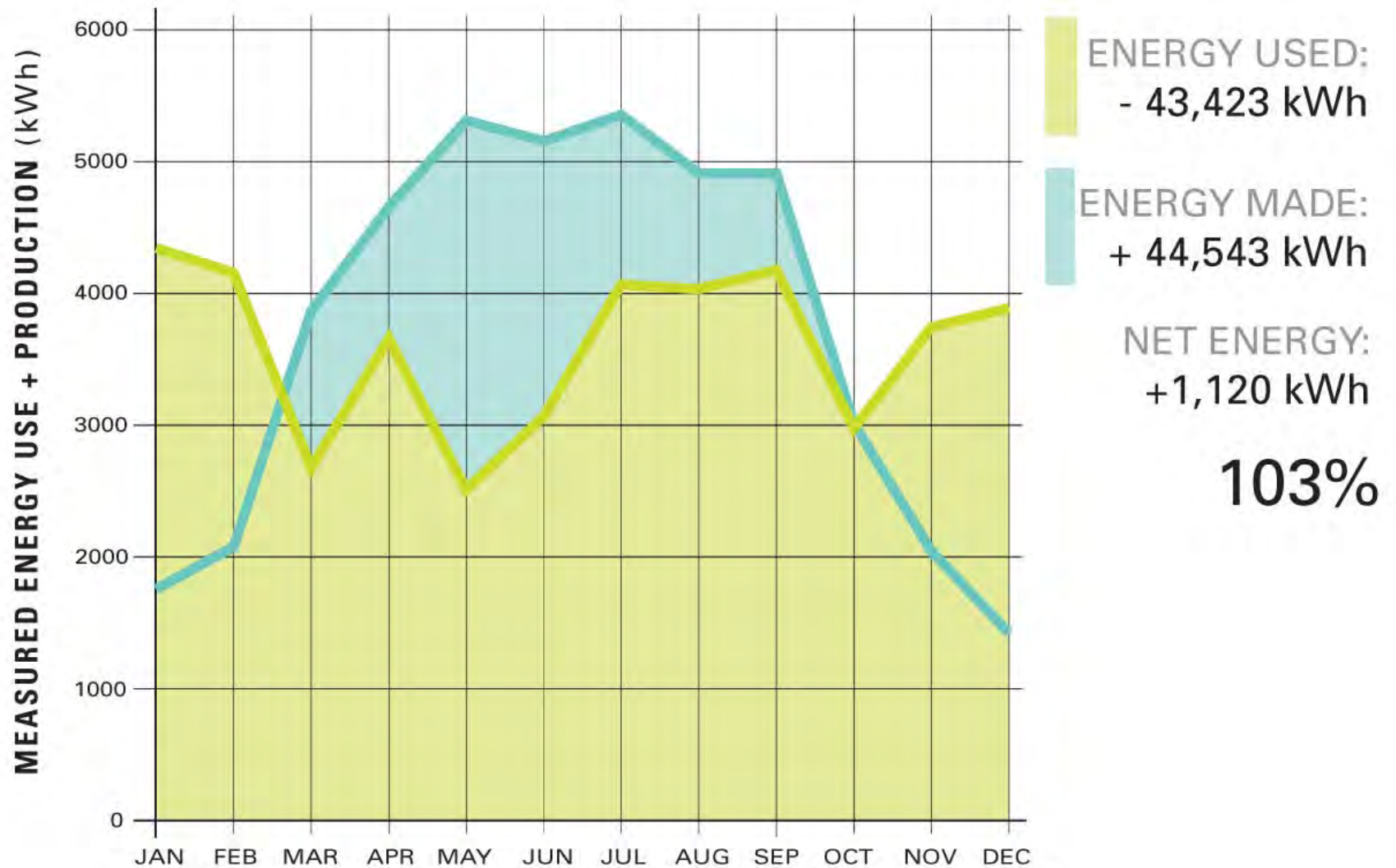


# Process & Projects



# NZE | Energy Use and Production

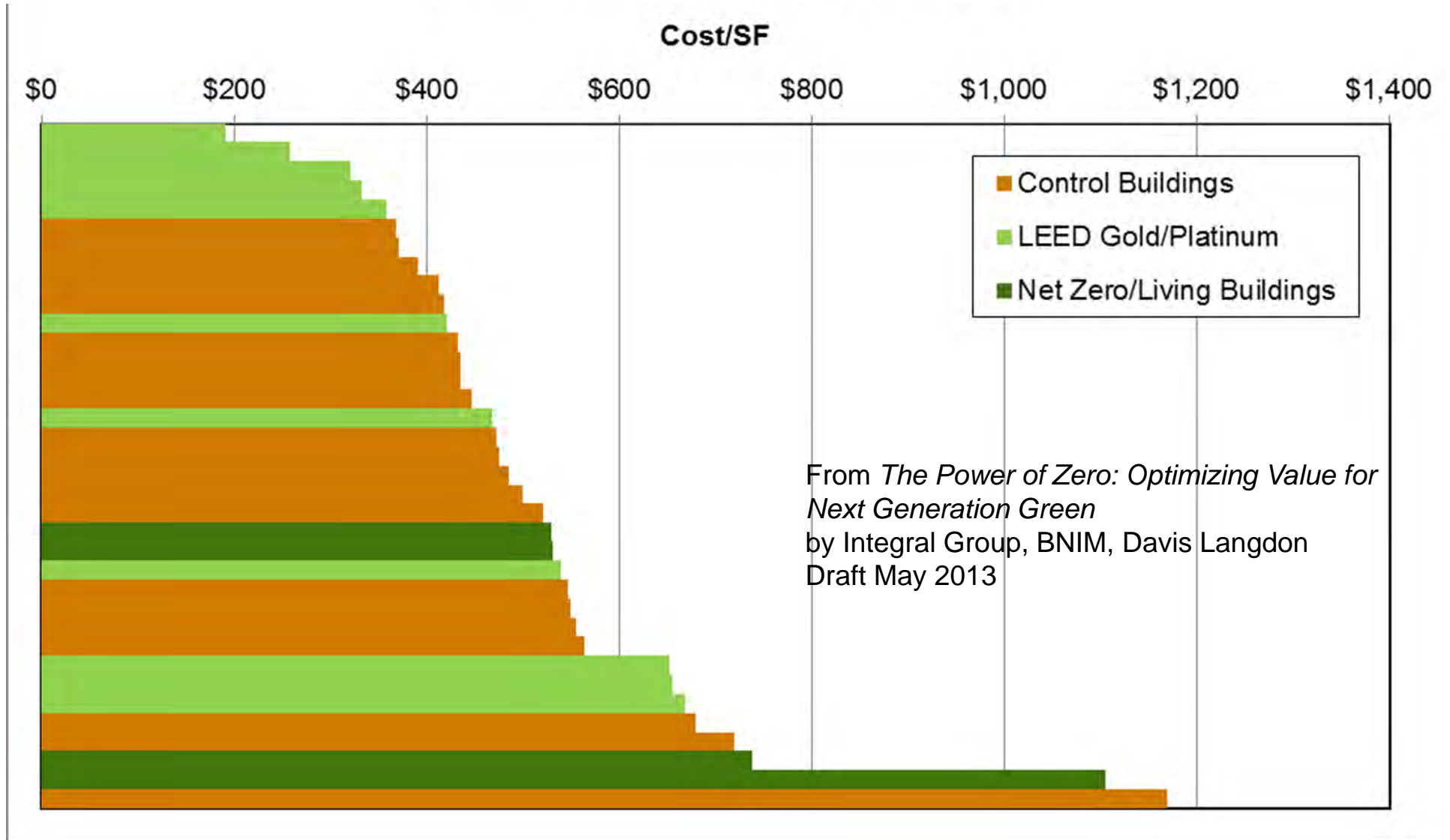
