Tokyo Initiative for a Low Carbon City

Yuko Nishida
Bureau of Environment
Tokyo Metropolitan Government

Tokyo Climate Change Strategy

GHG Emission Reduction Target

25% below 2000 levels by 2020

Key Message
To build a Sustainable City

Clear Target & **Effective Measures**

Create vast **Investments**
in Energy Efficiency Measures and Renewables

Diffusion & Advance in **Technology**

Promote Green Buildings

Tokyo Metroplitan Government

Agenda

1. Tokyo Climate Change Strategy
2. Tokyo **Cap-and-Trade** Program
3. Green Building Era in Tokyo

   Low Emission Buildings **TOP 30** in Tokyo

1. Tokyo Climate Change Strategy

GHG Emissions in TMG area

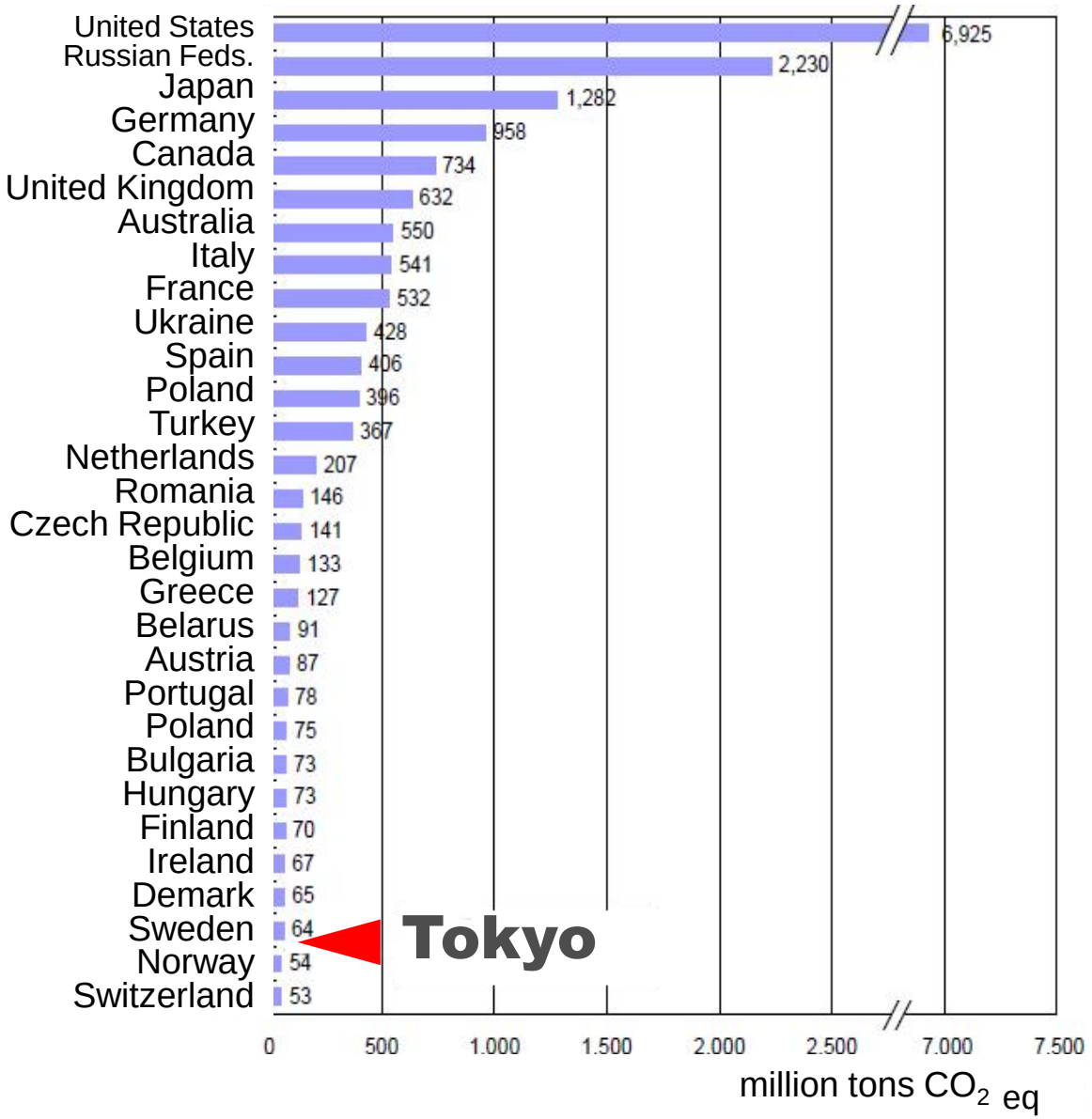
65 million

tons CO_2 eq

(FY2008)

