JCM Feasibility Study (FS) 2015

“Introduction of co-generation and solar power generation system in large shopping malls”

Table of contents
1. Overview of JCM FS
   a. F/S scheme
   b. Project location
   c. Description of the technology
   d. Indonesia partner
   e. Project details
2. Reference scenario
3. Monitoring methods
4. Quantification of GHG emissions and their reductions
5. MRV methods
6. Capacity building plan that can be delivered to Indonesian partner(s)
7. Next step

Nomura Research Institute, Ltd.
Osaka Gas Co., Ltd.
AEON MALL Co., Ltd.
PT. AEON MALL Indonesia
Hitachi, Ltd.
1. Overview of JCM FS/ a. FS Scheme

The role of entities in Feasibility Study

- **Local**
  - **Indonesian governmental organizations**
    - Various consulting/report
  - **AEONMALL INDONESIA**
    - Promotion of the overall plan of the mall

- **Japan**
  - **AEON MALL**
    - Promotion of the overall plan of the mall
    - Study of energy management/MRV scheme
  - **Hitachi**
    - Support for the energy system study

- **NRI**
  - Control/facilitate/management/Summarization of the research overall
  - Study of scheme/advice for the facilities support program

- **Osaka Gas**
  - Study/promotion of the energy service business
  - Study of energy systems
  - Feasibility analysis as a JCM project
  - Study of energy management/MRV scheme

Cooperation between entities.
1. Overview of JCM FS/ b. Project location

The construction site is in Delta Mas City, Bekasi, about 37km from Jakarta.

- **Developer**: PT AMSL Delta Mas
- **Site area**: 200,000 m²
- **Total Floor Space**: 135,000 m²
- **Open**: 2019

Source: GIIC leaflet
1. Overview of JCM FS/ c. Description of the technology

The project technology consists of cogeneration system and PV

Scope of JCM

PLN
(National power company)

PGN
(National gas company)

Source: Osaka Gas

Absorption chiller
(670RT)

PV
(106kW)

Poly crystal

MITSUBISHI HEAVY
INDUSTRIES, LTD.
Power efficiency 49%

Gas engine
3,800kW

CHILLER

CS
H

EXT

Air-conditioning

CHILLER

CR
H

Power

PLN

PGN

Source: Osaka Gas
1. Overview of JCM FS / c. Description of the technology

The project technology consists of cogeneration system and PV

### Gas Engine generation

<table>
<thead>
<tr>
<th>Maker</th>
<th>MITSUBISHI HEAVY INDUSTRIES, LTD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>3,800kW</td>
</tr>
<tr>
<td>Frequency</td>
<td>50Hz</td>
</tr>
<tr>
<td>Rotational speed</td>
<td>750m⁻¹</td>
</tr>
<tr>
<td>Size</td>
<td>(L) 9.85m x (W) 3.18m x (H)4.98m</td>
</tr>
<tr>
<td>weight</td>
<td>40ton</td>
</tr>
<tr>
<td>Nox</td>
<td>320ppm @0%O₂</td>
</tr>
<tr>
<td>generation efficiency</td>
<td>49%</td>
</tr>
<tr>
<td>Gas Consumption</td>
<td>731m³(N)/h (*LHV:38.1MJ/m³(N))</td>
</tr>
</tbody>
</table>

**Comparative Advantage**

### Absorption Chiller

<table>
<thead>
<tr>
<th>Maker</th>
<th>Hitachi-Johnson Controls Air Conditioning, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absorption manner</td>
<td>Exhaust gas and hot water input</td>
</tr>
<tr>
<td>Output</td>
<td>2,356kW (670RT)</td>
</tr>
<tr>
<td>Cold water temperature</td>
<td>7-15°C</td>
</tr>
<tr>
<td>Cold water flow rate</td>
<td>253m³/h</td>
</tr>
<tr>
<td>Coolant temperature</td>
<td>32-37°C</td>
</tr>
<tr>
<td>Jacket water temperature</td>
<td>88-83°C</td>
</tr>
<tr>
<td>Power supply</td>
<td>380V/50Hz/3ph, 25kVA</td>
</tr>
<tr>
<td>Size (L) x (W) x (H)</td>
<td>8.1m x 3.3m x 3.5m</td>
</tr>
<tr>
<td>Weight</td>
<td>32ton</td>
</tr>
</tbody>
</table>

* The specification might be changed without notice by improvement of the products.
1. Overview of JCM FS/ d. Indonesia partner
The project counterpart in Indonesia is Joint company of AEONMALL and Sinarmas Land

<table>
<thead>
<tr>
<th>Name</th>
<th>PT. AMSL DELTA MAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Foundation</td>
<td>26 / 3 / 2013</td>
</tr>
<tr>
<td>Capital fund</td>
<td>US$ 61,310,000</td>
</tr>
<tr>
<td>Shareholder</td>
<td>AEONMALL INDONESIA 67%</td>
</tr>
</tbody>
</table>
1. Overview of JCM FS/ e. Project details

2. Two cases are under investigation for the project scheme.

CASE ① AMSLD owns and operates the system.
CASE ② The third party energy service company owns and operates the system.

---

**Legend**
- : Chair of the facilities support project
- : Owner of the facilities
1. Overview of JCM FS/ d. Project details

Payout time is 5.7 years if the project got a subsidy of MoE.

<table>
<thead>
<tr>
<th></th>
<th>REFERENCE</th>
<th>PROJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial cost</strong></td>
<td>¥993 billions</td>
<td>With support ¥1,355 billions*3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Without support ¥1,730 billions*2</td>
</tr>
<tr>
<td><strong>Yearly running cost</strong></td>
<td>¥555 billions</td>
<td>¥456 millions</td>
</tr>
<tr>
<td><strong>Payout time</strong></td>
<td>With Subsidy support 5.7 years</td>
<td>Standard 9.5 years</td>
</tr>
<tr>
<td></td>
<td>Without support Standard 9.5 years</td>
<td>5.7 years</td>
</tr>
</tbody>
</table>

*1 Running cost for whole building
*2 1,730M is whole initial cost and 937M is for project boundary of JCM.
*3 A support rate of 40% for project boundary was used.
2. Reference scenario
BAU consists of 6 chillers, REFERENCE: 6 turbo chillers, PROJECT: Cogeneration, PV and 5 turbo chillers.

- BAU equipment is consisted of 6 chillers and REFERENCE equipment is consisted of 6 turbo chillers.
- Project is consisted of cogeneration, PV and Chiller.

Source: Osaka Gas
3. Monitoring methods

Monitoring will be conducted by AMSLD or Energy management company with BEMS
4. Quantification of GHG emissions and their reductions, 5. MRV methods

Emission reduction is 9,161 t–CO₂

- REFERENCE emission: 33,333 t-CO₂
- PROJECT emission: 24,172 t-CO₂
6. Capacity building plan that can be delivered to Indonesian partner
Transferring Management knowhow of shopping-mall and energy management systems.

<table>
<thead>
<tr>
<th>AEON MALL Co., Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Management knowhow</strong></td>
</tr>
<tr>
<td><strong>Mall Management</strong></td>
</tr>
<tr>
<td>✓ Design</td>
</tr>
<tr>
<td>✓ Attract tenants</td>
</tr>
<tr>
<td>✓ Customer Relations</td>
</tr>
<tr>
<td>✓ PR</td>
</tr>
</tbody>
</table>
7. Next steps,

We continue to study, aiming for applying for the facilities support program 2017.