

Green Art Studio

I PRO 335



MISSION STATEMENT

To deliver a visionary yet realistic building design to the public, demonstrating the full potential and importance of using Green Solutions

STAKEHOLDERS

- The public
- Developers
- Engineering / Design firms
- Government

THE PROBLEM STATEMENT

- **Buildings leave a huge impact on the environment**
- **Most of the Green Solutions are Value Engineered out**
- **The Initial Investment in “Green” Building is very high**

SEMESTER OBJECTIVES

- Design and estimate a Green Building that has very low impact on the environment
- Develop an innovative building, “Green Art Studio”, as a prototype for public use building
- Analyze the cost and payback time for return on investment
- To build team work experiences

DEFINITIONS

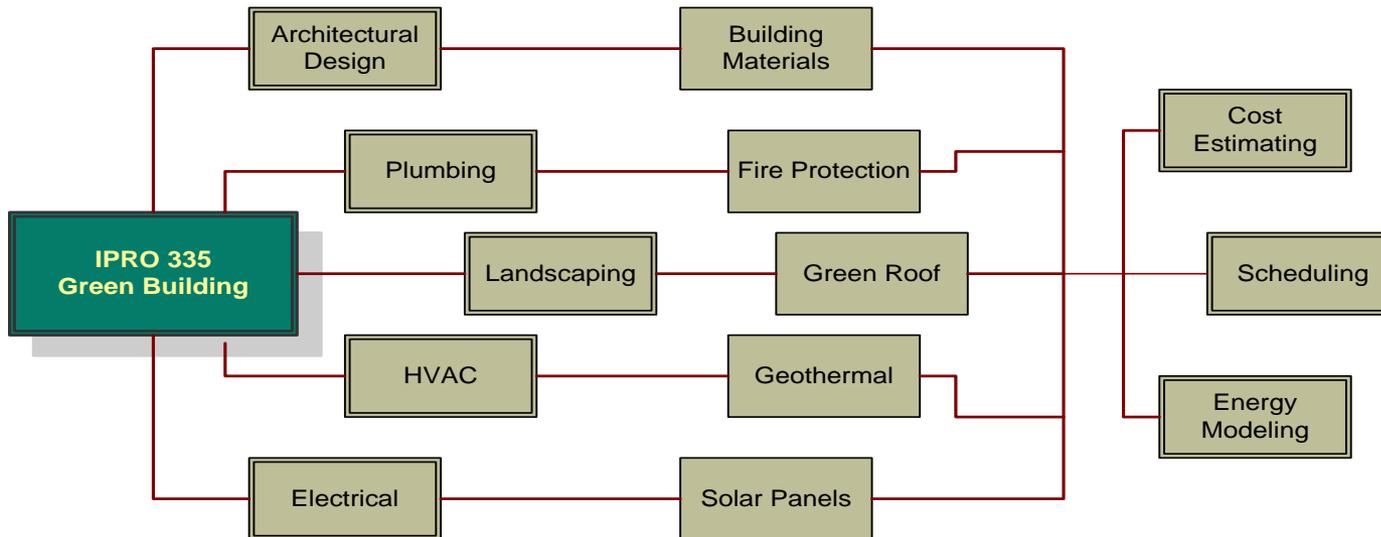
- LEED –Leadership in *Energy and Environmental Design*
- USGBC – U.S. Green Building Council
- HVAC- Heating, Ventilating and Air Conditioning
- iGroups – collaboration website for students to work on IPRO Projects

