Carbon Footprint – What's Your Shoe Size?

PA Chamber's 2008 Annual Environmental Conference

April 2, 2008

Overview

- Why is this important
- Calculating your footprint
- Regulatory trends
- Reducing your footprint
- US Climate Policy

Overview

- **Voluntary (unless in California)**
- **Are all of the six major GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) included? Identify as Kyoto gases?**
- **The industrial sector accounts for approximately 30 percent of the total Greenhouse gas emissions.**

Why is this important –

- **ECOnomics**
- **Perception of Climate Change**
- **Business Relationships**
- **Financial Investment**

Making a Footprint

- Development of a protocol
- Resources
- What other companies have done
- Regulatory Climate

Develop a Protocol/Inventory Management Plan

- GHG Accounting Principals
  - Relevance, Complete, Consistency, Transparent, Accurate
- Business Goals – Risk and Reduction
- Organizational Boundaries
- Operational Boundaries
  - Identify all sources
  - What are the larger carbon emitters
  - Focus seems to be on CO_2
  - Other sources may have more potential
- Tracking Emissions

Develop a Protocol/Inventory Management Plan cont.

- Quality Assurance
- Tracking Progress Towards Goal(s)
  - Base line Year Adjustments
- Management Tools
- Auditing and Verification

GHG Accounting Principals

- Relevance
- Completeness
- Consistency
- Transparency
- Accuracy

GHG Accounting Principals
Relevance

- **Inventory appropriately reflects the GHG emissions of the company**
- **Serves the decision making needs of users**
  - **Internal**
  - **External**

GHG Accounting Principals
Completeness

- **Account for and report all GHG emission sources and activities within the chosen inventory boundary**

- **Disclose and justify any specific exclusions**

GHG Accounting Principals
Consistency

- **Allow for meaningful comparison of emissions over time**

- **Transparently document changes**
  - **Data**
  - **Inventory Boundary**
  - **Methods**
  - **Other Relevant Factors**

GHG Accounting Principals

Transparency

- **Address all relevant issues in a factual and coherent manner**
- **Based on a clear audit trail**
- **Disclose any relevant assumptions and make appropriate reference to:**
  - **Accounting Methodologies**
  - **Calculation Methodologies**
  - **Data Sources Used**

GHG Accounting Principals
Accuracy

- **Ensure that the quantification of GHG emissions is neither over or under true emissions**
- **Reduce uncertainties**
- **Achieve sufficient accuracy to enable users to make decisions with reasonable assurance to the integrity of the reported information**

Business Goals

- **Management of GHG risks and identifying reduction opportunities**
- **Public reporting and participation in GHG programs**
- **Participation in mandatory reporting programs**
- **Participation in GHG markets**
- **Recognition for early voluntary action**

Organizational Boundaries

- **Equity Share**
  - **Account for GHG emissions from operations according to its share of equity in the operation.**
  - **Basically reflect economic interests**
- **Control Approach**
  - **Account for 100 percent of the GHG emissions from operations over which it has control.**
- **Accounting for the Complexity of Corporate Ownership (Double Counting)**

Operational Boundaries - Calculating Your Footprint

- Direct Sources
- Indirect Sources
- Optional Sources
- Define Inventory Boundaries

Direct Sources

- A list of groups of sources by emission category for each facility or reporting unit
  - Stationary combustion e.g., boilers
  - Thermal oxidizers/flares
  - Engines
  - Transportation Sources

Indirect Sources

- A list of energy imports or exports that are reflected in the inventory:
  - Steam
  - Electricity
  - Hot Water

Optional Sources

- A list of other optional emission sources that are accounted for in the inventory:
  - Outsourced activities,
  - Upstream or downstream activities
- Employee Travel
- Product Transportation
- Offset Projects
- Renewable Energy

Slide 19

w1 Define what they mean by this
wkesack, 2/15/2008

w2 wkesack, 2/15/2008

Case Study - Background

- European Information Technology company with headquarters in the United States
- Wanted to develop GHG inventory (CO_2 as the basis) for all world-wide sites
- Assisted with inventory for U.S. HQ site
- Implementing Environmental Management System (EMS) for all sites with GHG reduction goals
- Evaluated site primarily service based, no product manufacturing
- 1,400 employees at the campus

Case Study - Direct Sources

- **Combustion Sources**
  - **Boilers**
  - **Diesel-fired IC Engines/Emergency Electric Generators**
- **Facility tracked operating hours and fuel use for combustion sources**
  - **Used EPA's AP-42 emission factors as the basis for calculating CO_2 emissions**

