Insight into Green Airport

Moonkyu Park

Republic of Korea
National GHG Reduction Policy

**Negotiated Assignment (‘10~‘14)**
- Period: 2010 ~ 2014
- Assignment target: 30% energy saving during assignment period

**Emission Trading Scheme (‘15~)**
National Energy Usage Regulation for Public Organization

- Obtaining a building energy efficiency rating certification over 1st Grade
- Installing renewable energy facilities (New construction building)
- Maintaining airport passenger terminal temperature
  (summer: over 25°C, winter: under 20°C)
- Using high efficiency facilities (LED Installation 100% by 2020)
- Encouraging Electric Vehicle (EV) purchase
- Carrying out energy saving education & promotion
‘Promoting optimized carbon emissions management by identifying the total amount of Green House Gases emitted by all airport facilities and stakeholders’

ACI Airport Carbon Accreditation
- Period: 19 March 2014 - 18 March 2015
- Level: 3 (OPTIMISATION)

<table>
<thead>
<tr>
<th>Section</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 3+</th>
<th>Total</th>
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<td>16</td>
<td>17</td>
<td>86</td>
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<td>ACI Asia</td>
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<td>7</td>
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<td>-</td>
<td>20</td>
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<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
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<tr>
<td>ACI Africa</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35</strong></td>
<td><strong>35</strong></td>
<td><strong>21</strong></td>
<td><strong>17</strong></td>
<td><strong>108</strong></td>
</tr>
</tbody>
</table>
Aircraft (81%)

Ground Service (0.5%)

Tenants (3%)

APU (5%)

Transportation (6%)

Scope 2 (4%)

Scope 1 (0.5%)
<table>
<thead>
<tr>
<th>Energy usage</th>
<th>Consumption (TJ)</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>4,136</td>
<td>86.0</td>
</tr>
<tr>
<td>Steam</td>
<td>610</td>
<td>12.8</td>
</tr>
<tr>
<td>Fuel (car)</td>
<td>51.6</td>
<td>1.0</td>
</tr>
<tr>
<td>Fuel (Boiler)</td>
<td>8.3</td>
<td>0.18</td>
</tr>
<tr>
<td>Fuel (Generator)</td>
<td>0.5</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,806</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Scope 2 (Significant Energy Use in IIAC)

Admin. Building
- Heat exchanger: 9%
- Chiller: 28%
- AHU: 16%
- Pump: 9%
- BHS: 38%
- Lighting, etc: 38%

Concourse
- Heat exchanger: 12%
- Chiller: 7%
- AHU: 31%
- Pump: 4%
- BHS: 20%
- Lighting, etc: 26%

Transportation BLDG
- Heat exchanger: 15%
- Chiller: 5%
- AHU: 12%
- Pump: 68%
- BHS: 68%

Utility Building A
- Chiller: 89%
- AHU: 11%

0% 20% 40% 60% 80% 100%
**Vision**

Globally Leading Low-carbon Eco-friendly Airport (by 2020)

**Strategic theme**

- ACI Airport Carbon Accreditation
- LED Lamps Installation 100%
- Energy Self-reliance 3%
- GHG emission reduction 66,000tCO₂
- Environmental Performance Index 250

**Action plans**

- Enhance eco-friendly management
- Improve energy efficiency
- Expand low-carbon operation
- Reinforce environmental resources management

**Strategic objectives**

- Enhanced eco-friendly management systems
  - Comprehensive energy management
  - Training, Publicity
- High-efficiency equipment
- Renewable energy
- Construction of certified eco-friendly airport
- Green transportation
- Reduction in aircraft GHG emissions
- Carbon offset program
- Surveillance of resource-recycling
- Eco-friendly space
- Minimization of environmental impacts

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**Strategic theme**

ACI Airport Carbon Accreditation

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ISO 50001 demonstration certification in 2012
ISO 50001 formal certification in 2014

- Purpose
  1) Establish systematic energy management system
  2) Achieve cost reduction & efficiency improvement
  3) Induce company-wide participation by employees

PDCA:
- P: Management Responsibility
- D: Action & Operation
- C: Measurement & Monitoring
- A: Improvement & Reform

Energy Saving & Efficiency
Energy Policy
- Energy Policy and Goals

Planning
- Energy consumption analysis
- Energy flow map
- Significant energy use
- Setting up Energy consumption baseline & EnPI
  (EnPI: Energy performance Index)

Operations
- Energy consumption goal
- Making an improvement plan or energy saving plan

Management Review
- Reporting to CEO

Checking
- Monitoring & Verification
- Internal audit
### LED Lighting Deployment Goal By 2020

