Burnham-Moores Center for Real Estate
University of San Diego
Master of Science in Real Estate
Presentation

IDeAs Z² Design Facility
San Jose, California

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IDeAs Z^2 Design Facility

- Adaptive reuse by and for Integrated Design Associates (IDeAs)
- Focused on **plug load reduction**, **day lighting**, and **energy metering**
- One of the first two projects to achieve the *International Living Future Institute's* NetZero Energy Building certification.

**PROJECT TEAM**
Architectural: EHDD Architecture  
Landscape: MPA Design  
Structural: Tipping and Mar  
Contractor: Hillhouse Construction  
Mechanical: Rumsey Engineers, Johnson Controls  
Civil Engineer: Carroll Engineering  
Lighting Design: Osis Architecture  
Electrical: Integrated Design Associates (IDeAs)

**DETAILS**
- Project Area: 34,000 sf
- Building Area: 7,200 sf
- Building Footprint: 3,250 sf
- Start of construction: 01/2007
- Start of Occupancy Period: 10/2007
- Owner occupied: Yes
- Number of occupants: 15

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Goals


• Took on the design of their own headquarters

• Act as a demonstration of sustainable design techniques that can achieve energy efficiency and comfort for occupants – “Living Lab.”

• Focus was on energy efficiency and renewable energy.
Design/Developer of Building

• Looked at creating a LEED Platinum building.
• Shifted focus to an ultra high efficiency, all electric, net zero energy, and zero carbon emissions building. = “Z Squared”
• Relied on experience rather than computer modeling to select most options.
  – Collaboration between the disciplines
• Use computer modeling “Equest” to optimize the daylighting, HVAC and lighting design

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Renderings

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Before – Bank Branch

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After – IDeAs Z² Design Facility

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Before/After - Aerial

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Photovoltaic System

- 2,600 SF roof membrane integrated PV system
- SunPower A-300 monocrystalline solar cells.
  - Efficiency of 20-21.5%.
  - Does not require support structure, ballast, or structural penetrations.
- BIPV system over main entrance at south side of building
Measured results to date

IDeAs Building Usage v. PV Production

Result: net zero annual energy use
NetZero

• **Annual Energy Use:**
  – 30kW system designed for 56,000 KWh/yr
  – Actual Energy Use Intensity: 21.17 kBtu/sf
  – Annual Electricity Generated: 21.73 kBtu/sf
  – Net Energy Use: -0.55 kBtu/sf

• **Energy Consumption:**
  – 60% below ASHRAE 90.1

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Sage Electrochromic Window on the east wall (this side is exposed to morning sun)

Radiant floor topping slab contains 50% fly ash, which reduced the amount of new cement required

18 ft. ceiling maximizing daylight

Workstation devices are plugged into occupancy controlled power strips. Used for task lighting, monitors, and speakers
Building Features

T8 lighting on a dimming ballast, controlled by daylight sensor and switched on by an occupancy sensor.

High Reflective Paint (89%) and illuminates them with daylight.

Plug loads are shot off/on each day automatically.

Data and telecom flow from a single CAT6a cable.
Building Features

Sunshade blocks direct sunlight in the summer and in winter sunlight penetrates 16’ into the building warming polished concrete and radiant floor.

Displacement ventilation system. Vents are placed lower on walls and are larger in size. Air comes out at a lower velocity and is slightly cooler than ambient air.

“The Onions” Called Biax and contain two 15 watt CFL lamps.

Spectrally selective glass keeps infrared waves out but allows visible light to enter.
Skylights

• 17 skylights throughout the main studio and second floor office space.

• Skylights use a high performance spectrally-selective glass to block unwanted heat and glare
  – Light-to-solar heat gain coefficient = 2.33

• Prismatic Acrylic Diffusing Panels
  – Diffuses the sunlight to a softer, more dispersed light.
  – Used seasonally in the summer and removed in the winter.
Radiant Flooring

- Hydronic (liquid) system to heat and cool the office through radiant floor topping slab
- Uses less energy to provide the same amount of HVAC, and does not disperse allergens
Water Conservation

• Original parking lot covered 93% of the site.
  – Reduced to 36% after the renovations.
  – Created a permeable hardscape area with native/drought resistant flora and drip irrigation.
• Used recycled façade to created the permeable hardscape.
• Bioswale was created to collect rain, remove pollutants, and recharge the water table.
• Appliances are energy-star rated.
• In the bathroom facilities they use dual flush toilets, automatic low flow faucets, and waterless urinals.

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Awards

- Bay Area Certified Green Business (2008)
- Flex Your Power Award (2008)
- Commendation from Gov. Schwarzenegger (2008)
- Acterra Business Environmental Award (2008)
- Commendation from the City of San Jose (2006)
- San Jose Business Journal Structures Award (2007)
Finances

• Owners sold their personal house to finance project.
• Added cost for NetZero was a 6% premium.
• Bought and constructed during the height of the market. If they sold the building today might not recoup all costs.
• $10 a watt for PV, today $3.50 a watt.
Challenges

• No proof of concept, 1st net zero building
  – “science experiment, trial and error”
• Radiant floor cracks, too much water in mix
• Water heater heat pump doesn’t work
• PV system installation on flexible sheet failures
  – Co. who installed went bankrupt, no warranty
Summary

• Created an adaptive reuse of an existing 1960s concrete tilt up building.
• Wanted to create a building that was both net zero energy and carbon emissions.
• Built as a demonstration for clients – “Living Lab”
• Placed their sustainable focus on **plug load reduction, day lighting**, and **energy metering**.
• Building uses electricity as the source of power
  – PV provides their power needs.
• Building uses radiant flooring to help heat/cool the building.
  – Limits indoor allergens

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Vendors and web sites of those who impressed you

- **Sage Glass**
  - [http://www.sageglass.com](http://www.sageglass.com)
  - Electrochromic Window

- **SunPower Solar Panels**
  - [http://global.sunpowercorp.com/](http://global.sunpowercorp.com/)
  - 20.4 percent conversion efficiency
  - delivers 3-kW in less than 17 square meters

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Other References


• “International Living Future Institute” - https://ilbi.org/lbc/casestudies/ideas-z2-design-facility

• “Sage Glass” – http://www.sageglass.com

• “Greentech Zone” - http://www.engineering.net/site/zones/greentechZONE/product_reviews/grnp_060203


• “SunPower” - http://global.sunpowercorp.com/

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