

# Getting to Zero NBI Study Update 2013 – Project Examples



getting to zero national forum  
2013 NASEO Annual Meeting *at the*  
Framing the policies, programs and projects that will drive zero net energy buildings

## Zero Net Energy and Ultra-low Energy Buildings



**nbi** new buildings  
institute

# Thank you to our sponsors!

Diamond



Platinum



Gold



Silver



Bronze



Supporting



Media



# Thank you: Reception Host





# Richardsville Elementary School

- Bowling Green, KY
- 72,300 SF
- Education K-12
- Completed in 2010
- LEED Gold
- \$206/SF

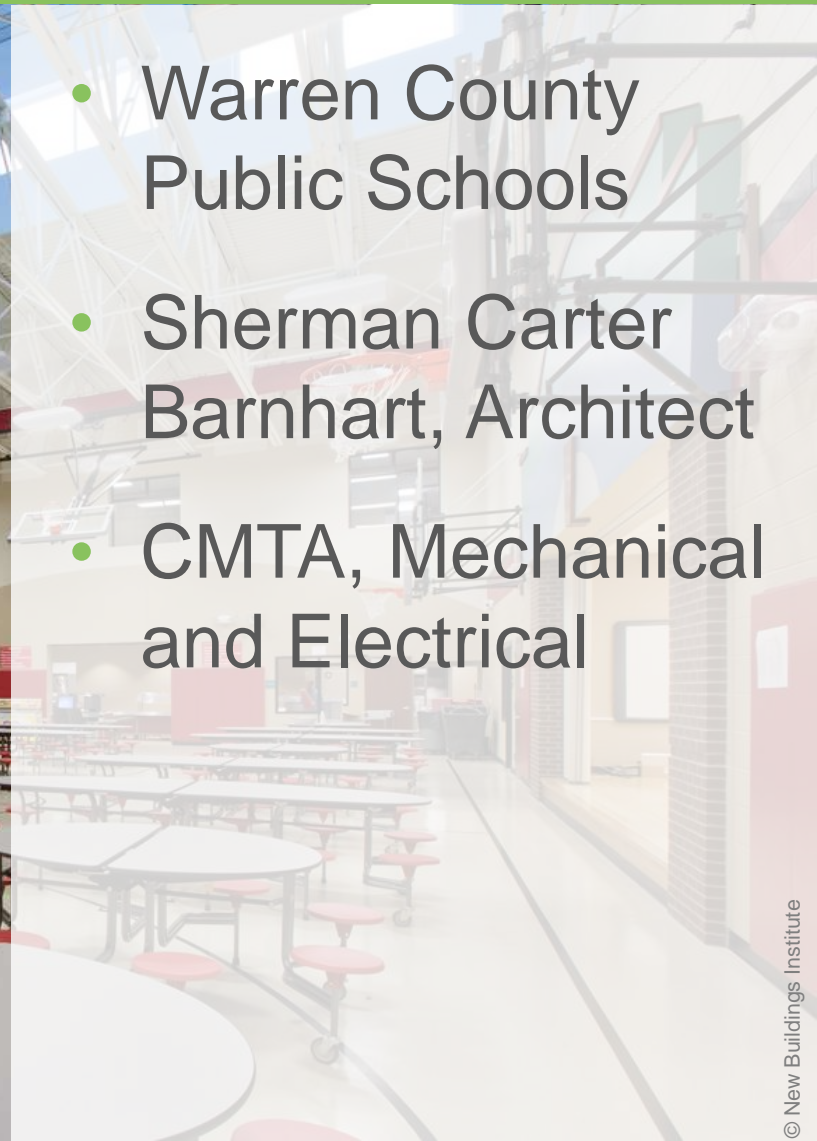


Photo: Sherman Carter Barnhart

# Richardsville Elementary School



- Warren County Public Schools
- Sherman Carter Barnhart, Architect
- CMTA, Mechanical and Electrical

