



**BUILDING DESCRIPTION**

After being damaged in the 1989 Loma Prieta earthquake, Green Library West was reconstructed and reopened in 1999 as the Bing Wing. The Bing Wing’s expansive reading rooms underwent painstaking historic restoration. Major disciplinary collections in the humanities, philosophy and religious studies are housed in the Bing Wing, along with a large government documents and political science section. Temperature and humidity levels are strictly controlled to help preserve books and documents.



Building Number	03-200
Gross Square Feet	188,762
Building Type	Library
Year Constructed	1919
Last Major Renovation	1999

**PROJECT OVERVIEW**

Stanford implemented a comprehensive retrofit of the heating, ventilation and air conditioning system (HVAC) in Bing Wing in 2011. The project has reduced energy costs in the building by over 50 percent. The main energy savings measures were to upgrade and enhance the energy management system and to replace steam humidifiers with ultrasonic humidifiers. The control system is one of the first on campus to use wireless humidity and temperature sensors to allow for an increased number of monitoring points. Other measures included reprogramming of select air handler fans to operate at lower speeds, installation of new VFDs on air handlers and pumps, and installing premium efficiency motors.



*New electric ultrasonic humidifiers use less energy than steam units*

*Air handler fans were reprogrammed to operate at lower speeds*



**MORE INFORMATION**

**FACILITIES ENERGY MANAGEMENT**

Leslie Kramer, Energy Retrofit Programs Manager, 650.725.5388, lfkramer@stanford.edu



**KEY PROJECT METRICS**

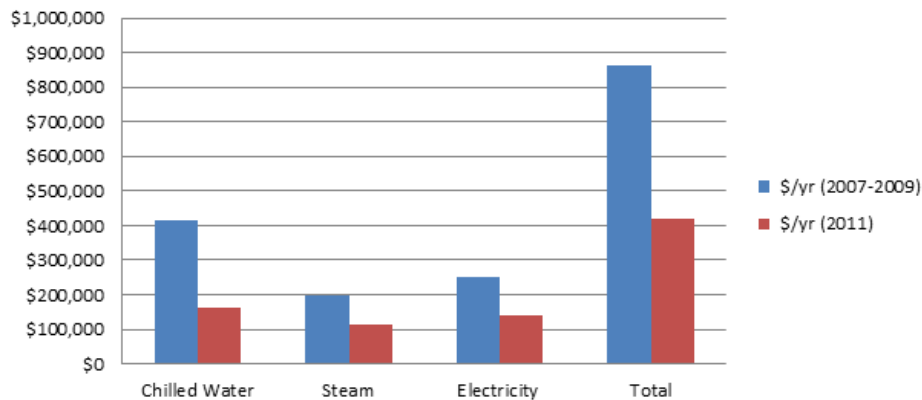
Online Date	January 2011
Project Cost	\$1,078,246
PG&E Rebate	\$181,518
Simple Payback	2.6 Years
CO2 Savings	1,390 tons/yr
<b>Baseline Energy Use*</b>	
Chilled Water	958,882 ton-hrs/yr
Steam	9,419,349 lbs/yr
Electricity	2,384,049 kWh/yr
Cost (2013 rates)	\$861,905/yr
<b>Energy Savings**</b>	
Chilled Water	582,354 ton-hrs/yr (61%)
Steam	3,972,051 lbs/yr (42%)
Electricity	1,030,508 kWh/yr (43%)
Avoided Cost(2013 rates)	\$443,249/yr (51%)

\* Average 2007-2009

\*\* Savings based on usage in 2011

PROJECT TEAM	
Stanford Team Member	Role
Scott Gould/Shalani Singh	WBERP managers
Marc Epstein/Jesse Shuker/Dan Young	Facilities Energy Systems Operations ("EMCS")
Kathleen Baldwin	Zone C Manager
Kevin Hutcherson	Zone Construction Project Manager
Edgar Maxion/Jacob Cohen	Building Managers
Tai Tran	HVAC Shop
Non-Stanford Team Member	Role
Salas Obrien	Energy Study and Design consultant
Southland	Contractor

**Annual Energy Costs Pre and Post Retrofit \***



\*Pre- and post-retrofit costs normalized by applying FY 2013 rates to pre- and post-retrofit energy usage.

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