

City-led Building Energy Efficiency Tokyo and Other Cities

20170214 ECCJ

Bureau of Environment

Tokyo Metropolitan Government

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Photo: ICLEI



Actions in Building Sector

Building Action Day Nov. 10th

- ◆ Organized by the Global Alliance for Buildings and Construction
Established at COP21 for 2^o C target

24 states, 73 organization

- ◆ Showcasing and Dialogues

Introducing various initiatives

Policy, Education and awareness-raising

Financing, Market transformation

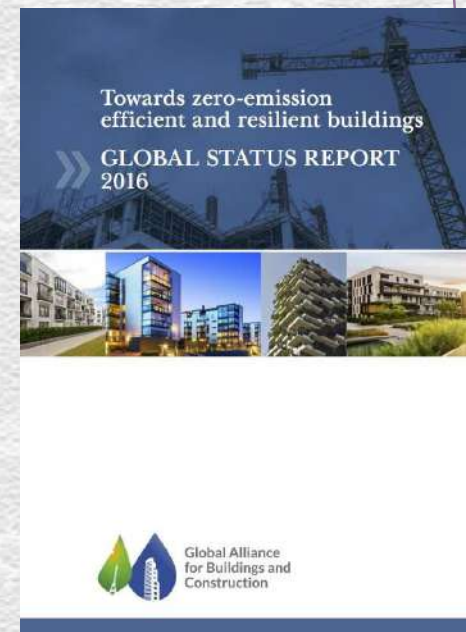
Data, Monitoring

Low-Carbon Buildings

Financing for Low-Carbon Buildings

- ◆ Global Status Report 2016

- ◆ Global Roadmap



Global Roadmap

Toward low GHG and resilient buildings

◆ **Towards energy-efficient, zero GHG emissions and resilient buildings well before the end of the century**

◆ **Key Steps to enable the transition**

1. Implement urban planning policies for energy efficiency
2. Accelerate the improvement of existing buildings' performance
3. All new buildings achieve nearly net zero operating emission performances
4. Improve the management of all buildings
5. Decarbonised energy: decarbonise the energy and power supply for buildings load
6. Reduced embodied energy and GHG emissions: reduce environmental impacts (life cycle approach) of materials and equipment: manufacture (extraction included), transport, maintenance, use and end-of-life

Cities Actions

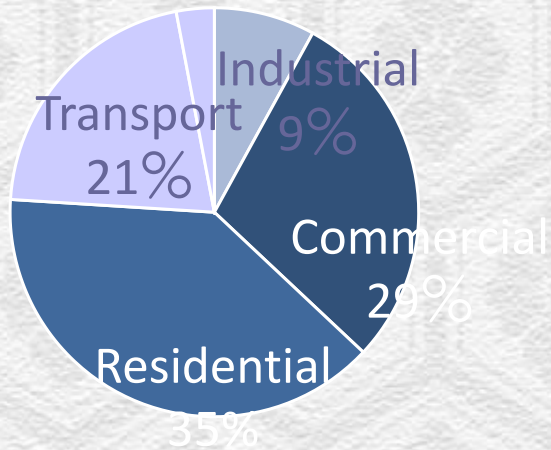
For Building Energy Efficiency



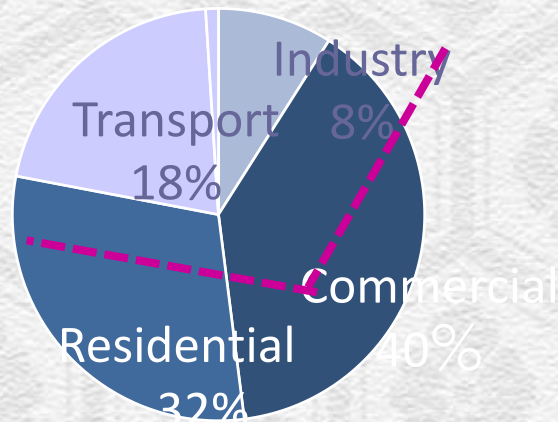
Why Building Sector?

CO2 Emissions by Sector

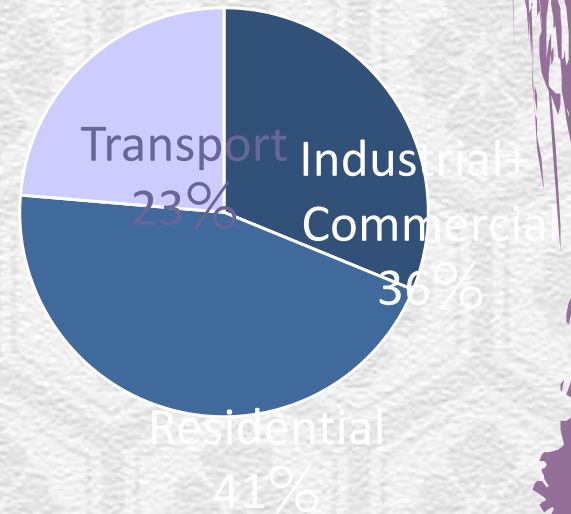
Tokyo, NYC, London



NYC
2014



TMG
2013



GLA 2012

■ Industry ■ Commercial ■ Residential ■ Transportation ■ Other

Policy Development in BEE

(From national level to local level)

~2000

- Energy Certification-Denmark('97)
- US EPA Energy Star Potofolio Manager('99)
- Australia NSW ABGR('99)

2000~2004

- Tokyo Environmental Security Ordinance (ESO) ('00)
- Tokyo Carbon Reduction Reporting
- EU EPBD('02)

2005~2009

- NSW NABERS(national system) ('05)
- CA Energy rating law ('07)
- Tokyo ESO revision('08)- Cap & Trade
- Austin, DC, NYC Enact benchmarking system ('08~)
- EU EPBD revision('09)

2010~

- Tokyo Implementation of Cap & Trade('10)
- Benchmarking in US 19 cities('10~)
- Singapore Building Control Act ('10) –EB law('12)

