1. Outline of Project in Surabaya

- Based on Green Sister City relationship (November, 2012) between Kitakyushu and Surabaya, starting from Introduction of Low-carbon Technology at Industrial Estate & Advancement of Infrastructure such as Wastewater Treatment. Next, Realizing Low-carbon Community & Smart Community in Surrounding Area
- Finally, Smart Community as Whole City

**Surabaya City, East Java, Indonesia**
(Population : Around 3 million
Surface Area: 274.06km²)

- Expanding Advanced Energy Supply System to Surrounding Area
- Expanding Smart System to Surrounding Area
- Collecting Energy Consumption Data, Energy Generation Data
- Renewable Energy
- ICT
- Office Building, Factory
- Medical Center, Warehouse
- Restaurant
- Combined Heat & Power System
- Steam, Electricity, Water

**Red Line : 1ST STEP**
**Blue Line : 2ND STEP**
2. Needs in Indonesia

- Lack of energy conservation activities
  - Knowledge and understanding of the importance and benefits is still limited.
  - Low electricity price due to subsidy
  - Inefficient electrical equipment
  - Weak ability to implement Energy Management & Audit
  - Little Financial support
  - Little ESCO

- Awareness of GHG emission reduction is growing through activities implemented by both national and local government.
  - Preparation of RAN-GRK and RAD-GRK

In the future...

- Expand of energy conservation activities among factories, building, etc.
- Growing needs of managing GHG emission amount at large facilities

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3. Conserving Energy & Energy Management in Factory & Building

A. Study on CHP installation at SIER

- We plan to do CHP business at SIER
- We found 5 potential users in SIER and specified candidate CHP (Electricity: 16MW, Steam: 37t/h)

B. Study on potential of ESCO, BEMS, dispersion type power source

- Tunjungan complex
- BAPPEKO
- High way

Source: wikimapia, tripadvisor, etc
Based on the local needs, we are planning to establish SPC (Special Purpose Company) invested by both Japanese organizations and Indonesian Organizations.

Stakeholder (Japan)
- Nippon Steel & Sumikin Engineering
- Fuji Electric
- NTT Data Institute of Management Consulting
- Others

Stakeholder (Indonesia)
- PT SIER
- PT PLN

Cooperation with Stakeholders at Each Area

Industrial Estate (SIER)

Special Purpose Company (SPC)
- Design and Build of Combined Heat & Power plant (incl. ancillary facilities)
- O&M of Combined Heat & Power plant
- Procurement of Gas, Electricity & Steam Sales and so on
- Saving Energy Service without guarantee

Financial Institutions

4. Challenges or Concerns

Institutional Challenges
- Limited liberalization for electricity selling to end customer
- Electricity wholesale price is low
- Shortage of supporting system for low-carbon tech. including Co-generation
  - No supporting system for electricity selling price
  - No supporting system for natural gas fuel
- Shortage of supporting system for energy conservation
- Shortage of incentives for CO2 emission reduction

Contractual Challenges
- Prospect for long term procurement of natural gas fuel
- Prospect for long term contract for electricity selling
- Prospect for long term contract for steam selling (incl. penalty)
- Complementary Scheme of end user’s creditworthiness in supplying CHP & ESCO

Financial Challenges
- Shortage of low-interest finance scheme
- Shortage of supplemental system of end user’s creditworthiness
- Shortage of supporting system for saving energy
- Shortage of incentives for CO2 emission reduction
### 5. Implementation Structure (1/2)

