

Narrative for FY2012 GHG Emissions Inventory

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Introduction

Loyola University Chicago set out to track its Greenhouse Gas Inventory to serve as a quantitative understanding of our energy and environmental footprint. We utilized version 6.851 of Clean Air Cool Planet's Campus Carbon Calculator. Different than previous years, for FY2012, two students under the direction of Professor Elizabeth Coffman compiled the data for the inventory and worked with the calculator tool (both Excel and Online formats) to generate the emissions report. Final analysis was completed by A. Durnbaugh in version 6.851 of the Clean Air Cool Planet's Excel Calculator. Following is a narrative of how the information was collected and any boundary constraints that were addressed throughout the process.

Boundary Setting

Following the lessons of the FY08 and FY11 inventories, geographic scope included only Water Tower and Lake Shore Campuses (Lakeside Campuses). NOTE: *In the future, Loyola will need to set up separate GHG Inventory for separate campuses (Health Sciences, LUREC, Cuneo).*

Temporal boundary was set at Financial year 2012 (July 1, 2010 – June 30, 2011). Unless noted, all information is for within this time window. Information for other years was collected where possible to serve as comparative and baseline setting.

Operating Budget is from annual approved budget (J Filipiak in Budget Office provided this information).

Research Budget is from Office of Research Services (W Sellers). Only External dollars that are identified as 'Research' were accounted.

Total Building Space – This is from Facilities Building List worksheet. (E Pascual). Also identified a series of dates and square footage amounts to use for other inventories and benchmarking (Have 2005, '06, '08, '12)

Total Research Building Space – This is from Federal Government Indirect Rate agreement reporting (J Filipiak). NOTE: *Need to determine if this is the best way to identify research square feet as it is more directly to the energy use of the space and not the financial use.*

Residence Life Space - This is from Facilities Building List worksheet. (E Pascual and I Greenwald)

Scope 1

Scope 1 emissions are direct emissions from sources that are owned and/or controlled by the institution. This includes the combustion of fuels in college-owned facilities or vehicles, fugitive emissions from refrigeration, and emissions from on-campus agriculture or livestock.

Loyola has no co-generation facilities on the Lakeside Campuses and limited stationary and direct transportation (fleet) sources.

On-Campus Stationary (Natural Gas)

This is produced from monthly utility bills. Many utility bills fall slightly over or under the timeframe of this inventory but we utilized the determination of the Facilities Office to identify if they were within FY12. If necessary, each utility bill is assigned a Financial Year Quarter and could be analyzed even further. Total therms was reported and total cost was added to Electricity Bills to determine Energy Budget. (E Pascual)

Direct Transportation (Fuel purchases)

This is produced by running budget report for this time for Budget Line 6421, Vehicle Costs – Fuel. By inventorying the fleet we determined that 95% of fuel purchases were for gasoline and 5% were for diesel (primarily snow equipment). By using Chicago-area average cost of all grades (<http://www.eia.gov/petroleum/gasdiesel/>), all formulations of gasoline (\$3.33) and Midwest average cost of #2 Diesel Retail (\$3.86) we determined the number of miles to enter into the tracking spreadsheet. (E Pascual)

Electric Fleet is not appropriate because all kWh are tracked under purchased electricity. Note; These are not submetered.

Refrigerants

For this inventory, no refrigerant data was collected although we anticipate including refrigerant data in future inventories.

Chemicals

We were able to receive tracking sheets for chemicals being disposed of. No chemicals were determined to include trackable greenhouse gases. *In future inventories, we will need to determine chemicals at time of procurement to include them into the inventory.* (W Curtin)

Agriculture

We were able to receive tracking sheets for fertilizer use on Lake Shore Campus (none is used at Water Tower) for both facilities and our landscape contractor (Clauss Brothers) (W. Curtin). Simple calculations determined weights for nitrogen in fertilizer and entered into tracking spreadsheet.

Scope 2

Scope 2 emissions are indirect emissions from sources that are neither owned nor operated by your institution but whose products are directly linked to on-campus energy consumption. This includes purchased electricity, steam and chilled water. Loyola has no purchased steam or chilled water sources.

Purchased Electricity

This is produced from monthly utility bills. Many utility bills fall slightly over or under the timeframe of this inventory but we utilized the determination of the Facilities Office to identify if they were within FY11. If necessary, each utility bill is assigned a Financial Year Quarter and could be analyzed even further. Total kilowatt hours were reported and total cost was added to Gas Bills to determine Energy Budget. (E Pascual)

Unique to electricity is the fuel sources that generate electricity. Due to the tracking provided by our electricity broker (Amren brokers utility purchases, Champion Energy provides electricity), our fuel sources are listed as '100% unknown':

<http://www.icc.illinois.gov/electricity/environmentaldisclosure.aspx>

This being the case, we used the regional averages provided by the calculator for RFC West. For 2009 these averages were: Coal- 69.88%, Nuclear-23.56%, Nat. Gas-3.51%, Other- 3.06%. This is the most up to date electricity grid numbers available.

http://www.epa.gov/cleanenergy/documents/egridzips/eGRID2012V1_0_year09_SummaryTables.pdf

Scope 3

Scope 3 Emissions – Other indirect emissions attributed to an institution. This includes emissions from sources that are neither owned nor operated by an institution but are directly financed or otherwise encouraged or influenced by the institution. These include air travel, commuting, solid waste disposal and transportation/distribution losses from energy.