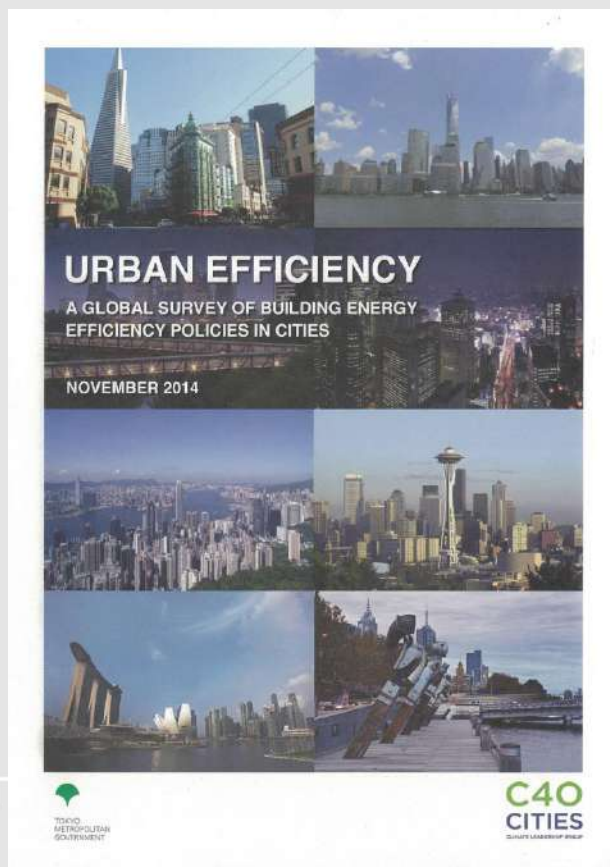
Building Energy efficiency (BEE) Policies in Mega Cities

C40CITIES
CLIMATE LEADERSHIP GROUP

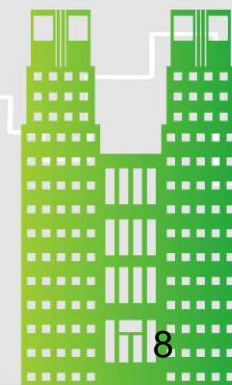
& **Tokyo**

Urban Efficiency A Global Survey of Building Energy Efficiency **Policies** in Cities

- Policy Map
- Best Practices
(Case Studies)



http://www.kankyo.metro.tokyo.jp/en/int/c40/c40_pse_r.html





BEE Policies in Cities—Major measures

- 1 Building energy code/ standard
- 2 Energy/Carbon Reporting and Bench marking
- 3 Energy Audit, Retrocomissioning
- 4 Cap-and-Trade scheme
- 5 Green building Ratings, Energy Performance Labeling, Energy Certifications
- 6 Financial Incentives
- 7 Non-financial Incentives
- 8 Awareness Raising
- 9 Green Lease (Tenant programs)
- 10 Voluntary Leadership Program (eg. Green Building Challenge)
- 11 Government Leadership Program
- 12 Others



Urban Efficiency

Policy Map (Existing buildings)

| Country | China | Japan | Singapore | Australia | | Canada | USA | | | | | | | UK | Sweden | South Africa |
|---|-----------|-------|-----------|-----------|--------|---------|---------|---------|--------------|----------|----------|---------------|---------|--------|-----------|--------------|
| City | Hong Kong | Tokyo | Singapore | Melbourne | Sydney | Toronto | Chicago | Houston | Philadelphia | Portland | New York | San Francisco | Seattle | London | Stockholm | Johannesburg |
| Policy Type | | | | | | | | | | | | | | | | |
| Building energy code | | | | | | | | | | | | | | | | |
| Reporting, Benchmarking | | | | | | | | | | | | | | | | |
| Energy audit, retro-commissioning | | | | | | | | | | | | | | | | |
| Cap & Trade | | | | | | | | | | | | | | | | |
| GB ratings, Energy performance labeling | | | | | | | | | | | | | | | | |
| Financial incentive | | | | | | | | | | | | | | | | |
| Non-financial incentive | | | | | | | | | | | | | | | | |
| Awareness raising campaign | | | | | | | | | | | | | | | | |
| Green lease, tenant program | | | | | | | | | | | | | | | | |
| Voluntary leadership program | | | | | | | | | | | | | | | | |
| Government leadership program | | | | | | | | | | | | | | | | |
| Others | | | | | | | | | | | | | | | | |

| | | | | | |
|--|-----------------|--|--------------------------------------|--|--------------------|
| | City's Programs | | Regional, National, State's Programs | | Partner's programs |
|--|-----------------|--|--------------------------------------|--|--------------------|



