Overview of the recent Building Energy Efficiency related situation in Japan and ASEAN

5 June 2018, Manila

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International Cooperation Division,
The Energy Conservation Center, Japan
1. History of the discussion of BEC (Building Energy Codes)/GBC (Green Building Codes) between Japan & ASEAN

2. Major points of discussion now
   (1) Mandatory Building Codes
   (2) Net-zero energy consumption in buildings

3. Possible synergy between BEA & ECCJ
   (1) ECCJ’s side
      ➢ Simulation tool (Energy Conservation target Tool etc.)
      ➢ EE&C Benchmarking System for various use of building
   (2) BEA side
      ➢ Approach and measures useful for Asia-Pacific Region

<Abbreviation>
### History of the discussion of BEC/GBC between Japan & ASEAN

<table>
<thead>
<tr>
<th>Date</th>
<th>WS name</th>
<th>AEA</th>
<th>BEC/GBC</th>
<th>BEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 2013</td>
<td>ECAP4</td>
<td>• Green Building Category</td>
<td>• Evaluation Standard revision (Energy Management Category)</td>
<td></td>
</tr>
<tr>
<td>Dec. 2014</td>
<td>ECAP7</td>
<td>Discussion of CASBEE (Green Building Category)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 2015</td>
<td>SEforALL Tokyo Forum</td>
<td></td>
<td>• Philippines: GBC established in 2015</td>
<td>1) City-led policies for Building Energy Efficiency</td>
</tr>
<tr>
<td>Nov. 2015</td>
<td>ECAP9</td>
<td>Evaluation Standard &amp; BOJ Procedure</td>
<td>• present status of JBEC &amp; ASEAN BEC</td>
<td>2) Smarter Urban transport infrastructure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Best Practice case study (Tokyo MG)</td>
<td>3) Optimization of the District Energy System</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4) Way Forward for the Promotion of EE&amp;C in the Expanded City Area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>WS name</th>
<th>AEA</th>
<th>BEC/GBC</th>
<th>BEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 2017</td>
<td>SEforALL Tokyo WS</td>
<td></td>
<td>• Law Enforcement of the BEC in Japan</td>
<td>• BEC-driver for the EE&amp;C for the building</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Calculation method of the primary energy consumption</td>
<td>• BEC enforcement-poor status in SEA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• introduction of the benchmark system</td>
<td>• Refer to the BP in country, city and district</td>
</tr>
<tr>
<td>Nov. 2017</td>
<td>ECAP14</td>
<td>• BOJ procedure-ML's proposal</td>
<td>• Implication of the mandatory BEC execution in Japan</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• ZEB -Special Submission sub-category</td>
<td>• Benchmark system in Japan-work in progress</td>
<td></td>
</tr>
</tbody>
</table>
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The compliance rate for the Energy Conservation Standards of new buildings is about 90%, which is quite high, but the compliance rate of newly built residential housing is only about 40% to 50%.

(The reason for the rise in the compliance rate for residential housing from 2009 to 2010 was due to the impact of the Residential Eco Point program.)

* Estimated values, based on a survey for the distribution of residential housing units according to the levels of thermal insulation, were used as the figures up to FY2009 and estimated values (tentative values), based on the number of units for which residential housing Eco Points were issued (single dwelling residential housing) and the number of notifications submitted (for multiple dwelling residential buildings, etc.) under the Energy Conservation Law, were used as the figures for FY2010.
### Change of the regulation of BEC after 2017 in Japan

<table>
<thead>
<tr>
<th>Large-scale buildings</th>
<th>Non-Residential</th>
<th>Residential</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000 m² or larger</td>
<td>Type 1 Specified Buildings</td>
<td><strong>Notification obligation</strong> [In the case where the response is noticeably insufficient, give instructions, orders, etc.]</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Notification obligation</strong> [In the case where the response is noticeably insufficient, give recommendations]</td>
</tr>
<tr>
<td>Medium-scale buildings</td>
<td>Non-Residential</td>
<td>Residential</td>
</tr>
<tr>
<td>300 m² or larger, less than 2,000 m²</td>
<td>Type 1 Specified Buildings</td>
<td><strong>Notification obligation</strong> [In the case where the response is noticeably insufficient, give instructions, orders, etc.]</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Notification obligation</strong> [When the standards are not complied with, give instructions, orders, etc. when necessary]</td>
</tr>
<tr>
<td>Small-scale buildings</td>
<td>Residential</td>
<td>Effort obligation</td>
</tr>
<tr>
<td>Less than 300 m²</td>
<td></td>
<td><strong>Effort obligation</strong> [Give recommendations, orders, etc. when necessary]</td>
</tr>
</tbody>
</table>

**Act on the Rational Use of Energy**

**Act on the Rational Use of Energy for Buildings**

**Compliance obligation** [Linked to building confirmation procedures]

**Notification obligation** [When the standards are not complied with, give instructions, orders, etc. when necessary]
Status of BEC/GBC in ASEAN &
Effective use of AEA for the improvement of the situation

➢ Status is different country by country. ASEAN tries to use award system as a driving force.

