

U.S. Department of Energy's

Research Support Facility

at the National Renewable Energy Laboratory (NREL)

Project Type: Commercial

Project Completion Date: June 2010

Location: Golden, CO

Size of Building: 222,000 SQ FT

Size of Site: 4.25 Acres

Project Cost: \$64MIL

Construction Cost: \$57.4MIL

Scope of Work:

Office building with data center

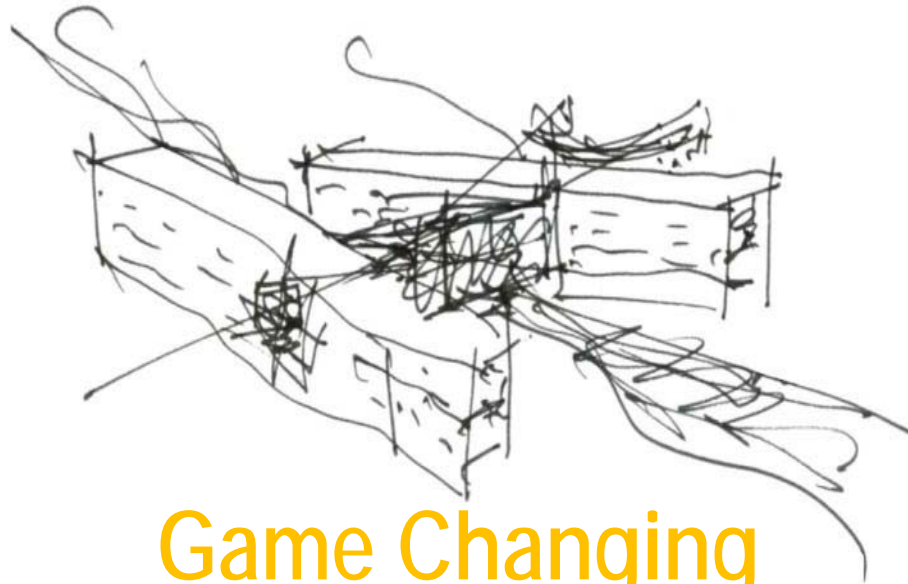
800+ NREL and DOE Staff

Zero energy design

35kBtu/SF/Yr energy target

LEED Platinum as contract requirement

Flexible, high performance workplace



Game Changing

Primary Materials:

Structural Steel

Reclaimed natural gas pipe as columns

Insulated precast concrete panels

Zinc panels

Transpired solar collector panels

High performance glazing systems

Raised floor system

Beetle Kill Pine

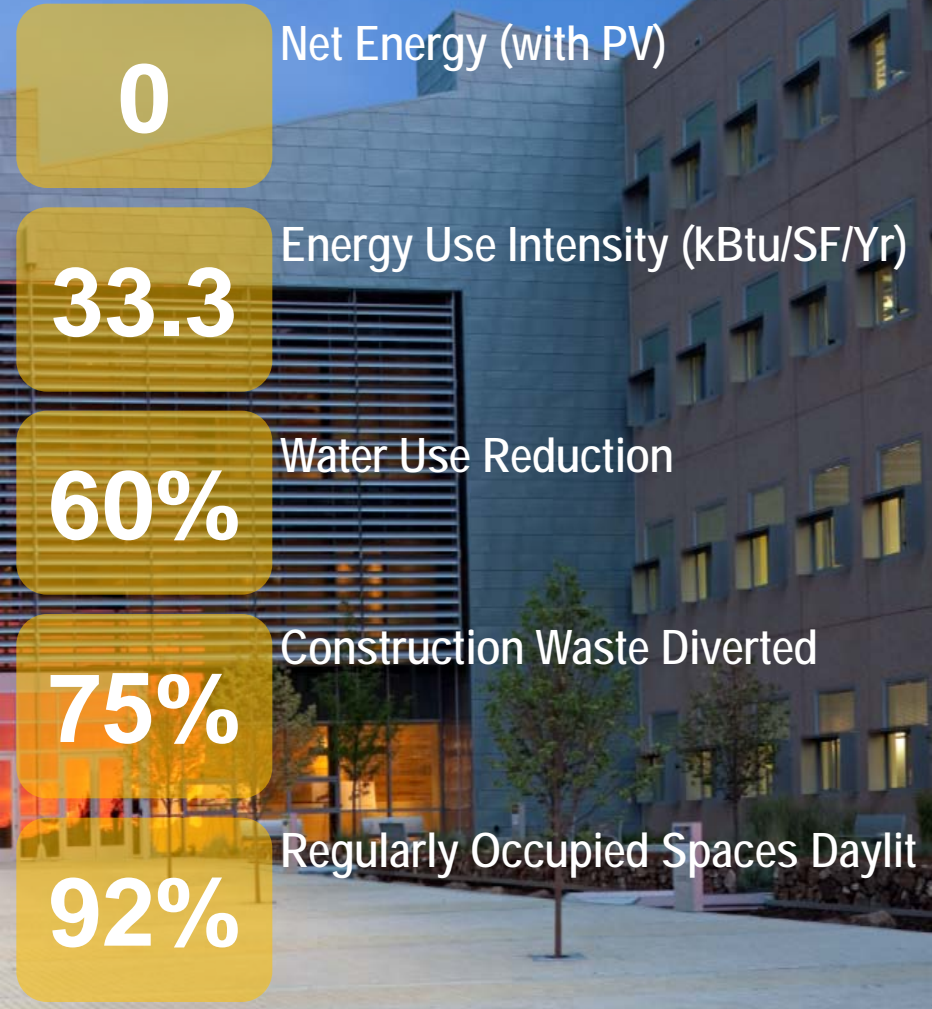
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Net Zero Energy Design:
Prototype for large scale commercial net zero energy buildings.

Architectural Passive Design Strategies:
Daylighting, natural ventilation, thermal mass, night purging, thermal labyrinth, transpired solar collector.

Workplace of the Future:
Flexible and adaptable
Collaborative and open
Accessibility across organizational hierarchy
Multi-generational workplace
Enhanced workplace productivity
High indoor environmental quality