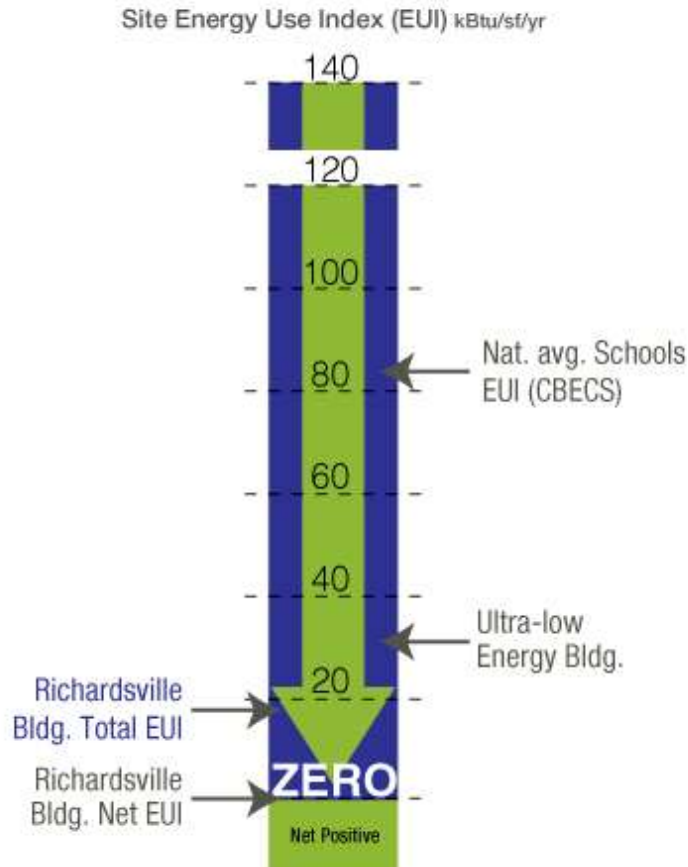




# Richardsville Elementary School

$$18 - 18 = 0$$

BUILDING'S TOTAL EUI      RENEWABLE PRODUCTION EUI      BUILDING'S NET EUI



## Efficiency Measures:

- Ground source heat pump
- DOAS
- CO2 sensors
- Daylighting
- High performance lighting system with controls
- EMS & Energy Dashboard



Photo: Sherman Carter Barnhart

# Alameda County Library

- Castro Valley, CA
- 35,000 SF
- Completed March 2011
- LEED Gold
- \$330/SF



Photo: Sibila Savage



# Alameda County Library



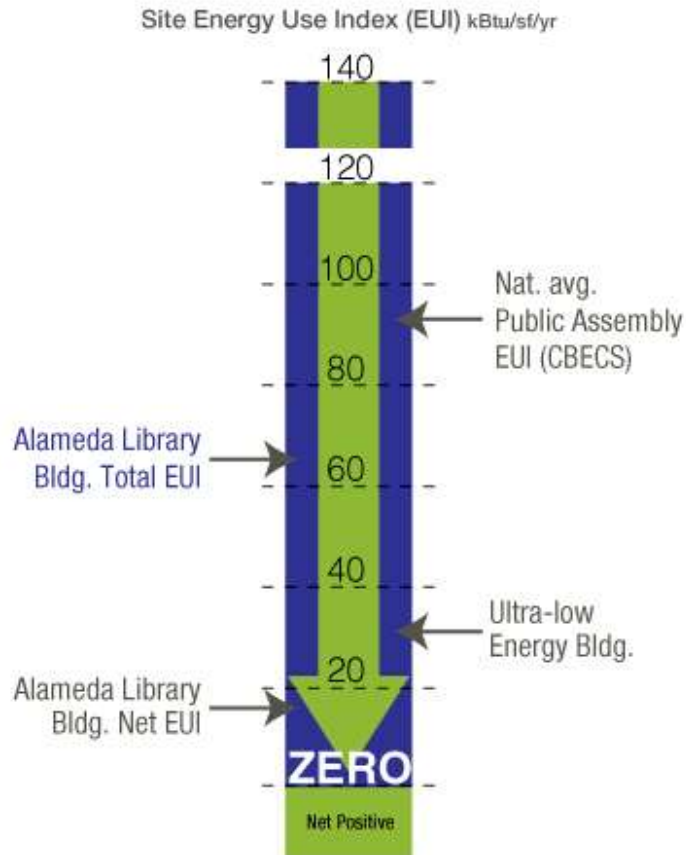
- Alameda County, Owner
- Noll & Tam, Architects
- Simon & Associates, Green Building Consultant
- W.A. Thomas Company, General Contractor



