

### Objective

Find the greatest possible return on investment given a \$5 million investment in Renewable Energy Sources

### Summary

- \$158k initial investment in Geothermal systems for various Calvin-owned residential buildings
- \$3.34M initial investment in solar panels for Calvin's rooftops
- The overall savings would be \$233,850 per year
- Emissions would be reduced by 864 tons of CO<sub>2</sub> emissions per year
- The recommended investment would be fully paid back in 11-15 years



Figure 1. Recommended On-campus Locations

### Geothermal

Geothermal heating and cooling loops will be implemented to cover the full heating and cooling load for six residential buildings, including Dewitt Manor and two Project Neighborhood houses.

### On-Campus Solar

The solar panels would be placed on East-West facing rooftops on campus, including the new Student Union building, the Spoelhof Fieldhouse Complex, Hekman Library, and North Hall/Science Building.

### Off-Campus Solar

Calvin College could partner with an outside organization to install a ground solar farm in New Mexico, where there is a greater average of sunlight per day. This option would involve additional research into companies that Calvin could partner with as well as state requirements regarding how electricity is sold back into the grid.

### Results

#### Solar

- Space Required: 5.11 acres of rooftop
- Capital Investment: \$3.34 million
- Covers baseline of electricity used by Calvin College over the course of a year

#### Geothermal

- Capital Investment: \$157,000
- Covers the heating and cooling of six residential buildings

#### Contingency/Investment Fund

- \$1.503 million
- Carbon credits for further reduction of Calvin College Emissions

#### Wind

- Requires further, in-depth study of wind speed on campus and the surrounding area due to narrow margins on the payback period

