



Case Study in Commercial Near Net-Zero LEED Design

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Mapleleaf Orthopedics

- ◆ 8,000 SF medical office, completed Dec 2007
- ◆ Construction cost \$220/SF
- ◆ Southern Colorado's 1st LEED Building – *LEED 2.2 Gold*
- ◆ CRES award winner www.cres.org



First LEED project for
owner and A/E team

Project Team

Owner: Dr. Ken Danylchuck

Architect: HGF Architects

Sustainability Consultants: Sustainable Building
Concepts & PCD Engineering

Mechanical Engineer: AE Associates

Electrical Engineer: Kohnert Engineering

Energy Consultant: PCD Engineering

Commissioning Agent: PCD Engineering

General Contractor: TL Printz Constructors





Project Goals



Design a ‘green’ facility
with a ‘healthy’ environment

Site & Water

- ◆ Building oriented South to harvest solar
- ◆ Pervious paving
- ◆ Low water landscaping
- ◆ Generous open space
- ◆ Low flow fixtures



Energy

- ◆ 30kW Photovoltaic (PV) system – meets 30% of energy needs
- ◆ Ground source heat pumps (GSHP)
- ◆ Energy recovery ventilator (ERV) reduces ventilation load by 75%



GSHP



ERV

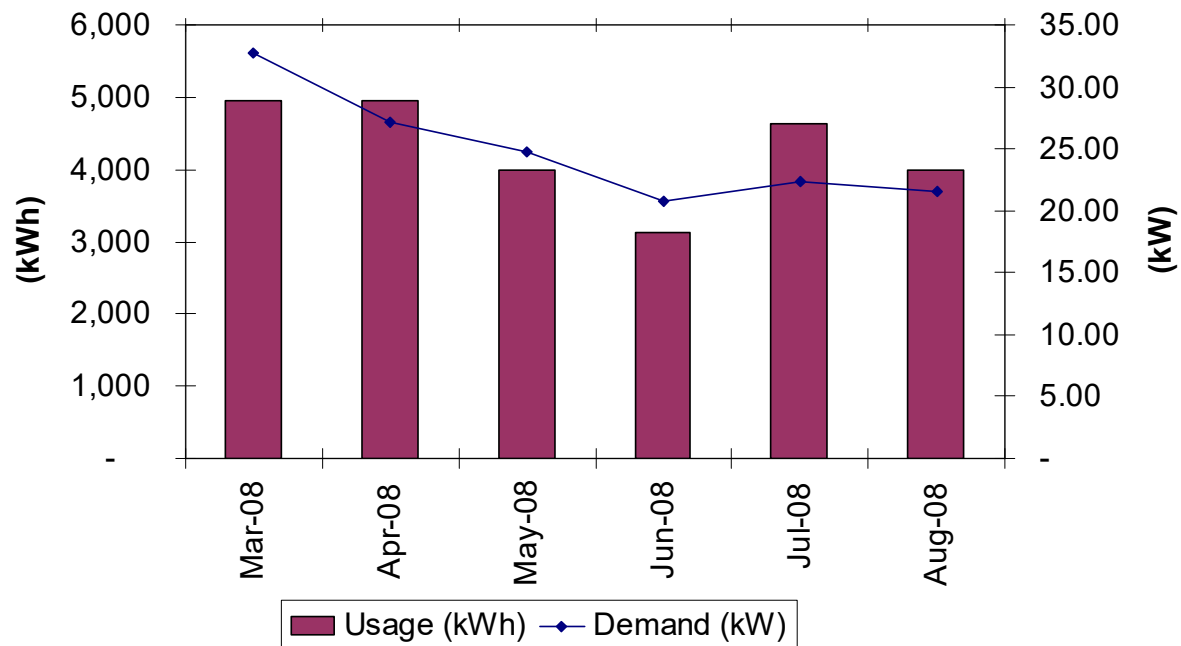
Lighting

- ◆ Dimming and occupancy based lighting controls



Energy Profile

Electric Usage and Demand



Performance Metrics

Period March 2008 - August 2008	
kWh Used/Year	51360
kWh Produced/Year	12640
Net kWh Used/Year	38720
Energy Use Intensity (Btu/Square Foot/Year)	16.5
CBECS: Office US 1990-2003*	88.0
CBECS: West Mountain Region 1990-2003*	81.2
Mapleleaf Orthopedics Performs 80% Better Than a Typical Building	
\$/Year	\$ 5,187
\$/SF/Yr	\$ 0.65