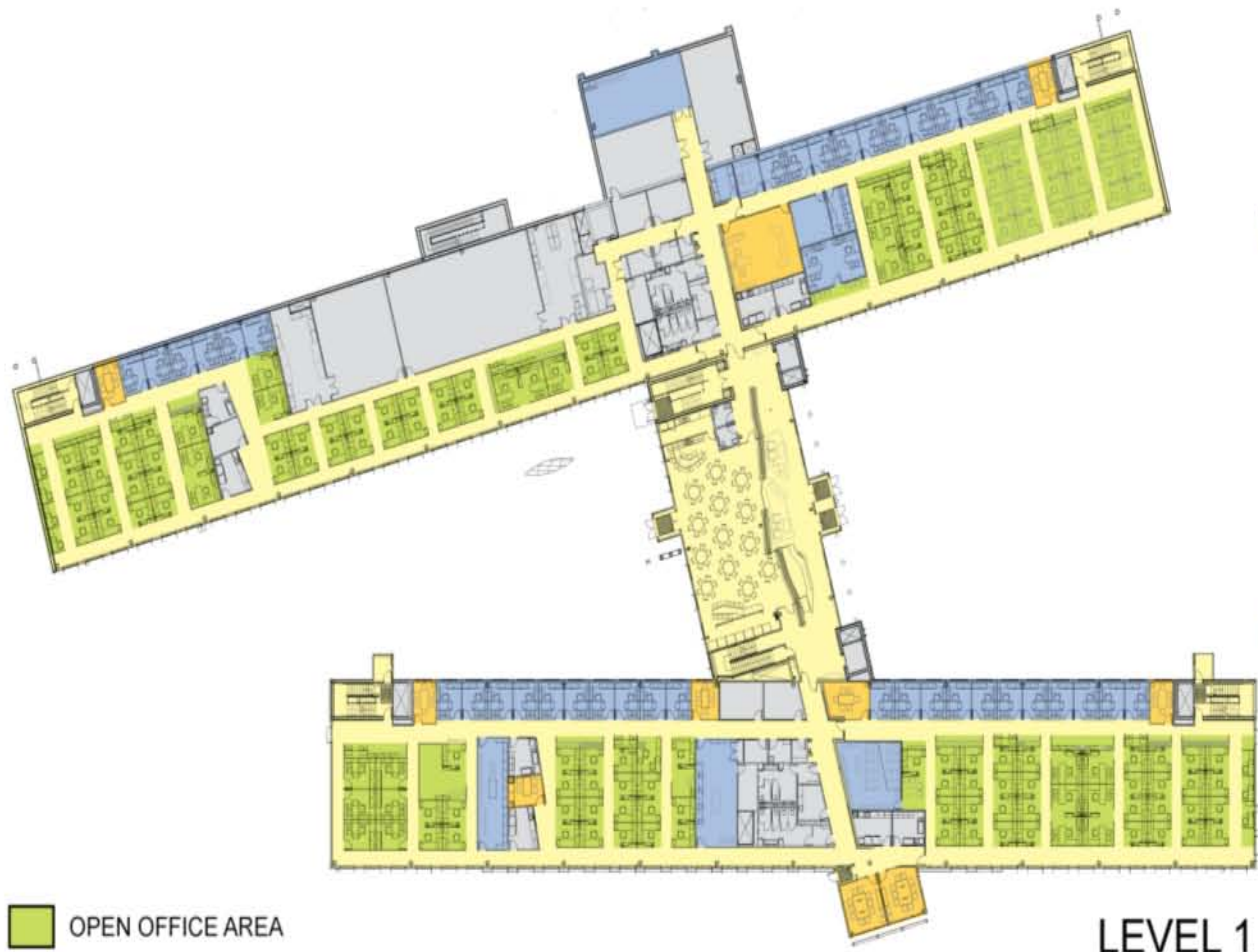
Redefining Commercial Real Estate












Delivered through a national design competition and breakthrough DOE performance-based procurement process, the **Research Support Facility** owners, operators, future-occupants, contractor, architect and a bevy of sub-consultants forged an unprecedented partnership to successfully produce a prototype for the future of large-scale net-zero energy buildings.



