Airport GHG and Other Environmental Management

ICAO Environment Seminar
11 March 2015
Dubai, UAE
2. Noise
3. Local Air Quality
4. Water
5. Solid Waste
6. Other Issues
1 Airport Greenhouse Gas Emissions Management

1. ACI Guidance Manual
2. Inventory Tool - ACERT
3. Mitigation of Emissions Sources
4. Certification of achievements Airport Carbon Accreditation
1.1 ACI Guidance Manual

- Structure – Scopes 1, 2, and 3
- Inventory
- Goal Setting
- Reducing emissions
- Carbon Neutrality
- Reporting and Certification

(Also in Français and Español)
1.1 Categorizing Emissions based on Ownership

**Scope 1** Airport owned emissions
- Power plant
- Emergency generators
- Airport fleet vehicles
- Airport maintenance/landscaping
- Fire training

**Scope 2** Electricity emissions
- From the off-site generation of electricity (and heat) purchased by the airport
1.1 Categorizing Emissions based on Ownership

Scope 3 Airport-related emissions

- Aircraft engines (LTO, taxiing and cruise)
- Aircraft Auxiliary Power Units (APU)
- Airline/contractor GSE and airside vehicles
- Ground access vehicles (incl bus and rail)
- Corporate travel
- Construction
- Aircraft maintenance
- Off-site waste disposal
- and others…
1.2 Inventory – ACERT v3.0 – Do-It-Yourself

- Inventory - the first step to emissions management
- Airport Carbon and Emissions Reporting Tool ACERT
- Developed by ACI and Transport Canada
- No purchase cost
- No expertise required
- Operational inputs – fuel used, electricity purchased, aircraft activity, estimates of ground transport
- Report generated automatically
### Output – Emissions table

**Airport Carbon and Emissions Reporting Tool**

**ACERT**

**Airport:** Seattle-Tacoma International Airport  
**Report Date:** 18/6/2012  
**Operator:** Ports of Seattle

<table>
<thead>
<tr>
<th>Entity</th>
<th>Source</th>
<th>Scope</th>
<th>CO₂</th>
<th>CH₄</th>
<th>N₂O</th>
<th>CO₂e</th>
<th>CO₂e %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport Airside Vehicles</td>
<td>1</td>
<td>1.212</td>
<td>0.2468</td>
<td>0.1011</td>
<td>1.249</td>
<td>0.21%</td>
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</tr>
<tr>
<td>Airport Buildings (gas/oil/coal)</td>
<td>1</td>
<td>14.421</td>
<td>0.2571</td>
<td>0.0257</td>
<td>14.435</td>
<td>2.45%</td>
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</tr>
<tr>
<td>Airport Fire Training</td>
<td>1</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Airport Emergency Generator</td>
<td>1</td>
<td>16</td>
<td>0.0008</td>
<td>0.0025</td>
<td>17</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Airport Glycol</td>
<td>1</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Airport Electricity Purchase</td>
<td>2</td>
<td>4,537</td>
<td>-</td>
<td>-</td>
<td>4,537</td>
<td>0.77%</td>
<td></td>
</tr>
<tr>
<td>Airport Heat Purchase</td>
<td>2</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Airport Operator Sub-total:** 20,238  
**3.4%**

<table>
<thead>
<tr>
<th>Entity</th>
<th>Source</th>
<th>Scope</th>
<th>CO₂</th>
<th>CH₄</th>
<th>N₂O</th>
<th>CO₂e</th>
<th>CO₂e %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenant Aircraft (LTO &amp; taxi)</td>
<td>3</td>
<td>307,489</td>
<td>9.6639</td>
<td>27.8204</td>
<td>316,316</td>
<td>53.69%</td>
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<tr>
<td>Tenant Aircraft APU</td>
<td>3</td>
<td>42,149</td>
<td>1.3247</td>
<td>3.8135</td>
<td>43,359</td>
<td>7.36%</td>
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<tr>
<td>Tenant Aircraft Engine Run-ups</td>
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<td>456</td>
<td>0.0144</td>
<td>0.0414</td>
<td>469</td>
<td>0.08%</td>
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</tr>
<tr>
<td>Tenant Aircraft De-icing</td>
<td>3</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
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<tr>
<td>Tenant Airside Vehicles</td>
<td>3</td>
<td>8,947</td>
<td>1.7332</td>
<td>0.7355</td>
<td>9,211</td>
<td>1.56%</td>
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</tr>
<tr>
<td>Tenant Buildings (gas/oil/coal)</td>
<td>3</td>
<td>2,827</td>
<td>0.0276</td>
<td>0.0314</td>
<td>2,837</td>
<td>0.48%</td>
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</tr>
<tr>
<td>Tenant Electricity Purchase</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Tenant Heat Purchase</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Tenant Fire Training</td>
<td>3</td>
<td>48</td>
<td>0.0758</td>
<td>0.3884</td>
<td>170</td>
<td>0.03%</td>
<td></td>
</tr>
<tr>
<td>Tenant Emergency Generator</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Tenant Landside Vehicles</td>
<td>3</td>
<td>48,411</td>
<td>17.2212</td>
<td>4.0374</td>
<td>50,024</td>
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<tr>
<td>Airport Employee Vehicles</td>
<td>3</td>
<td>3,142</td>
<td>1.1442</td>
<td>0.2600</td>
<td>3,246</td>
<td>0.55%</td>
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</tr>
</tbody>
</table>