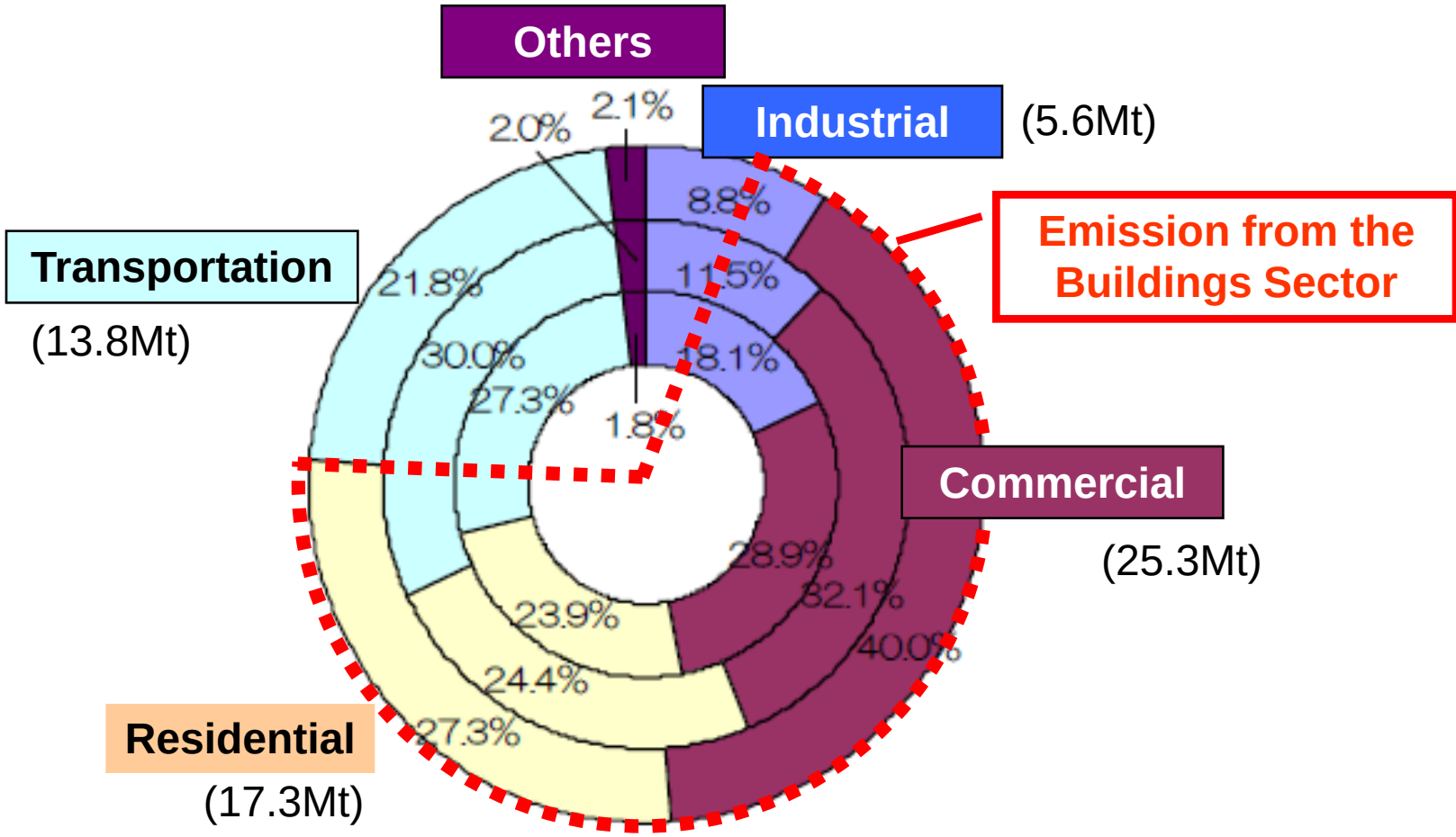
- **Population:**
  13 Million
- **Area :**
  2,187 sq.km

<GHG emissions of Annex I parties in 2008>



Source: UNFCCC, GHG emissions of Annex I parties

Tokyo Carbon Dioxide Footprint by Sector



CO_2 emissions in TMG area by sector

Inner circle : FY1990 / Total :54.4Mt-CO2
Middle circle: FY2000 / Total :58.8Mt-CO2
Outer circle : FY2008 / Total :63.3Mt-CO2

Tokyo Climate Change Strategy
Basic Policy

1 Importance to approach the demand side of energy

As a large energy consumer, Tokyo has a responsibility to reduce emissions from the demand side of energy

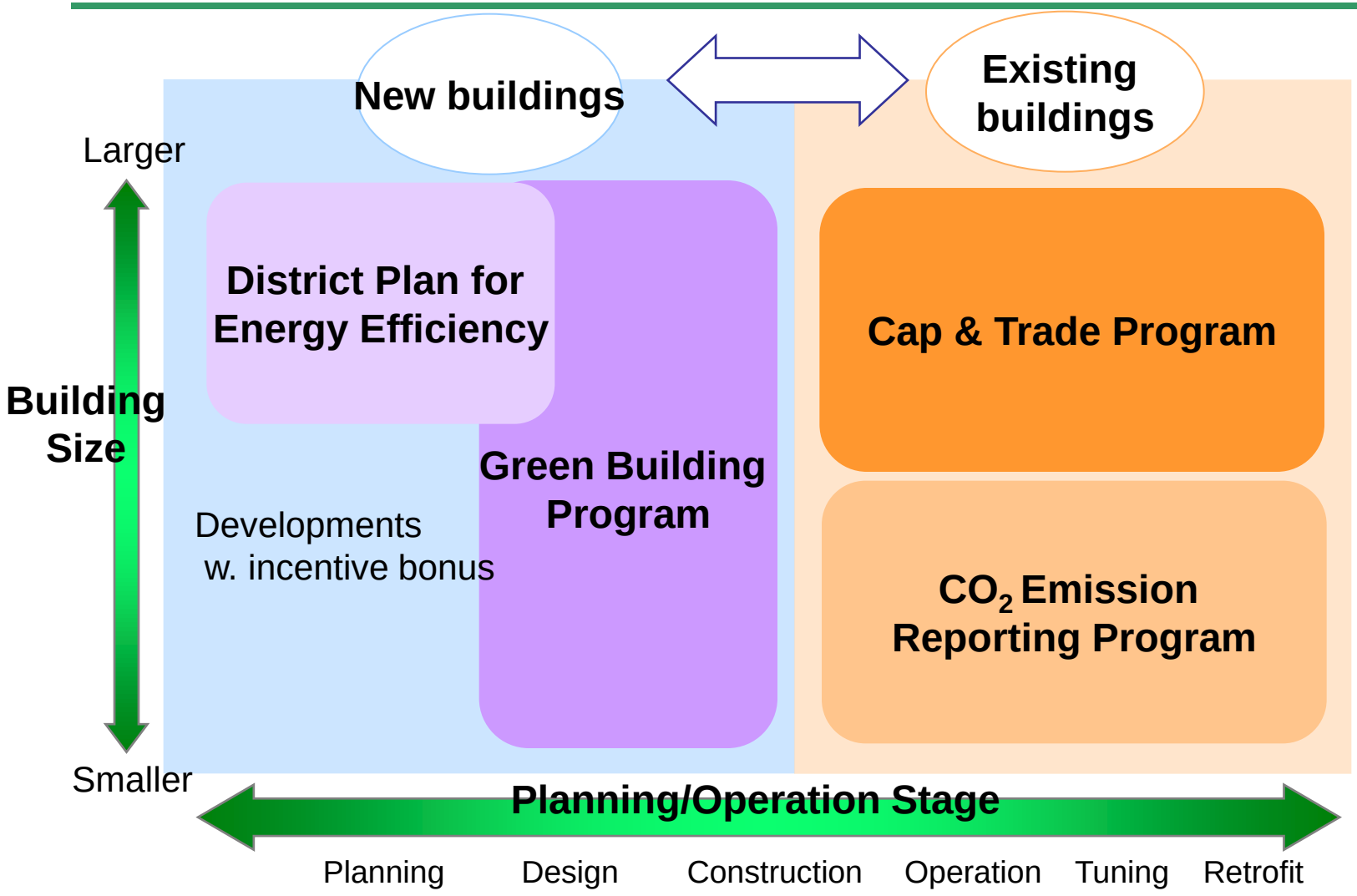
2 Importance to reduce emissions from urban facilities (buildings)