#### Biomass

- Not feasible at Calvin College due to the small amount of bio-waste produced

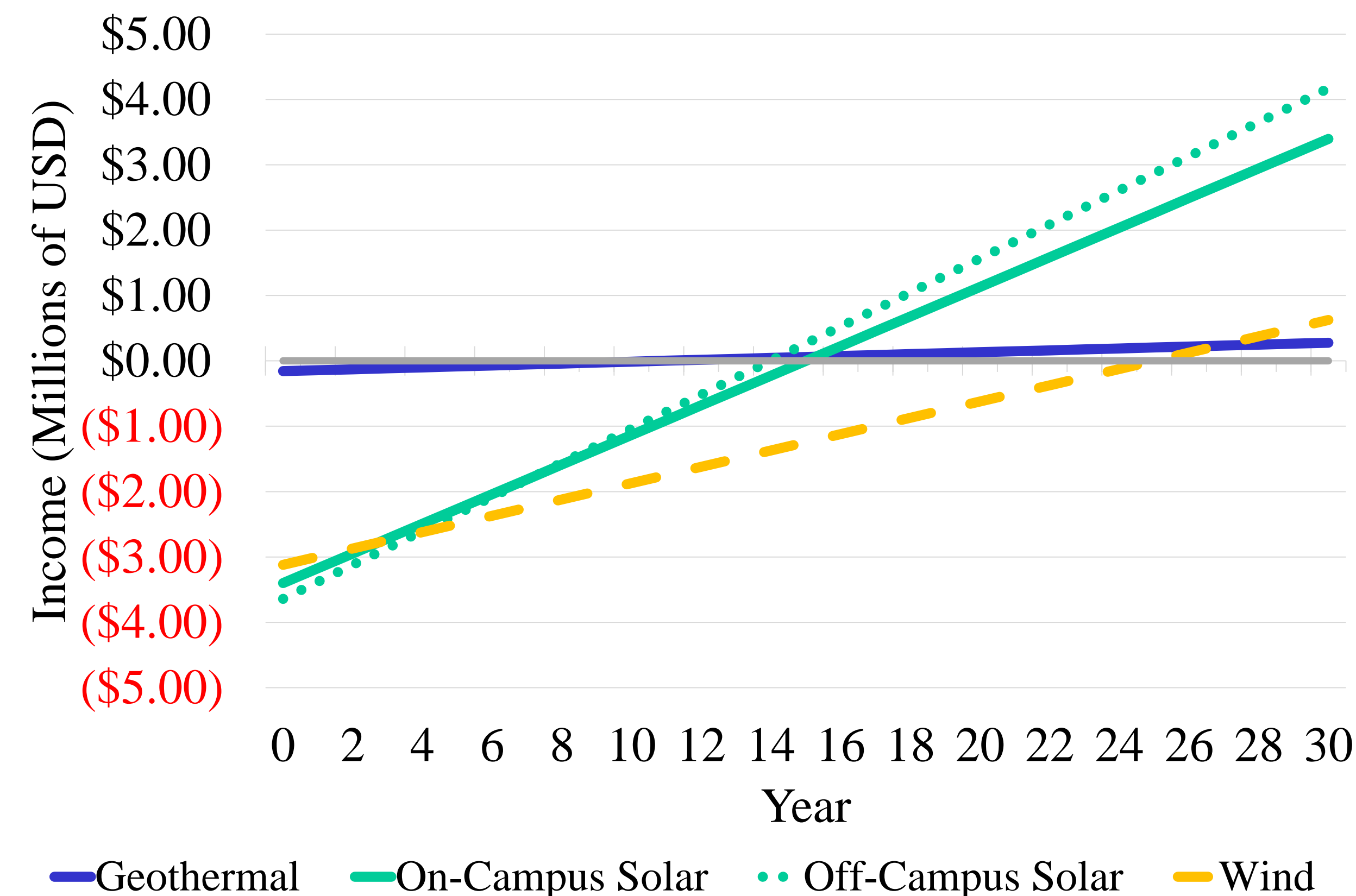


Figure 2. Initial investment and annual revenue for each renewable energy option

### Acknowledgements

The class would like to acknowledge the advice and support of Dr. Matthew Heun and Russell Bray, the director of Calvin's Physical Plant.

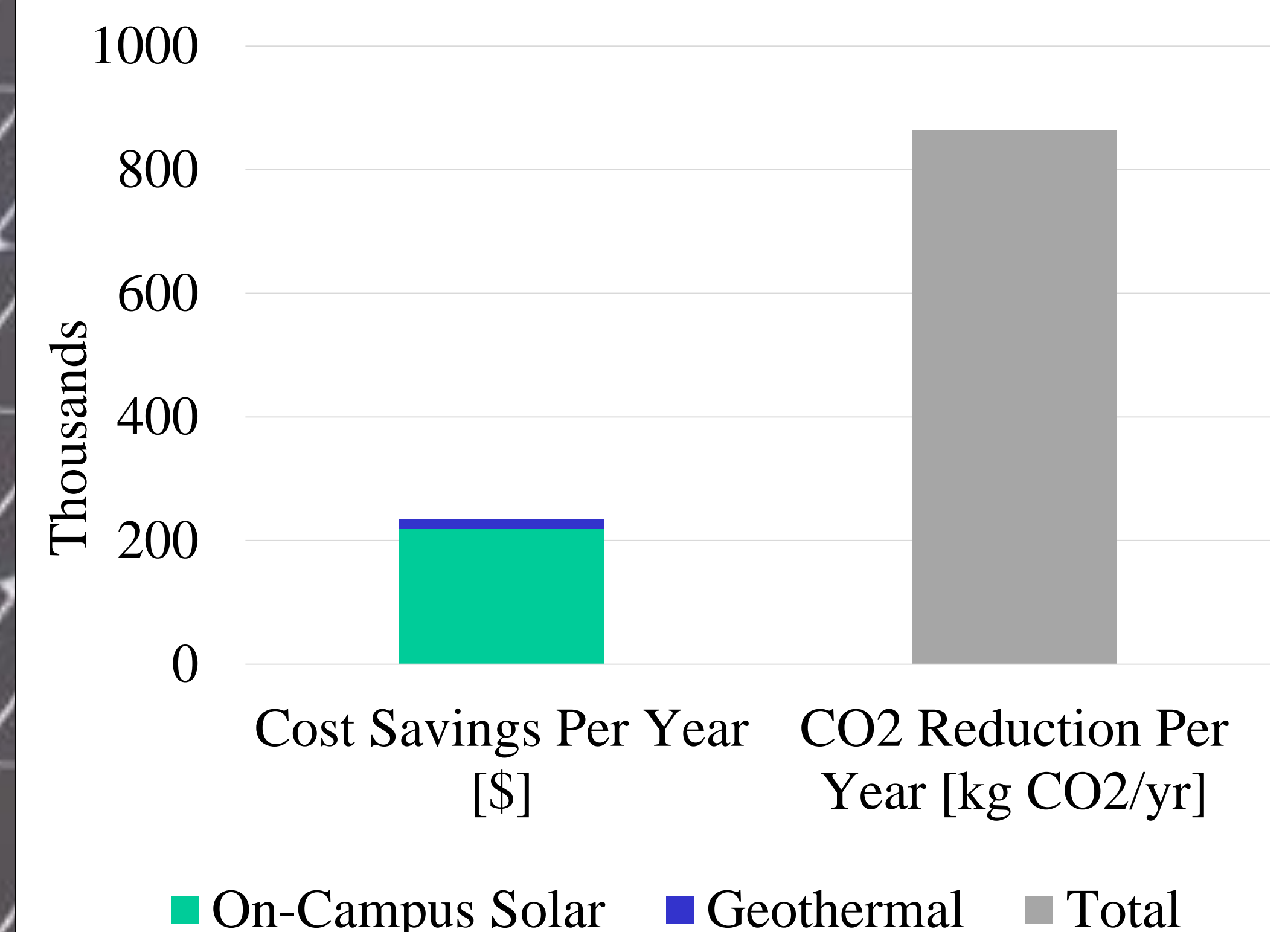


Figure 3. Cost Savings and CO<sub>2</sub> reduction from recommended investments.