# Alameda County Library

$$64 - 47 = 17$$

BUILDING'S TOTAL EUI      RENEWABLE PRODUCTION EUI      BUILDING'S NET EUI



## Efficiency Measures:

- Natural Ventilation
- UFAD
- Daylighting & Controls
- High Performance Lighting
- 277 kW of Roof Mounted PV



# Anna Maria Historic Green Village

- Anna Maria, FL
- 5 Buildings (about 10,000 SF total)
  - 2 residential over retail
  - 1 office
  - 1 café
  - 1 bakery/gallery
- 2 LEED Platinum buildings
- \$193 / SF



Photo: Raymond Kaiser



# Anna Maria Historic Green Village



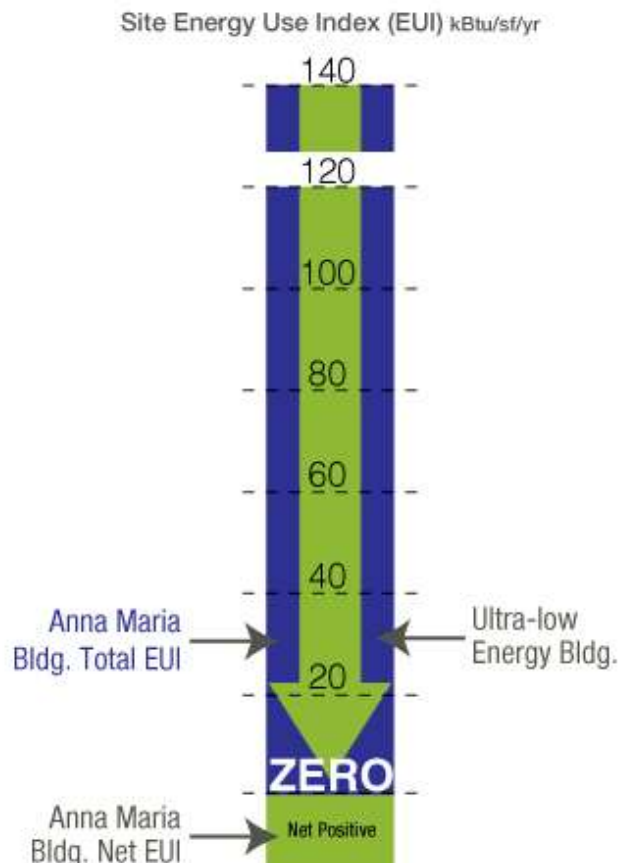
- Mike and Lizzie Thrasher, Owner Developers
- Tom Stockebrand, Energy expert
- Ray Kasier, Engineer



# Anna Maria Historic Green Village

$$28 - 35 = -7$$

BUILDING'S TOTAL EUI      RENEWABLE PRODUCTION EUI      BUILDING'S NET EUI



## Efficiency Measures:

- Ground source heating and cooling
- Energy Star appliances
- 78 kW of PV
- Solar thermal water
- Rainwater collection for irrigation and flushing toilets



Photo: Raymond Kaiser

# Coastal Maine Botanical Gardens

- Boothbay, Maine
- 8,200 SF addition
- Office and classroom at public building
- Completed in 2011
- LEED Platinum
- \$390 / SF