#### A. Study on CHP installation at SIER

<table>
<thead>
<tr>
<th>Contents</th>
<th>Counterpart</th>
<th>Participant company</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Trial calculation of CO2 emission reduction</strong></td>
<td>• BAPPEKO, KLH</td>
<td>NTTDATA Global IT Innovator</td>
</tr>
<tr>
<td>• Trail calculation of CO2 emission reduction amount of CHP installation at SIER based on last year’s survey</td>
<td>• PT SIER</td>
<td></td>
</tr>
<tr>
<td><strong>2. Developing MRV methodology</strong></td>
<td>• Factories in SIER</td>
<td></td>
</tr>
<tr>
<td>• Developing JCM applicable MRV methodology based on current situation of SIER, referring to existing similar methodology.</td>
<td>• PLN, etc</td>
<td></td>
</tr>
<tr>
<td>• Quantification of CO2 reduction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Expansion feasibility study</strong></td>
<td>• BAPPEKO, Industry Bureau, etc</td>
<td>ATGREEN</td>
</tr>
<tr>
<td>• Doing business expansion feasibility study of CHP installation at neighboring areas other than SIER.</td>
<td>• East java province</td>
<td></td>
</tr>
<tr>
<td>• Examining possibility of applying JCM</td>
<td>• Other local governments</td>
<td></td>
</tr>
</tbody>
</table>

#### B. Study on potential of ESCO, BEMS, dispersion type power source

<table>
<thead>
<tr>
<th>Contents</th>
<th>Counterpart</th>
<th>Participant company</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Potential of energy saving and installation of dispersion type power source outside of industrial area</strong></td>
<td>• BAPPEKO, Industry Bureau, etc</td>
<td>NTT FACILITIES</td>
</tr>
<tr>
<td>• Examining possibility of energy conservation and installation of dispersion type power source outside industrial area (i.e. data center, shopping mall, university, hospital, city government building and so on)</td>
<td>• Suppliers, Builders, etc</td>
<td>NTTDATA Global IT Innovator</td>
</tr>
<tr>
<td>• Developing JCM applicable MRV methodology according to specified candidate technology</td>
<td></td>
<td></td>
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<tr>
<td>• Quantification of CO2 reduction potential</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Installation of LED at the highway lighting</strong></td>
<td>• BAPPEKO, Public works bureau, etc</td>
<td></td>
</tr>
<tr>
<td>• Examining possibility of LED installation at the high way</td>
<td>• LED supplier, etc</td>
<td></td>
</tr>
<tr>
<td>• Developing JCM applicable MRV methodology referring to existing similar methodology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Quantification of CO2 reduction potential</td>
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</tbody>
</table>
### 6. CO2 emission reduction potential

- CO2 reduction potential of these activities in Surabaya is estimated at approximately 50,000 t-CO2/year in total.

<table>
<thead>
<tr>
<th>Activities</th>
<th>CO2 emission reduction</th>
<th>Conditions of Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHP installation at SIER</td>
<td>About 38,000 t-CO2/year</td>
<td>Installing natural gas fueled CHP at SIER and supplying both power (16MW) and steam (37t/h) to factories located in SIER.</td>
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<td></td>
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<td>- Baseline: Electricity supplied from PLN. Each factory produces steam by their natural gas-fueled boiler 112,000t-CO2/year</td>
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<tr>
<td></td>
<td></td>
<td>- Project: Electricity and Steam supplied to each factory by natural gas-fueled CHP plant 74,000t-CO2/year</td>
</tr>
<tr>
<td>Energy conservation in building</td>
<td>About 10,000 t-CO2/year</td>
<td>Assuming 20% energy saving achieved at each building</td>
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<td></td>
<td></td>
<td>- Shopping mall: 5,040t-CO2/year</td>
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<td></td>
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<td>- Hotel: 2,350t-CO2/year</td>
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<td></td>
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<td>- Data center: 170t-CO2/year</td>
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<td></td>
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<td>- Hospital: 1,790t-CO2/year</td>
</tr>
<tr>
<td>Installation of LED at the highway lighting</td>
<td>About 630 t-CO2/year</td>
<td>Assuming 640 LED lights are installed at the 14km highway in Surabaya which is planned to be constructed this year.</td>
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<td>- Compared with conventional mercury lamps: 630t-CO2 / year</td>
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<td></td>
<td></td>
<td>- Compared with high pressure sodium lamps: 250t-CO2 / year</td>
</tr>
</tbody>
</table>
- The total of industrial sector and commercial sector accounts for more than 50% of whole CO2 emission amount in Surabaya.

### CO2 emission amount by sector in Surabaya city (2010)

![CO2 emission chart](chart.jpg)

- **A. Study on CHP installation at SIER**
- **B. Study on potential of ESCO, BEMS, dispersion type power source**

出典: The World bank SUED program Report