- **Installation (%):**
  - Current: 45
  - 2020: 100%

<table>
<thead>
<tr>
<th>Section</th>
<th>~'13</th>
<th>'14</th>
<th>'15</th>
<th>'16</th>
<th>'17</th>
<th>'18</th>
<th>'19</th>
<th>'20</th>
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<tbody>
<tr>
<td>Installation</td>
<td>45</td>
<td>55</td>
<td>65</td>
<td>75</td>
<td>85</td>
<td>90</td>
<td>95</td>
<td>100</td>
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<tr>
<td>Investment</td>
<td>8.4</td>
<td>3</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Reduction CO₂</td>
<td>5,974</td>
<td>1,876</td>
<td>1,968</td>
<td>1,968</td>
<td>1,968</td>
<td>1,078</td>
<td>1,078</td>
<td>1,078</td>
</tr>
</tbody>
</table>

**Notes:**
- LED: 75,091ea
- **CO₂ Reduction:**
  - Current: 5,974 tCO₂/yr
  - 2020: 1,078 tCO₂/yr

**Source:** ICAO - Uniting Aviation
‘Introducing various renewable energy & improving energy usage’

9,357KW by 2017

2ND Terminal

Total 10,970kW

Solar power
- 889kW (500kW progressing) → 4,996 kW

Geothermal heat
- 724kW → 5,974 kW
‘Introducing a variety of eco-friendly transport operations’

- Bicycle Road (18.4km)
- Hydrogen Fuel Cell Bus (2ea)
- Electric Car (Low speed, 1ea)
- Electric Car (High Speed, 3ea)
- Hybrid Car (10ea)
- Magnetic Levitation Train (6.1km)
‘Encouraging varied initiatives to reduce airplane’s carbon emissions’

**Operation of Low-carbon Green Apron**
- Designate position of spots to reduce the movement
- GHG reduction: 243,296tCO2/year

**Light-weight Unit Loading Device Supply**
- 400 light ULDs supplied (114kg → 69kg)
- GHG reduction: 1,800 tCO2/year

**Expansion of AC-Ground Power Supply**
- GHG reduction: 37,922tCO2/year (Compared to APU)
- AC-GPS: Current 104 units, 2025 224 units
Expanding energy management for big energy consumers in the airport

Voluntary Agreement for Energy and Carbon Reduction

- Date: Nov. 21th '13
- Participants: 11 tenants (43.5% of total tenants’ energy consumption)
- Agreement period: '14 ~ '16 (3 years)
- 2014 Goal: 2% reduction
- 2014 Performance (first half): 3.6% reduction

<table>
<thead>
<tr>
<th>Energy</th>
<th>First half in 2013</th>
<th>First half in 2014</th>
<th>Reduction</th>
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</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>34,224 TJ</td>
<td>33,005 TJ</td>
<td>-1,216 TJ (3.6%)</td>
</tr>
</tbody>
</table>
Terminal Tenants’ Electric Facilities Guidelines

- **Target**: 19 terminal tenants
  (contracted electricity of more than 75kW)

- **Activities (twice a year)**
  1. Inspection of energy conservation effort
  2. Seminar with terminal tenants to share information

- **2014 Performance (first half)**: 0.8% reduction

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<th>First half in 2014</th>
<th>Reduction</th>
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<tbody>
<tr>
<td>TOTAL</td>
<td>6,891TJ</td>
<td>6,837TJ</td>
<td>-54TJ(0.8% )</td>
</tr>
</tbody>
</table>
“The 2nd terminal design achieved preliminary G-SEED 1st grade of domestic certificate in April 2014”

(G-SEED : Green Standard for Energy and Environmental Design)
“Eco-friendly, Low carbon Airport (40% Energy saving)”

- PV on the roof of Terminal 2
- Power Generation site (PV)
- BIPV on the Transportation center 2
- Geothermal
- Boarding lounge with natural light
- Performance Improvement of Exterior Insulation
“Breathing with Nature, Green Airport in the Park”

- Plants on an interior wall
- Natural finishing materials and greenery for interior
- Green landscape at T2 access road
- Cascade at Transportation center 2
- More trees to expand indoor comfort
- Purification plants absorbing pollutants
Summary

Continuous implementation of strategic plan
- Specify & implement plans for airport
- Install high efficiency equipment step by step

Green, Eco, Smart Airport Construction
- Construct an Eco-friendly airport
- Save more than 40% energy for the 2nd passenger terminal

Strengthening of “Green Partnership Council”
- Airlines & ground handling companies
- Exchange of ideas & cooperation
Thank You