Reporting and Benchmarking

Monitoring and reporting of energy consumption and GHG/CO2 emissions

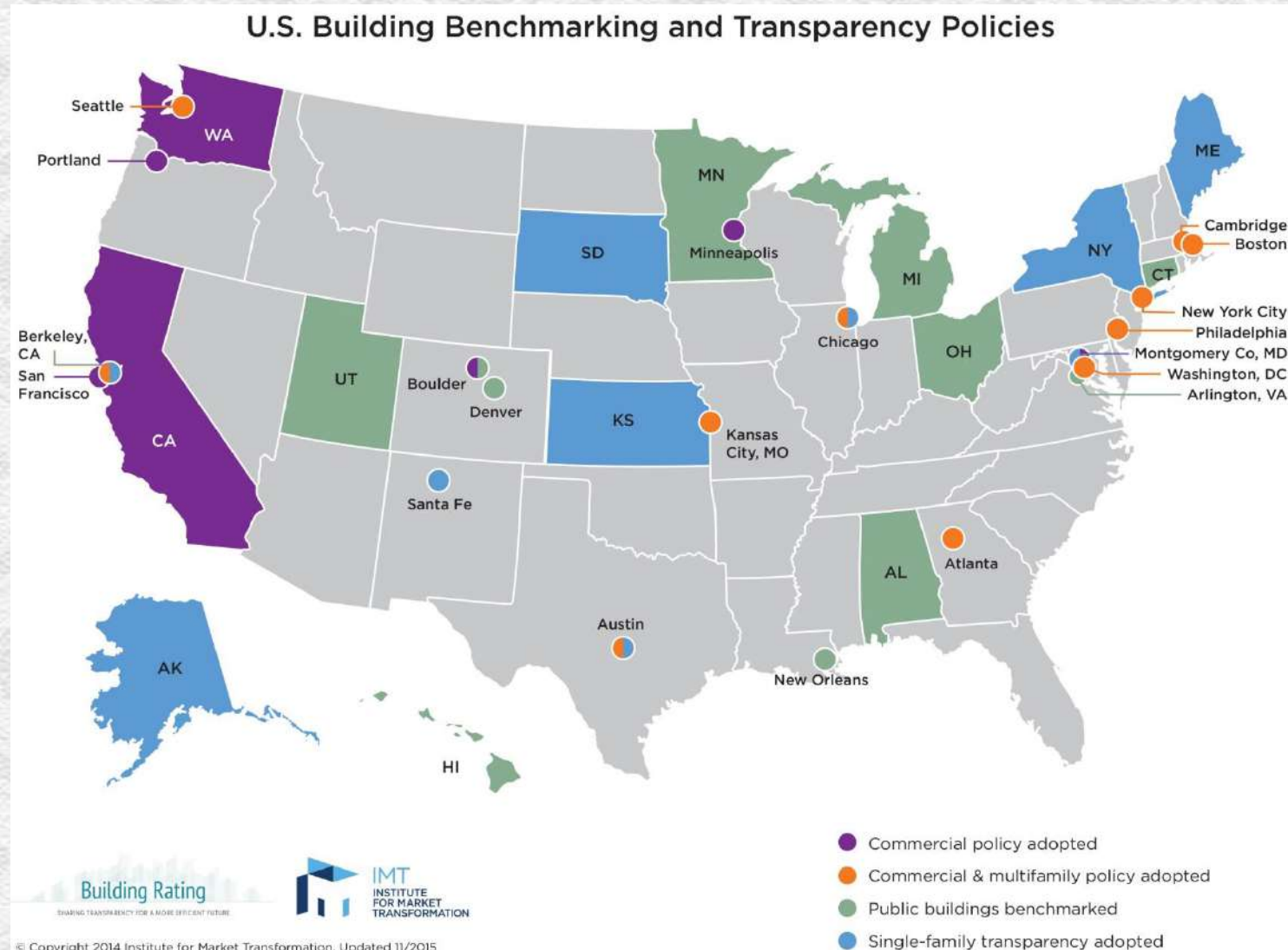
+ Benchmarking, rating, and disclosure requirement

- **US** Introduced in 18 cities, 1 county, 2 states
 - ⇒ Scope: Non-residential, multifamily, municipal above 10,000ft² ~ 50,000ft²
 - ⇒ Using “Energy Star” Portfolio Manager
 - ⇒ Yearly reporting, Benchmarking, Scoring, Disclosure on the website
 - ⇒ Energy and water consumption
- **Japan** Introduced in major cities
 - ⇒ Scope: Non-residential, municipal buildings above 1500 litter (Crude oil equivalent) fuel consumption
 - ⇒ Guidelines by the MOE, CO2 and energy
 - ⇒ Yearly reporting, Disclosure on the website some with ratings and benchmarking
- **Singapore** Non-residential above 15,000m², Online submission, equipment info.





Benchmarking in the US





Various Types of Reporting Program

Mandatory or Voluntary

Scope:

**Public and/or Private, Commercial/Industrial/Residential
Large/Medium Including tenants/ only base building**

Reporting target/ Contents:

**Energy consumption/GHG, CO2 emissions/ Water consumption
Include reduction plan, equipment facilities status, design
performance**

Submission, Template:

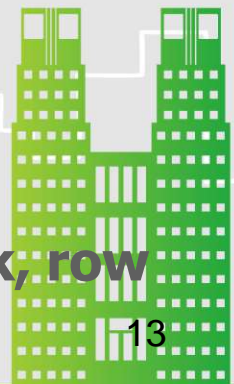
**Online, Nation-wide platform (Energy star), Local specific
template**

Assessment

Benchmarking, Rating,

Disclosure:

**On the website, By request/ Including score, benchmark, row
data**





Program Development in Reporting & Benchmarking

C40 Survey: 12 Cities (2011) \Rightarrow 30 Cities
Coverage in the US 6. billion square ft²/ year



- **Expanding Coverage**

Scale of buildings

ex. NYC: 50,000ft² \Rightarrow 2500ft² , Tokyo: large buildings \Rightarrow all

Building use

Municipal buildings + Non-residential + Multifamily

- **More Transparency (Disclosure)**

Disclosing on the website

- **Policy Mix**

Energy audit, Retro-commissioning, Consulting...





Energy Audit, Retro-commissioning

- **Energy Audit**

To assess the status of energy use of building through the required procedure by qualified experts, and to propose retrofit and operational improvements

(The assessment of building system and equipment when they used, and also includes analysis and proposal on measures to reduce energy consumptions)

- **Retro-commissioning**

To check the performance of equipment of buildings and implement actual operational improvement by experts

(Mainly operational tunings in the most efficient way based on the design)



Energy Audit, Retro-commissioning

- **NYC** Target buildings : Above 50,000ft² (Expanded to 20,000ft²) Including Multifamily
=About 23000Buildings, !/2 of total NYC building stock
Scope : Building envelope, HVAC, Lightings system (Base building)
Every 10years (from 2011) Notification 3yrs before the deadline
Qualified auditor + Retrocommissioning
OK by Energy Star, LEED
ASHRAE level 2 standard/ Contents, process and procedure are regulated by local law
- **SF** Target buildings: Above 10,000ft² Air Conditioned Area; ASHRAE level 1
Above 50,000ft² ;Level 2
Non residential, whole building
=about 1900 Buildings, 450Municipal buildings
Every 5 yeas from 2012 Notification by 1yr before the deadline
Qualified auditor or Retrocommissioning
OK by Energy Star, LEED
Certification of Energy Efficiency Audit (submission required)



Energy Audit, Retro-commissioning

- **Singapore**

target buildings : above 15,000m²Non-residential buildings(New and Existing)

Scope : Chiller

Every 3 years (from 2014~) Using “Green Mark” for assessment

Audit by a qualified auditor

Contents and procedure are regulated in the code ⇒ When the performance does not meet the standard, audited results are required to be carried out

Reporting required(common template) with data for a week, Equipment drawings, etc.