Case Study - Direct Sources

- **Onsite shuttle bus**
  - **Operating company tracked miles driven each day**
  - **Estimated fuel economy using Greenhouse Gas Protocol for Mobile Sources**
  - **Emission factor from EPA Climate Leader's protocol guidance**

Case Study - Direct Sources Data Gaps

- **Combustion Sources**
  - **Facility already tracked fuel usage and operating hours of combustion equipment to comply with its air operating permit**
- **Onsite shuttle**
  - **Estimated values for fuel economy and fuel usage**
  - **Recommend including fuel use (e.g. gallons per fillup) to get a better picture of actual emissions**

Case Study - Indirect Sources

- **Indirect emissions were from electricity usage at the facility**
  - **Electricity supplied directly to the facility**
  - **Electricity required by providers to generate the electricity that it sells to the facility**

Case Study - Indirect Sources Data Gaps

- The emission factor used to calculate emissions from direct electricity consumption by the facility was based on a regional profile
- No readily available information from electricity provider on the specific mix of fuels used to supply the facility's electricity (e.g. nuclear versus coal, natural gas, etc.)
- Would have an impact on the emissions

Case Study - Indirect Sources Data Gaps

- Poor data and no benchmark on how much electricity is required by providers to produce one MWh of electricity
- State electricity profile from U.S. DOE was referenced, but factor developed seemed low compared to European guidance (3.1 – 3.6 MWh needed to produce 1 MWh)
- Doesn’t seem to be a regulatory reporting requirement for data required to be reported to DOE by providers
- In conclusion -- Data not readily available from electricity providers

Case Study – Optional Sources

- Employee commuting
- Service provider trips
  - Mail services
  - Office supplies
  - Fuel deliveries
  - Waste management
  - Food services
- International company, so a number of business trips are conducted

Case Study – Optional Sources Data Gaps

- **Facility did not have the data readily available to accurately calculate impacts from commuter travel**
- **Number of assumptions made**
  - **Average commute distance**
  - **Fuel economy**
  - **Car pooling numbers**
- **A survey of employees would yield better data**

Case Study – Optional Sources Data Gaps

- **Service Provider Trips**
  - **Need to define what is attributed to your facility's footprint**
  - **Mail services, service/materials providers may make multiple trips as part of their service route for your facility**

Case Study – Optional Sources Data Gaps

- **Employee Business Travel**
  - **Employee business travel was not tracked based on mode of transportation and destination**
  - **Number of trips per employee was not easily defined**
  - **Implementing required tracking parameters for business travel arrangements and/or an employee survey would yield better data**

Case Study – Optional Sources Data Gaps

- **Other considerations**
  - **Defining the parameters to be tracked in your footprint**
  - **As part of the services the facility provides, a number of people from all over the country come to their site for training**
  - **Whose footprint does this travel belong to?**

Case Study - Conclusions

- Data Gaps
  - Short project turnaround time
  - More encompassing than expected, particularly mobile sources
  - Availability of general electricity provider data
- Future inventories
  - More detail
  - Provide sufficient time to collect accurate and reliable data

Management Tools

- **Methods - the technical aspects of inventory preparation**
- **Data - activity levels, emission factors, processes, and operations**
- **Inventory processes and systems - institutional, managerial, and technical procedures for preparing GHG inventories**
- **Documentation - methods, data, processes, systems, assumptions, and estimates used to prepare an inventory**

Tracking Progress

- Company structural changes
  - Mergers, acquisitions, and divestments
  - Outsourcing and in-sourcing
- Changes in calculation methodology
- Discovery of significant errors, or a number of cumulative errors, that are collectively significant

Auditing and Verification

- **Verification entails an appraisal of the risks of material discrepancies in reported data.**
- **Disparity between reported data and data generated from the application of the relevant standards and methodologies.**
- **Insurance of overall data quality.**

Reducing your footprint

- Set a Goal
- Offset Investment
  - Sequestration
  - Landfill Methane
- Renewable Energy
- Offsite Waste Disposal
- Employee Commute and Travel

Resources

- EPA Climate Leaders Technical Resources
- US Department of Energy
- The Intergovernmental Panel on Climate Change (IPCC)
- Provide protocols on developing an inventory
- Some have spreadsheets available online to help prepare your inventory

Resources for Direct Sources

- **U.S. EPA AP-42 emission factors for combustion sources**
- **Greenhouse Gas Protocol Initiative, sector toolsets and guidance for calculating emissions**

Resources for Indirect Sources

- Department of Energy, Energy Information Administration
- U.S. EPA eGRID
  - Emission data from electric utilities by state, utility service region, type of utility, etc.

