APEC LCMT Project
Feasibility Study Phase 1
Tianjin YUJIAPU Low-Carbon CBD
FS Report (Final Draft)
18, Oct, 2011
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Outline of Yujiapu financial district

The financial district occupies approximately 4km² with a total construction area of 500,000m². The total planned daytime population is 500,000 and nighttime population is 50,000. Construction is ongoing in some part of precedent development area.

Most of architectural planes within this district are selected by international competition.

Location: Tianjin Yujiapu financial district in Binhai new area

Project: The first low-carbon CBD (Central Business District) development project in this large scale. Financial center in Bonhai Bay area, the center of international trade, the center of information service, center of international culture and amusement.

Area:
- Site area: 3,500,000m²
- Total floor area: approximately 9,500,000m²
- Precedent development area
  - Site area: approximately 400,000m²
  - Total floor area: approximately 2,900,000m²
- Planned population:
  - Daytime: approximately 500,000
  - Nighttime: approximately 50,000

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Planning Area Rate</th>
<th>Planning Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>50%</td>
<td>4,750,000m²</td>
</tr>
<tr>
<td>Commercial</td>
<td>12%</td>
<td>1,140,000m²</td>
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<tr>
<td>Residence</td>
<td>25%</td>
<td>2,370,000m²</td>
</tr>
<tr>
<td>Hotel</td>
<td>6%</td>
<td>570,000m²</td>
</tr>
<tr>
<td>Culture</td>
<td>6%</td>
<td>570,000m²</td>
</tr>
<tr>
<td>Others (Station)</td>
<td>1%</td>
<td>100,000m²</td>
</tr>
</tbody>
</table>

Developer: Tianjin Innovative Finance Investment Co., Ltd.
Prepare a Low-Carbon Strategy for Yujiapu CBD based on “LCMT Concept”

0. Investigate the detailed information about Yujiapu necessary for FS

1. Develop a comprehensive concept for low carbon town development

2. Define the CO2 reduction targets and other concerning indexes for evaluating the progress of low carbon

3. Prepare the categories to make low carbon challenge in urban development

4. Select and develop CO2 reduction measures in each planning category

Analyze CO2 reductions and cost increase of measures in each category

Report Preparation
Main target < CO2 reduction target >

- 2020 (mid-term) real reduction of approximately 30% (which is over 50% CO2/GDP growth)
- 2030 (long-term) real reduction of approximately 50%

1) Standard type buildings without low carbonized
2) GDP growth in 2011 and 2012 in China are predicted 9.6% and 9.5% by analysis. In this CO2 target study, the GDP growth by 2020 is set as 5% that is around ½ of the actual growth with consideration of uncertainty of prediction.
3) Mitigation effects by area energy, renewal energy and untapped energy have been counted into the result of CO2 reduction in Buildings.
It is necessary to configure Breakdown targets of CO2 mitigation on each measure in each Category to achieve the total Low carbon Target.
The Optimum target categories for studying CO2 Reduction Measures in CBD

Setting the Target of Low-carbon Town

- Low carbon Urban Structure Planning
- Transportation Planning
- Environmental Planning
- AEMS (Area Energy Management System)
- Renewable Energy Use Planning
- Low-carbon Building Design
- Area Energy Planning
- Untapped Energy Use Planning
Energy consumption and Low-Carbon measures

Design Low-Carbon building along the following steps:

Priority

Load Reduction
- Sun shading blind, louver
- High performance Façade system
- Greenery Roof

Natural Energy Use
- Day lighting
- Natural ventilation, Underground heat
- Solar panel on buildings

High Efficiency Equipments & System
- Top runner Chiller, Heat Recovery system, Air-to-Air Heat Pump
- Hf lamp, LED lamp
- Building Management

Efficient Energy Saving
Prediction of CO₂ Reduction effects (Office)

CO₂ emission has been assumed and achieved 40% reduction from BAU with combinations of low carbon measures. 10% of reduction in commercial buildings and 30% for the residential and hotels.
Development to Smart Grid by 2030

Implement Smart grid, connect PV and Biomass power with existing power grid. Connecting each DHC to each other encourages leveling-off of peak energy consumption. AFMS manages all of infrastructure network, power grid.
Climate planning for Heat Island mitigation

Simulation Result

Distribution of air temperature (GL+1.5m), 13:00, August

Case 1
(BAU; Based on existing Master plan)

Case 2
(Case of Low carbon design)

Air temperature differences (Case 2 - Case 1): Lower area than Case 1
### Comprehensive analysis of Low-Carbon measures

**Simulation results of CO2 in Buildings and area energy, Untapped energy, Renewable energy**

The CO2 emission from BAU buildings is approximately 1.37 million t-CO2/year.
The CO2 reduction rate may be approximately 30% by measures of Low energy Buildings, DHC, Untapped Energy, and Renewal Energy.
Calculation results in Transportation sector

BAU (Business as usual)

1. Change in land use
2. BRT
3. Loop Bus

Approximately 30%
The cost of CO2 Emissions reduction (RMB/t-CO2)

The comprehensive measures are necessary in order to achieve Low-carbon target.