

# Economic Feasibility Study of Photovoltaic System on UNH Campus

Jongsung Lee

BS Civil Engineering

Faculty Mentor: Dr. Byungik Chang

## **ABSTRACT**

All renewable energy sources are land intensive. A solar photovoltaic (PV) system requires a lot of spaces, and roofs of buildings are perfect places for installation of campus-wide PV system since most universities cannot afford to waste their land for PV modules. There are 25 buildings on the University of New Haven (UNH) campus with 30,000 m<sup>2</sup> of roof areas that are structurally suitable for solar photovoltaic. UNH is located in West Haven, Connecticut, where an average of 206 days, which is equivalent to approximately 2,585 hours of sun shine is annually present. The average annual insolation at this location is about 4.0 to 4.5 kWh/m<sup>2</sup>/day. This geographical information suggests that solar resource at this location is



**Figure 6.** Solar radiation calculation on tilted module [7]

	Institute			
20	Kaplan Hall	668	70	110,858
21	Maxcy Hall	730	76	141,446
22	Peterson Library	1380	144	223,324
23	Ruden Street Apt	606	63	102,421
24	S. Campus Hall	279	29	50,605
25	Subway Building	275	29	47,500
	Total	30172	3147	5,224,064

**CONCLUSION**

Energy cost makes up a significant portion of overall university operation expenses. UNH is currently spending approximately \$3 million annually for electricity, and this expense will continuously increase. Installations of PV systems throughout UNH campus will contribute significant monetary savings to the university, which would allow extra supports in improving facilities, funding

tuition bills. Successful outcomes from Celentano Hall encouraged installation of a PV system at Westside Hall, taking advantage of similar measures, and this will raise the level of awareness to the greater UNH community for sustainable efforts. A higher level of awareness will promote additional interests and investments in renewable energy research and sustainability projects, as well as greater responsibilities for wise use of our depleting natural resources. The conclusion of this research proved the feasibility of PV system installation at the University of New Haven. In the near future, feasibility of PV systems at other universities in Connecticut can be evaluated using the economic analysis model created from this research.

**FUTURE STUDY**

Data for the PV system performance at the Celentano Hall will be continuously collected. A more accurate and precise economic analysis model can be constructed with more data collected. Further research on the developing solar module technologies and future data collection will be useful to promote application of such a system at the universities throughout the NE.

For the purpose of this research, the electricity rate was assumed as the same for all UNH buildings. In the