GREEN BUILDING TEAM



ORGANIZING TEAMS

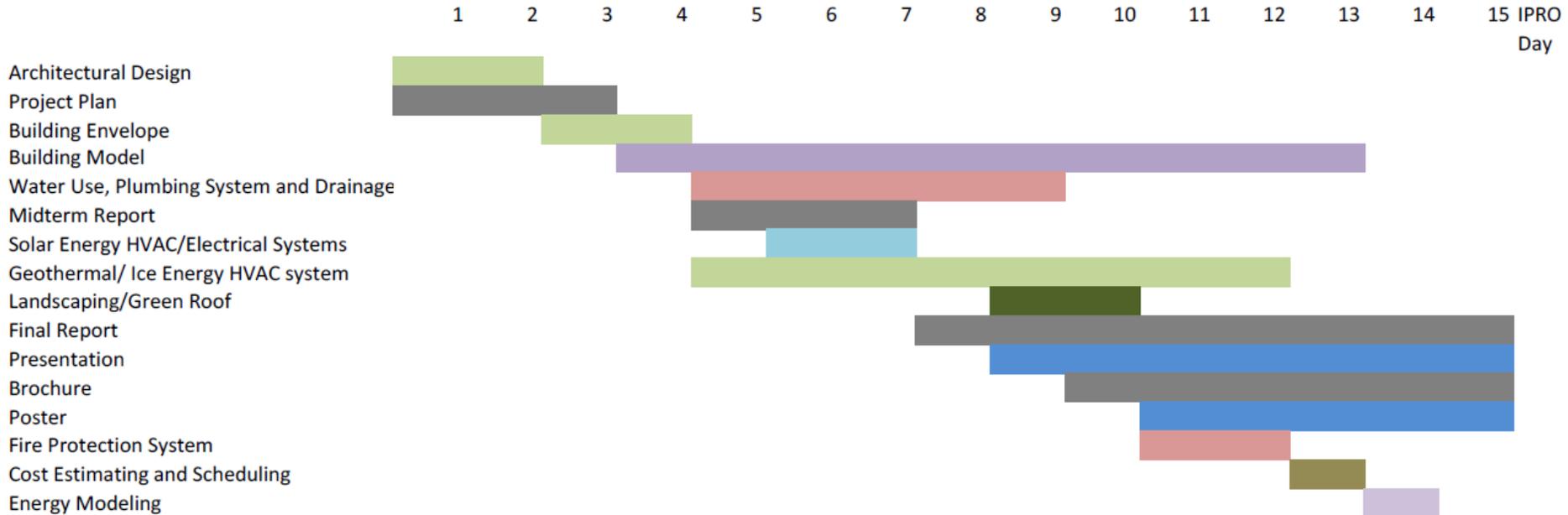
Compiled groups included members from various fields