Promoting measures in the buildings sector is the key to reduce emissions from urban areas

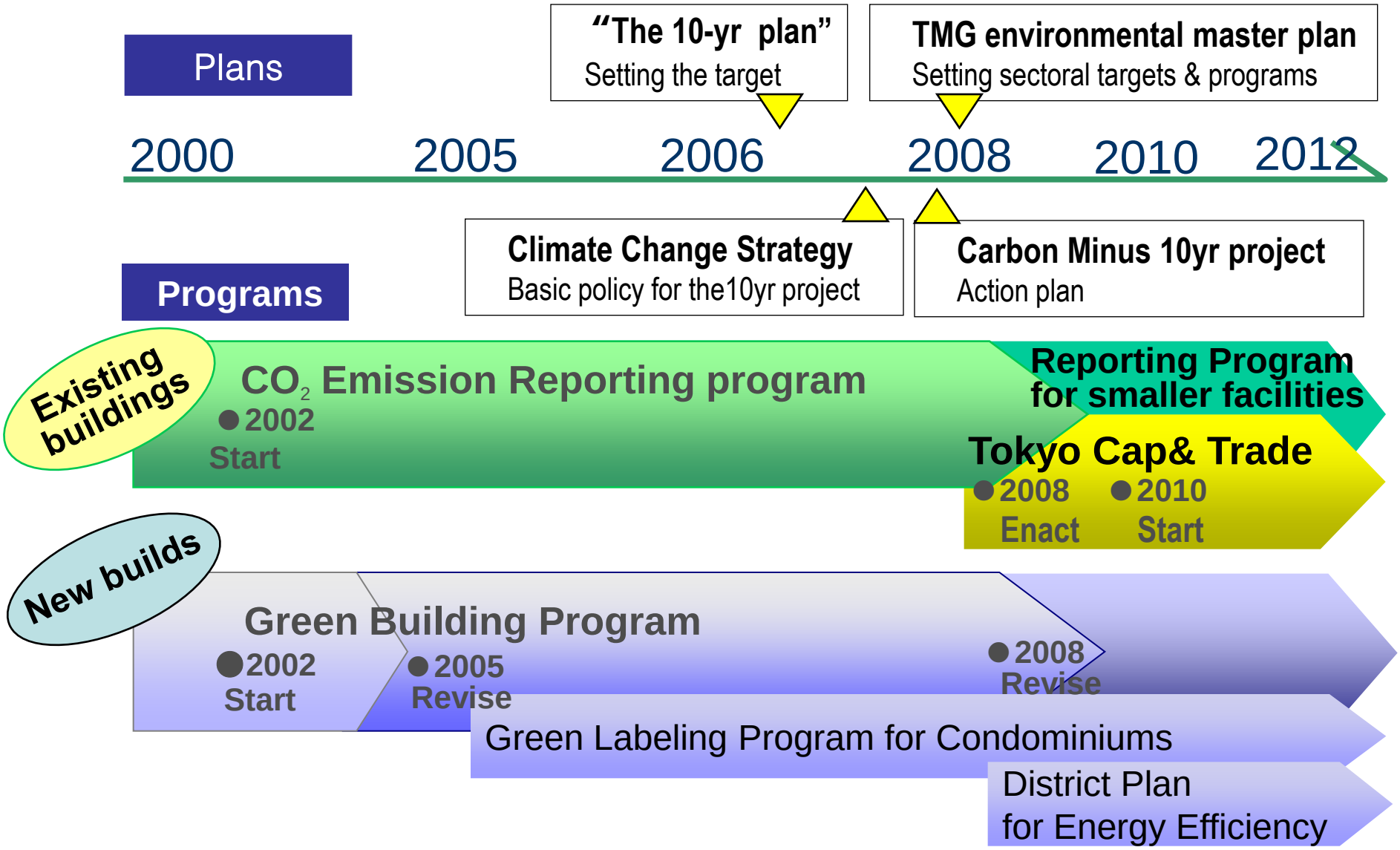
3 Enable Tokyo to grow in the coming carbon restrain age

Taking an advantage of the early shift to a low carbon city to realize sustainable growth of Tokyo

Tokyo Climate Change Strategy
Framework of Measures for the Buildings Sector



Tokyo Climate Change Strategy
Policy Development



Tokyo Climate Change Actions

■ **For large facilities in industrial and commercial sector**

- **Tokyo Cap-and-Trade Program**

■ **For small and medium sized facilities in industrial and commercial sector**

- **Carbon Reduction Reporting for medium and small facilities**
- Project to Promote Energy-Saving and Creation of Carbon Credit
- Eco-finance project
- Tax reductions for environmentally-friendly Action

■ **For new buildings and developments**

- **Tokyo Green Building Program**
- **Green Labeling Program for Condominiums**
- **Energy Efficiency Certificate Program**
- Energy Efficient District Plan Program

Portfolio… *More!*

- **For residential sector**
- Energy Efficiency Labeling System for Home Appliance
- **Subsidy Program for Solar Energy System**
- Home Energy Efficiency Advisers
- **For transportat sector**
- Obligations on Introduction of Low-emission vehicles
- EV-pHV promoting project
- Public transportation improvements
- **Others**
- **Programs to Expand Solar Energy**
- **Environmental Finance Initiative**
- Environmental Educations …

For details ; **TMG Environment White Paper**
http://www.kankyo.metro.tokyo.jp/en/documents/white_paper_2010.htm

3. Tokyo Cap-and-Trade Program

Tokyo Cap & Trade : Coverage

The urban cap and trade program to cover commercial sector buildings including office buildings

Target facilities: 1,300 facilities

Facilities with annual energy consumption of 1,500 kl or more (crude oil equivalent)