- **Hong Kong** : Non-residential, Mixed use buildings (except small buildings, historic buildings)

Scope: Every 10 years from 2012

Audit by a qualified auditor

Energy Audit Form (submission required)⇒ Display at the entrance

- **Tokyo**: Free energy audit/ assessment for small and medium sized buildings

- **EU** **EED**(Energy Efficiency Directive 2012)Energy audit requirement for large companies

- **UK** **ESOS**(Energy Saving Opportunity Scheme Regulation), OK by ISO5001, DEC, etc.

Buildings being used by large companies: Every 4 years from 2015

BEE Policy in Cities --Summary

Growing BEE programs for existing buildings

- Energy/ Carbon Reporting and Benchmarking
- Energy Audit/ Retro commissioning

More Policy Mix

- Various Incentive programs
- More compressive, holistic approach for effective

Various Partnerships

- NGOs, International organizations, experts...



**Toward low carbon cities
Scael up & Speed up!**

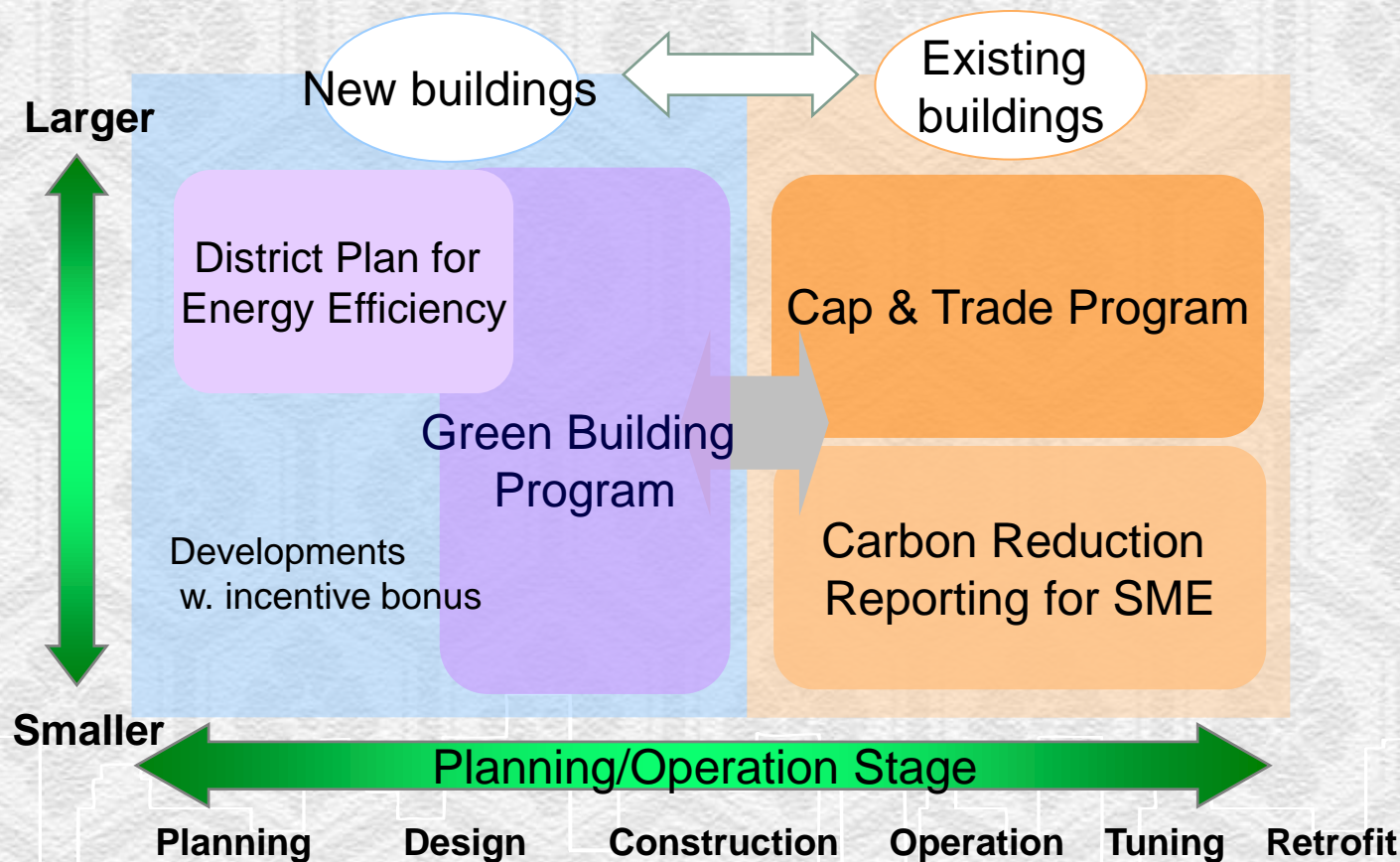
Tokyo's Case



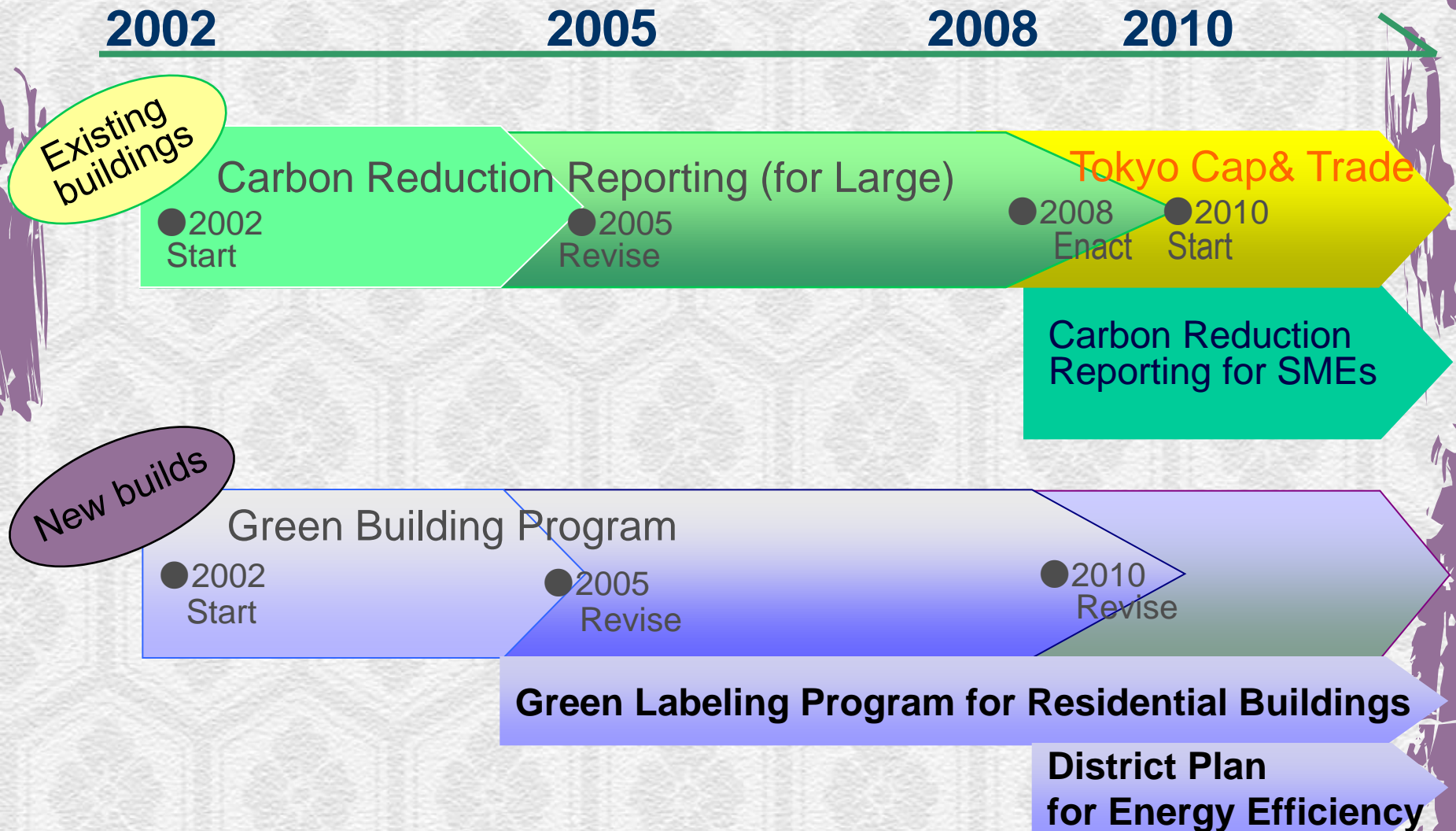
Outline of the Tokyo's Building Energy Efficiency Policy