WORKFLOW SCHEDULE

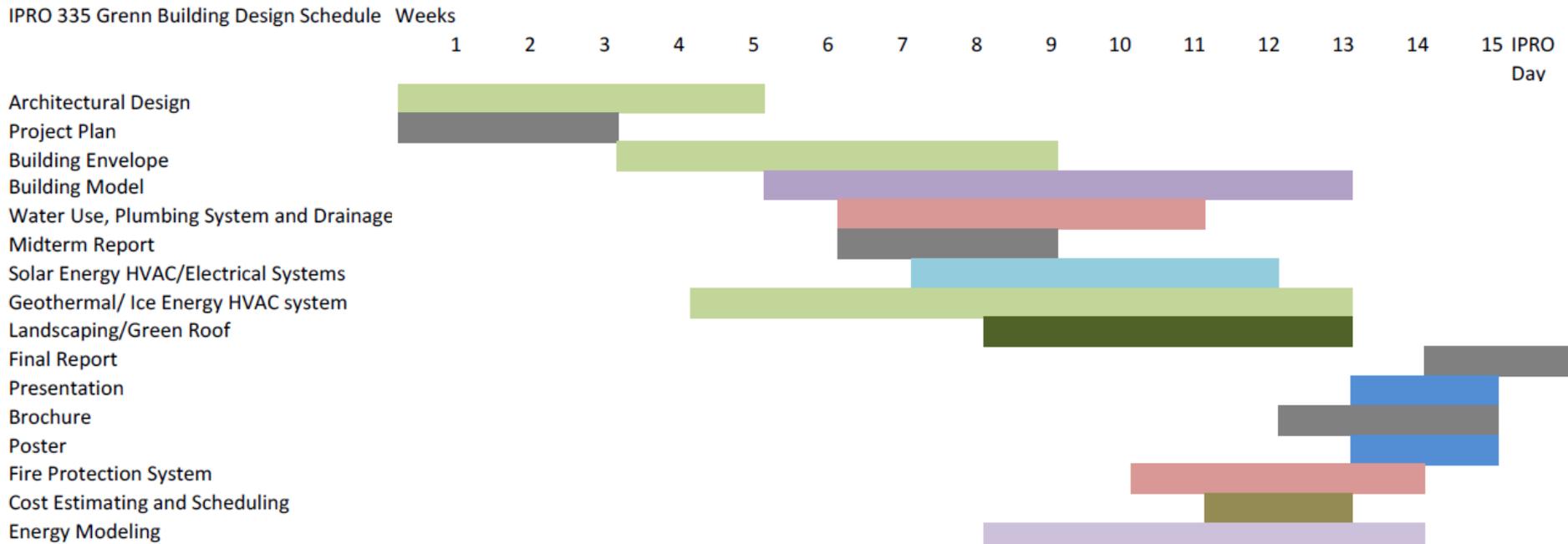
■ Enthusiastic Beginning

IPRO 335 Grenn