Source: EIA CBECS 2003: Table C.12 Consumption and Gross Energy Intensity by Year Constructed for Sum of Major Fuels for Non-Mall Buildings, 2003

Materials & Indoor Environment

- ◆ Healthy, low/no VOC carpet & flooring that is recyclable or biodegradable
- ◆ No VOC paints & stains
- ◆ Wheat board cabinets
- ◆ Sustainable lumber
- ◆ Construction waste recycling
- ◆ Recycled content products
- ◆ Regional materials





Exemplary Performance



- ◆ Exceed % of building energy cost met by PV System
- ◆ Exemplary lighting design – auxiliary lighting system
- ◆ Exemplary plumbing design – 59% reduction in water use from baseline
(29% above LEED requirement)
- ◆ Vegetated open space exceeds local zoning requirements by 516%
(491% above LEED requirement)



Lessons Learned – LEED

- ◆ Set LEED goals early
- ◆ Get team members on board early with respect to LEED, and schedule progress meetings
- ◆ Budget time for credit documentation and compliance
- ◆ Value experience
- ◆ Seek out exemplary projects and lessons learned

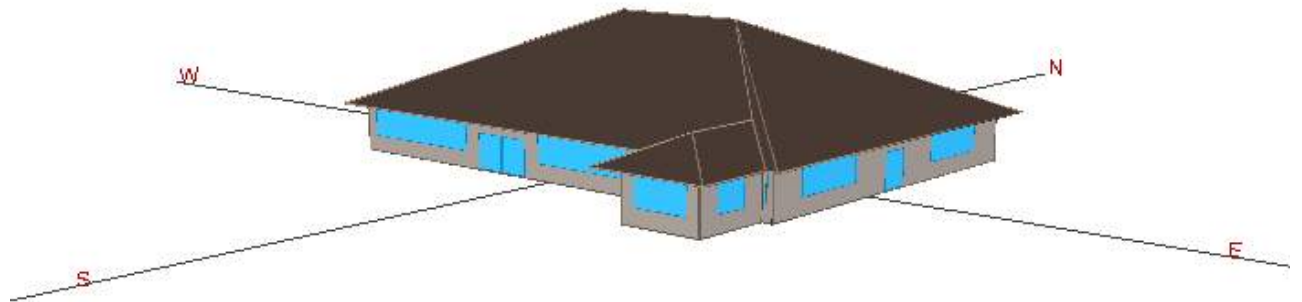


Lessons Learned – High Performance Design

- ◆ Well written Owner Requirements and Basis of Engineering Design are key
- ◆ Best results are achieved when risk is shared by a committed team
- ◆ A building is not a thing – It's a collaboration – Be involved
- ◆ Reduce loads – Harvest passive and renewable energy sources
- ◆ Track VE efforts and changes back to Basis of Design and Owner Requirements. Resist temptation to peel-off efficiency add-alternates

Lessons Learned – Energy Modeling

- ◆ Establish Measurable Goals and stick to them
- ◆ Use modeling to inform the design
- ◆ Complete modeling throughout the process = best value
- ◆ Monitor Post-Occupancy



Lessons Learned - Design Cx

- ◆ Follow through early on to end
 - Need clear Owner Defined Requirements & Basis of Design
 - LEED Checklist actively maintained (even if LEED not a goal)
- ◆ Be O&M advocate during design
 - Access and Service, Controls and Operations, Training
- ◆ Requirements (including LEED) appropriately represented in Plans and Specs
- ◆ High performance and LEED - breeds O&M advocate to assure operational



Lessons Learned - Construction

Cx

- ◆ Don't believe anything until you see it
- ◆ Frequent communications with team – facilitate teamwork
- ◆ Objective is not “filling out forms” – it is in the value of the process
- ◆ Cx raises subcontractor level of performance and compliance
- ◆ Maintain issues log and follow through





Challenges and Keys

- ◆ Focus on the Value Tasks
- ◆ Establish reasonable expectations
- ◆ Apply appropriate technologies for the facility type
- ◆ Get team “up the curve” on high performance design requirements
- ◆ Achieve goals within budget



Feedback

- ◆ Owner is thrilled with utility cost and increased exposure for the facility
- ◆ Gold Rating exceeded team's expectation
- ◆ LEED not black and white

Thank you!

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