-  OPEN OFFICE AREA
-  BUILDING SUPPORT
-  ENCLOSED OFFICE AREA
-  CONFERENCE
-  PUBLIC SPACE

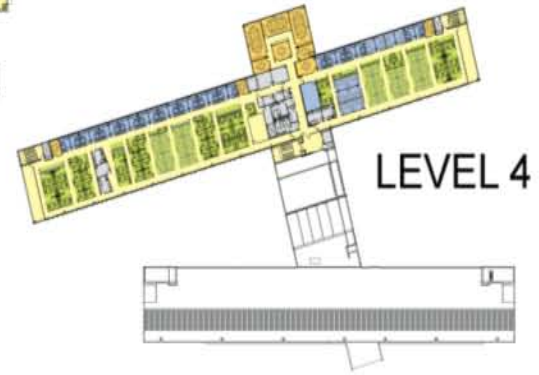
LEVEL 1



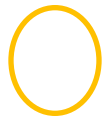
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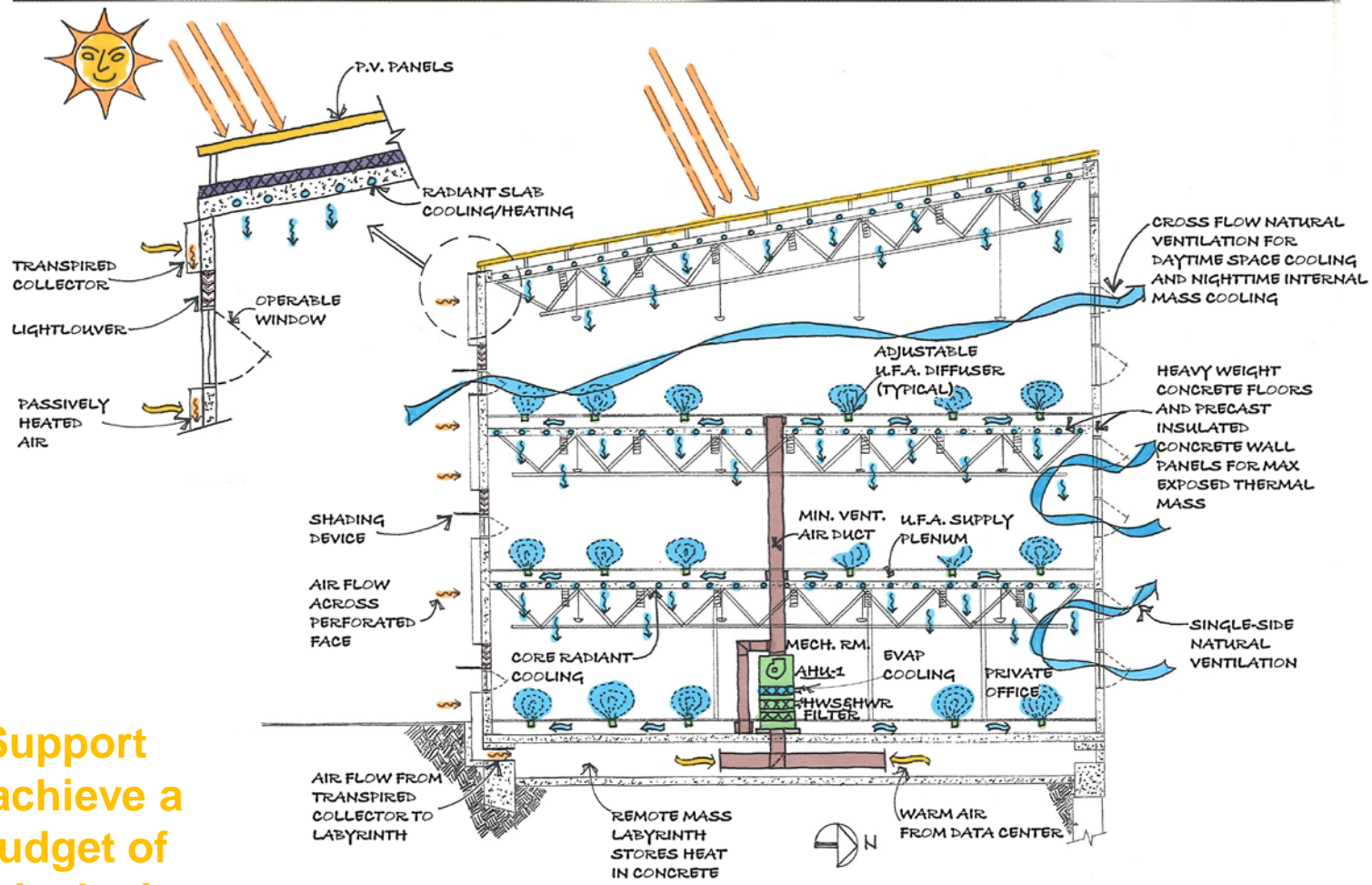


LEVEL 3



LEVEL 4





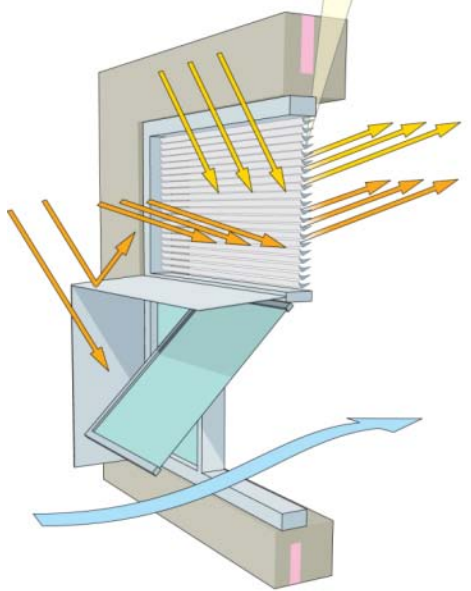
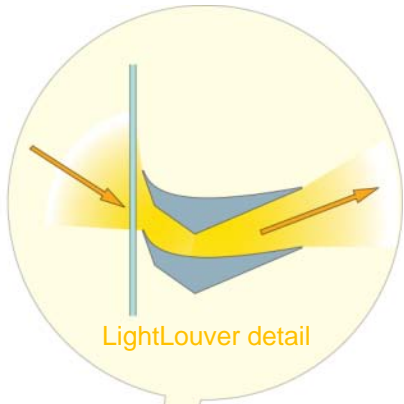
The Research Support Facility had to achieve a target energy budget of 35k Btu/sf/year, inclusive of the data center, and 50% better than the ASHRAE 90.1 2004 standard. To achieve this, all design strategies had to pass the energy model litmus test.