**<BEC/GBC related status quo>**

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-category</th>
<th>Brunei</th>
<th>Cambodia</th>
<th>Indonesia</th>
<th>Lao PDR</th>
<th>Malaysia</th>
<th>Myanmar</th>
<th>Phillipines</th>
<th>Singapore</th>
<th>Thailand</th>
<th>Vietnam</th>
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</thead>
<tbody>
<tr>
<td>EC Law/ Regulations</td>
<td>Existence</td>
<td>○</td>
<td>UP</td>
<td>○</td>
<td>UP</td>
<td>○</td>
<td>Draft</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>(Enforced in)</td>
<td></td>
<td>2014</td>
<td>2009</td>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Building Efficiency Codes</td>
<td>Mandatory</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>Labeling System</td>
<td>EEBuilding</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Green Building</td>
<td></td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
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<td>○</td>
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<td>○</td>
</tr>
<tr>
<td>Award program</td>
<td>EEBuilding</td>
<td>○</td>
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<td>○</td>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>Green Building</td>
<td></td>
<td>○</td>
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<td>○</td>
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<td></td>
<td>○</td>
<td>○</td>
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</tr>
</tbody>
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**<AEA – Driving force of the BEC’s realization>**

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Efficient Building</td>
<td>New &amp; Existing Building</td>
</tr>
<tr>
<td></td>
<td>Retrofitted Building</td>
</tr>
<tr>
<td></td>
<td>Tropical Building</td>
</tr>
<tr>
<td></td>
<td>Special Submission</td>
</tr>
<tr>
<td></td>
<td>Cutting Edge Technology</td>
</tr>
<tr>
<td></td>
<td>Appropriate Technology</td>
</tr>
<tr>
<td></td>
<td>ZEB</td>
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<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-category</th>
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</thead>
<tbody>
<tr>
<td>Energy Management</td>
<td>Building -Small &amp; Medium</td>
</tr>
<tr>
<td></td>
<td>ditto -Large</td>
</tr>
<tr>
<td></td>
<td>Industry- small &amp; Medium</td>
</tr>
<tr>
<td></td>
<td>ditto -Large</td>
</tr>
<tr>
<td></td>
<td>Special Submission</td>
</tr>
<tr>
<td></td>
<td>Building</td>
</tr>
<tr>
<td></td>
<td>Industry</td>
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<thead>
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<th>Sub-category</th>
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</thead>
<tbody>
<tr>
<td>Green Building</td>
<td>Small &amp; Medium Building</td>
</tr>
<tr>
<td></td>
<td>Large Building</td>
</tr>
<tr>
<td></td>
<td>ZEB</td>
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   (2) BEA side
      - Approach and measures useful for Asia-Pacific Region

<Abbreviation>
AEA: ASEAN Energy Award
AJEEP: ASEAN & Japan Energy Efficiency Program
BEA: Building Efficiency Accelerator
BEC: Building Energy Codes
EE&C: Energy Efficiency & Conservation
GBC: Green Building Codes
Realization Plan of the ZEB

Future visions

【Residential Building】
- Target: net – Zero - Energy Houses (ZEH) available by 2020. (standardized type, newly built only)
- Realization: ZEHs in average newly built houses by 2030.

【Commercial Building】
- Realization: ZEBs in average newly constructed public and private buildings by 2030.
Various Energy Conservation Technologies contributable to ZEBs and Their level of magnitude

- **Standard case**
- **Primary energy consumption** (MJ/m²/Year)

- **Passive architecture** (High heat insulation, shielding of insolation)
- **High-efficiency heat sources** (About 20% more efficient than current ones)
- **Utilization of natural energy** (Outer air cooling, etc., night purge, outer air intake control based on indoor CO₂ concentration)
- **Low-consumption transportation** (Full adoption of inverters, etc.)
- **High-efficiency lighting** (1/3 of current power consumption)
- **Low-consumption OA equipment** (Servers with 1/2 power consumption, PCs with 1/12 power consumption)
- **Other power consumption** (Security and disaster preventive devices and standby energy electric devices with 1/3 power consumption)
- **Photovoltaic power generation** (Double efficiency, installed over 2/3 of roof area)
Energy Reduction Efforts have to be evaluated country by country

Energy Consumption Level

Baselines can be different country by country

Country A
Country B
Country C
Country D

Reduction efforts which should be evaluated

Plan for achieving net ZERO
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Some application tools are available for free. Now English version is expected.
<Reference> Simulation Results using ECTT

Results of step by step Calculation (1) Office

The effect by high efficiency equipment & inverter

![Graph showing percentage differences](chart1)

<table>
<thead>
<tr>
<th>NO.</th>
<th>Items</th>
<th>Base</th>
<th>8</th>
<th>8-9</th>
<th>8-10</th>
<th>Note</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Adjust Rm tem 24</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>Adjust Rm tem</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>Reduce outdoor air</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>4</td>
<td>Reduce lighting (numbers &amp; using hour)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>5</td>
<td>Reduce outlet (power &amp; using hour)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>Human motion sensors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>Hf lighting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>Total heat exchangers</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>9</td>
<td>Install an inverter</td>
<td>○</td>
<td>○</td>
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<td></td>
</tr>
<tr>
<td>C</td>
<td>10</td>
<td>High-efficiency equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A: Change of Using & Operating of equipment (10 items)

B: A small-scale repair work (6 items)

C: A large-scale retrofitting work (12 items)

ECTT/ Weather data :Naha Japan

The effect by lighting outlet, high efficiency equipment & inverter

![Graph showing percentage differences](chart2)
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Turning points of EE&C standards

- It became difficult to continue decreasing the energy consumption intensity by 1% or more in yearly average.
- Superior business operators who had already achieved considerable energy conservation are not appropriately assessed because it became difficult for them to achieve 1% decrease.