Tokyo's Policy Framework

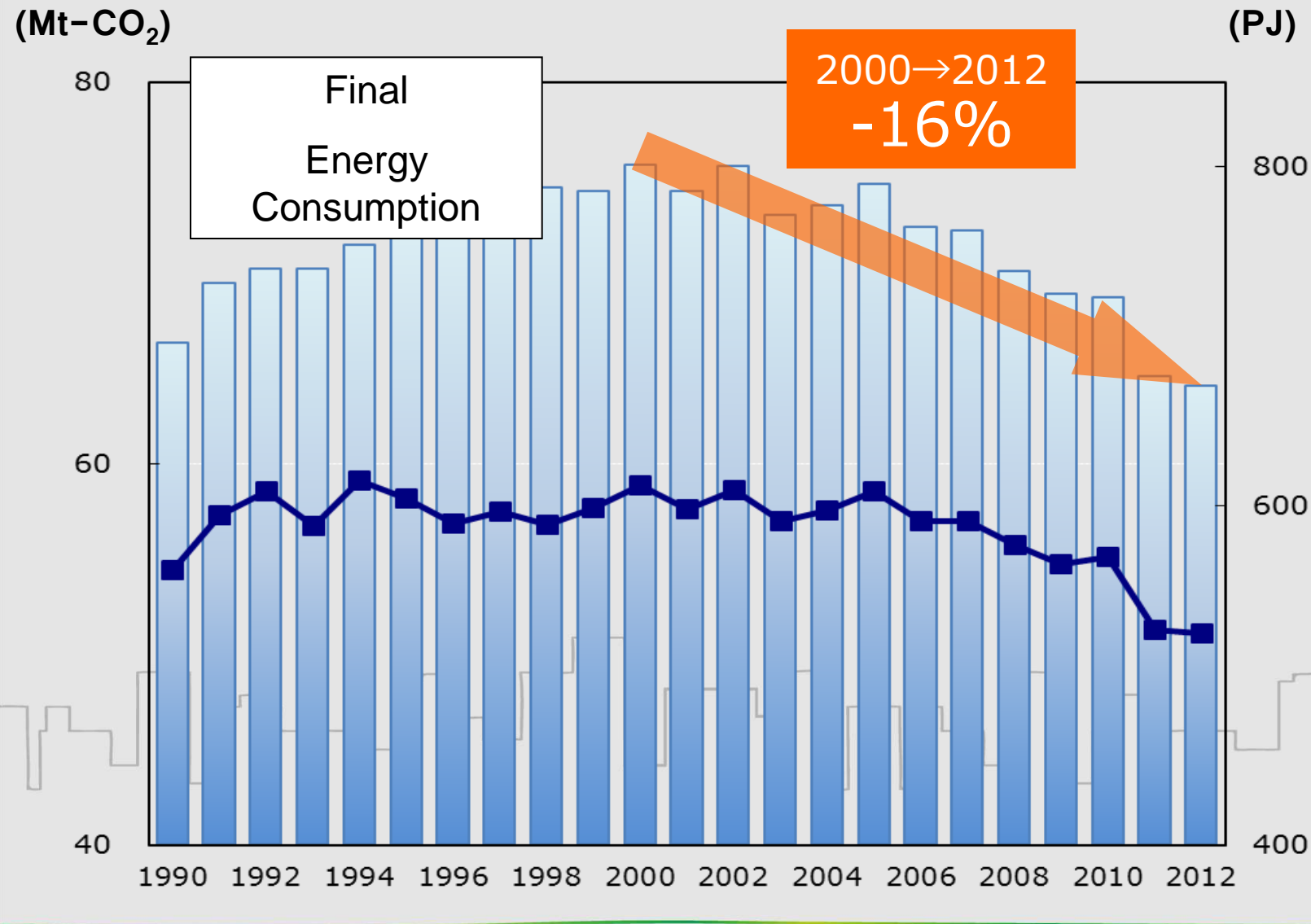
Policy Linkages & Policy Developments



Tokyo's Policy Development



Energy Consumption Trend in Tokyo



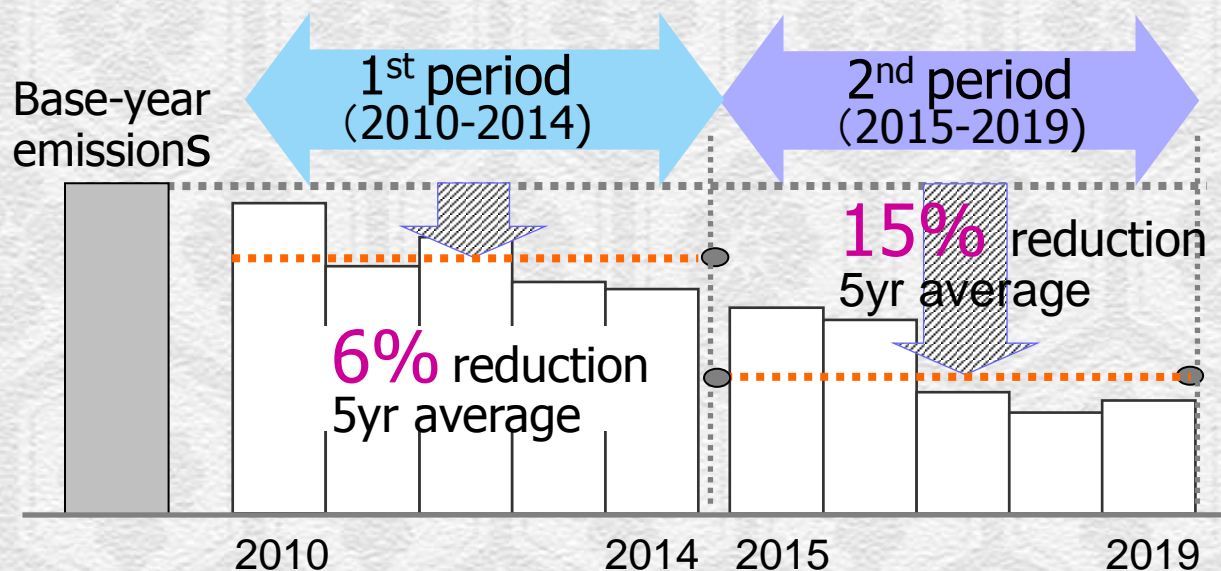
Tokyo Cap-and-Trade 1

Cap, Covered Facilities, Cap Settings

Cap (Total emissions allowed for the covered sector) was designed to enable Tokyo to achieve "-25% by 2020" emission target

Setting cap on emissions from 1,300 facilities (Mainly commercial bldgs.), accounting for 20% of Tokyo's total emissions