NREL - RESEARCH SUPPORT FACILITY BUILDING SECTION 



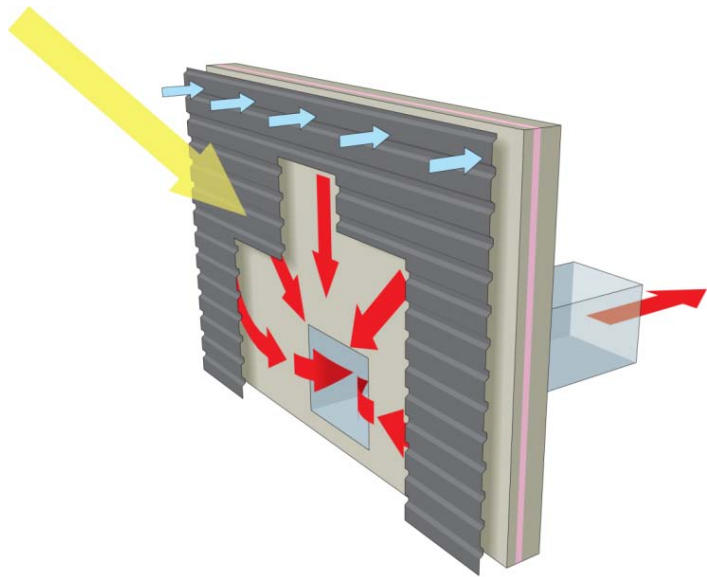
SUSTAINABLE FEATURES

- 1 Permeable landscaping and rain garden
- 2 Thermochromic east-facing windows reduce heat transmission in winter
- 3 Fresh-air inlet into thermal-mass labyrinth
- 4 NREL-developed "transpired solar collectors" preheat ventilation air.
- 5 In winter, warm air is pulled from the transpired collector into the labyrinth.
- 6 Louvered sunshade block high-angle summer sunlight.
- 7 Low-profile workstations aid daylighting and air flow.
- 8 Highly reflective interior paint, flooring, and workstations enhance daylighting.
- 9 Radiant structural decking
- 10 The 55,000-square-foot array of rooftop PVs has a 1.6-megawatt capacity.
- 11 Electrochromatic west-facing windows tint on command.
- 12 Open-ceiling offices introduce daylight and natural ventilation.
- 13 Repurposed natural-gas pipes are used as structural columns.



