

Calvin College Carbon Neutrality Project-Campus Emissions

Bio 354 and Engr 333

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Objective

Becoming carbon neutral at Calvin College means that there would be net zero carbon emissions, brought about by balancing the amount of carbon released with the amount sequestered. This can be attained by both reducing our carbon footprint and maximizing our sequestration potential.

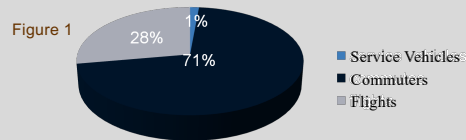
In relation to other regional colleges and universities Calvin is less developed in efforts toward carbon neutrality. Both Aquinas College and Grand Valley State University have centers for sustainability that allow students to gain more information about their carbon emissions and methods of reduction. Several regional schools have residences that are devoted to this ideal. Wright Hall, a new dormitory at Alma College has several green features including solar panels, use of recycled building materials, geothermal heating and cooling, and energy saving appliances. Many regional schools have signed the American College and University Presidents Climate Commitment in which the school administration recognizes the need for and strives toward carbon neutrality.

Calvin has improved its image as a sustainable campus recently by constructing the LEED certified Bunker Interpretive Center and installing a wind turbine on campus. Recently, biology and engineering students teamed up to assess Calvin College's carbon footprint and sequestration potential and develop possible solutions that can bring Calvin to carbon neutrality. Influenced by Calvin's Sustainability Statement, the students sub-divided into five groups to learn about and analyze the major carbon dioxide emitters on campus. Carbon emissions and sequestration were assessed using Metric Tons Carbon dioxide Emitted (MTCE).

Transportation

Total carbon footprint 20,900 MTCE/yr

- Air traffic (5,800 metric tons CO₂)
- Service vehicles (300 metric tons CO₂)
- Commuters (14,800 metric tons CO₂)



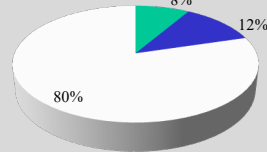
Construction

Total carbon footprint 1,134 MTCE/yr

Figure 2

MTCE/year for Construction Annualized for 20 year period

- new dorm wing
- commons addition
- specialhoff fieldhouse complex

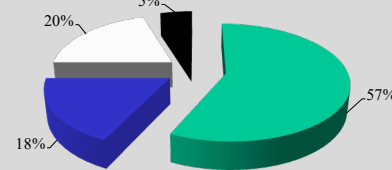


Energy Use

Total carbon footprint 42,352 MTCE/yr

Figure 3

- Coal
- Natural Gas
- Nuclear
- Renewable



Total electricity usage 21,451,200 kWh/yr

Land and Water Use

Table 1

Community	Total Area [Acres]	Total CO ₂ Fixed (MTCE/yr)	Rate of Sequestration [MTCE/(acre-yr)]
Maintained Lawn	122	21.7	0.18**
Prairie Grassland	33	5.8	0.18
Shrub	29	10.1	0.35
Edge	22	8.2	0.38
Early Successional	58	-3.9	-0.07
Mature Forest	18	9.4	0.52
Total	282	51.3	-

Table 2

Total campus water use:	
Tap water:	59.67 million gallons
Sewer:	59.62 million gallons
Total Costs	\$305,371
Energy Costs (est.)	\$152,686
Energy [MW-hr]	1,696.5
CO ₂ Emissions [MTCE/yr]	1,756.5

**not offset by maintenance costs

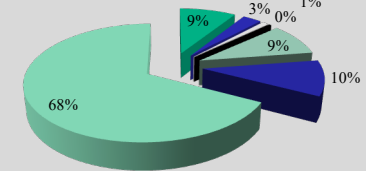
Waste Management

Total carbon footprint is 274 MTCE/yr

Figure 4

Annual Waste (Metric tons)

- Food Scraps
- Paper
- Newspaper
- Magazines
- Cardboard
- Plastics
- Other Waste



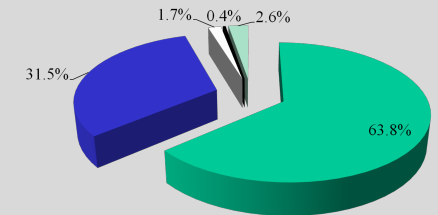
Total waste is 1,000 tons

Summary

Figure 5

Total Carbon Footprint of Calvin College

- Energy Use
- Transport
- Construction
- Waste
- Land



Currently, Calvin College emits 66,400 MTCE per year. The vast majority of greenhouse gas emissions on Calvin's campus come from energy from fossil fuels and the use of motor vehicles. Efforts to achieve carbon neutrality will primarily focus on eliminating or negating the effects of current emissions by using green energy, increasing energy efficiency, and encouraging alternate forms of transportation (see adjoining poster).

References

- 1) Donbos Jr, David, Christine Prins, and Sara VanderBranden. Carbon Sequestration at Calvin College. Personal Communication: Calvin College, August 2007.
- 2) GMB Architects
- 3) Piers, Kenneth, and Brent Geurink. A Sustainability Study at Calvin College Progress Report. Personal Communication: Calvin College, Spring 2007.



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