Benchmark system started to be studied as a new assessment index.

Benchmark system assesses energy conservation of business operators by using indices common to the business types. Under the benchmark system, business operators endeavor to achieve the target (level to be aimed at) to realize energy conservation.

2008: Benchmark system stated to be studied

2009: Committee for studying benchmark system

2009-2010: Industry sector Benchmark system was introduced.

2014: Benchmark system for the commercial sector started to be studied on a full-scale at the committee for studying assessment system for energy conservation of the commercial sector.

August, 2015: At the summary of Energy Efficiency and Conservation Subcommittee, it was decided that “a benchmark system for the commercial sector should be established”.

November, 2015: Prime Minister Mr. Abe instructed to expand the benchmark target business in the commercial sector.

April, 2016: Benchmark system was introduced to the convenience store business.
*Introduced as the first business from the commercial sector

Source: Data of Ministry of Economy, Trade and Industry
The 1st expansion of application (6 industries) realizes the coverage rate of 65% and the 2nd expansion (schools, hospitals, etc.) will increase it up to 75%. → Expand from the applicable fields as soon as possible to aim at 70%.

Currently 59.4% is covered.

Aim to target 70% of all the industries.

Steel 22%
Chemical 24%
Ceramic 4%
Offices and buildings 5%
Other 35%

Blast and electric furnaces
Cement
Paper and paperboard
Wholesalers/retailers, department stores & supermarkets
Hotels and inns

Convenience stores
Department stores
Hotels
Supermarkets
Rental office business
Shopping centers

Introduced in April, 2016
Introduced in April, 2017
Consideration will be made for Introduction

Industrial Sector: Review of Target Level
Business Sector: Expansion of Target Industries

Source: Ministry of Economy, Trade and Industry
Benchmark System in Building Sector

- Benchmark index is considered as not only “intensity” but also “ratio of the energy consumption of the concerned building to the average of the energy consumptions of the buildings” in the specified category of buildings.
- The standard level is determined based on that 10%-20% of the buildings of the concerned category can satisfy the level.
- According to the feature of the buildings, the parameters correlated with energy consumption are different according to the type of buildings.
- In consideration of these circumstances, three kinds of approaches shown below are taken for the benchmark system for building energy efficiency in Japan.

<table>
<thead>
<tr>
<th>Applied categories of buildings</th>
<th>Energy Intensity</th>
<th>Actual / average of the group</th>
<th>Energy Saving ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient stores</td>
<td>hotels, department stores, food supermarkets</td>
<td>Tenant office</td>
<td></td>
</tr>
<tr>
<td>Shopping Center</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Reasons for application**
  - Small variation on the feature of buildings
  - Many parameters correlate with energy consumption
  - Varies widely due to variation of tenants

Source: METI website
1. History of the discussion of BEC/GBC in SEA
   - In 2015 AJEEP and SEforALL were merged into one working body i.e. BEC/GBC has been discussed in terms of Mandatory or not in Japan and ASEAN.
   - Since 2017 AEA program is being used for a catalyst or leverage for BEC/GBC promotion.

2. Major points of discussion now
   (1) Mandatory Building Codes
      - Japan just introduced mandatory compliance to the law in 2017
      - 6 countries have mandatory building regulation in ASEAN
   (2) Net-zero energy consumption in buildings
      - Strategic Energy Plan in 2014 specifies realization of net-zero energy building in newly built average (both in terms of residential and commercial building)
      - ASEAN try to promote ZEB-ready building in accordance with respective countries’ situation.

3. Possible synergy between BEA & ECCJ
   (1) BEA side
      - What kind of policies & Actions are effective and applicable for Asia-Pacific Region
   (2) ECCJ’s side
      - Technical tools: ECCT (Energy Conservation Target Tool), ESUM (Energy Specific Unit management Tool) etc.
      - EE&C Benchmarking System for various use of building
The Symbol of Energy Conservation
Since 2005 ECCJ has been spreading the symbol mark with the visual image of a flour-leaf clover which is thought to bring happiness named as “SMART CLOVER”, representing everyone’s energy conservation activities.

Thank You Very Much

For More Information;
The Energy Conservation Center, Japan
http://www.eccj.or.jp  <from 1996>

Asia Energy Efficiency and Conservation Collaboration Center
(Established in April 2007)
http://www.asiaeec-col.eccj.or.jp

Japanese Business alliance for Smart Energy-Worldwide
(Established in October 2008)
https://www.jase-w.org/

The Energy Conservation Center, Japan
Since 1978

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