annual net zero energy profile



# COMMUNITY CENTERS

*statistical analysis*

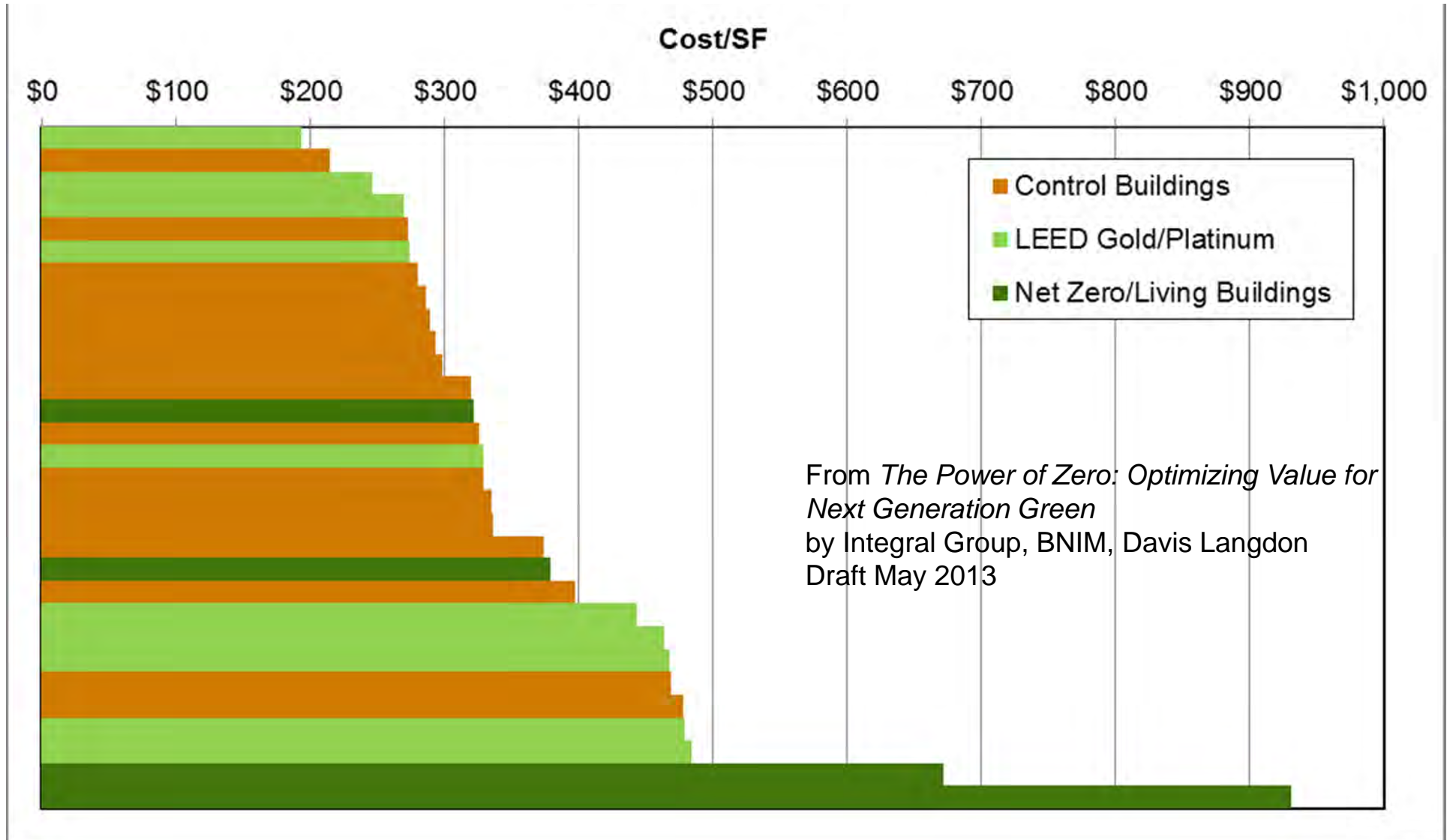
*early data*



# K-12 SCHOOLS

*statistical analysis*

