



Calvin College Carbon Neutrality Project-Solutions

Bio 354 and Engr 333

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Objectives

A carbon footprint is term which refers to the net amount of greenhouse gases produced to directly or indirectly by human activities and is usually expressed in terms of metric tons of carbon dioxide. The Calvin community places a strong emphasis on practicing good stewardship, including stewardship of Creation. Reducing Calvin's carbon footprint is crucial because carbon dioxide is a major greenhouse gas and contributes heavily to global climate change. In a previous portion of this project, the carbon footprint of Calvin College was calculated to be about 66,400 MTCE (Metric Tons Carbon dioxide Emitted). The goal of this portion of the project is to propose a plan for Calvin College to reduce these carbon emissions and eventually obtain net-zero carbon balance, becoming carbon neutral. Carbon neutrality can be achieved by matching the amount of carbon released into the environment with the amount of carbon sequestered from the environment. Several possible ways to achieve carbon neutrality are through purchasing carbon offsets, increasing renewable energy use, decreasing energy consumption, and improving carbon sequestration. With the plan presented here, Calvin would become carbon neutral in 11 years and sustain that neutrality for the following 35 years. The plan also calls for the establishment of a green energy fund to continue carbon neutrality for years to come.



Image A shows a picture of a wind turbine, also referenced in Table 1, a way to generate renewable energy. Both are potential ways for Calvin to decrease its carbon footprint.

Total Possible Carbon Reductions

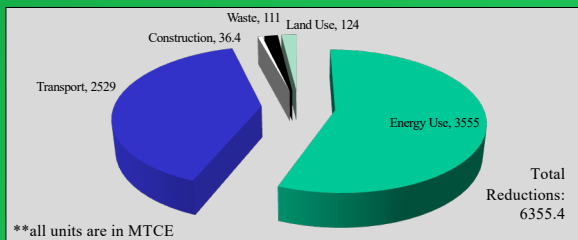


Figure 1: This graph displays the total possible carbon reductions from each group (see Table 1).

Proposed Solutions

	Solutions	Carbon Reduction (Mtons/yr)	Ratio (\$/Mton)	Cost
Land and Water Use	Planting White Oak Trees	1.02 /acre	\$9,709	\$8,696
	Carbon Sequestering Fertilizer	1.03	\$6,578	\$6775/yr
	Waterless Urinals	52.96	\$330	\$350/urinal + filters
Transportation	EV gift to a student each month	1.25	\$192,000	\$240,000
	Campus Safety in EVs	0.96	\$83,333.3	\$80,000
	Calvin owned bikes	1.258	\$2,385.38	\$3,000
	Adding Lake Dr. Bike lane and path	14.93	\$1,407	\$21,000
	Full Rapid Subsidation	264	\$358.53	\$94,500
	Daily Parking Tolls	2033.512	\$9.51	\$19,350
Solid Waste Reduction and Recycling	Increase permit fees	271.135	\$-184.83	\$-50,100
	Increase Recycling	111	\$757	\$84,000
Construction	Change Heating System in Dorms	36.4		\$-33,600
	Wind Turbine			\$820,000
Energy Use and Purchasing	Drop Temperature in Buildings	3,555	\$-48.38	\$-172,000

Table 1: This table displays the proposed solutions for how to reduce the carbon emissions at Calvin College. Columns three, four, and five display the amount the carbon emissions would be reduced (metric tons/year) by the proposed plan, the ratio of cost per metric tons of carbon dioxide (\$/metric ton), and the total cost of the solutions respectively.

Finances

An upfront investment of \$8.5 million would be required for Calvin college to become carbon neutral for 35 years. Carbon neutrality would be achieved primarily through the use of wind turbines and the purchasing of carbon offsets. But it is more feasible to establish a green energy fund and deposit \$1.05 million annually for the next 10 years until all \$8.5 million has been saved, and then implementing this carbon neutrality plan. From that point on Calvin would have enough funding to stay carbon neutral for 35 years. A variety of potential funding sources

are available to raise this money: raising tuition \$250 per year (1.16%), government grants, and donations. After the first 35 years, the money saved from the wind turbines (\$15.8 million) can be invested and used to fund the next generation of carbon neutrality.



Image B: One of the main solutions is to increase awareness and decrease commuter traffic. A very prominent solution would be increasing the Calvin student body's use of bikes.

Summary

Becoming carbon neutral is an important goal for Calvin College because carbon is a major greenhouse gas that is contributing to global climate change. Currently, Calvin emits 66,400 MTCE. This is equivalent to the emissions of driving a large vehicle (Ford F-150) over 4,500 times around the world at the equator.

Calvin has several options for reducing its carbon emissions: converting to renewable energy, reducing energy consumption, increasing carbon sequestration, and buying carbon offsets. In the process of conducting this research, buying carbon offsets emerged as one good option worth pursuing. The carbon offsets that are needed in our plan would cost \$264,000. Converting to renewable energy is another highly recommended option. Building wind turbines would provide Calvin with a carbon-free source of energy and has a pay back time of about 10.9 years per wind turbine, eventually saving Calvin money. Decreasing Calvin's energy consumption is another important component; one way to do this is becoming more efficient in energy use, such as heating in the buildings. Maximizing carbon sequestration is not a large contributor to decreasing Calvin's carbon footprint, but still important in becoming entirely carbon neutral. In the end, the most important aspect of reducing Calvin's carbon footprint is increasing awareness throughout Calvin College. Without the support and involvement of Calvin's community, becoming carbon neutral will be an incredibly difficult process.

References

- 1) Dombos Jr, David, Christine Prins, and Sam VandenBranden. 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.
- 4) Middlebury, Aquinas, Alma Colleges