Building Design Schedule Weeks



WORKFLOW SCHEDULE

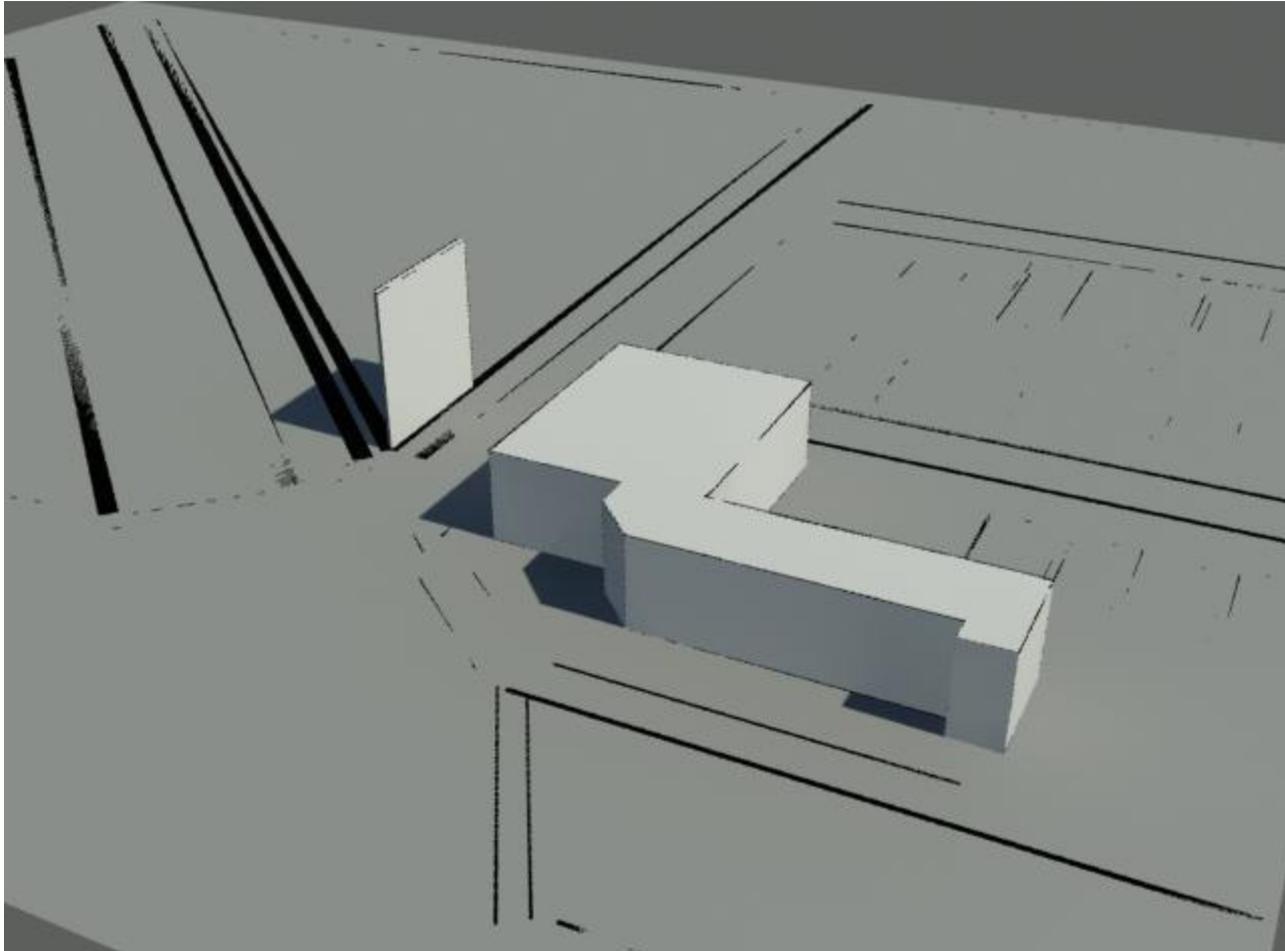
■ Reality!



