City-led Building Energy Efficiency
Tokyo and Other Cities

20170214 ECCJ
Bureauor Environment
Tokyo Metropolitan Government
Yuko Nishida
ACITON COP: COP22
Building sector and Cities

Photo: ICLEI
Actions in Building Sector
Building Action Day  Nov. 10\textsuperscript{th}

- Organized by the Global Alliance for Buildings and Construction
  Established at COP21 for 2\degree \textdegree 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
Why Building Sector?
CO2 Emissions by Sector
Tokyo, NYC, London

- **NYC 2014**
  - Residential: 35%
  - Commercial: 29%
  - Industrial: 9%
  - Transport: 21%

- **TMG 2013**
  - Residential: 41%
  - Commercial: 36%
  - Transport: 18%

- **GLA 2012**
  - Residential: 41%
  - Commercial: 36%
  - Transport: 23%

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**Sources:**
NYC, GLA, TMG
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

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 Benchmarking
3. Energy Audit, Retrocommissioning
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 (e.g., Green Building Challenge)
11. Government Leadership Program
12. Others
## Urban Efficiency

### Policy Map (Existing buildings)

<table>
<thead>
<tr>
<th>Country</th>
<th>China</th>
<th>Japan</th>
<th>Singapore</th>
<th>Australia</th>
<th>Canada</th>
<th>USA</th>
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Legend:
- 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 buildings above 10,000ft\(^2\) ~ 50,000ft\(^2\)
  ⇒ 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 15,000m\(^2\), Online submission, equipment info.

* AUS NABERS, EU EPBD, Requirement of EPC (New buildings and at sales/lease)
Benchmarking in the US

U.S. Building Benchmarking and Transparency Policies

- Seattle, WA
- Portland, OR
- Berkeley, CA
- San Francisco, CA
- Denver, CO
- Austin, TX
- Atlanta, GA
- New Orleans, LA
- New York City
- Philadelphia
- Montgomery Co, MD
- Washington, DC
- Arlington, VA

Legend:
- Purple: Commercial policy adopted
- Orange: Commercial & multifamily policy adopted
- Green: Public buildings benchmarked
- Blue: Single-family transparency adopted

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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) ⇒ 30 Cities
Coverage in the US 6. billion square ft²/year

• Expanding Coverage
  Scale of buildings
  ex. NYC: 50,000ft⇒2500ft², Tokyo: large buildings⇒all
  Building use
    Municipal buildings + Non-residencial + 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 23000 Buildings, 1/2 of total NYC building stock
  Scope: Building envelope, HVAC, Lightings system (Base building)
  Every 10 years (from 2011) Notification 3 yrs before the deadline
  Qualified auditor + Retrocommissioning
  OK by Energy Star, LEED
  ASHRAE level 2 standard/ Contents, process and procedure are regulated by local law
  Energy Efficiency Report (submission requirement), Data Collection Tool

- SF
  Target buildings: Above 10,000ft² Air Conditioned Area; ASHRAE level 1
    Above 50,000ft² ; Level 2
    Non residencial, whole building
  =about 1900 Buildings, 450 Municipal buildings
  Every 5 years from 2012 Notification by 1 yr 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 15,000m² Non-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
Scale up & Speed up!
Tokyo’s Case

Outline of the Tokyo's Building Energy Efficiency Policy
Tokyo's Policy Framework

Policy Linkages & Policy Developments

Planning         Design        Construction     Operation    Tuning    Retrofit

New buildings

District Plan for Energy Efficiency

Existing buildings

Cap & Trade Program

Carbon Reduction Reporting for SME

Planning/Operation Stage

Planning   Design   Construction   Operation   Tuning   Retrofit

Smaller

Larger

Green Building Program

Developments w. incentive bonus
Energy Consumption Trend in Tokyo

Final Energy Consumption (Mt-CO₂)

2000→2012 -16%
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.
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

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Thousand tCO2e</th>
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<tbody>
<tr>
<td>Base Yr.</td>
<td>13,627</td>
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<tr>
<td>FY2010</td>
<td>11,824</td>
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<tr>
<td>FY2011</td>
<td>10,595</td>
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<tr>
<td>FY2012</td>
<td>10,636</td>
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<tr>
<td>FY2013</td>
<td>10,530</td>
</tr>
<tr>
<td>FY2014</td>
<td>10,267</td>
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</tbody>
</table>

CO2 emission reductions: 13%, 22%, 22%, 23%, 25%
Carbon Reduction Reporting for Small and Medium Facilities

**Target:**
Small & medium emitters not covered by the Tokyo C&T

**Requirement:** Mandatory reporting
Reporting annual CO\(_2\) emissions & their plan for reductions
Disclose on the TMG website

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

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

The most-used energy measurement and tracking tool for commercial buildings.
Toward Decarbonization
Scale up & Speed up!