2011 results) submitted in 2012, 725 facilities which had a description of heat source installed capacity, etc. have been totalized.
Clarifying the Degree of Adopting the Energy Conservation Technologies

– Diffused energy conservation items addressed by many facilities –

Items to Be Addressed First

 Those already addressed by more than half of the target facilities of the Credit-and-Trade Program

<table>
<thead>
<tr>
<th>II. Items related to equipment performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Heat insulation of the steam valve and flange</td>
</tr>
<tr>
<td>☐ Introduction of variable flow rate control of the secondary air-conditioning pump</td>
</tr>
<tr>
<td>☐ Introduction of temperature control of the elevator machine room</td>
</tr>
<tr>
<td>☐ Introduction of temperature control of the electric room</td>
</tr>
<tr>
<td>☐ Introduction of the high-luminance and light-storing guide lights</td>
</tr>
<tr>
<td>☐ Introduction of the variable voltage and variable frequency control system for the elevator</td>
</tr>
</tbody>
</table>
## Clarifying the Degree of Adopting the Energy Conservation Technologies

### Items to Be Addressed First

- **III. Items related to operation**
  - ○ Management of the air ratio of the combustion equipment
  - ○ Mitigation of the temperature of other than the living room
  - ○ Adjustment of the cooling water temperature setting value of the refrigerator
  - ○ Optimization of the setting temperature for the elevator machine and electric rooms
  - ○ Adjustment of the cold/hot water outlet temperature setting value of the heat source equipment
  - ○ Mitigation of the luminance conditions
  - ○ Confirmation of heat insulation of cold/hot water piping, steam piping, etc.
  - ○ Suspension of heating the bidet toilet seat during summer
  - ○ Adjustment of valve opening
  - ○ Suspension of the night-time power source for the water heater
  - ○ Suspension of the heat source equipment, etc. during the heat source unrequired period
  - ○ Discontinuation of hot water supply to the toilet/washroom or reduction of the hot water supply period
  - ○ Optimization of the heat source start-up time when starting air-conditioning
  - ○ Cleaning of the condenser and evaporator for the refrigerator
  - ○ Optimization of the air-conditioning start-up time when starting use of the room
  - ○ Cleaning and scale removal from the heat transfer surface of the combustion equipment
  - ○ Optimization of the living room temperature
  - ○ Filter cleaning of the air-conditioner, fan coil unit, etc.
  - ○ Implementation of intermittent fan operation

---

Clarifying the established technologies

*Those already addressed by more than half of the target facilities of the Credit-and-Trade Program*
Clarifying the Degree of Adopting the Energy Conservation Technologies
– Items adopted more by the top-level facilities –

<table>
<thead>
<tr>
<th>Items to Be Addressed Next</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. General management items</td>
</tr>
<tr>
<td>○ Introduction of the building energy management system (BEMS), etc.</td>
</tr>
<tr>
<td>II. Items related to equipment performance</td>
</tr>
<tr>
<td>○ Introduction of the high-efficiency heat source equipment</td>
</tr>
<tr>
<td>○ Introduction of the economizer for the steam boiler</td>
</tr>
<tr>
<td>○ Introduction of the water supply system by the large temperature difference</td>
</tr>
<tr>
<td>○ Introduction of the high-efficiency package type air-conditioner</td>
</tr>
<tr>
<td>○ Introduction of outdoor air shut-off control during warming up</td>
</tr>
<tr>
<td>○ Introduction of the variable air volume system for the air-conditioner</td>
</tr>
<tr>
<td>○ Introduction of the vaporizing humidifier for the air-conditioner</td>
</tr>
<tr>
<td>○ Introduction of proportional control of the fan coil unit</td>
</tr>
</tbody>
</table>

Those adopted more by the top-level facilities and addressed by part of the target facilities of the Credit-and-Trade Program
Clarifying the Degree of Adopting the Energy Conservation Technologies

– Items adopted more by the top-level facilities –

**Items to Be Addressed Next**

Those adopted more by the top-level facilities and addressed by part of the target facilities of the Credit-and-Trade Program

### III. Items related to operation

- Optimization of the number of operating heat source equipment during partial loading
- Mitigation of hot water temperature setting
- Replacement by the energy conservation fan belt

**Clarifying the technologies established at the top-level facilities in advance**
Clarifying the Degree of Adopting the Energy Conservation Technologies