**Tenant Sub-total:** 425,634  
**72.2%**

**Public (including passengers) Sub-total:** 143,308  
**24.3%**

**TOTAL**  
**Total emissions (tonne):** 572,502  
**73.47**  
**48.82**  
**589,180**

**Summary**  
**t CO₂e**  
**CO₂e %**

<table>
<thead>
<tr>
<th>Scope</th>
<th>CO₂e</th>
<th>CO₂e %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport Scope 1</td>
<td>15,701</td>
<td>2.66%</td>
</tr>
<tr>
<td>Airport Scope 2</td>
<td>4,537</td>
<td>0.77%</td>
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<tr>
<td>Airport Scope 3</td>
<td>568,942</td>
<td>96.57%</td>
</tr>
</tbody>
</table>

**Total CO₂e Emissions (t):** 589,180  
**100%**

The aircraft emissions calculations were based on detailed aircraft data. The landside traffic calculations were based on estimated traffic data. A more detailed separate GHG inventory is also available for Year: 2011.
Figure 1: Airport GHG Inventory - Scopes 1 and 2 (t CO2 e)

- Airport Buildings (gas/oil/coal), 14434.6
- Airport Electricity Purchase (Sc2), 4537.2
- Airport Heat Purchase (Sc2), 0.0
- Airport Airside Vehicles, 1248.8
- Airport Emergency Generator, 17.2
- Airport Glycol, 0.0
- Airport Fire Training, 0.0

Note: Scope 2 sources include only Airport Electricity and Heat Purchases (not on-sold to Tenants). All others here are Scope 1.

Total Scope 1 + 2 = 20,238
Figure 2: Airport GHG Inventory - Scopes 1, 2 and 3 (t CO2 e)

- Aircraft (LTO & taxi), 316315.8
- Public Landside Vehicles, 143308.3
- Employee Vehicles, 3246.2
- Tenant Landside Vehicles, 50024.5
- Tenant Airside Vehicles, 9211.4
- Tenant Elect./Heat/Fuel, 2837.3
- Aircraft (other), 43828.6

Total Scope 1 + 2 + 3 = 589,010
1.3 Mitigating GHG (and LAQ) Emissions

Airport Scope 1 and 2 - Airport Operator Emissions
- Airport power plant, generating electricity and heat/cooling
- Airport fleet vehicles, including transfer buses and site machinery
- Building energy use – lighting, HVAC, machinery

Airport Scope 3 - Aircraft Emissions
- Aircraft engine emissions during LTO, taxiing and cruise
- APU emissions

Airport Scope 3 - Other Airport-Related Emissions
- Most Ground Support and Ground Handling equipment
- Landside (off site) ground access vehicles, trains
1.3 Mitigating Emissions

Airport Scope 1 and 2 - Airport Operator Emissions
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- APU emissions

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- Landside (off site) ground access vehicles, trains
1.3 Mitigating Aircraft Emissions at Airports

Approach, Landing and Departure

- Sufficient airport and terminal capacity to minimise holding and queuing
- Air Traffic Management (ATM) efficiencies
- Continuous Descent and Continuous Climb Operations
- Slot management
- Departure management
- Arrival management – maximising gate availability
1.3 Mitigating Aircraft Taxiing Emissions

Provide efficient taxiway and airport layout

Single-engine taxiing

Aircraft towing

Advanced Surface Movement Guidance and Control System (A-SMGCS)

- New ground radar system for taxiways and aprons
- Improved guidance for taxiing aircraft.
- Up to 10% reduction in taxiing fuel usage
1.3 Mitigating Aircraft Auxiliary Power Unit Emissions

Provide fixed electrical ground power (FEGP) and pre-conditioned air (PCA) at terminal gates.

Enforce APU restrictions

Ducting for Pre-Conditioned Air (PCA) – widely used in many countries.
1.3 Mitigating Emission

Airport Scope 1 and 2 - Airport Operator Emissions
- Airport power plant, generating electricity and heat/cooling
- Airport fleet vehicles, including transfer buses and site machinery
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Airport Scope 3 - Aircraft Emissions
- Aircraft engine emissions during LTO, taxiing and queuing
- APU emissions

Airport Scope 3 - Other Airport-Related Emissions
- Most Ground Support and Ground Handling equipment
- Landside (off site) ground access vehicles, trains

Co-Benefits of State Action Plans
1.3 Mitigating Airport Scope 1 and 2 Emissions

Reduce Electricity Use
- Energy efficient buildings and lighting
- Energy efficient operations

Reduce Fuel Use
- Modernize power/heating plants
- Fleet vehicle modernization and use of alternative fuels/hybrid/electric