Architectural Progress



SOLAR SUN STUDY



SUNPOWER

BENEFITS

Highest Efficiency

Panel efficiency of 19.3% is the highest commercially available

More Power

SunPower 315 delivers 50% more power per unit area than conventional solar panels and 100% more than thin film solar panels

Reduces Installation Cost

More power per panel means fewer panels per install. This saves both time and money.

Reliable and Robust Design

Proven materials, tempered front glass, and a sturdy anodized frame allow panel to operate reliably in multiple mounting configurations



SPR-315E-WHT

315 SOLAR PANEL

EXCEPTIONAL EFFICIENCY AND PERFORMANCE



The SunPower 315 Solar Panel provides today's highest efficiency and performance. Utilizing 96 next generation SunPower all back-contact solar cells, the SunPower 315 delivers an unprecedented total panel conversion efficiency of 19.3%. The 315 panel's reduced voltage-temperature coefficient and exceptional low-light performance attributes provide outstanding energy delivery per peak power watt.

SunPower's High Efficiency Advantage - Up to Twice the Power

Comparable systems covering 1000 m ² / 10,750 ft ²			
	Thin Film	Conventional	SunPower
Watts / Panel	65	165	315
Efficiency	9.0%	12.0%	19.3%
kWs	90	120	193



SunPower 315 Solar Panel Data

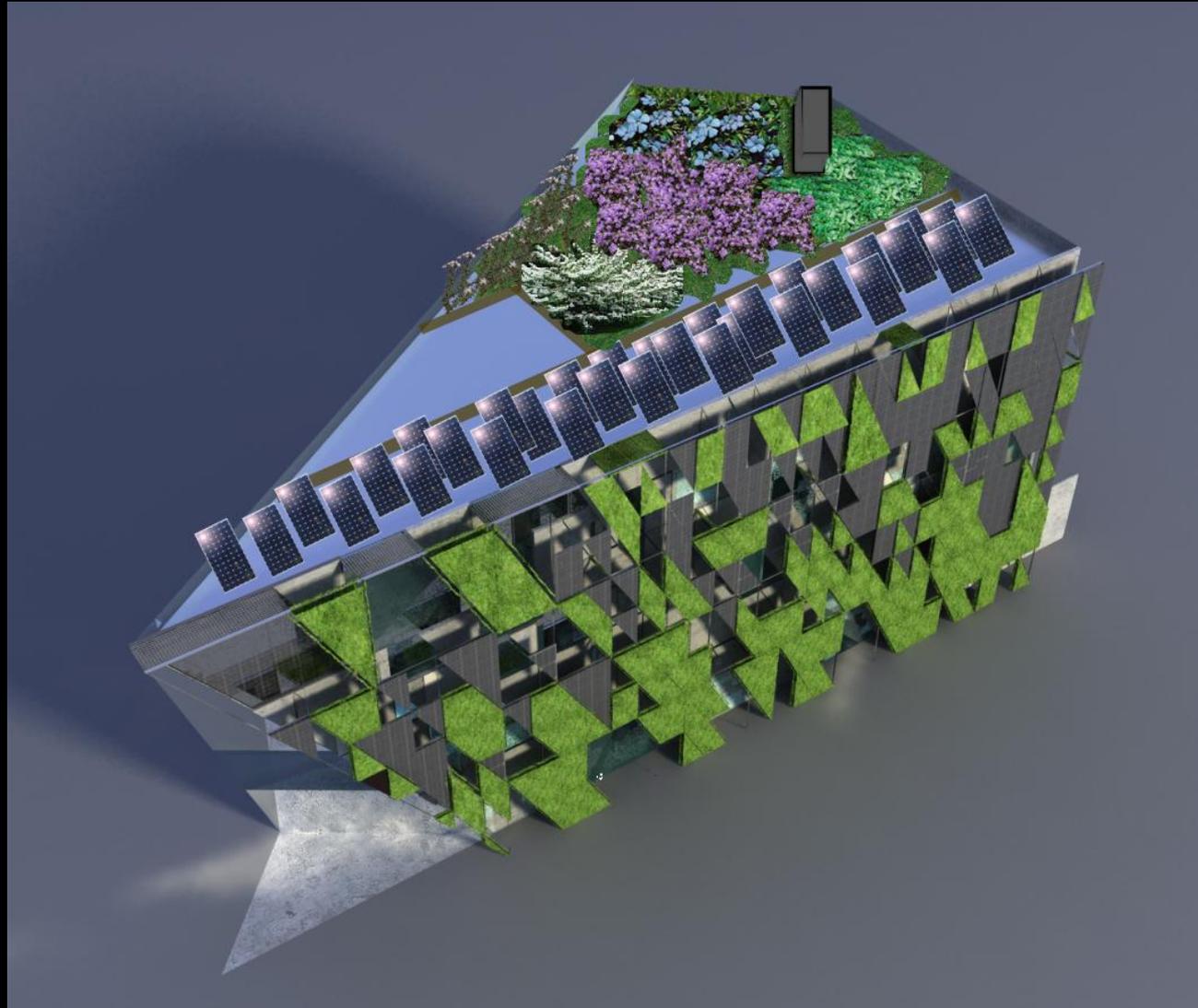
- 19.3% Efficiency
- 315 Watts peak per panel
- 61.39" x 41.18" x 1.81"