– Items adopted by some top-level facilities –

**Items to Be Addressed Systematically**

**II. Items related to equipment performance**

- Introduction of the high-efficiency cooling tower
- Introduction of the high-efficiency air-conditioning pump
- Introduction of variable flow rate control of the primary air-conditioning pump
- Introduction of the variable flow rate control of the cooling water pump
- Introduction of end differential pressure control of the secondary air-conditioning pump
- Introduction of high-efficiency cogeneration
- Introduction of the high-efficiency air-conditioner
- Introduction of the high-efficiency fan
- Introduction of the outdoor air cooling system
- Introduction of the equipment not mixing cold air and hot air
- Introduction of outdoor air volume control by CO₂ concentration
- Introduction of the total heat exchanger
- Introduction of the air-blowing and air-conditioning system by large temperature difference
Clarifying the Degree of Adopting the Energy Conservation Technologies

– Items adopted by some top-level facilities –

**Items to Be Addressed Systematically**

<table>
<thead>
<tr>
<th>II. Items related to equipment performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ Introduction of the high-efficiency kitchen ventilation system</td>
</tr>
<tr>
<td>○ Introduction of initial luminance correction control of lighting</td>
</tr>
<tr>
<td>○ Introduction of the high-efficiency transformer</td>
</tr>
<tr>
<td>○ Introduction of daylight based illumination control</td>
</tr>
<tr>
<td>○ Introduction of security interlocked control of lighting</td>
</tr>
<tr>
<td>○ Introduction of the high-efficiency water supply pump</td>
</tr>
<tr>
<td>○ Introduction of the natural refrigerant heat pump water heater</td>
</tr>
<tr>
<td>○ Introduction of the latent heat recovery water heater</td>
</tr>
<tr>
<td>○ Introduction of the automatic or dead slow escalator operation system</td>
</tr>
<tr>
<td>○ Introduction of high-efficiency refrigeration and chilling equipment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>III. Items related to operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ Optimization of the perimeter setting temperature during winter</td>
</tr>
</tbody>
</table>

Energy conservation technologies expected to be diffused at the target facilities in the future
### Additional assessment items (some of them)

- Heat insulation of the heat exchanger (added from the 2nd planning period)
- Optimization of indoor luminance of the office (added from the 2nd planning period)
- Introduction of security interlocked control of lighting (added to the existing assessment items)
- Introduction of the desiccant air-conditioning system (added to the existing assessment items)
- Introduction of the medium-temperature cold water based system (added from the 2nd planning period)
- Introduction of the integrated heat source control system (added from the 2nd planning period)
- Introduction of the fan and circulation fan creating sense of air flow (added from the 2nd planning period)
- Energy conservation tuning of the package type air-conditioner (added from the 2nd planning period)

---

*The items newly added from the 2nd planning period present the latest energy conservation technologies, etc.*
What Do You Think About the Future Climate Change Strategy of the Tokyo Metropolitan Government?
Agreement between JDCC and Tokyo Metropolitan Government

- May 14 (Thursday), 2015
- An agreement signing ceremony was held at the Metropolitan Government Office.
Change of Energy Consumption and GHG Emissions in Tokyo

Final energy consumption

GHG emissions
In Tokyo, economy grows while reducing energy consumption.

**Energy Consumption and Economic Growth in Tokyo**

Change of final energy consumption and economic index (Tokyo/national)

- Metropolitan GDP
- Final energy consumption

![Graph showing change in energy consumption and GDP](image-url)
Looking to the Most Environmentally-advanced City in the World

September 2013: C40 & Siemens City Climate Leadership Awards (at London)
- Commends a municipality carrying out a remarkable climate change strategy. It was highly assessed that CO₂ emissions had been reduced by 23% in the second year after starting the Cap-and-Trade Program.

June 2014: UNFCCC Expert Meeting (at Bonn)
- At the UN Climate Change Conference, Tokyo’s experiences were presented in a place for sharing the approach cases for raising the 2020 reduction goals.

September 2014: UN Climate Summit (at New York)
- A video message was put on the screen in approval of an appeal from the World Bank at a summit conference in order to promote climate change negotiations among nations.

December 2011: COP17 Government Leadership Award (at Durban)
- Commends a municipality taking the measures for remarkable city planning, low-carbon buildings, etc. The world’s first establishment of the urban type Cap-and-Trade Program was highly assessed.