Photo: Maclay Architects



# Coastal Maine Botanical Gardens

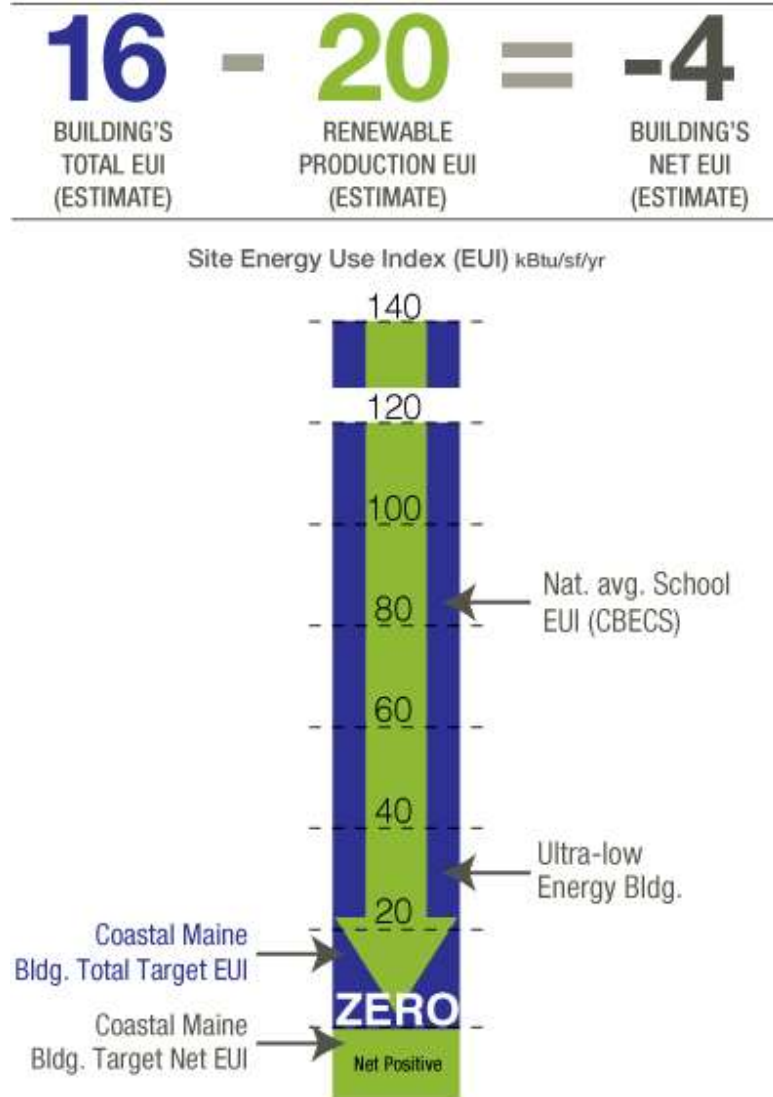


- Coastal Maine Botanical Garden
- Fore Solutions
- Maclay Architects
- Scott Simons Architects
- Allied Engineering
- Bensonwood
- HP Cummings
- Energy Balance
- J&M Lighting Design
- Investment Engineering

Photo: Maclay Architects



# Coastal Maine Botanical Gardens



## Efficiency Measures:

- Operable windows
- Variable refrigerant volume heat pump system for heating and cooling
- Energy recovery
- Daylighting and controls
- EMS and energy dashboard



# DPR Construction San Diego

- San Diego, CA
- 24,500 SF
- Office
- LEED NC Platinum
- ILFI Zero Energy Building Certified



Photo: DPR Construction

# DPR Construction San Diego



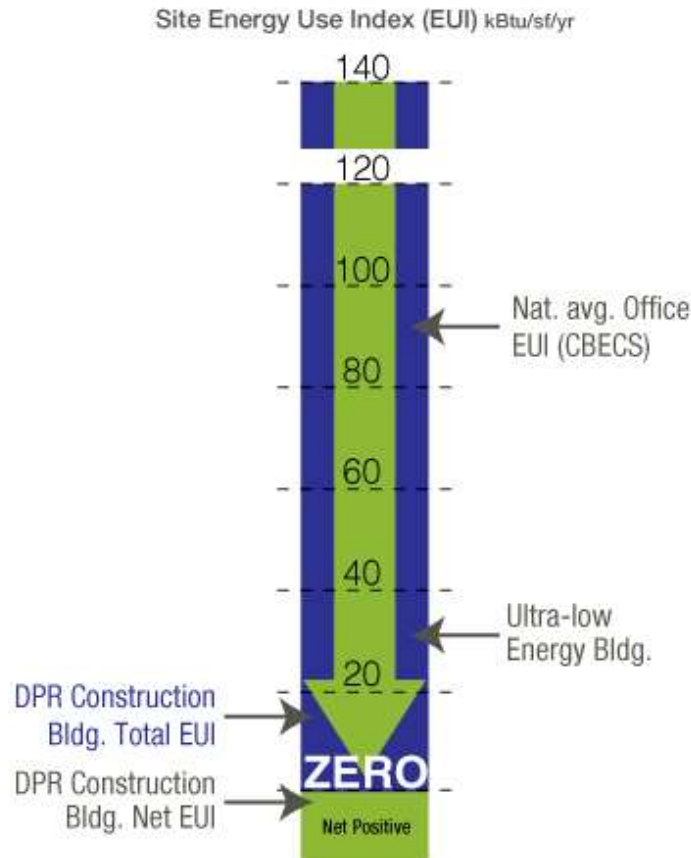
- Callison Architecture
- DPR Construction, Owner, Design/Builder
- Kema, Bioclimatic Design
- Hope Engineering, Structural
- Latitude 33, Civil
- Howard Associates, Landscape
- Berg Electric, Electrical Services
- Pacific Rim Mechanical Plumbing & Mechanical Services