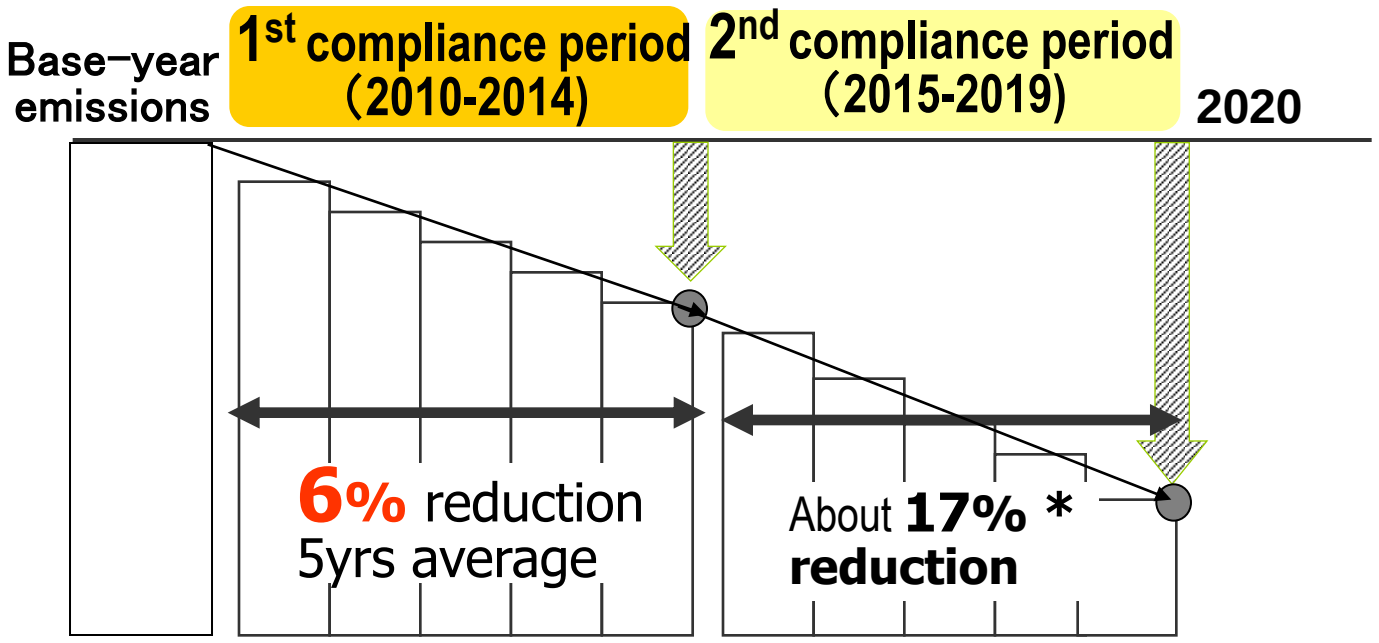
Approx. 1000 commercial & institutional buildings
Approx. 300 industrial facilities

Covers approx.40% of commercial & industrial sectors' emissions

Tokyo Cap & Trade Program

Strict Cap Setting to Achieve the TMG Target

To achieve the Tokyo's emission reduction target "By 2020 25% reduction from 2000", the necessary reduction in industry & commercial sector is 17% reduction



* Current estimation.
The Cap for the 2nd compliance period will be fixed by the end of the 1st compliance period

Fair allowance allocations

Emission Allowance (5yrs) = (Base-year emissions − Obligation reductions) × 5 years

Obligation reductions = Base-year emissions × Compliance factor

Base-year emissions : Average emissions of three consecutive years between 2002 to 2007

Category		Compliance factor
Ⅰ-1	**Commercial buildings, District cooling & heating facilities (plants)**	8%
Ⅰ-2	**Commercial buildings using EHC**	6%
Ⅱ	**Factories, etc.**	6%
Top level	A facility already achieved high energy efficiency is certified as a: **Top Level / Near-top level Facility**	**1/2 or 3/4 of the compliance factor**

Tokyo Cap & Trade Program

Emission Trading:

Creating a New Local Carbon Market

Tradable allowance:

Reductions exceeding the obligation

Emission reduction exceeding the yearly obligation is allowed to be traded from the 2nd year.

Creation of Emission Reduction Registry System:

Every Facility has account in a registry

Creation of a MRV system:

Guidelines on MRV

Requirements of verification by a registered verification agency

Emission Trading: Offset Credits

1. **Emission reductions from small and midsize facilities within the Tokyo area**

   * Emission reductions through energy-saving measures in smaller facilities not covered by the TC&T

2. **Renewable Energy Certificates**

   * Solar energy (heat and power), wind energy, etc.
   * No limit for offsetting

3. **Emission reductions outside the Tokyo area**

   * Sellers will be assumed to be covered under the Tokyo Cap-and-Trade Program, and reduction exceeding the reduction obligation would be counted as offset credit
   * Can only buy up to 1/3 of base year emissions

Tokyo Cap & Trade Program

Tokyo Cap & Trade: Offset Credits Creation

215,000 t-CO2 Offset Credits are expected to be created

As of September 30, 2011

Offset Credits Types	Number of Application	Projected Reduction Amount (t-CO2)
Emission reductions from Small and Midsize Facilities	289	54,094
Renewable Energy Certificates	7	65,000
Emission reductions Outside the Tokyo area	11	96,317
Total	307	215,411

Penalties for non-compliance

Fines: up to JPY500,000

Charges: 1.3 times the shortfall

Violation will be published

***Among the other TMG programs, exceptionally high charges**

Tokyo Cap & Trade Program

Overview

Mandatory emission reduction program targeting urban facilities in a cost effective way

+ Targeting BUILDINGS
+ Targeting existing buildings
+ Targeting total emissions from a building as a whole
+ Focusing on demand side energy consumption
  Including scope 2 emissions of electricity consumption
+ Capturing real energy consumptions (emissions)
  > design performance
+ Creating vast investments on energy efficiency measures and renewable energy introductions
+ Pursuing the cost effectiveness through the ETS

Tokyo Cap & Trade Program

Results of the Operation (FY 2010)

Provisional results of the first fiscal year (1,159 0f 1,348 covered facilities)

Total emissions reductions: **13%**

below base year emissions

Total emissions; 9,763,956 t

Base year emissions; 11,208,596 t

64% facilities reduced more than compliance factor (6% or 8%)

26% facilities reduced more than 17%

71% facilities expected to fulfill their reduction obligations only through measures in their sites