Commuting Data – Faculty and Staff

By using the results of the Metropolitan Planning Council's 2011 Commuter Options Survey and information from Human Resources, we estimated the median distance for faculty/staff from their primary campus using the center point of their residential zip code. The number of trips per week per mode was then multiplied by the number of faculty/staff, the median mileage and 50 weeks per year, accounting for vacations. NOTE; Additional data is available for other modes not listed (bike, walking,

rideshare) and thus additional detail on avoided emissions could be developed. For the sake of this effort staff and faculty were analyzed together. (Office of Sustainability / Metropolitan Planning Council Commuter Options Survey)

Commuting Data – Students

Using the 2012 Environmental Awareness Survey results we estimated the number of students taking trips by various modes, by their reported distance to their primary campus. Each subset was assigned a median distance and the modes were multiplied by the number of students and the average mile. Note; Additional data is available for other modes not listed (bike, walking, rideshare) and thus additional detail on avoided emissions could be developed. We were able to estimate the emissions from the campus shuttle more precisely by determining the number of trips (15,900) and miles (7.8) = 174.84 metric tons CO2 equivalents. (Free Enterprise Shuttle Service and Office of Sustainability Pulse Survey) (E Racz)

For both Faculty/Staff and Students, the average per person emission was multiplied by the population to determine emissions going backwards and forwards. We only felt that this was sufficient to go back to 2008 and not further. Also, commuter rail is included with light rail as this was not differentiated in either survey. We will be redoing this survey in late 2013 and will update/verify our approach at this time.

NOTE; There is good evidence that on-campus residential students have increased over the last decade and certainly the last 25 years although no good records could be found. If this could be found to be more definite, one could suggest that commuting trips by car and other source would have been more significant in the past.

Air Travel

Faculty- Email request to Provost's Office (J. Pappas). Received Procard and total budget line 6310 (Professional Development, Meeting) amount for air fares. Only some administrators and chairs have procards. All other faculty submit expense reimbursement requests (Budget line 6310). This line also includes conference fees, other transportation expenses, hotels, etc..). Requested sample of travel reimbursement forms to discern % of total budget line to be attributed to air fare. Multiplied amount spent minus 20% to remove taxes and airport fees multiplied by \$.1464 cents per mile.

(www.airlines.org/pages/annual-round-trip-fares-and-fees-international--.aspx)

To verify these percentages and assumptions we requested a complete account report from budget line 6310 for FY2008. Over 15,000 budget items were categorized. Of the total \$6,619,941 expensed to this budget line, \$676,858.93 was identified as airfare (10.2%), \$2,569,578 as reimbursement (38.8%), \$358,850 as travel agency (5.4%) and \$149,302 as unknown (2.3%). The latter three amounts (reimbursements, travel agency and unknown) were multiplied by a coefficient to estimate a conservative amount spent on airfare and added to the airfare amounts. This produced a percentage of

this budget line of 33% on air fare. We feel this is a highly conservative and thoughtful amount to be used for this effort. This percentage was then multiplied by the total amount in Line 6310 for FY2012 to estimate amount spent on air fare by faculty and staff directly funded by the university. This produced the estimated amount spent on air travel in FY12 at \$2,065,435. When assuming half international and half domestic at an average of 15 cents per mile, we estimate 13,875,950 air miles by Loyola staff and faculty.

Students- Started by an email request to International Affairs (R. Max and P. Boyle). Received summary of all faculty and staff using the travel insurance program. Did not include faculty travel as we assumed this was included in Faculty/Staff Air Travel above. We used number of students TIMES mileage between Chicago O'Hare and main international city TIMES 2. Did not account for other return trips or trips in country. Only return trip from Chicago to host city. Used the World Atlas site to determine distance between cities. (http://www.worldatlas.com/travelaids/flight_distance.htm)

Athletics Travel Narrative

Although not collected or included in the FY2011 data, Adam Senese and Scott Willis have gathered data to include Loyola's athletics teams travel emissions. In order to collect this data, we contacted Dr. Pat Kraft and Pat Schultz asking for information pertaining to travel arrangements made by the all of the men and women's teams. This includes: mode of transportation to events, numbers of vehicles used (if applicable), and the number of athletes and staff on plane (if applicable).

We gathered all of the away games for each team from the Loyola athletics website from the Schedules/Results section. All the away games that fell under the FY12 date range were located in the 2011 schedules besides the Women's Softball team which fell under the 2012 schedule. The Men's and Women's Cross Country/Track teams shared transport to their away games so the miles were only calculated once. The travel mileage was put into three categories gas miles, diesel miles, and air miles.

We assumed that all teams traveling by land departed from Norville Athletics Center to their final destination. The final destination was determined by the location on the schedule, we used exact event locations when listed otherwise we used the city listed instead. We then doubled mileage to get the roundtrip mileage. We used Google Maps to determine all of the mileage and we used the recommended directions.