Under the cap, each building is obligated to reduce emissions by 6-8 % (first period) and 15-17% in the second period



Tokyo Cap-and-Trade 2

Trade and Offset

Emission Trading:

Trade scheme can be utilized by owners to fulfill their obligations

Tradable allowances are limited to the excess reductions over compliance obligations

MRV: Monitoring and annual reporting are required

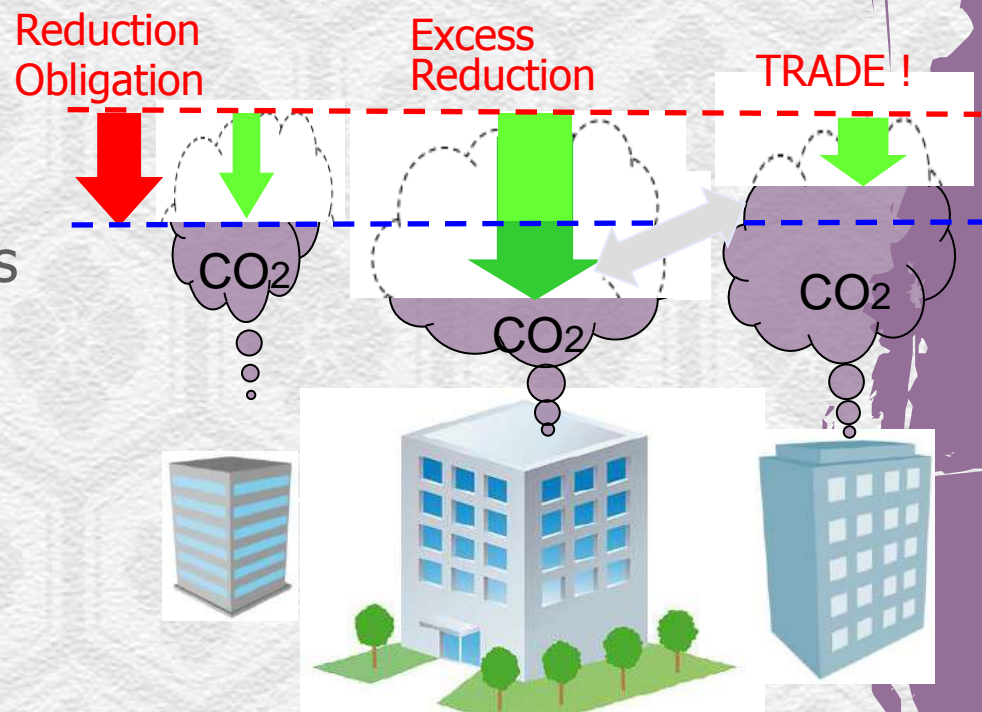
Verification system established for the program

