project overview

good design, desirable housing

collaborative design

university influence and opportunities
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project beginnings
A 47-unit student row house just steps away from Tresidder Student Union

The ground floor building systems laboratory serves School of Engineering students and faculty

A building oriented towards the sun on a site with unobstructed solar access

An interactive “information center” where residents and visitors can learn about building systems and access and real-time performance

A second floor roof deck supporting experimental green roof, solar panels, and outdoor social space
Environmental Performance Goals

5 measurable environmental performance

Zero Carbon Building
Eliminate net carbon emissions due to operational and embodied energy use over the course of a year

Close the Water Cycle
Reduce water use, capture rainwater, and recycle water within the building to ultimately eliminate the import of potable water and the export of wastewater

Optimizing Material Resources
Cut the embodied energy of building materials in half while reducing earthquake losses through high-performance structural design
$12.2 million project cost for Living Laboratory model supports research, educational, environmental performance, and housing goals described in the Report.

$9.65 million project cost for Baseline Green model is equal in first cost to Stanford’s benchmark, demonstrating that sustainable housing at Stanford can be first cost neutral.

Life cycle cost analysis shows 30-year payback for Living Laboratory with immediate and ongoing payback for Baseline Green.
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6 the most desirable housing on campus

a popular row-house that aims to place at the top of the housing draw

a design balancing privacy and community

access to programs and research contributes to the goals of residential education

building feedback loops encourage sustainable lifestyles as students monitor the impacts of their choices

designed to the highest standards of thermal comfort, occupant health, lighting and acoustic quality
quality of life

BUILDING DESIGN

• thermal comfort
• lighting quality
• facilitating sustainable lifestyles
• air quality

STUDENT RESEARCH

• time of use studies
• experience
• metering, display, education
student creativity
a living laboratory for research

A vehicle for ongoing research and learning in sustainable engineering and design

A living case study for School of Engineering coursework and independent studies

Data collection and analysis to test and demonstrate systems and strategies

Built-in adaptability to invite future modifications
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user group

Bob Wheeler, Associate Director of Facilities and Planning, School of Engineering

CEE Faculty:
Dick Lutth (chair)
Gil Masters
Martin Fischer
John Haymaker
Craig Criddle
Sarah Billington
Sandy Robertson
Eduardo Miranda

Other Faculty Advisors:
Chris Gennies, Mechanical Engineering
Phil Levis, Computer Science
Scott Klemmer, Computer Science

Student Representatives:
Jonas Ketterle
Mike Lin
Lauren Dietrich

Woods Institute for the Environment
CEE 124/224: Sustainable Development Studio
Students for a Sustainable Stanford
Roosevelt Institute
MACDADI
Multi-Attribute Collective Decision Analysis

Environmental Performance: 30%
Living Laboratory: 33%
Desirable Housing: 28%

Identify Stakeholders
Identify Project Goals
Weight Preferences
Weight Stakeholders
Explore Options Merits
Choose Best Options

Identify Decision Maker
Identify Design Team
Identify Design Options
Weight Options Impacts

Identify Project Goals
Weight Preferences
Weight Stakeholders
Explore Options Merits
Choose Best Options

Environmental Performance: 30%
Living Laboratory: 33%
Desirable Housing: 28%

Baseline Green
Info Center
Parachute Solar
Radiant Solar
Wood Frame
Future Upgrades
Half Moon Labs
Roof Deck
Electro Car
Solar Power

Living Laboratory
100% Glass
Shape Structure
Certified Wood
Fuel Cell
Solar Hot Water
Grey-Water
PV Array
Directed Lighting
Bio Light
Soffit Lighting
Upgrading Windows
"Green" Radiology
Barn Roof
Grey-Black-White Roof
East Finish
Green Roof
Triple-Paned Wind
Orientation
Vert Atrium

Environmental Performance: 30%
Living Laboratory: 33%
Desirable Housing: 28%

Community 9%
Learning 9%
Indoor Environment 20%

Completion Date 12%

Material Use 9%
Demonstration 12%
Experimentation 20%

## Stanford Green Dorm Process Tool Evaluation

### Link | Tool | Communication | Integration | Optimization
--- | --- | --- | --- | ---
| Preferences (TBD) | | | | |
| Central Project Tools | | | | |
| Project Team Meetings (Autumn 2005) | | | | |
| Face to Face Meetings | | | | |
| Telephone | | | | |
| E-mail | | | | |
| View | Feasibility Study DRAFT | | | |
| View | Feasibility Study | | | |
| View | Technology Choice Matrix | | | |
| View | Project Team Org Chart | | | |
| View | Old Green Dorm Website (2004-05) | | | |
| View | Project Wiki | | | |
| View | Feasibility Study Interactive Timeline | | | |
| View | POP Model - Meetings and Master | | | |
| View | MACDADI Process | | | |
lotus living laboratory
finding sustainable pathways

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P3 Phase II winner

Interdisciplinary Research

Collaborative Design Process

Metering & Monitoring

“Discovering and sharing sustainable pathways”

http://es.epa.gov/ncer/p3
Green Globes Award

Greatest potential for replication/commercialization
Student researchers
Row House Annual Primary Energy Use
(All Values Scaled to Green Dorm)

- Natural Gas/Heat
- Electricity
- On-Site Generation

Green Dorm primary energy use predicted to be 57% below average existing row house

average row house primary energy use = 1,750 MMBtu

On-site energy generation offsets all of building primary energy use

Net zero primary energy