Clean Air Heads

EPS Alumni Student Career Forum
Lan Ma
February 17, 2012
The Talk Today…

• What is environmental consulting?
  – The variety of services at ENVIRON
  – Why do we need environmental consultants?

• Two types of air practices at ENVIRON Novato Office
  – Emission modeling
  – Air quality modeling

• Consulting and you
  – The Berkeley experience (classes / research)
  – Is consulting for you?
Who I Am…

• B.A. from UCB in May 2008:
  – Atmospheric Science, Dept. of Earth & Planetary Science
  – Plant Ecology (Emphasis), Dept. of Integrative Biology

• ENVIRON Air Practice Associate (Jun 2008 – present)
  – Novato, CA
  – Criteria pollutants and greenhouse gases emission inventory (for EIRs)
  – Greenhouse gas emission inventories for municipalities
  – Statistical data analysis
  – Regulation reviews (compliance checks, emission reduction goals)
  – Technology assessment (emission controls, alternative fuels)
Since 1982 ENVIRON has worked with clients to assess and manage potential environmental, sustainability, and health issues associated with their activities and products, both locally and globally.

A network of more than 1000 consultants operating from over 80 offices in 18 countries.

Offers experience and expertise in a wide variety of disciplines with a high level of technical and scientific skills, informed by well-honed business sense.
ENVIRON Locations Worldwide

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Boca Raton, FL
Boston, MA
Chapel Hill, NC
Chicago-Loop, IL
Chicago-O'Hare, IL
Clackamas, OR
Cleveland, OH
Columbus, OH
Denver, CO
Emeryville, CA
Groton, MA
Hartford, CT
Houston, TX
Indianapolis, IN
Irvine, CA
Kansas City, MO
Lincoln, RI
Little Rock, AR
Los Angeles, CA
Lynnwood, WA
Milwaukee, WI
Monroe, LA
Mountain View, CA
Nashville, TN
Newark, NJ
New Orleans, LA
Novato, CA
Oklahoma City, OK
Olympia, WA
Philadelphia, PA
Phoenix, AZ
Portland, ME
Princeton, NJ
San Francisco, CA
Seattle, WA
St. Louis, MO
Tampa, FL
Washington, DC
Wichita, KS

Bath
Birmingham
Cardiff
Edinburgh
Exeter
Glasgow
Leeds
London
Maidstone
Manchester

Delft
Den Dolder
Ghent
Essen
Frankfurt
Munich
Aix
Lyon
Paris
Milan
Rome
Madrid

Helsinki
Warsaw
Moscow

Beijing
Hong Kong
Shanghai
Kuala Lumpur
Singapore

Hunter
Melbourne
Perth
Sydney

Johannesburg

Belo Horizonte
São Paulo
Valeinhas
ENVIRON Practice Areas

- Air Quality Management
- Applied Epidemiology
- Building Technology Services
- Climate Change & Energy Management
- Compliance Assistance
- Ecology & Sediment Management
- EHS Information Management
- EHS Management
- Expert Services
- Exposure Reconstruction & Analysis
- Human Health Sciences
- Impact Assessment & Planning
- Industrial Wastewater Management
- International Finance
- M&A Due Diligence
- Nanotechnology
- Occupational Health & Safety
- Product Safety & Regulatory Support
- REACH
- Risk Assessment & Management
- Site Investigation & Remediation
- Sustainability
- Toxicological Services
- Water Resources
- Waste Management
- WEEE, RoHS & Eco-Design
Clean Air Heads in Novato

- **Emission Modeling**
  - Identify and quantify emissions from stationary, area, and mobile sources
  - Compare emissions to regulatory thresholds; analyze mitigation measures as needed
  - Litigation support

- **Air Quality Modeling**
  - Regional models analyzing photochemical and dispersion effects
  - Meteorology models
  - Process tools development
Environmental Impact Report for
The 34th America’s Cup & James R. Herman Cruise Terminal and Northeast Wharf Plaza

- The America’s Cup is a world-wide sailing race
  - Oldest trophy in sports - held in San Francisco Bay from July to September of 2013
  - Assess the various component of environmental impacts for construction and operation of the race

- Cruise terminal
  - New cruise terminal to be built at Pier 27 (in place of the current terminal at Pier 35) to accommodate modern cruise ship operations
  - Assess the various component of environmental impacts for construction and operation of the cruise ship terminal
AC34 & Cruise Terminal EIR

- Land Use
- Aesthetic
- Population & Housing
- Cultural & Paleontological Res
- Transportation & Circulation
- Noise and Vibration
- Air Quality
- Greenhouse Gases
- Wind & Shadow
- Recreation
- Utilities and Service Systems
- Public Services
- Biological Resources
- Geology and Soils
- Hydrology and Water Quality
- Hazards & Hazardous Materials
- Mineral & Energy Resources
- Agriculture & Forest Resources

Photo: Gilles Martin-Raget, courtesy America's Cup Event Authority
AC34 & Cruise Terminal EIR

Source: AC34 & Cruise Terminal EIR
What does it mean for air quality?