# DPR Construction San Diego

$$15 - 17 = -2$$

BUILDING'S TOTAL EUI      RENEWABLE PRODUCTION EUI      BUILDING'S NET EUI



## Efficiency Measures:

- Natural ventilation
- Daylighting
- Roof monitors
- Efficient HVAC
- Solatubes and high performance lighting
- 64 kW PV



Photo: DPR Construction

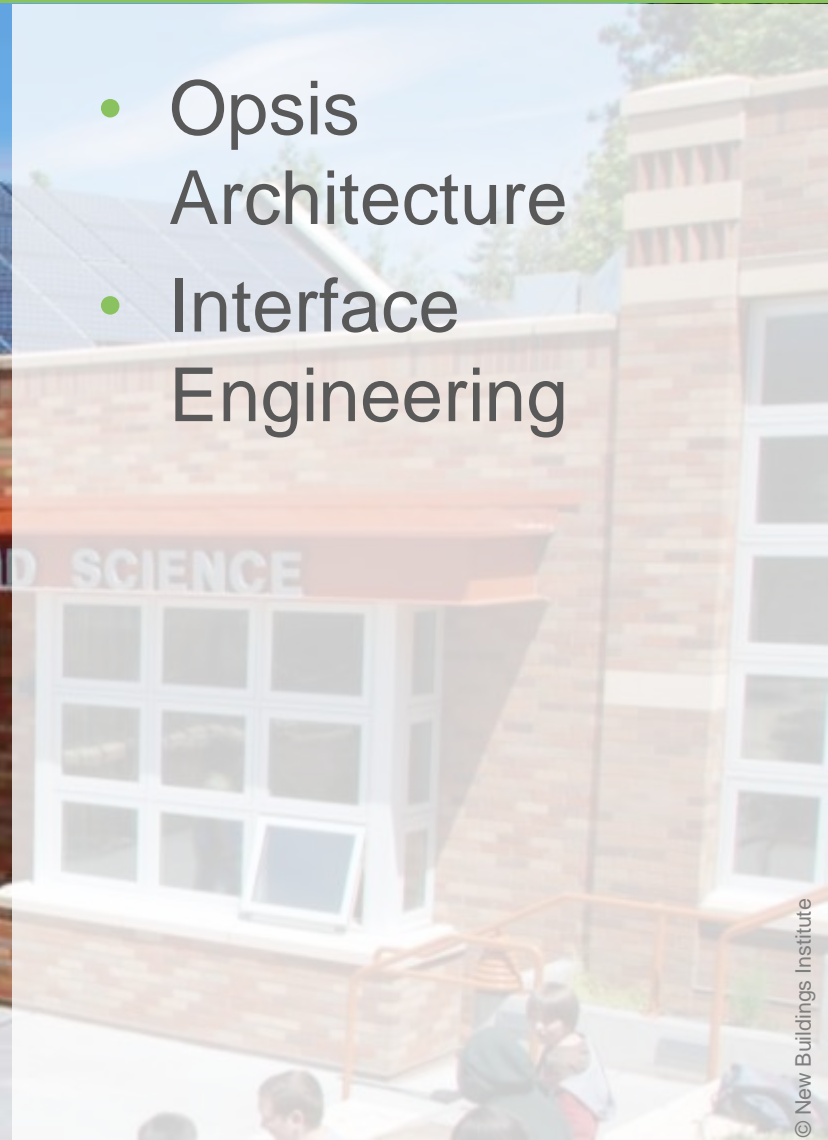
# Hood River Oregon Middle School Addition

- Hood River, OR
- 5,300 SF
- Education K-12
- Completed 2010
- LEED Platinum
- \$247 / SF