Daylighting





Transpired
Solar Collector



Transpired Solar Collector



Solar Shading / Daylight Control

Zinc Panel

Solar Shading / Daylight Control

**Insulated Precast
Thermal Mass Wall**

**Regional Material
Ceiling Tiles**

Beetle Kill Pine Wall

**Rapidly Renewable
Sunflower Seed Desk**

**High Recycled
Content Floor Tile**



**Regional Material
Ceiling Cloud**

Beetle Kill Pine

**Reclaimed Natural
Gas Pipe - Column**

**Truth Window in
Raised Floor**



**Reclaimed Natural
Gas Pipe - Column**

Beetle Kill Pine Wall

PVC Free Carpet Backing



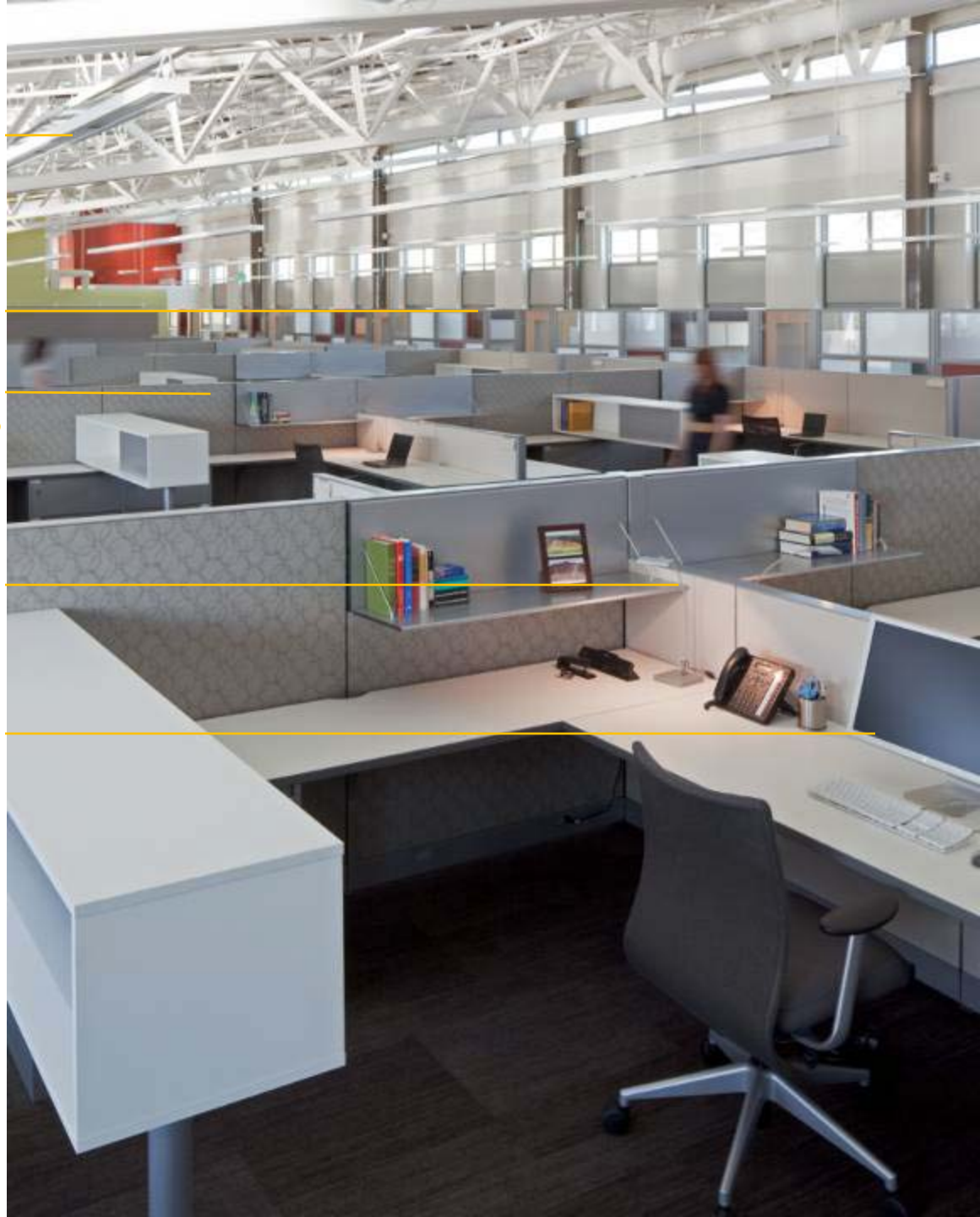
**Efficient Lighting
with Daylight Sensors**