<table>
<thead>
<tr>
<th>Cruise Terminal Phase I and AC34 Construction</th>
<th>ROG</th>
<th>NOx</th>
<th>PM10</th>
<th>PM2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition at Piers 27-29</td>
<td>0.2</td>
<td>1.3</td>
<td>0.1</td>
<td>0.05</td>
</tr>
<tr>
<td>Shell Construction Piers 27-29</td>
<td>16</td>
<td>90</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>AC34 Venue Construction</td>
<td>8</td>
<td>69</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>160</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>BAAQMD Threshold</td>
<td>54</td>
<td>54</td>
<td>82</td>
<td>54</td>
</tr>
<tr>
<td>Above Threshold?</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**NOTES:**

- The total emissions may not sum precisely due to rounding of subtotals.
Sample Project #2

Statistical Analysis of Temporal Trends in Mercury Emissions and Deposition in Florida

- Coal-fired EGUs are the largest sources of mercury emissions in Florida

- Conduct a statistical analysis to determine if temporal trends in coal-fired EGU Hg emissions in Florida correlate with trends in Hg concentrations in rain and wet deposition in FL during 1998-2010
Hg Trend Analysis

- Coal-fired EGUs
- Hg wet deposition/rain concentration monitors
Hg Trend Analysis

- **Estimate Emissions**
  - Collected heat input, coal quality, and historical control data for coal-fired EGUs in Florida
  - Standard calculations and applied % removal by controls

- **Wet Deposition Data Processing**
  - Data quality filters
  - Match different types of data to make comparable

- **Statistical Analysis**
  - Non-parametric Theil-Sen slope analysis (important for seasonal effects and non-normal distributions)
  - Determine correlation, if any, between Hg emissions and rain concentrations
Hg Trend Analysis

Annual Florida Coal EGU Emissions and Rain Concentrations

Presented at 10th International Mercury Conference, Halifax
Hg Trend Analysis

Statistical Significance of Mercury Concentrations in Rainfall

- Rain Concentration in Panhandle region in winter time is significant

- Statistical significance of trends in EGU emissions not tested because reductions in Florida coal-fired EGUs are demonstrated and known to be real and not due to random chance/other factors

Sequel to presentation at 10th International Mercury Conference, Halifax – presented to FDEQ
Hg Trend Analysis

Seasonal Trend Analysis in Panhandle Region

Winter

Coal EGU Hg(II)+Hg(p) Emis (lb/yr)

Emis TS Slope = -13%

Conc TS Slope = -12%

Spring

Coal EGU Hg(II)+Hg(p) Emis (lb/yr)

Emis TS Slope = -17%

Conc TS Slope = -2%

Summer

Coal EGU Hg(II)+Hg(p) Emis (lb/yr)

Emis TS Slope = -13%

Conc TS Slope = -3%

Fall

Coal EGU Hg(II)+Hg(p) Emis (lb/yr)

Emis TS Slope = -18%

Conc TS Slope = 6%

Presented at 10th International Mercury Conference, Halifax
Greenhouse Gas Emissions Inventory and Climate Action Plan for Municipalities

- **Climate Change**

- **Assembly Bill 32 (AB 32): Global Warming Solutions Act**
  - Reduce statewide GHG emissions to 1990 levels by 2020
  - Mandatory GHG emissions reporting by major sources

- **The Climate Registry**
  - Sets forth the requirements for measuring, calculating, reporting and verifying GHG emissions
  - Supports both voluntary and mandatory reporting programs
GHG Inventory for a City

- Building energy consumption
- Industrial operations and process emissions
- Mobile direct combustion
- Waste (water, solid)

Source: Local Government Operation Protocol
## GHG Inventory for a City

### TRANSPORTATION SECTOR

<table>
<thead>
<tr>
<th>Methods</th>
<th>TRANSPORTATION SECTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Use</td>
<td>On-Road: Light Duty Gasoline Vehicles, Light Duty Trucks, Medium Duty Trucks, Heavy Duty Trucks, Urban Buses</td>
</tr>
<tr>
<td>Vehicle Miles</td>
<td>Travelled</td>
</tr>
<tr>
<td>Hours of</td>
<td>Off-Road: Construction and Mining Equipment, Industrial Equipment, Light Commercial Equipment, Transport Refrigeration Units, Lawn and Garden Equipment, Rail</td>
</tr>
<tr>
<td>Operation</td>
<td></td>
</tr>
</tbody>
</table>

### BUILDINGS SECTOR

<table>
<thead>
<tr>
<th>Methods</th>
<th>BUILDINGS SECTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Data</td>
<td>Residential / Commercial / City Operation Electricity, Natural Gas</td>
</tr>
</tbody>
</table>