By reported reduction plans of each facility

***8 million USD is planed to invest** (Research by NIKKEI)

Expansion of the Scheme

Regional Expansion

Saitama Prefecture

▶ Greater Tokyo Region

Spot Expansions

Through a “Out-side Tokyo Credit scheme

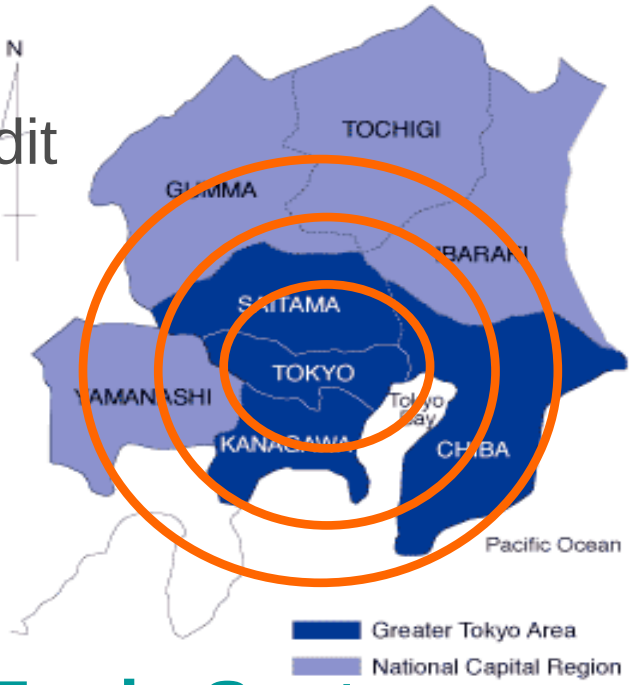
Proposal of the Two-tier Programs

▶ Overall Japan

Greater Tokyo Region

Regional Economy:

1.5 trillion USD



Global;
Emerging Local Cap and Trade System

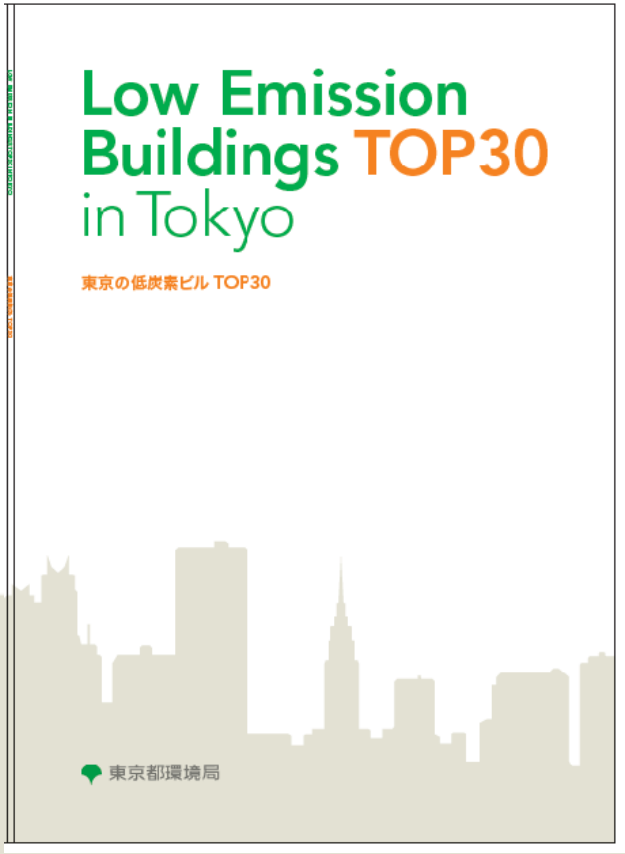
4. Green Building Era in Tokyo

Low Emission Buildings TOP30 in Tokyo

TOP30 buildings were selected in line with the policy measures of TMG.

Existing buildings section:
Highly valued in the C&T Program

New building section:
Based on the evaluation of the Green Building Program



TOP30 Existing Building Section

Top Level Facility Certification
In the Tokyo Cap-and-Trade Program

Assessment category	Required	General	Extra credit
I. General Management Establishment of cooperative structures for energy conservations, energy management status	23	4	1
II. Energy Performance (building Shells and equipments) Energy efficiency of air conditioning, lighting, and other facilities, equipment efficiency (COP), etc.	26	39	45
III. Operations Indoor temperature and humidity management, facility maintenance and management, etc.	25	56	9
Total	**228 items**		

TOP30 New Building Section

Assessment of Energy Performance In the Tokyo Green Building Program

Assessment category	Criteria
I. Heat load resistance of the shell Heat insulation of walls and windows, measures for shielding them from sunlight, etc.	**20%** or higher reductions from **PAL standard** (the national standard)
II. Energy efficient equipments Introduction of energy saving measures in the facilities (air conditioning, lightings, ventilation, water heating, and elevators)	**30%** or higher **ERR standard** (aggregation of the national standard)
III. Efficient operation systems Measurement and energy management system for optimal operation	**Level 2** or higher Ex; Introduction of certain level of BEMS
IV. Use of renewable energy On-site installation of renewable energy including PV and solar heat system	Amount of renewable energy introduced Ex; **30kW** in the case of **PV**