Offset systems:

Renewables, emission reductions in small facilities, etc.

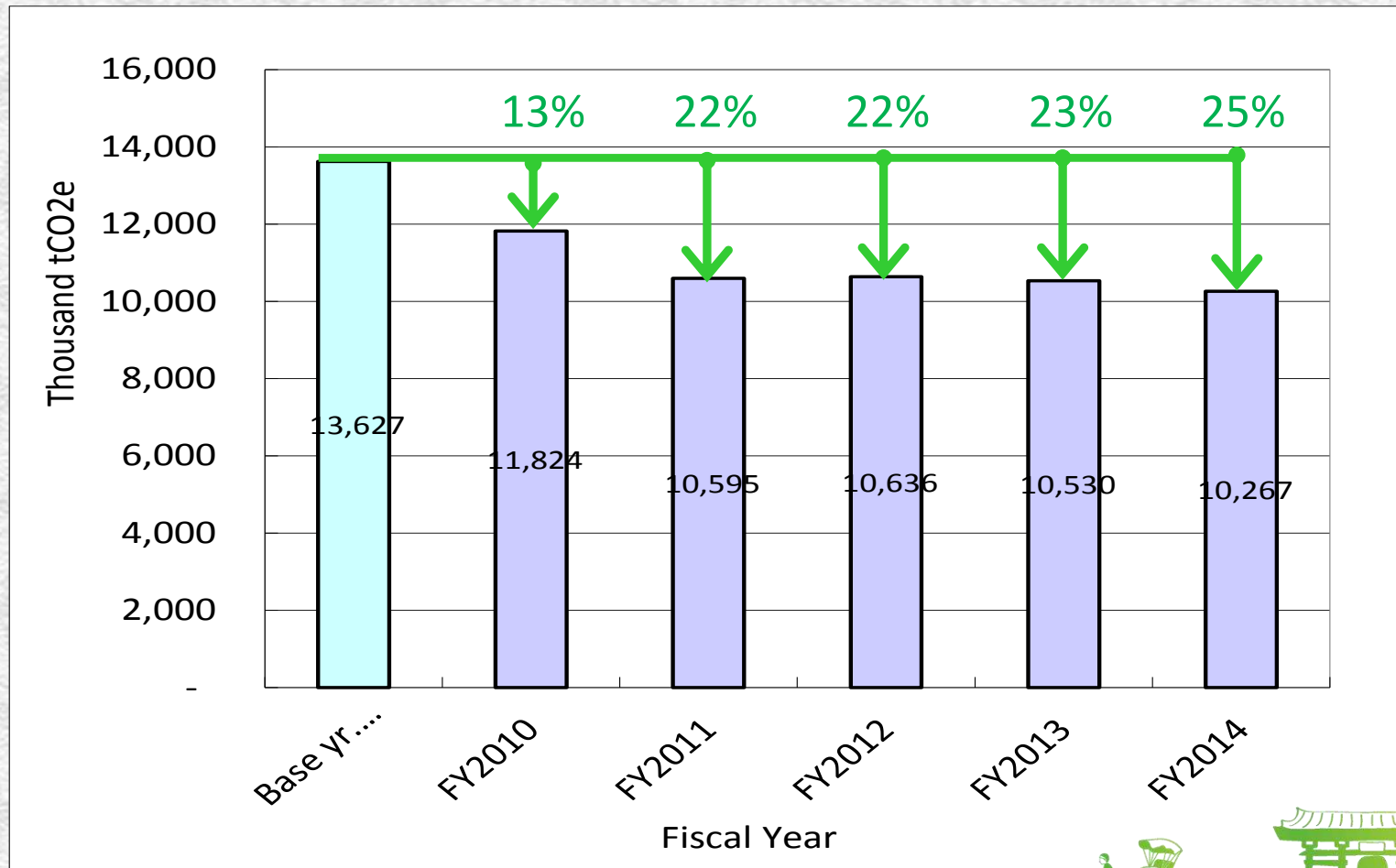
Linkage:

Link with the C&T of an adjacent prefecture



Tokyo's Cap-and-Trade: Result in the first five years

CO2 emission reductions



Carbon Reduction Reporting for Small and Medium Facilities

Target:

Small & medium emitters not covered by the Tokyo C&T

Requirement: Mandatory reporting

Reporting annual CO₂ emissions & their plan for reductions

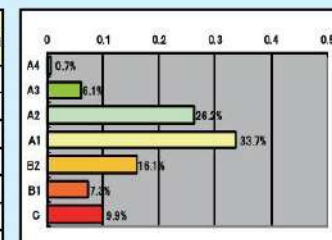
Disclose on the TMG website

**Over 34,000 facilities, 2, are reporting,
including 10,000 voluntarily**

Benchmarking & Certification Program lunched additionally
22 building-use categories in 7 ratings