Electrical Data

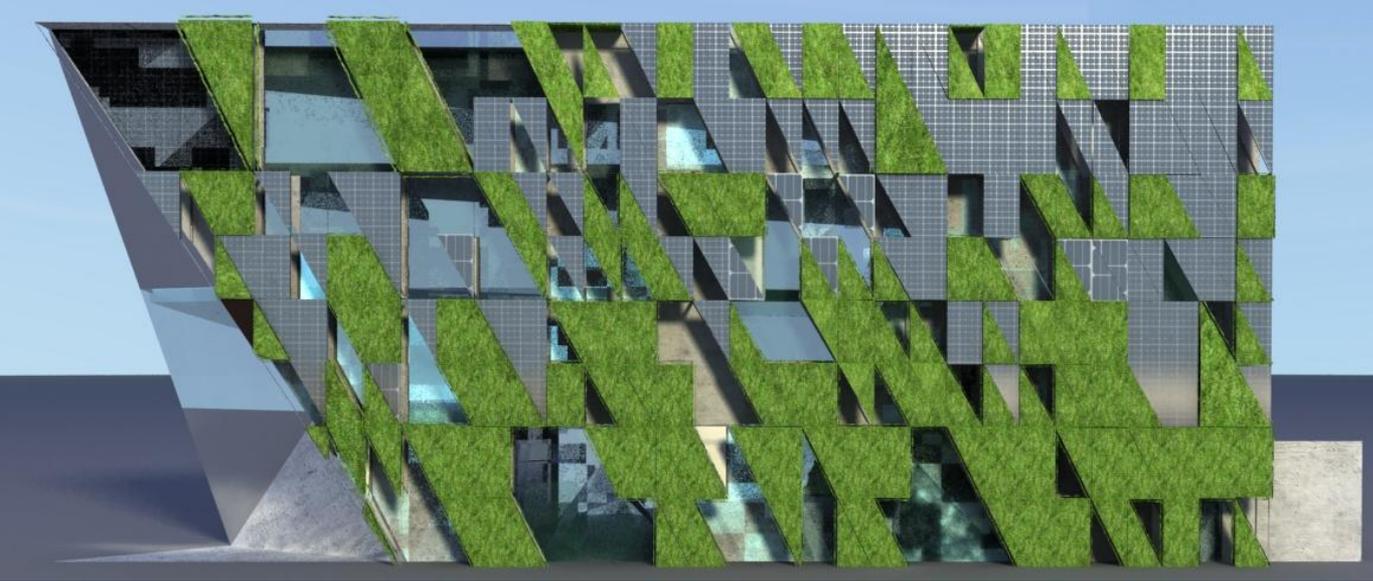
Measured at Standard Test Conditions (STC): irradiance of 1000/m², air mass 1.5g, and cell temperature 25° C