TOP30 Building List

東京の低炭素ビルTOP30 所在地マップ

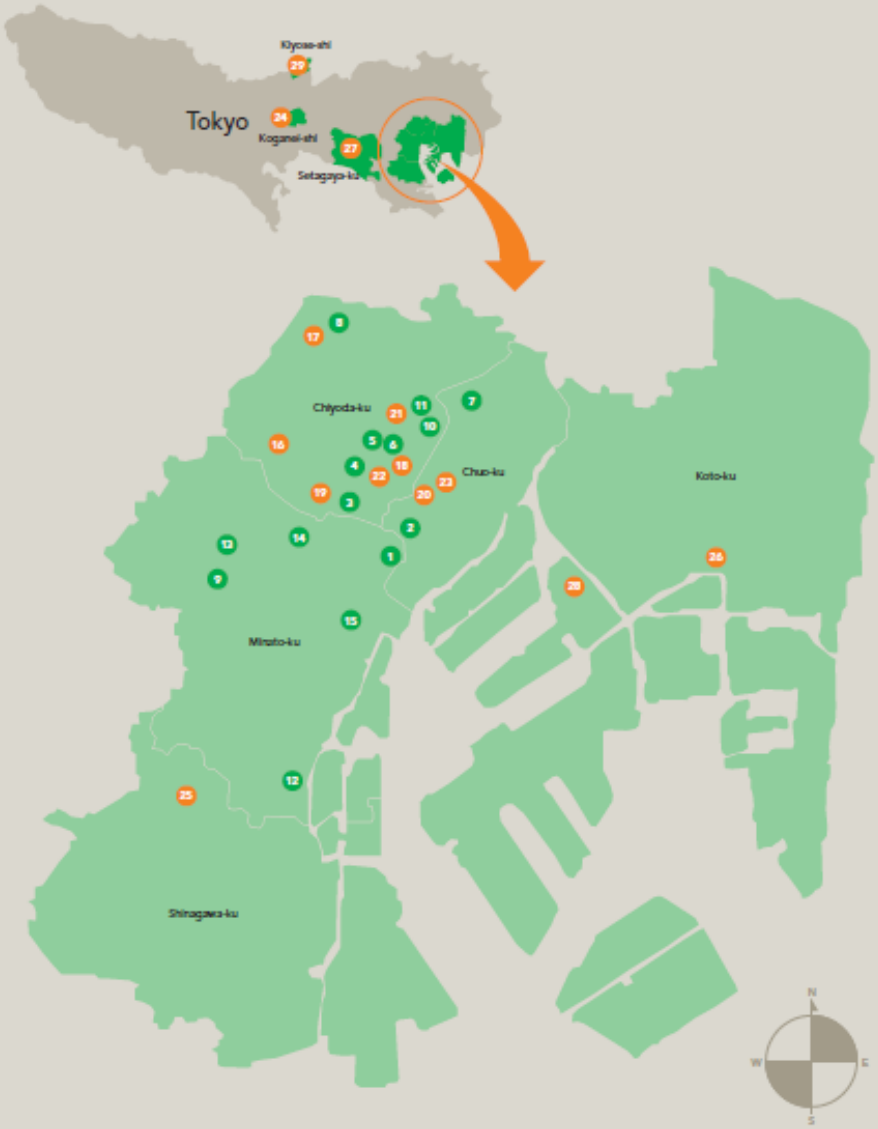
EXISTING BUILDING

1. Dentsu Shiodome Head Office Building
2. Ginza Mitsui Building
3. Hibiya International Building
4. Meiji Yasuda Seimei Building and Meiji Seimei Kan Building
5. Mitsubishi Shoji Building
6. Marunouchi Building
7. Nihonbashi Mitsui Tower
8. Otsuka Corporation Head Office Building
9. Roppongi Hills
10. Sapia Tower
11. Shin-Otemachi Building
12. Sony City
13. Tokyo Midtown
14. Toranomon Towers Office
15. Kokuryu Shiba Koen Building

Alphabetical order

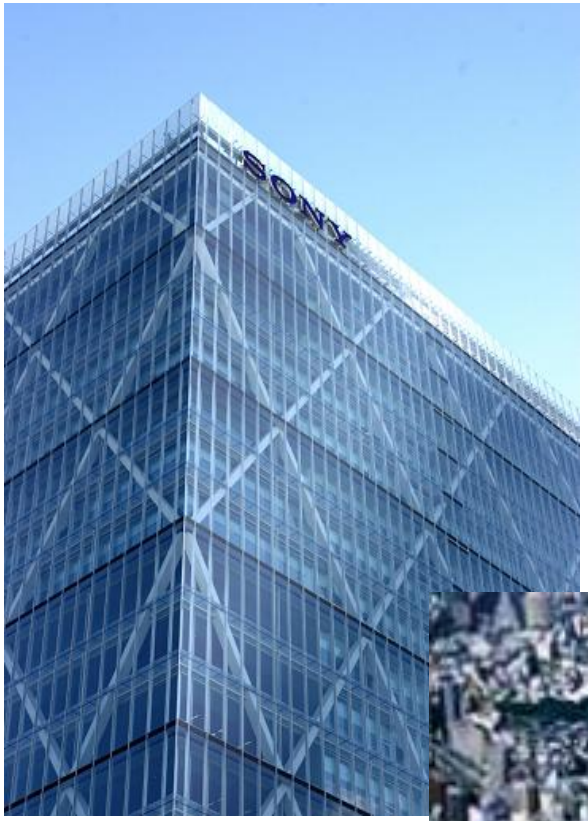
NEW BUILDING

16. Chiyoda Ward Koujimachi Junior High School
17. Fujimi Mirai Kan
18. JP Tower (tentative name)
19. Kasumigaseki Common Gate Central Government Building No.7
20. Kyobashi 3-1 Project (tentative name)
21. Marunouchi 1-4 Project New Building (tentative name)
22. Marunouchi Park Building
23. Shimizu Corporation New Headquarters Construction Project
24. Shopping Center at 1-1 block in the first south area of Musashi-Koganei Station
25. Sony Corporation Sony City Osaki
26. Takenaka Corporation Tokyo Main Office
27. Tokyo Metropolitan Matsuzawa Hospital
28. Toyosu Cubic Garden
29. Obayashi Corporation Technical Research Institute Main Building (Tecno-Station)



Low Emission Buildings TOP30

Existing Building Section



Sony City
Sony Corporation

Roppongi Hills
Mori Building Co., Ltd.

Tokyo Midtown
Mitsui Fudosan Co., Ltd.
East Japan Railway Company
Mitsubishi Estate Co., Ltd.

Low Emission Buildings TOP30

New Building Section

Techno-Station
Obayashi Corporation

New Headquarters Construction Project, Shimizu Corporation

Marunouchi Park Building
Mitsubishi Estate Co., Ltd.

JP Tower
Japan Post Network Co., Ltd.
East Japan Railway Company
Mitsubishi Estate Co., Ltd.