Demountable Office Walls

**Low Partition
Workstation Panels**

LED 6-Watt Task Lamp

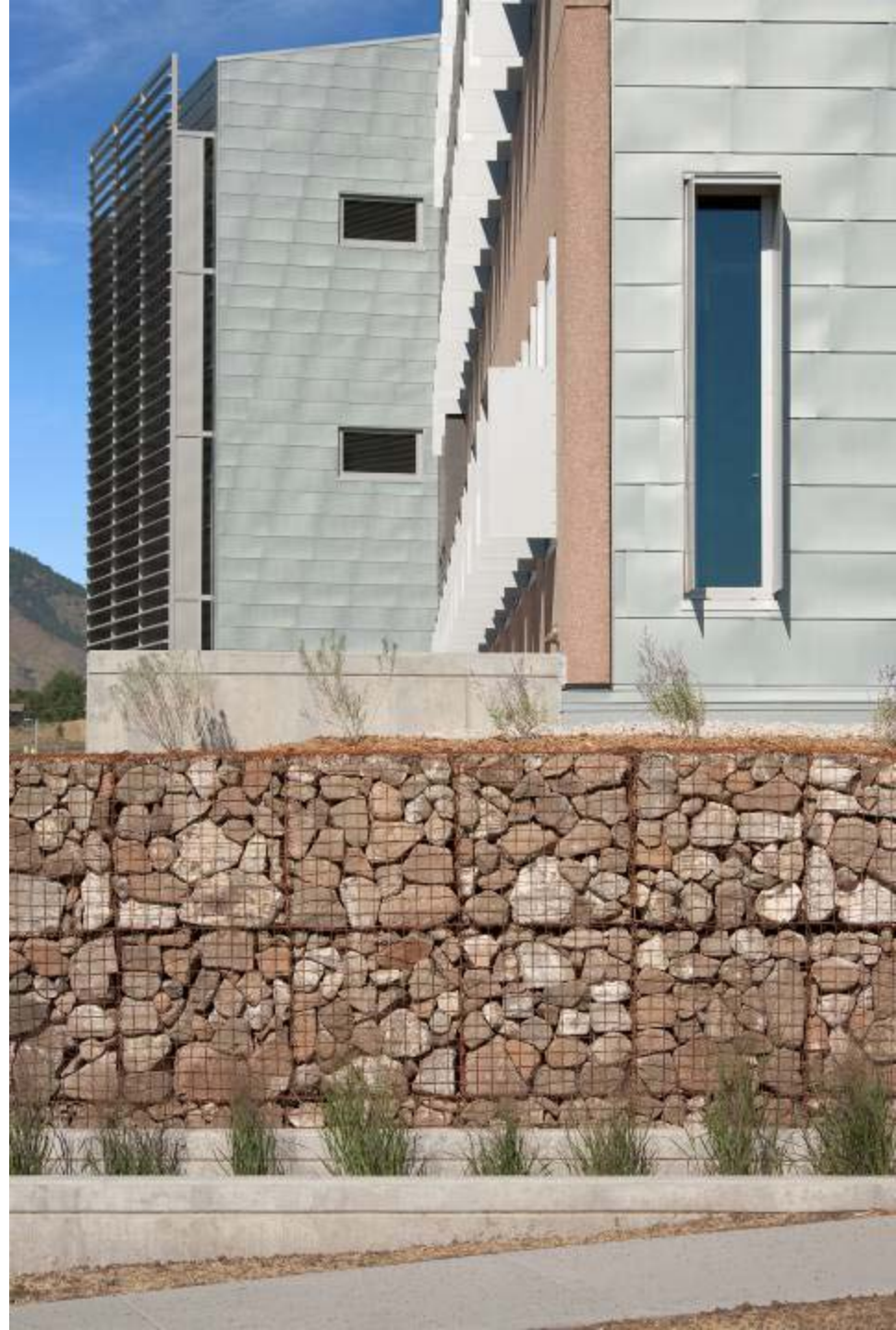
**Green IT –
Thin clients & Laptops**





The team convinced DOE through energy modeling that by eliminating ceilings in office spaces, critical daylighting would flow through the space and energy consumption would decrease.

With an eye on controlling carbon and construction impacts, the building team chose to create gabion walls from cobblestone unearthed on site during construction.





Building team collaboration allowed the turnover of the Research Support Facility's roof – a unique, fully adherent standing seam metal roof system – 90 days ahead of schedule to accommodate the owner's photovoltaic installation.



The Research Support Facility is NREL's "living laboratory",- a large-scale, high performance building that is replicable in today's market. This vanguard project could only be accomplished by a uniquely collaborative team of industry pioneers who forged new trails with courage, innovation and tenacity. *"This project exceeded our expectations in all categories,"* said Drew Detamore, PhD., Director of NREL Infrastructure and Campus Development.