Western Michigan University GHG Inventory: Baseline Year 2007

ENVS 4100: Campus as a living laboratory

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Introduction

We believe that a prerequisite to thoughtfully assessing the feasibility of signing the ACUPCC, is to have a rich understanding of WMU’s current GHG emissions. For our ENVS 4100 project we chose to assist Dr. Glasser and the PUSC by performing a GHG inventory of WMU. This GHG inventory enables WMU to: (1) have a baseline estimate prior to signing the ACUPCC. (2) meet one of the conditions of the ACUPCC (3) explore benchmarking ourselves relative to other similar/peer institutions; and (4) strategically plan a high-leverage GHG reduction strategy (and, potentially, to set a viable target date for meeting the ACUPCC goal of climate neutrality).

Performing this assessment allows us to model our University’s sustainability commitment and the WMU goal statement of promoting responsible environmental stewardship.

The greenhouse gas inventory also aids in fulfilling three principles of the Talloires Declaration: It will increase our awareness of environmentally sustainable development, allow us to practice institutional ecology, and help us maintain the movement.

Methodology

We used the Clean Air-Cool Planet protocol to estimate WMU’s GHG emissions, since it is was recommended by the ACUPCC and widely used by ACUPCC signatories. We also estimated some emissions through custom approaches when we felt it would provide more detailed information.

Emissions are broken down into scope I, II, and III. Scope I emissions are directly associated with campus activities, and result from university owned sources. Scope II emissions are indirect emissions from non-university owned sources, but are closely associated with campus activities. Scope III emissions are indirect emissions from outside sources, but are either financed or encouraged by the university.

Our inventory focuses on six GHG’s: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), chlorofluorocarbons (CFC’s), hydrochlorofluorocarbons (HCFC’s), and hydrofluorocarbons (HFC’s). While carbon dioxide is the most abundant, the other gases are important to take into consideration because they have high global warming potentials, and/or ozone depleting potentials.

We collected the majority of our data through university faculty and staff, who were exceedingly helpful. Without them this GHG inventory would not have been possible. We also collected some of our data through the City of Kalamazoo, and a commuting behavior survey.

Observations

In 2007 the university produced 126,411 metric ton of carbon dioxide equivalents (eCO₂), and per capita emissions of 5.1 metric tons per full time equivalent (FTE) student, faculty, and staff. On the backside of this sheet is a breakdown of total emissions into scopes I, II, and III, and individual sources per scope.

Performing this assessment has also opened the door for future research such as, alternatives to traditional refrigerants, storage of excess electricity through ice storage or batteries, and eliminating or reducing our need of purchased electricity. However exploring energy conservation would also significantly reduce our total emissions. These are all areas of research that would significantly reduce our overall emissions, and lead to best practice sharing with the community and other research institutions.
Emissions Summary

- **Scope I**: Direct emissions from sources that are university owned and/or controlled.
  - Cogeneration (electric): 10,402 MT eCO₂
  - Cogeneration (steam): 46,678 MT eCO₂
  - Other: 2,651 MT eCO₂
    - **Other Stationary**: 1,058 MT eCO₂
    - **Direct Transportation**: 1,132 MT eCO₂
    - Refrigerants: 448 MT eCO₂
    - Fertilizer: 13 MT eCO₂

- **Scope II**: Indirect emissions from sources that are neither owned nor operated by the university, but directly tie in to energy consumption on campus.
  - Purchased Electricity: 27,256 MT eCO₂

- **Scope III**: Emissions from sources that are neither owned nor operated by the university, but are either directly financed or encouraged by the university.
  - Commuting: 25,676 MT eCO₂
  - Directly Financed Outsourced Travel: 2,460 MT eCO₂
  - Study Abroad Air Miles: 1,633 MT eCO₂
  - Solid Waste: 4,117 MT eCO₂
  - Waste Water: 3,000 MT eCO₂
  - Paper: 290 MT eCO₂
  - Scope II T&D losses: 2,696 MT eCO₂

- **Total Emissions**: Includes scope I, II, and III
  - **Scope I**: 59,283 MT eCO₂
  - **Scope II**: 27,256 MT eCO₂
  - **Scope III**: 39,872 MT eCO₂
  - **Total**: 126,411 MT eCO₂