Low Emission
Buildings TOP30

High performance buildings in progress

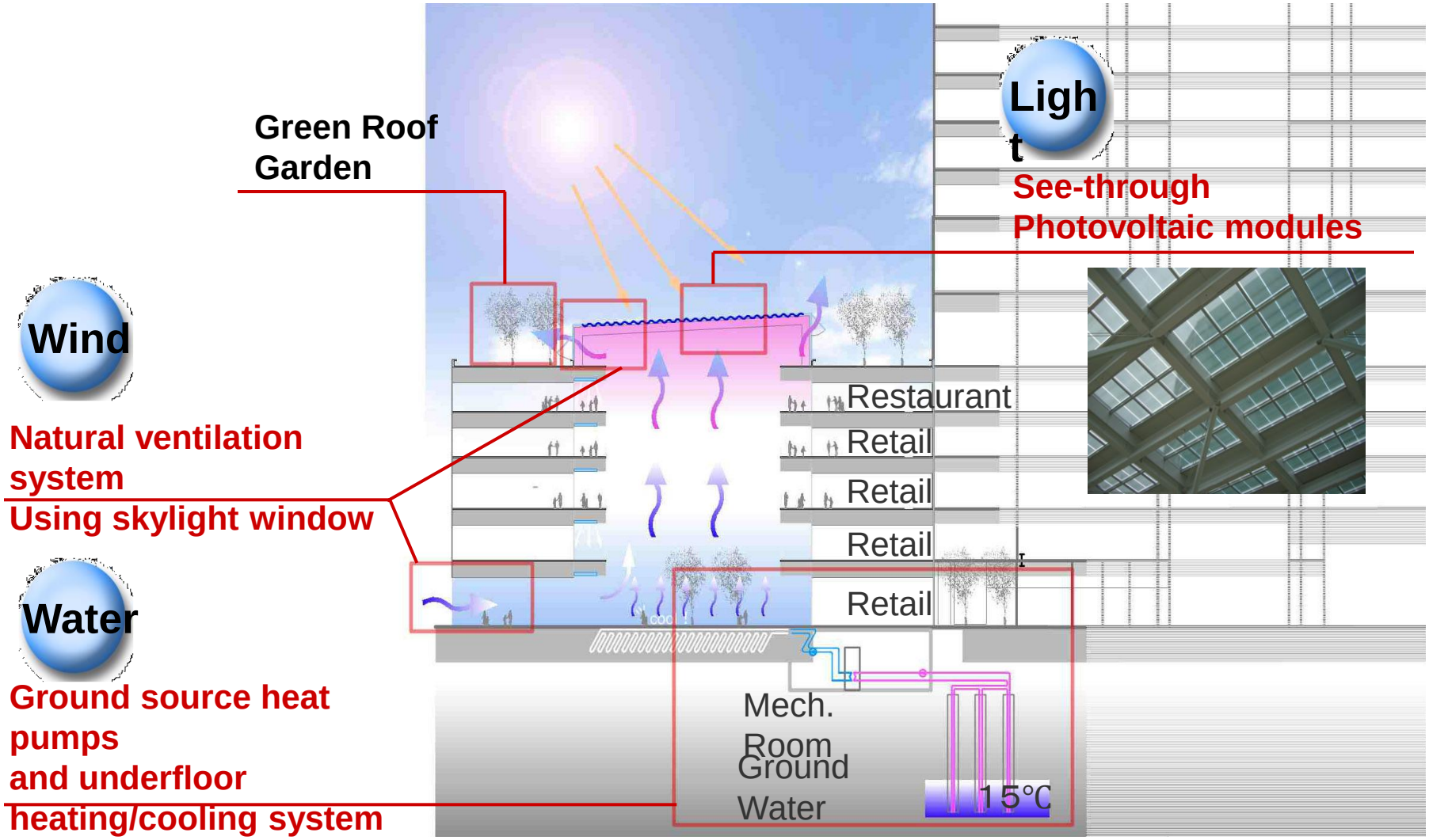
1. **High Performance Shells**
2. **Energy Efficient Equipments**
3. **Renewable Energy Use**
4. **Operations/ Management**
   - --Efficient Operation Systems
   - --Tuning, Commissioning
   - --Tennant Participations

New Buildings

Existing Buildings

Actual Energy Consumption/ Emissions

Incorporating natural energy in the atrium environment



Wastewater Heat Energy Mechanism

Treated sewage water is an untapped energy source that can be used as a coolant for use in heat source equipment using heat exchange

Tokyo Metropolitan Government Bureau Sewerage Shibaura Water Treatment Center

Sewage water 0.68 mil m^3 per day

Discharged into the canal

Treated water temperature
Summer27℃/Winter18℃
（Difference when in use±5℃）

Treated sewage water

0.06mil m^3 per day (MAX)

Treated sewage water
（After utilization of heat）

Sony City

◆Energy Saving

→ Using sewage water heat greatly reduces the electricity and water used by cooling towers in heat source equipment. （Reduced amount of clean water used -95%）

◆Heat Island Prevention

→ All heat emitted to air-condition the building is dissipated to drainage.
（64,000 GJ per year）