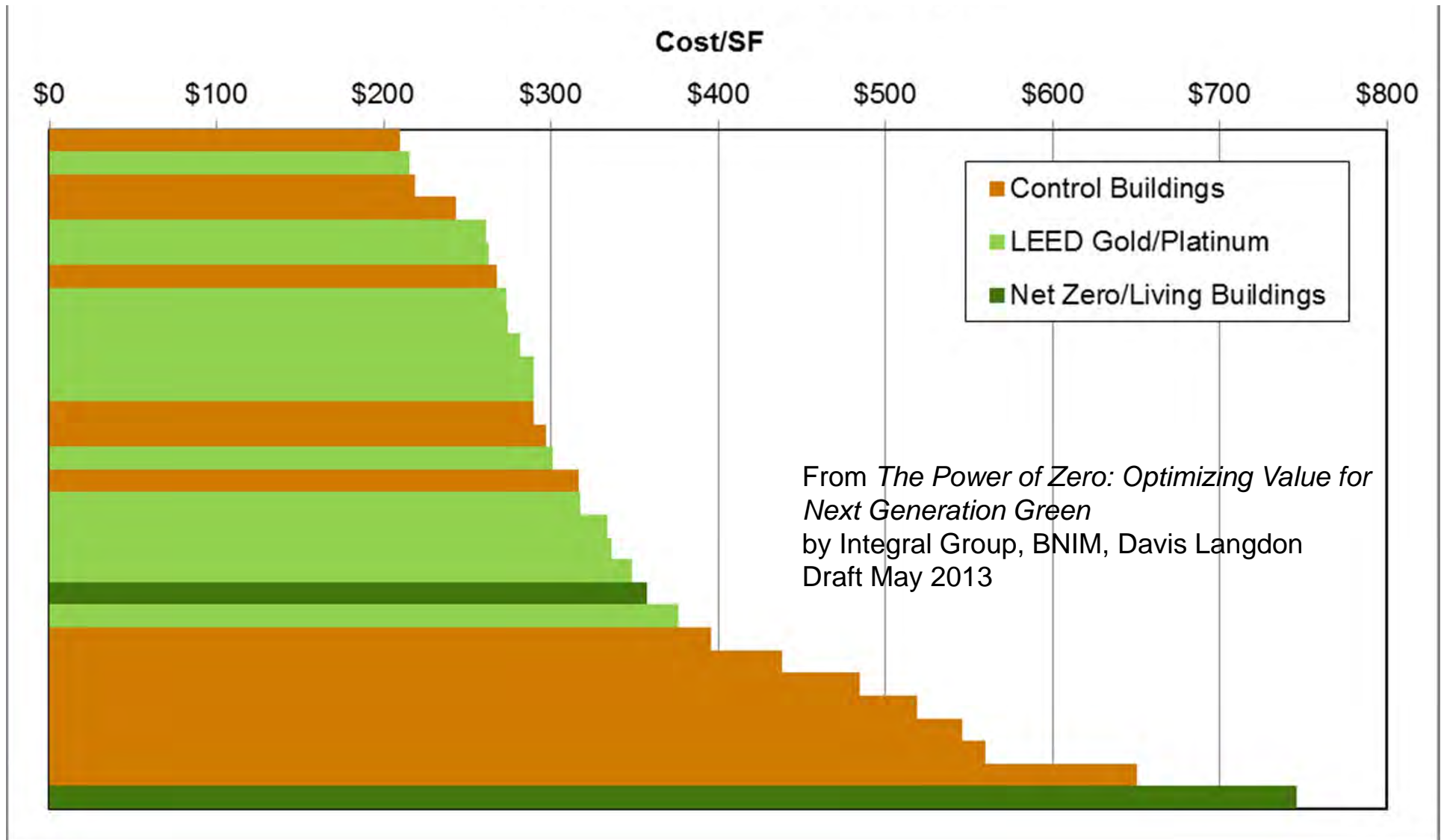
*early data*



# OFFICE BUILDINGS – LOW-RISE

*statistical analysis*

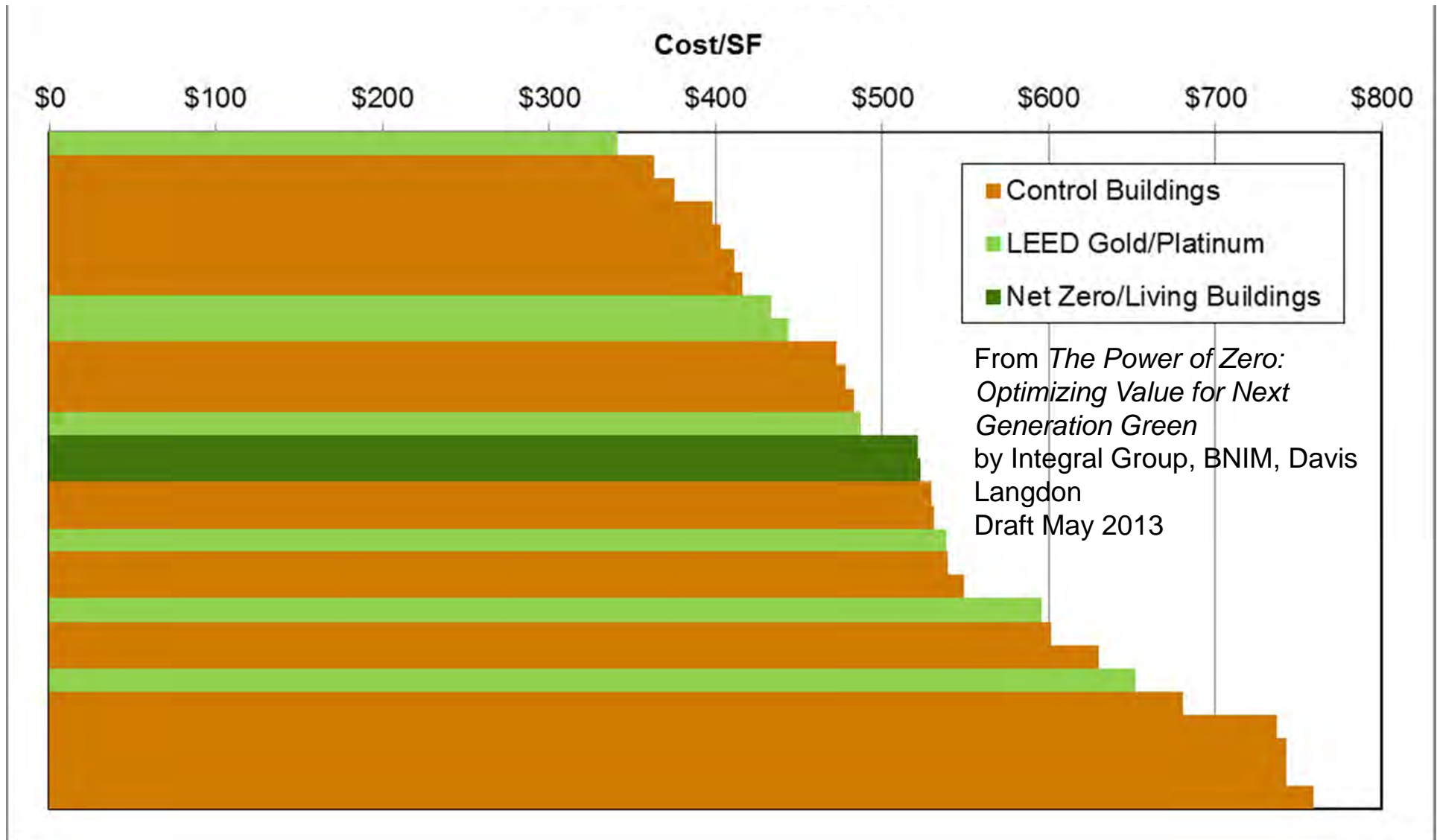
*early data*



# WET LAB

statistical analysis

early data



# NZE Approach – Plug Loads

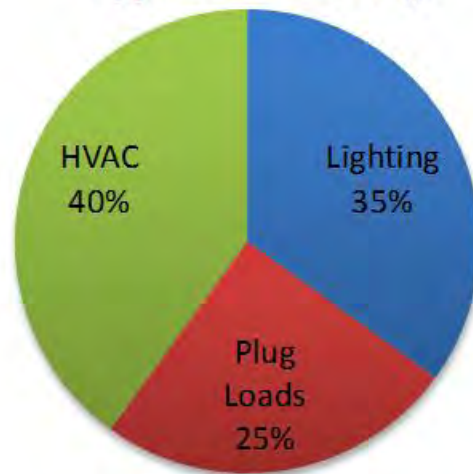
## First Address:

- Building Envelope,
- Lighting, & then
- HVAC

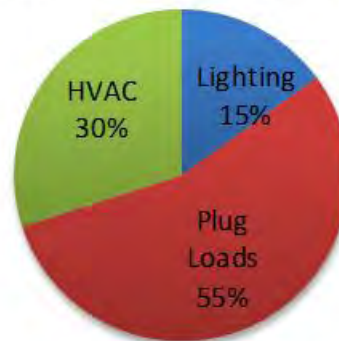
## Finally Address:

- Plug Loads

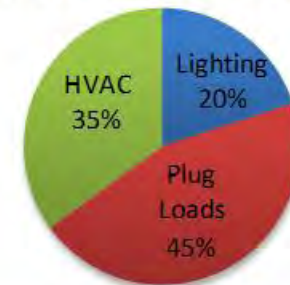
**Typical Building**



**Efficient HVAC & Lighting**



**Net Zero Building**

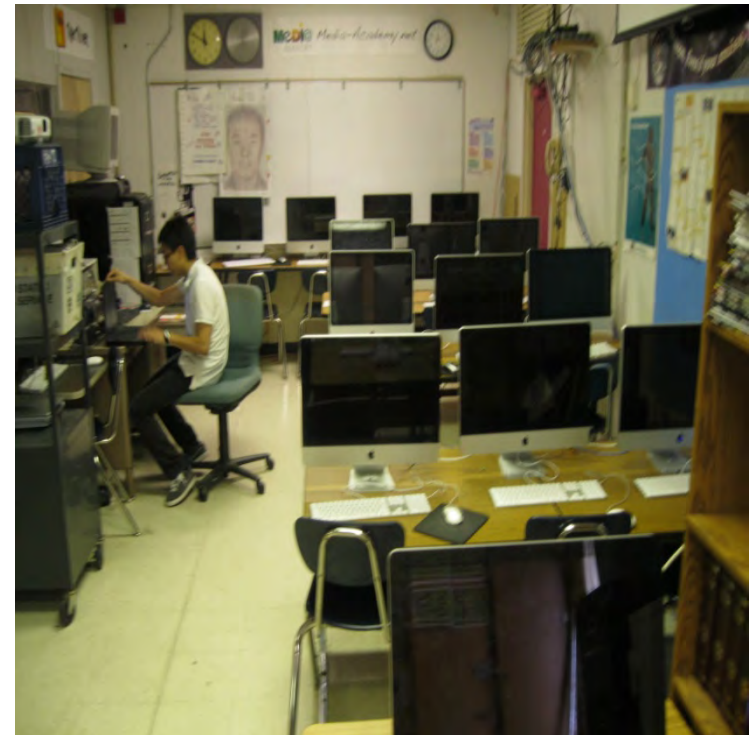




# NZE Approach – Plug Loads



## Plug Load Inventory & Analysis





# NZE Approach – Plug Loads

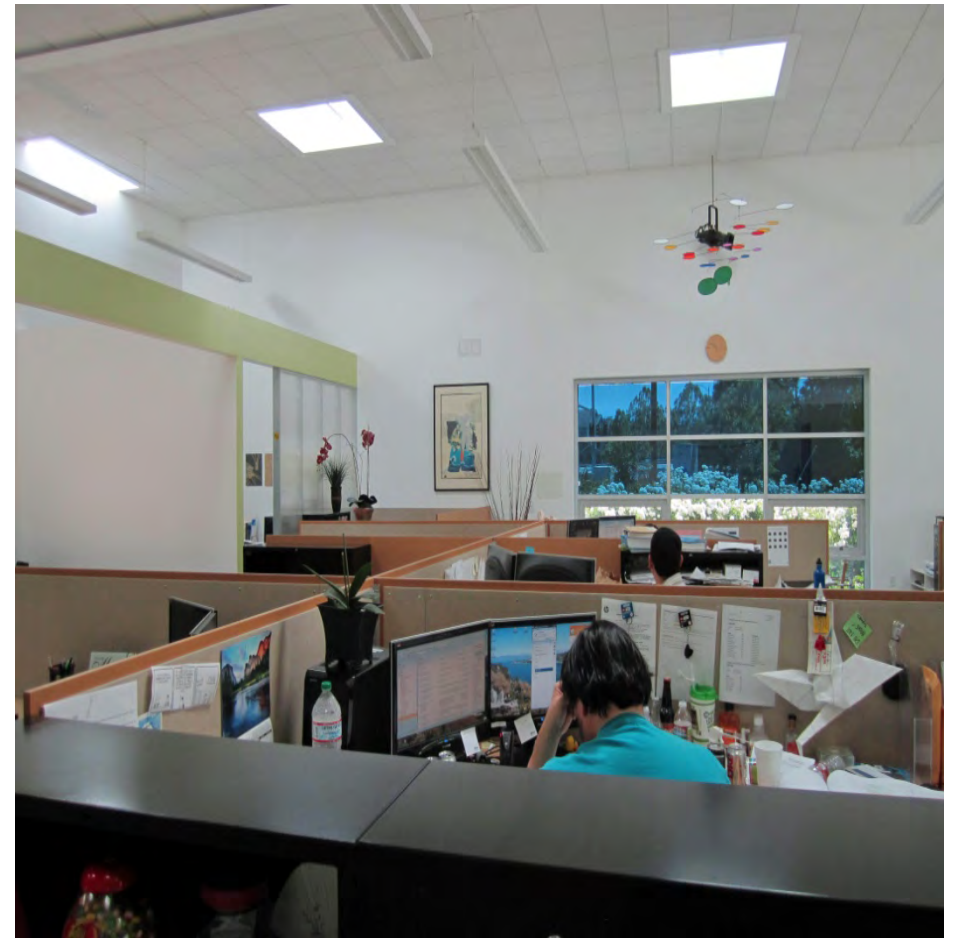


# Reduce Plug Loads by 50%





# NZE Case Study: Ideas Z-Squared Office



existing buildings can be re-purposed  
old branch bank to NZE Office



# NZE Case Study

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# NZE Case Study: Ideas Z-Squared Office