For the air travel we assumed that the teams departed from Chicago O'Hare International Airport to the airport closest to their final destination listed on their schedules and we then doubled that mileage to obtain a roundtrip total. We used <http://www.airmilescalculator.com/> to calculate the air miles. We did not include any travel to and from the airports.

*Some away games were omitted when teams either drove or flew to a faraway location and they had consecutive games. In these cases the roundtrip mileage was only calculated once.

Solid Waste – Landfilled Waste – Using the waste/recycling tracking we were able to account for the last 5 years of landfilling. In the Chicagoland region, landfills are all constructed with methane recovery, however flaring vs. electric generation is not as clear or certain. Many landfills were designed for flaring but have been retrofitted for capture or electric generation. To account for this, we split our total tons in half for flaring and half for electric generation. (W. Curtin / Lakeshore Waste Ltd)

Other Scope 3 Notes:

Although not included in the FY2012 Inventory, other scope 3 emissions were identified for consideration in future inventories. Please note all three of these are well under 5% and can be categorized as 'De Minimus'.

Potable Water Use- Using water meter data and calculations from the Center for Neighborhood Technology's Chicago Mitigation Analysis, an estimate of emissions related to potable water treatment and pumping in 2012 was completed. Of 109 Million Gallons consumed in financial year 2012, between 35 and 170 Metric Tons of CO₂ E are emitted. (De Minimus)

Waste Water – Using information on potable water use and stormwater management we estimated that 138 million gallons were sent to the combined sewer system in financial year 2012. Using an estimate from Chicago Department of Water Management and Metropolitan Water Reclamation District of Greater Cook County, we estimate that 180 Metric Tons of CO₂ E are emitted. (De Minimus)

Solid Waste Transportation- Using Solid Waste load tracking information, the emissions related to transportation of the wastes were estimated. Of the 971 tons of solid waste generated, we estimated 242 trips of 90 miles. With B20 blend of diesel, this produces 61.6 Metric Tons of CO₂ #. (De Minimus)

Offsets:

To date, Loyola has only purchased renewable energy credits (RECs) to meet the obligations of USGBC LEED projects. In FY 2012, RECs were purchased for Cuneo Hall. Although this was purchased for two years of energy use at Cuneo, we attributed the entire offset to FY2012 as it was part of this financial year. It is assumed that this will be the protocol for future offset programs.

Glossary – (All definitions adapted from Clean Air / Cool Planet)

Lakeside Campus – Includes Water Tower and Lake Shore Campuses

Water Tower Campus – Includes all holdings near Michigan Avenue, downtown Chicago. In 2012, this included 5 buildings.

Lake Shore Campus – Includes all holdings near Broadway and Devon, Rogers Park / Edgewater campus. In 2012, this included 62 buildings.

Organizational Boundary – This determines which part of the organization’s emissions will be included in the inventory. It defines what buildings, actions and budgets will be included.

Operational Boundary – This further refines the organization boundary to determine which operations of an institution will be included in the inventory. Important aspects including budgeted versus actual and directly financed vs. encouraged vs. incentivized should be considered and noted here.

Temporal Boundary – This determines the time frame for which data will be included in the inventory. Important aspects including annual year vs. fiscal year should be considered and noted here.

Directly-financed Emissions – Any activities creating emissions, either on-site or at other locations, which are paid for by the institution are considered directly-financed. Many directly-financed emissions have limitations on the ability to modify or limit emissions but should be accounted for as they are ‘owned’ by the institution.

Greenhouse Gas Emissions – Any chemical compound emitted from an institutional process that absorbs and emits radiation within the thermal infrared range. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Human produced (Anthropogenic) greenhouse gas emissions (i.e., emissions produced by human activities) come from combustion of carbon based fuels, principally wood, coal, oil, and natural gas.

Scope 1 Emissions – Direct emissions from sources that are owned and/or controlled by the institution. This includes the combustion of fuels in college-owned facilities or vehicles, fugitive emissions from refrigeration, and emissions from on-campus agriculture or livestock.

Scope 2 Emissions – Indirect emissions from sources that are neither owned nor operated by an institution but whose products are directly linked to on-campus energy consumption. This includes purchased electricity, steam and chilled water.

Scope 3 Emissions – Other emissions attributed to an institution often deemed “optional” emissions by corporate inventories. This includes emissions from sources that are neither owned nor operated by an institution but are directly financed or otherwise encouraged or influenced by the institution. These include air travel, commuting, solid waste disposal and transportation/distribution losses from energy.

Offsets – This is a reduction in emissions of carbon dioxide or greenhouse gases made in order to compensate for or to offset an emission made elsewhere. For the sake of this inventory all offsets are Renewable Energy Credits procured to offset energy use.

De Minimus Emissions – Sources that add up to less than 5% are considered to be “de minimus” and need not be inventoried if the resources required to inventory them are restrictive. Where possible, these items are included on the ‘high-end’ of their range so that a conservative approach is considered.