# Hood River Oregon Middle School Addition

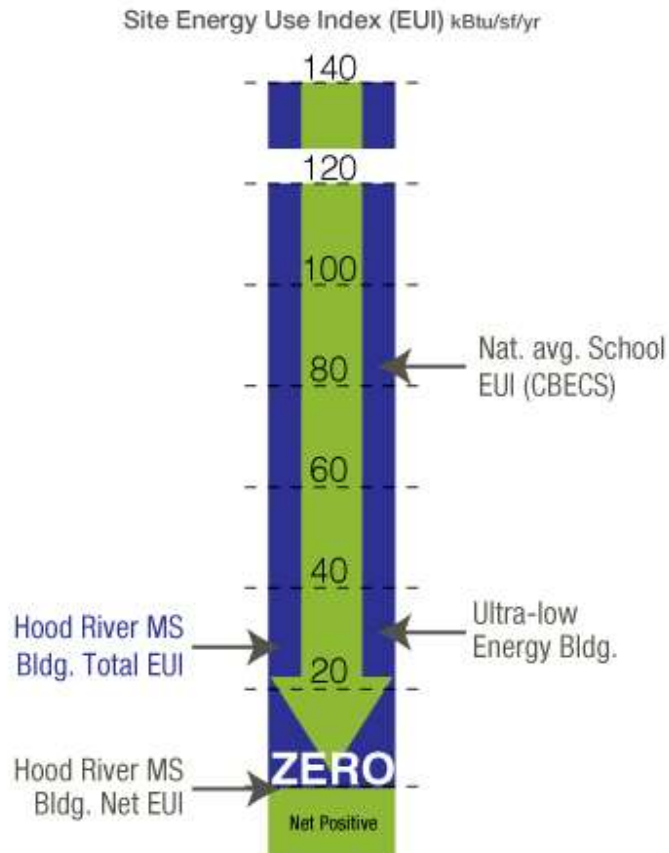
- Opsi Architecture
- Interface Engineering





# Hood River Oregon Middle School Addition

$$\begin{array}{ccc} 27 & - & 27 & = & 0 \\ \text{BUILDING'S} & & \text{RENEWABLE} & & \text{BUILDING'S} \\ \text{TOTAL EUI} & & \text{PRODUCTION EUI} & & \text{NET EUI} \end{array}$$



## Efficiency Measures:

- Natural ventilation
- Radiant floor
- Ground source heat pump
- Heat recovery
- Daylighting & controls
- Plug load control
- 35 kW roof mounted PV