Better quality light, higher productivity,  
saves lighting energy

Needs to be designed and modeled to  
ensure quality strategies:

- Courtyard brings daylighting to deep interior
- Organize occupied spaces near courtyard
- Toplighting
- Small aperture skylights with wells to distribute
- Side lighting—windows...placed with consideration for tilt up









# David & Lucille Packard Foundation Net Zero Energy Headquarters Building

49,000 sf Office Building  
70% less energy use than  
ASHRAE 90.1-2007  
18 kbtu/sf/yr

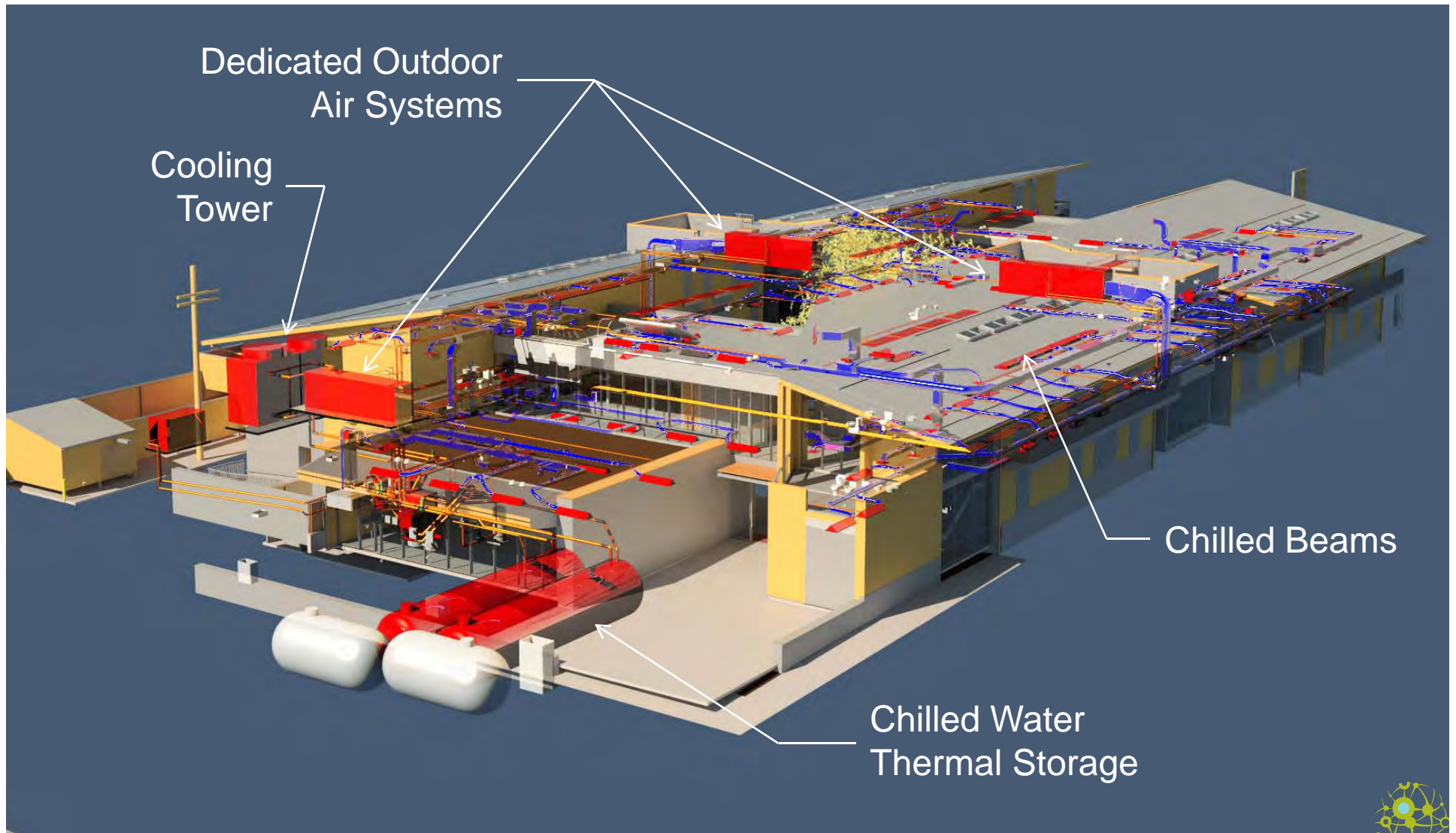




# 3D VIRTUAL BUILDING – “REVIT MODEL”



# BUILDING MEP MODEL OVERLAY







Trust | Nurture | Inspire

INTEGRAL  
GROUP





## **Exterior Motorized Shades**

Southwest  
Orientation

Blinds lower in  
afternoon

And rotate to  
maintain zero light  
penetration

While maintaining  
views to courtyard...