Peak Power (+/-5%)	P _{max}	315 W
Rated Voltage	V _{mp}	54.7 V
Rated Current	I _{mp}	5.76 A
Open Circuit Voltage	V _{oc}	64.6 V
Short Circuit Current	I _{sc}	6.14 A
Maximum System Voltage	IEC, UL	1000 V, 600 V
Temperature Coefficients		
	Power	-0.38% /°C
	Voltage (V _{oc})	-176.6 mV/°C
	Current (I _{sc})	3.5 mA/°C
Series Fuse Rating		15 A
Peak Power per Unit Area		193 W/m ² , 17.9 W/ft ²
CEC PTC Rating		291.6 W

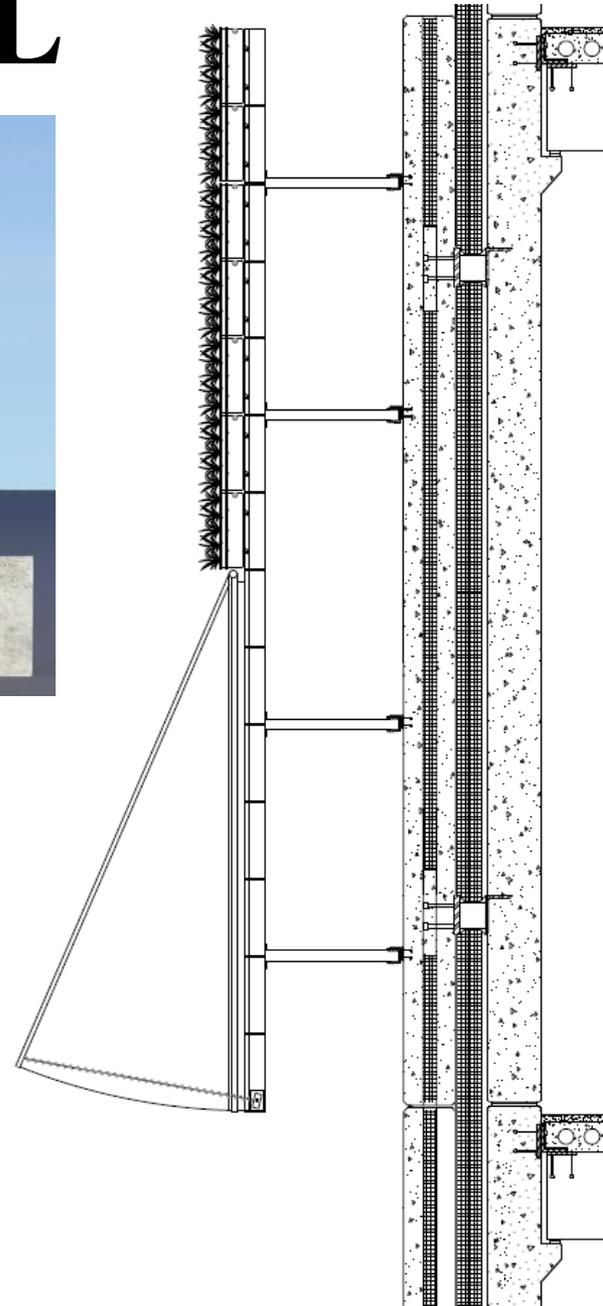
Photovoltaic Placement



SOUTH WALL DETAIL

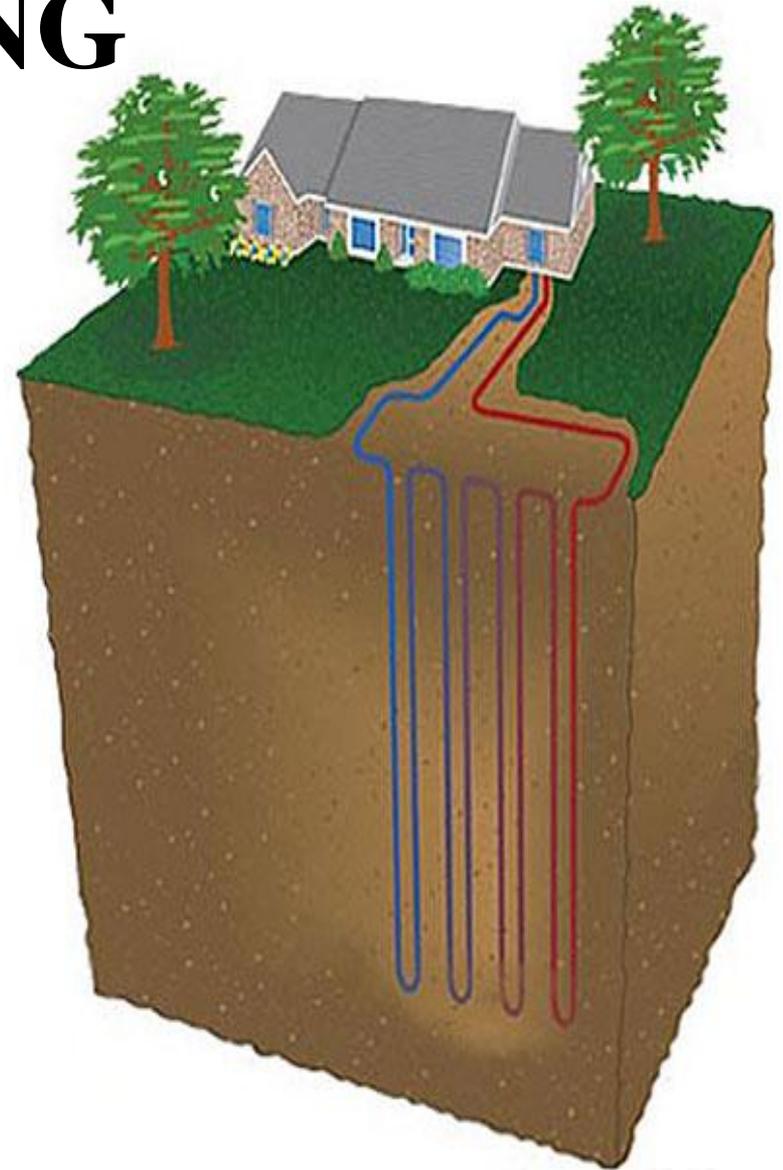


- Air gap increases PV efficiency by allowing passive cooling
- Operable panel allow for greater sunlight capture
- 25kW electricity generated at peak