Resources for Employee Travel

- **Greenhouse Gas Protocol Initiative: mobile source and business travel calculation tools**
- **US DOT/State DOT**
  - **Fuel Economy**
  - **Miles traveled**
- **US Census**
- **News Sources**

Other Case Studies

http://www.epa.gov/climateleaders/casestudies/index.html

3M	Energy metrics, demand/supply side management (PDF). (21 pp, 407K)
3M	Purchase electricity from renewable sources (PDF). (21 pp, 407K)
General Motors Corporation	Energy metrics, demand/supply side management (PDF). (30 pp, 749K)
Johnson & Johnson	Construct solar panel farm and install rooftop solar panels (PDF). (22 pp, 321K)
Mack Trucks, Inc. and Volvo Trucks North America	Partner Interview: December 2007 Carbon Copy (PDF). (3 pp, 17K)
Miller Brewing Company	Energy metrics, demand/supply side management (PDF). (27 pp, 709K)
Miller Brewing Company	Recover biogas from wastewater (PDF). (27 pp, 709K)
Pfizer Inc.	Energy metrics, demand/supply side management (PDF). (14 pp, 67K)

Regulatory Trends (just trends?)

- Federal (Currently Voluntary)
  - CAP and Trade most likely
- Regional Considerations
- States (California)
  - Other States
- Globally

Federal

- US Supreme Court affirmed that the Environmental Protection Agency has the legal authority to regulate emissions
- Federal restrictions on greenhouse gases debated in Congress
- Current energy policy provides for some increases in fuel efficiency standards

Federal

- The current administration has favored a voluntary approach
- Some U.S. companies are calling for federal regulation on carbon emissions
- Policy is to reduce the greenhouse gas intensity of the American economy by 18 percent over the 10-year period from 2002 to 2012

Federal

- **Cap and Trade**
  - **Past success with Cap and Trade**
  - **Mercury rules implications**
- **EPA has denied states from setting emission standards**
- **All presidential candidates favor a cap-and-trade**

Federal

- **March 7, 2008 EPA published Inventory of U.S. Greenhouse Gas Emissions and Sinks for 1990-2006 in the Federal Register for comment**
- **Executive Order to develop regulations for new mobile sources**

States

- States divided over EPA regulation of greenhouse gas
- California has actually passed legislation but needs a waiver from EPA which has been denied
- Ten States are challenging EPA in the case before the Supreme Court
- Intervening states, such as Texas, Michigan and North Dakota, are states that depend heavily on coal-fired, electricity or motor vehicle production for their economic livelihood

States - Pennsylvania

- **Both houses of the Pennsylvania legislature passed virtually identical pieces of greenhouse gas legislation**
- **October 31, 2007, the House of Representatives passed H.B. 110, the Greenhouse Gas Reduction Act**
- **Corresponding Senate legislation, S.B. 266, the Pennsylvania Climate Change Act on November 20, 2007**

States - Pennsylvania

Each piece of legislation would impose four major requirements for PADEP:

1. **Prepare a report within 12 months detailing the potential impacts of global warming in PA and opportunities as a result of the need to develop alternative energy sources and control CO_2 emissions**

2. **Inventory all PA greenhouse gas sources and sinks**

3. **Consult with stakeholders to produce within 1 year and every 3 years thereafter a greenhouse gas action plan for the Governor's approval**

4. **Create a voluntary greenhouse gas registry, where companies that choose to reduce their greenhouse gas emissions in advance of mandatory requirements could record and store these credits.**

World View

- United Nations Framework Convention on Climate Change (UNFCCC)
- European Union Emissions Trading Scheme
  - Began in January 2005
  - Includes the 27 countries
  - Covers only CO_2
- Japan – Emissions Trading
- Russia – Economic Downturn no regulation
- Japan and Russia in discussion of trading emissions
- China – Could not be determined
- Canada – Regualtion of Motor Vehicles

Voluntary programs

- Climate Leaders
- Clean Energy-Environment State Partnership
  - Pennsylvania is involved
- Combined Heat and Power (CHP) Partnership
- ENERGY STAR
- Combined Heat and Power (CHP) Partnership
- ENERGY STAR
- EPA Office of Transportation and Air Quality Voluntary Programs,
- Green Power Partnership
- Methane Voluntary Programs
- Wastewise

Conclusions

- Preparing inventory complicated
- Need well defined boundaries
- More data needed than normally tracked for compliance
- Wealth of guidance information
- Regulatory uncertainty

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