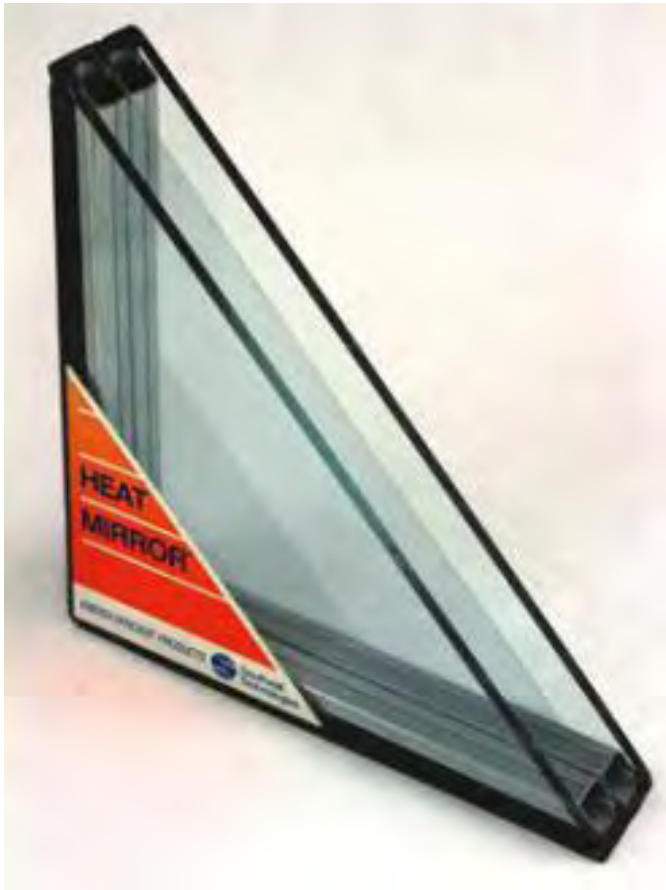


Trust | Nurture | Inspire



# HIGH PERFORMANCE TRIPLE ELEMENT WINDOWS

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**+ \$75,000** Premium for installed glazing

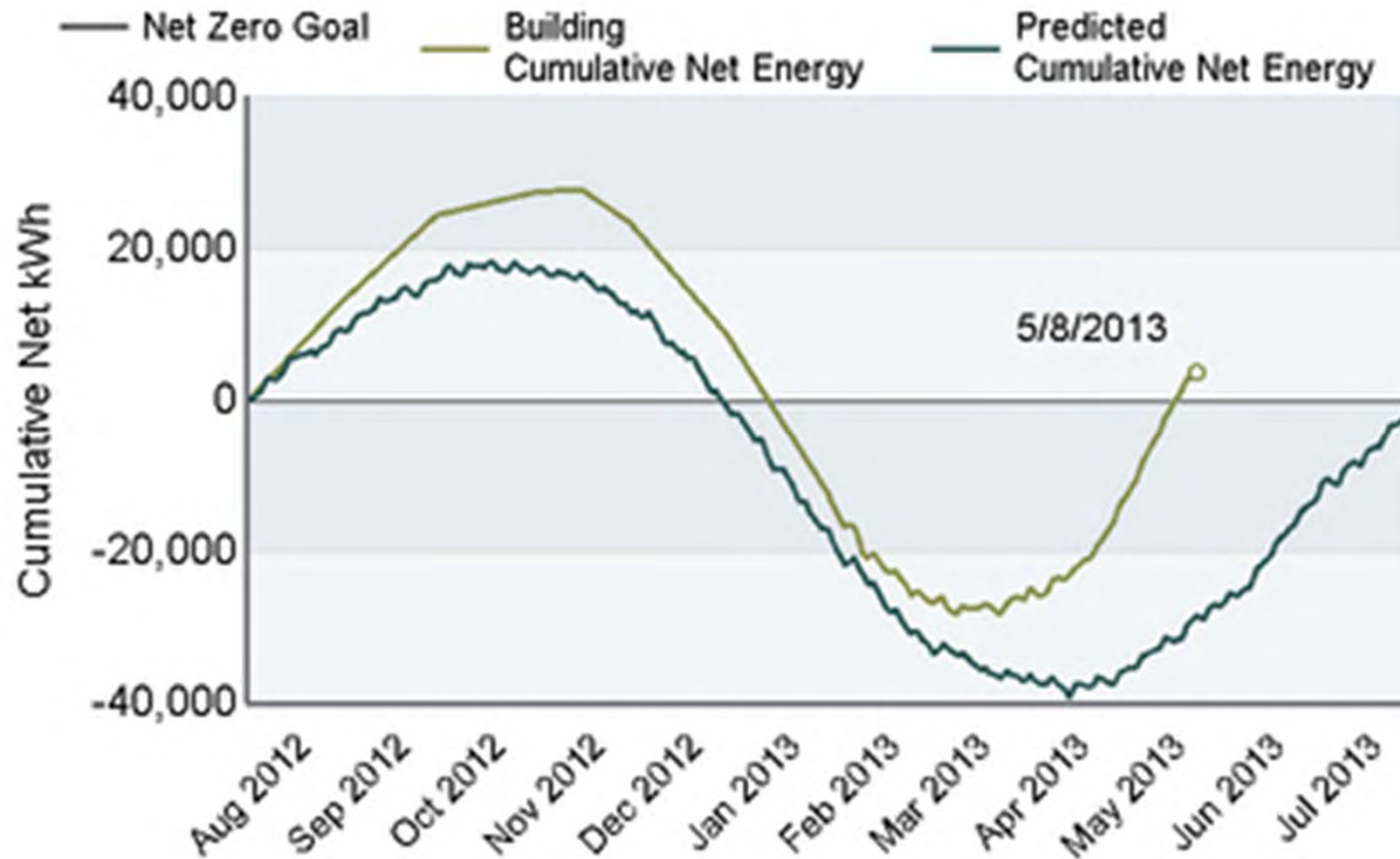
**- \$150,000** Eliminate perimeter heating system