No Idling
1.3 Mitigating Airport Scope 1 and 2 Emissions

Generate or purchase electricity and fuel from renewable sources - solar, wind, hydroelectric, biomass.
1.3 Mitigating Airside Vehicle Emissions

Electric aircraft tug

Electric baggage tractor
1.3 Mitigating Other Airport Scope 3 Emissions

- Enhance public transport services – buses and trains
- Hotel and car rental shuttle bus consolidation
1.4 Airport Carbon Accreditation

- Voluntary programme for active carbon management with measurable goals and reporting.
- Covers on-site airport operational activities that contribute the most to carbon emissions.
- Enables airports to implement best practice carbon management processes and gain public recognition of their achievements.
- 4 ascending levels of performance.
1.4 Airport Carbon Accreditation

- ACI Europe, Africa and Asia-Pacific Regions
- 99 Participating Airports

Reported Benefits
- Raised sustainability profile & external credibility
- Reduction in exposure to climate change regulatory risks
- Efficiency improvements
- Knowledge transfer
1.4 ACERT and Airport Carbon Accreditation

- ACERT v2.0 approved for Airport Carbon Accreditation Level 1 (Mapping) and Level 2 (Reduction)
2 Noise - Overview

Aircraft Noise Management
  • Reducing actual noise levels using aircraft modernization and flight track management

Land Use Planning
  • Reducing the number of people subject to high noise levels

Community and Communications
  • Improving community understanding, attitudes and acceptance of airport activity
2 Noise

Managing noise
• Runway use
• Tracks to avoid urban areas
• Modern aircraft fleet

(Schiphol AMS)
2 Noise - Land Use Planning

- Local government authorities zone the land.
- Need to avoid residences, schools and hospitals in noise affected areas.
2 Noise - Community and Communications

- Informing and interacting with communities
- Airport website
- Managing complaints and noise forums
- Focus on Sustainability elements – Impacts and Benefits on Environment, Society and Economics
- Noise-tracking web sites
- Clear, transparent and up to date information
2 Noise Tracking Websites

WebTrak

Airports are increasingly realizing that community engagement is more and more important to the operations of the airport. The growing challenge is how to manage this continuous engagement to realize the best results for both the general public and the airport.

Lochard has launched the first in a series of low-risk subscription services aimed at improving and maintaining valuable dialogue with the airport’s external stakeholders. This takes the pressure off your operations team and eases the pressure for your management team.

WebTrak provides live aircraft movements. It gives the community access to flight and noise data and reduces the need and time for airport employees to explain where aircraft actually fly, how often, who they are and where they go.

Read more...
3 Local Air Quality (LAQ) - Overview

Regulations/Guidance
• Permitted air quality pollutant levels

Inventory
• Identify sources and quantities of emissions

LAQ Assessment
• Monitoring pollutant concentrations
• Modelling dispersion – source to receptor

Mitigation of Sources
• Actions to reduce emissions
### 3 LAQ – Regional Regulation

**Example limits on local pollutant concentrations – µg/m3**

<table>
<thead>
<tr>
<th></th>
<th>SO$_2$</th>
<th>NO$_2$</th>
<th>CO</th>
<th>PM10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 hr</td>
<td>1 yr</td>
<td>1 hr</td>
<td>1 yr</td>
</tr>
<tr>
<td>WHO</td>
<td>125</td>
<td>-</td>
<td>200</td>
<td>40</td>
</tr>
<tr>
<td>EU</td>
<td>350</td>
<td>20</td>
<td>200</td>
<td>40</td>
</tr>
<tr>
<td>Australia</td>
<td>520</td>
<td>50</td>
<td>220</td>
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<tr>
<td>Brazil</td>
<td>-</td>
<td>90</td>
<td>320</td>
<td>100</td>
</tr>
<tr>
<td>Canada</td>
<td>900</td>
<td>60</td>
<td>400</td>
<td>100</td>
</tr>
</tbody>
</table>
3 LAQ – Assessment - Measurement for Compliance

Monitoring (measuring) pollutant concentrations
- Compliance with regulated limits

Red = points of non-compliance
3 LAQ – Modelling and Source Apportionment

Modelling (calculating) pollutant concentrations
• Inventory of emissions sources
• Calculating physical and chemical dispersion
• Source apportionment
4 Water - Use - Triple supply system at Hong Kong (HKG)
4 Water – Storm Water Management – SeaTac (SEA)

- Capture
- Storage
- Treatment
- Outflow control
5 Waste Management

Identifying waste streams
• Terminal, deplaned, office, maintenance
• Hazardous materials

Reducing waste production
• Awareness
5 Waste Management

Waste Hierarchy
Reuse Recycling
• Paper, cardboard, aluminium, composting
6 Other Environmental Matters

Planning and Development
- Wildlife and habitat
- Historical and archeological issues

Emergency Planning and Response
- Hazardous Materials
- Spill Management
- Soil and water contamination

Proactive Environmental Initiatives
- Operating and life-cycle costs
- Occupational Health and Safety
Merci
Thanks

Xavier Oh, ACI, Montréal
xoh@aci.aero

For ACERT:
acert@aci.aero