Photo: Opsis Architecture

# Iowa Utilities Board / Office of Consumer Advocate

- Des Moines, Iowa
- 44,640 SF
- Office
- Completed 2011
- \$226/SF



Photo: BNIM



# Iowa Utilities Board / Office of Consumer Advocate

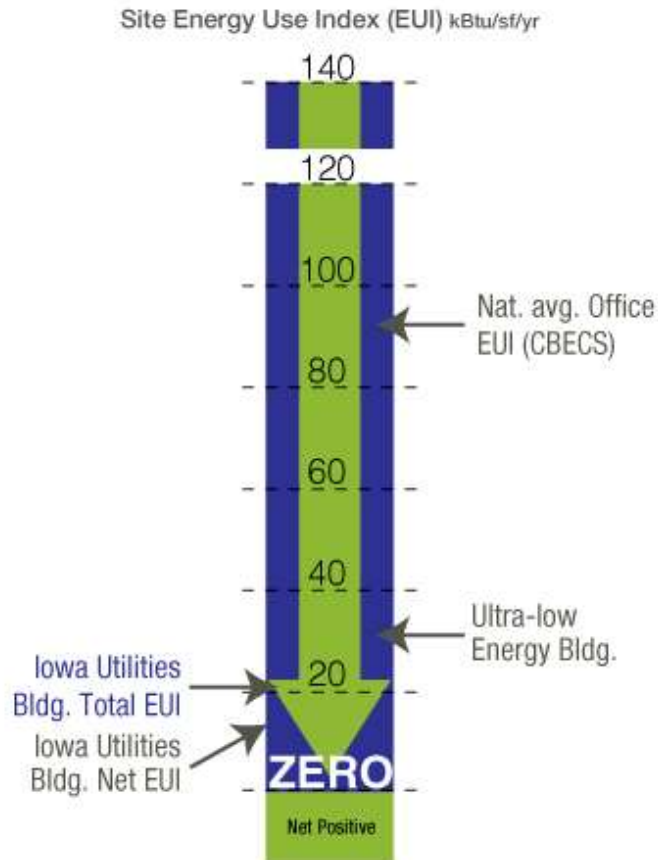


- BNIM, Architect/  
Landscape/Daylight  
Modeling
- KJWW, MEP
- Snyder and  
Associates, Civil
- Charles Saul  
Engineering,  
Structural
- The Weidt Group,  
Energy Modeling

# Iowa Utilities Board / Office of Consumer Advocate

$$21 - 5 = 16$$

BUILDING'S TOTAL EUI      RENEWABLE PRODUCTION EUI      BUILDING'S NET EUI



## Efficiency Measures:

- Natural ventilation
- Ground source heat pump
- Appropriate solar orientation
- Daylighting, high performance glazing and advanced lighting controls
- High performance lighting system
- 45 kW roof mounted photovoltaic array



Photo: BNIM



# CMTA Consulting Engineers Office

- Louisville, KY
- 20,000 SF
- Office
- Completed in 2009
- \$160 / SF



Photo: Dean Larson

# CMTA Office



- Laughlin Millea Hillman, Architect
- CMTA, MEP
- Mark Seibert, Energy Modeler
- SWL, Structural
- Busick Construction, Contractor
- Ray's Heating & Air, Mechanical
- Star Electric, Electrical