**= \$75,000 first cost *savings***

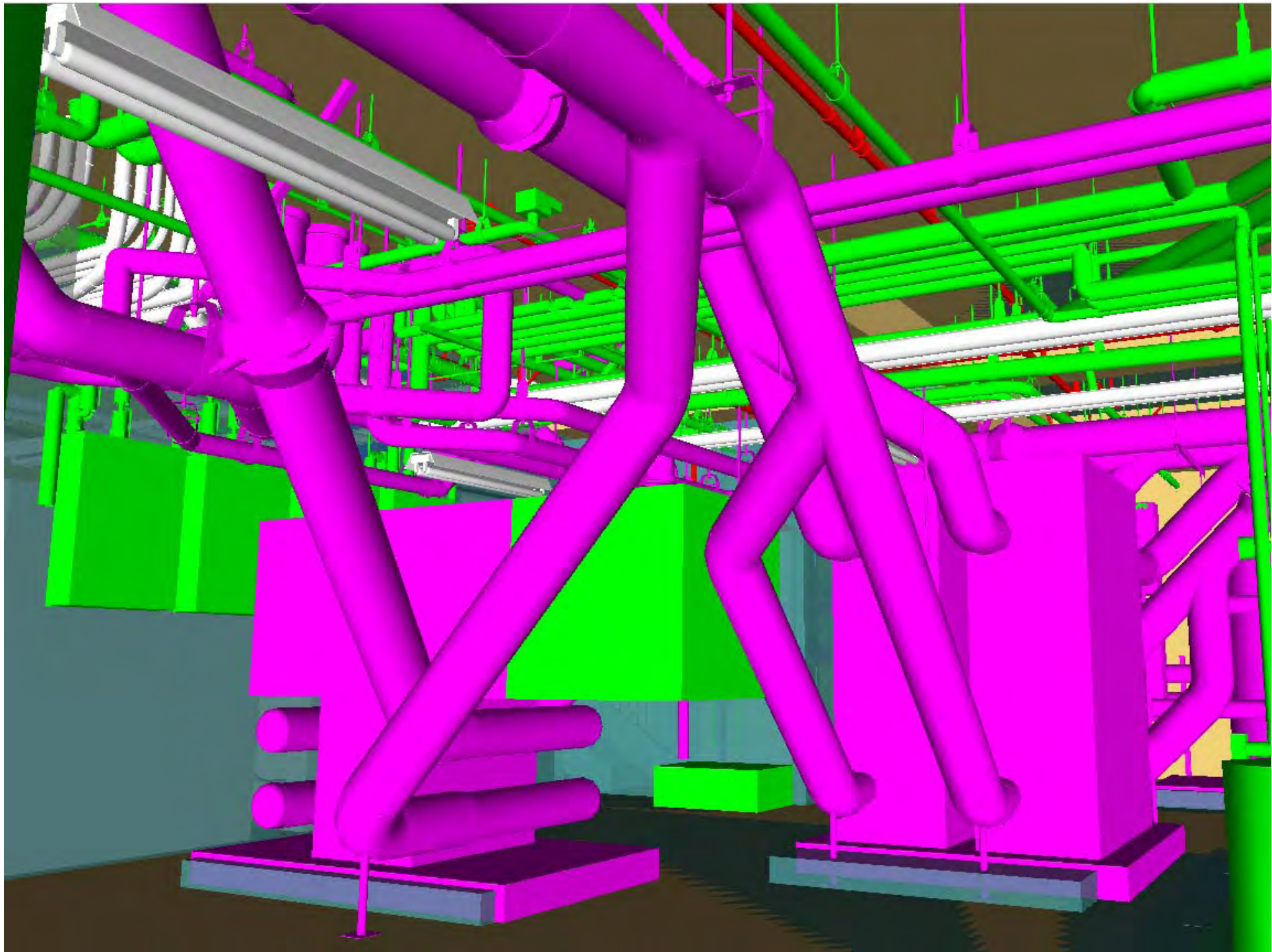
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**plus \$300,000 (35kW) in PV system downsizing**

# NET ZERO AFTER NINE MONTHS...



<http://www.packard.org/about-the-foundation/our-green-headquarters/energy-reports/>



















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