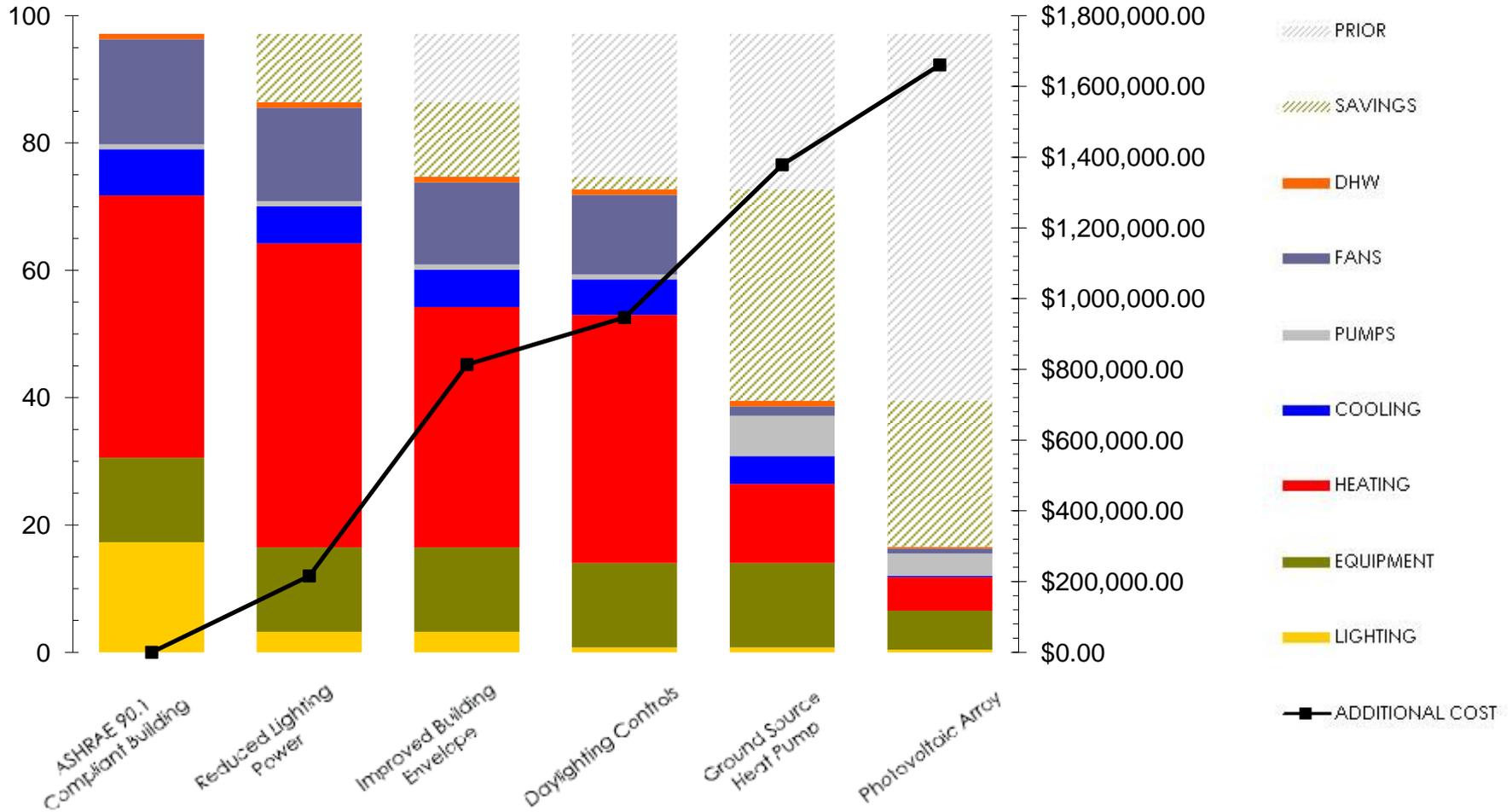


HEAT & COOLING

- Worked with an Industry Professional (McQuay Representative)
- Effective in Winter and Summer
- Choose a vertical closed well system
- Up to 70% possible year-to-year savings over conventional system



ENERGY SAVINGS VS. COST



GREEN ETHICS

- Is saving a planet worth the additional upfront building cost?
- Contractors have bias about green solutions as “something fancy” vs. “something efficient”
- Consumer ignorance

INDUSTRY FACTS

- Demolition and construction produce 136 million tons of waste in the U.S. (2.8 lb/person/day).
- Buildings use 40 percent (3 billion tons annually) of the raw materials consumed globally.
- Buildings use 40 percent of the world's energy, 75 percent of the world's wood, and 16 percent of the world's water.

POSSIBLE SOLUTIONS

- Constantly improve available technologies
- Educate the consumer (USGBC)
- Promote professional accreditation (LEED AP)
- Government Regulations
 - Building Codes
 - Tax Credits
 - Grants

EXISTING GREEN LEEDers



Jewish Reconstruction Congregation
Evanston, Illinois
LEED Platinum Certification
Built 2008



111 South Wacker Drive
Chicago, Illinois
LEED Gold Certification
Built 2005

MAJOR ACHIEVEMENTS

- Designed and integrated major Green technologies into a single innovative LEED Platinum building in Chicago
- Analyzed the cost associated with design and construction vs. the time for return on investment
- We all worked collectively in goal oriented teams

PROFESSIONAL REVIEW

- David DeBord, PE, Senior Engineer

Environmental Systems Design, Inc

“This is a great project. Students have done a tremendous job!”

- CP Management Corp. –Real Estate Company

“It’s a great project to build, and we will be happy to assist in design phase as well”

Thank you

Questions