2. Medium-sized Buildings for Rent (3,000 m² or larger but smaller than 10,000 m²)

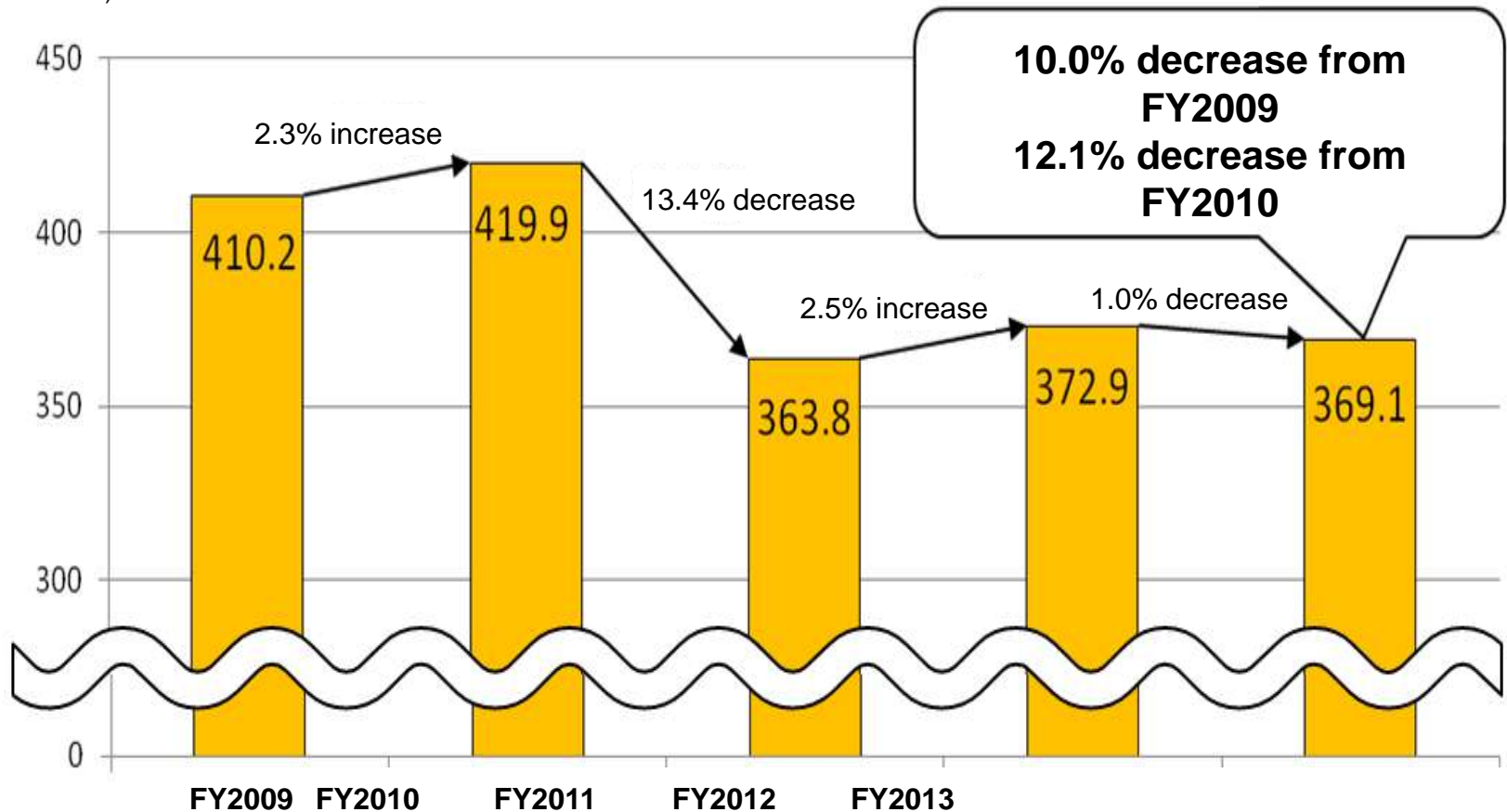
| Range | Basis | Emission Intensity (kg / m ²) | | | Number of Facilities | Percentage | Average Floor Area |
|-------|---------------------------------|---|------|-------|----------------------|------------|--------------------|
| A4 | 0.25 or less | 19.6 or less | | | 7 | 0.7% | 4988.83 |
| A3 | More than 0.25 but 0.50 or less | More than 19.6 but 39.1 or less | | | 58 | 6.1% | 5063.63 |
| A2 | More than 0.50 but 0.75 or less | More than 39.1 but 58.6 or less | | | 250 | 26.2% | 5526.83 |
| A1 | More than 0.75 but 1.00 or less | More than 58.6 but 78.1 or less | | | 321 | 33.7% | 5444.23 |
| B2 | More than 1.00 but 1.25 or less | More than 78.1 but 97.7 or less | | | 153 | 16.1% | 5930.80 |
| B1 | More than 1.25 but 1.50 or less | More than 97.7 but 117.2 or less | | | 70 | 7.3% | 5981.22 |
| C | More than 1.50 | More than 117.2 | | | 94 | 9.9% | 5537.81 |
| | | Average intensity | 78.1 | Total | 953 | 100% | 5566.20 |



Carbon Reduction Reporting for SMEs --Results

Total CO₂ emissions of facilities which have submitted the report continuously for 5 years
(target facilities: 23,069)

(Ten thousand tons)



After FY2011, the emission was decreased by approximately 10% continuously in comparison with FY2009.

* Calculated by fixing the electricity emission coefficient at 0.382t-CO₂/thousand kWh.

Further Steps



Networking among cities
Supporters of cities' Actions

BEE Policy in Cities

For further development

International Cooperation among cities works!

--Network of cities

--Peer to peer cooperation

To share experiences, To discuss common issues



BEE Policy in Cities

For further development

**Look for Supporters
Creating Partnerships**

**Needs for capacity building, Financial support,
Knowledge bank...**

- National/ Regional/ State Governments**
- NGOs**
- Business Organizations**
- Experts, Academics**



Toward Decarbonization

Scale up & Speed up!