Low Emission
Buildings TOP30

Operations/ Management

- Efficient Operation Systems

  BEMS,

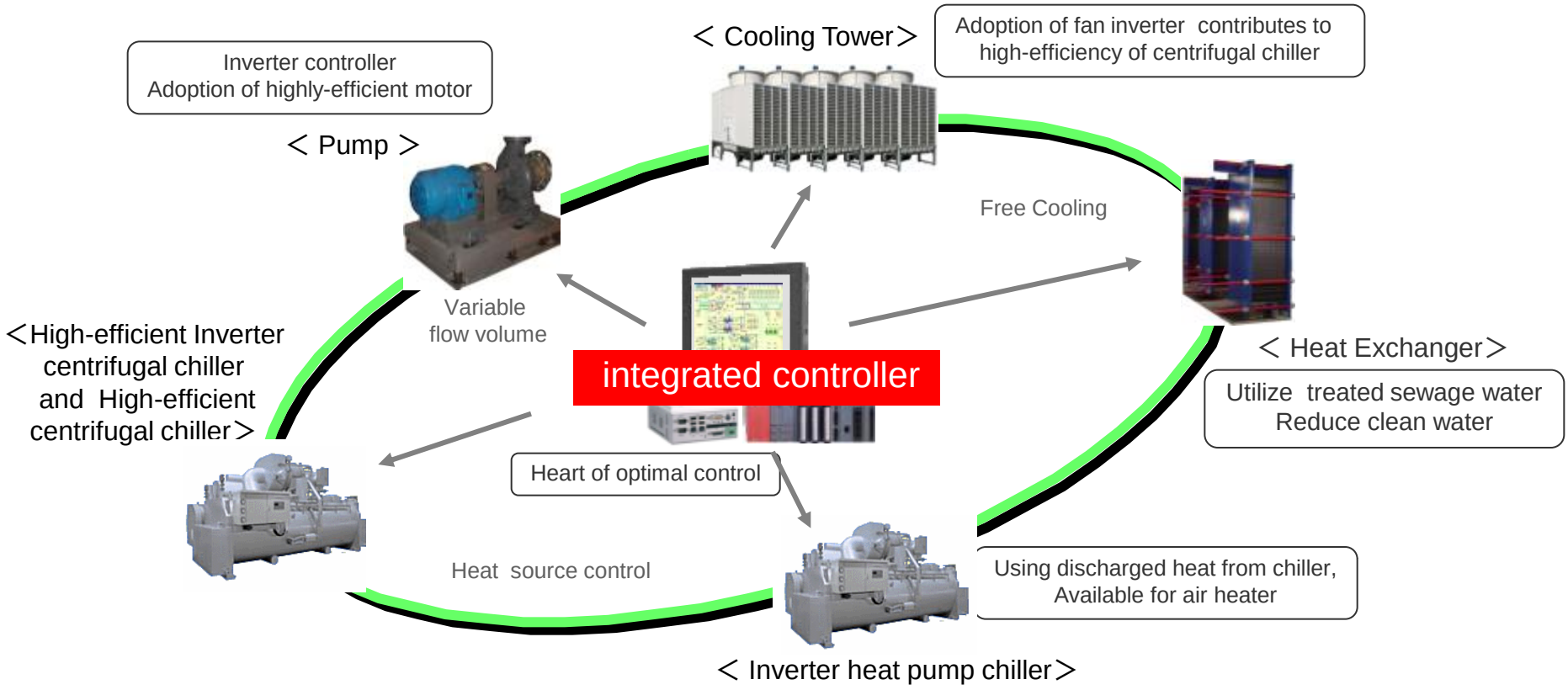
  Tuning, Commissioning

- Tennant Participations

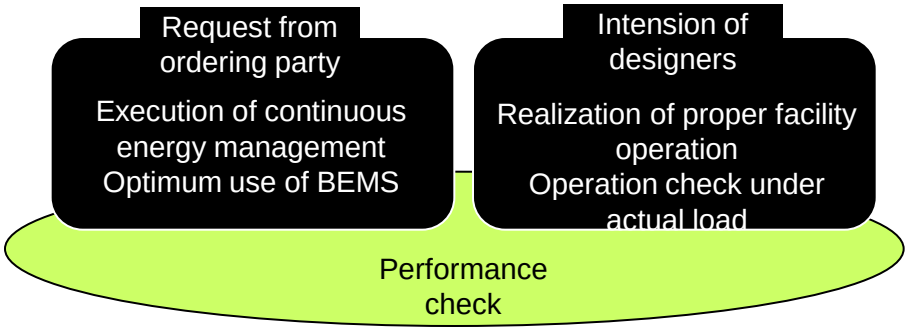
  Incentive system for tenants

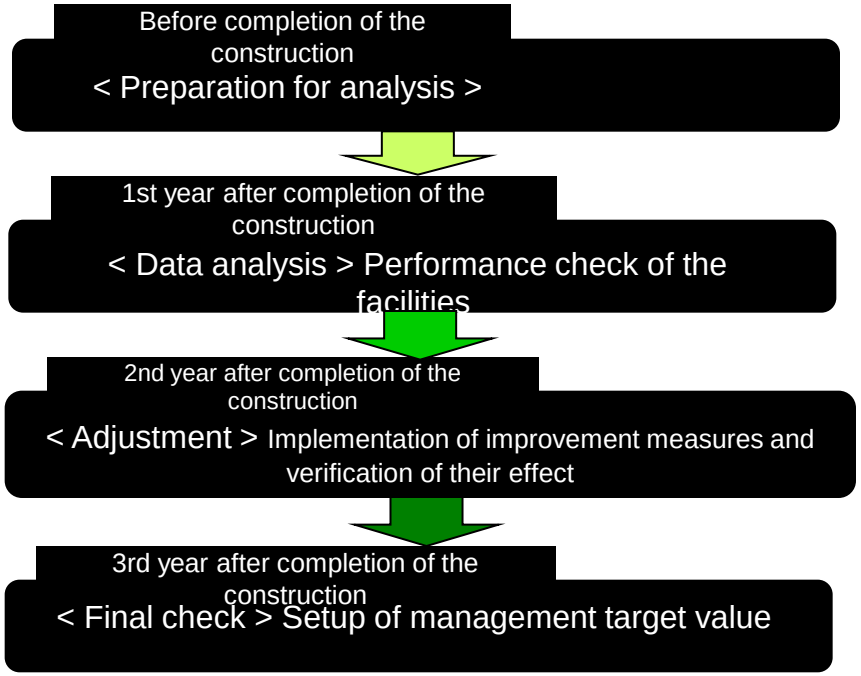
Integrated Heat Source System

Implement optimal control as a whole system by integrated controller to operate each equipment at maximum efficiency



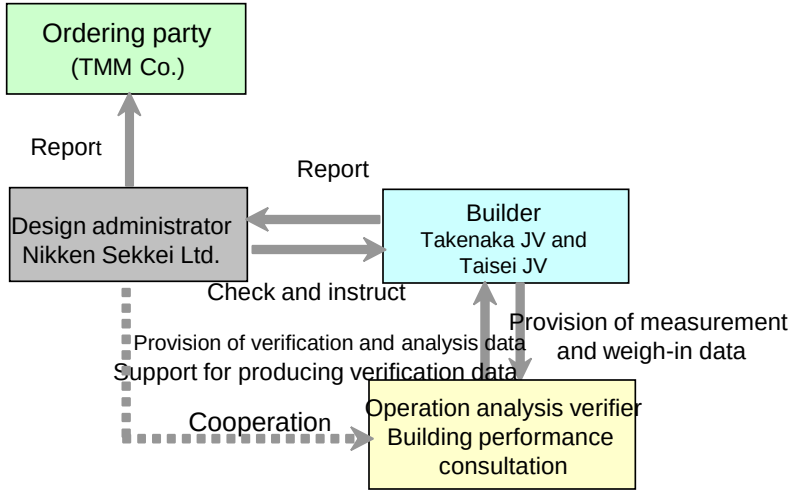
Overview of Performance Check – Objective, Steps and Structure





Date is collected for three years after completion of the construction (from April 2007 to March 2010) and by executing operation status check as well as indoor environment check for heat source and air conditioning systems under actual load whether or not design specifications are satisfied have been verified.

Also optimal operation conditions, indoor environment, and energy source unit according to usage are clarified to establish the operation standard which can be used for facility management after the for 4th year



Key Message

A clear & bold reduction **target**
+ Effective measures

World Green Building Council
Government Leadership Award
"Most Groundbreaking Policy"
To Tokyo

➔ Create vast investments
to facilitate technology diffusion and advance

➔ to be a Low Carbon City