### INDUSTRIAL SECTOR

<table>
<thead>
<tr>
<th>Methods</th>
<th>INDUSTRIAL SECTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Data</td>
<td>Industrial Operations: Electricity, Natural Gas, Other Fuel Use, Self-Gen Facilities</td>
</tr>
<tr>
<td>Fuel Use</td>
<td>Industrial Processes: Oil &amp; Gas, Other Processes</td>
</tr>
<tr>
<td>Fugitives</td>
<td></td>
</tr>
</tbody>
</table>

### OTHERS

<table>
<thead>
<tr>
<th>Methods</th>
<th>OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharge,</td>
<td>Waste: Wastewater Treatment, Landfills</td>
</tr>
<tr>
<td>Fugitives</td>
<td></td>
</tr>
<tr>
<td>CH4 Capture,</td>
<td>Outdoor Area Lighting: Streetlights &amp; Traffic Lights</td>
</tr>
<tr>
<td>Combustion of</td>
<td></td>
</tr>
<tr>
<td>LFG, Fugitives</td>
<td></td>
</tr>
<tr>
<td>Utility Data</td>
<td></td>
</tr>
</tbody>
</table>
GHG Inventory for a City

City of Los Angeles Emission Contribution by Sector and by Category

- On-road: 43%
- Off-road: 15%
- Residential: 21%
- Commercial: 19%
- City Operations: 0%
- Industrial Operations: 1%
- Industrial Processes: 0%
- Others: 1%

Annual Emissions: 38,700,000 metric tons of CO₂e
Source: City of L.A 2009 Greenhouse Gas Inventory, Draft Report – Do Not Cite
## GHG Inventory for a City

<table>
<thead>
<tr>
<th>City and Year of Inventory</th>
<th>Total Emissions (mil metric tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Angeles, CA (2009)</td>
<td>38.7</td>
</tr>
<tr>
<td>New York, NY (2010)</td>
<td>54.3</td>
</tr>
<tr>
<td>Seattle, WA (2008)</td>
<td>6.8</td>
</tr>
<tr>
<td>San Francisco, CA (2000)</td>
<td>9.7</td>
</tr>
<tr>
<td>Berkeley, CA (2005)</td>
<td>0.58</td>
</tr>
</tbody>
</table>

Sources:
- City of Los Angeles Greenhouse Gas Inventory
- Inventory of NYC Greenhouse Gas Emissions
- Seattle Community Greenhouse Gas Inventory
- Climate Action Plan for San Francisco
- City of Berkeley – Climate Action Plan
Next Steps

1. Develop a baseline inventory
2. Set a reduction target
3. Analyze possible reduction measures
4. Implement reduction measures
5. Monitor the program and track the progress
The Berkeley Experience

- Classes I found helpful:
  - Atmospheric Chemistry (EPS 180)
  - Physics, Dynamics (EPS 181, 182)
  - Climate Modeling (EPS 198/298)
  - Statistics (Stat 131)
  - Intro Computer Programming (E77)
  - Reading and Composition (R&C)
  - Technical Reading and Writing (EPS 150)

- Working in lab:
  - Data compilation and analysis (MS Excel)
The Berkeley Experience

- **Classes I wish I have taken / paid more attention:**
  - Fluid dynamics
  - Mechanical engineering courses on engines and emissions
  - Alternative and renewable energy technologies
  - Environmental regulation / management law

- **Other useful skills I wish I knew:**
  - Geo-Informational System (GIS)
  - Database analysis (MS Access)
  - More computer classes (using Linux, languages such as Perl, Fortran)
Consulting and You

Consulting might be right for you if:

– You like solving practical problems
– You are comfortable working independently or as part of a team
– The interface between science and policy interests you
– You have good professional judgment
– You are a good writer
– You can juggle multiple projects at the same time
– You can concentrate on but not get lost in the details
– You are a “people person”
– You are able to articulate complicated concepts in a way that is clear to people from non-technical backgrounds
– You are conscientious about deadlines
Opportunities

- Internships
  - Good way to get a step in the door
  - For the potential employer to get to know you and for you to get to know the job
  - Boost up your resume

- Career fairs
  - ask for a contact follow up; remember people’s names

- Information interviews
  - Informal, casual, understand if the job is what you like

- Alumni events / professional gatherings
Opportunities

- Do your homework before submitting an application
  - Revise your resume to reflect the qualification each job is looking for

- Do your homework before your interview
  - Do some research about the company: show sincere interest and preparation; ask meaningful (smart) questions

- Highlight your strengths, practice talking about yourself
  - Being articulate is also a skill

- Keep a strong academic background
  - “Luck is when preparation meets opportunity”
Questions?

- If you have any questions now or later, I’d like to hear from you

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