# CMTA Office

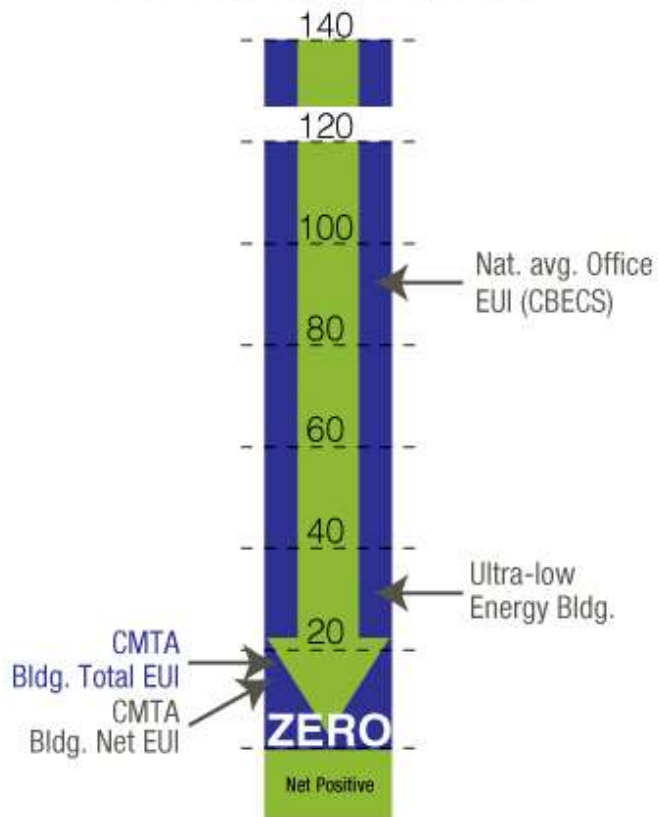
$$18 - 2 = 16$$

BUILDING'S  
TOTAL EUI

RENEWABLE  
PRODUCTION EUI

BUILDING'S  
NET EUI

Site Energy Use Index (EUI) kBtu/sf/yr



## Efficiency Measures:

- Ground source heat pump
- Energy recovery
- CO2 sensor
- DOAS

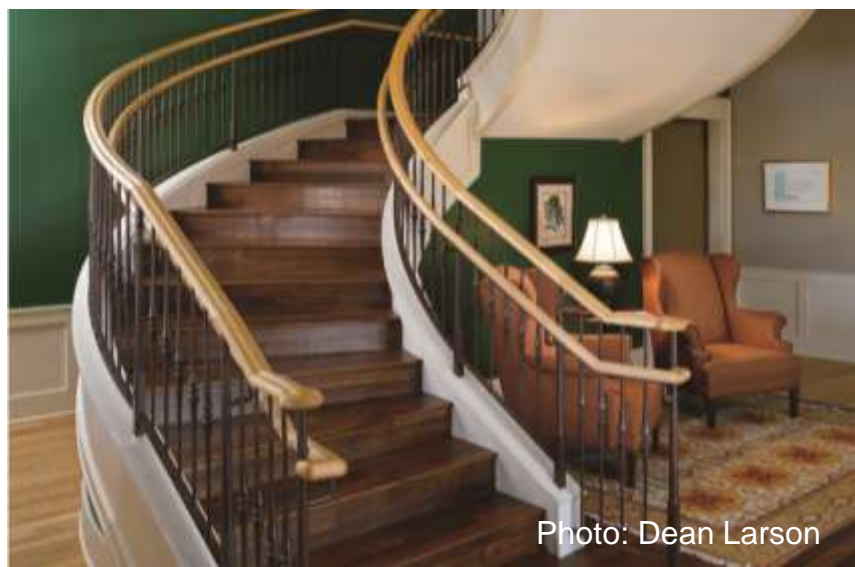


Photo: Dean Larson

# Rice Fergus Miller Office

- Bremerton, WA
- 39,000 SF
- LEED Platinum
- Office
- Renovation
- \$109/SF
- Completed in 2011
- Renewables being staged



Photo: Rice Fergus Miller



# Rice Fergus Miller Office

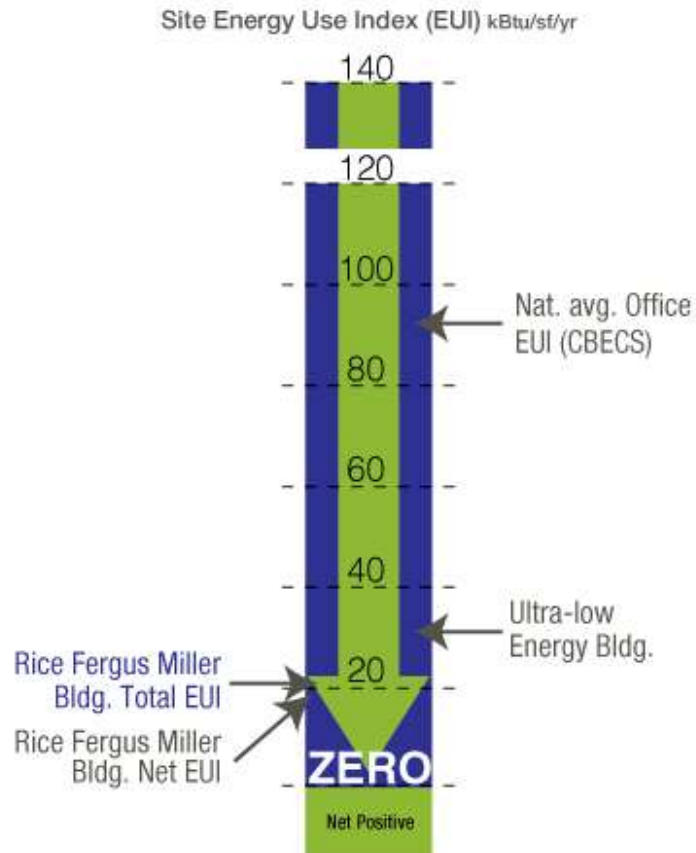


- Rice Fergus Miller, Architect
- PSC, Structural Solutions
- Gerber Engineering, Electrical
- Tim Ryan Construction, Contractor

# Rice Fergus Miller Office

$$21 - 3 = 18$$

BUILDING'S TOTAL EUI      RENEWABLE PRODUCTION EUI      BUILDING'S NET EUI



## Efficiency Measures:

- Hybrid natural/mechanical system with natural ventilation and VRV
- Daylighting
- Cool roof
- High performance lighting design and controls
- 9.3 kW PV array



Photo: Rice Fergus Miller



# Leon County Cooperative Extension Office

- Tallahassee, FL
- 13,000 SF
- Office
- Renovation
- Completed 2012
- \$56/SF (excludes lighting system upgrades)



Photo: Leon County Cooperative Extension Office



# Leon County Cooperative Extension Office

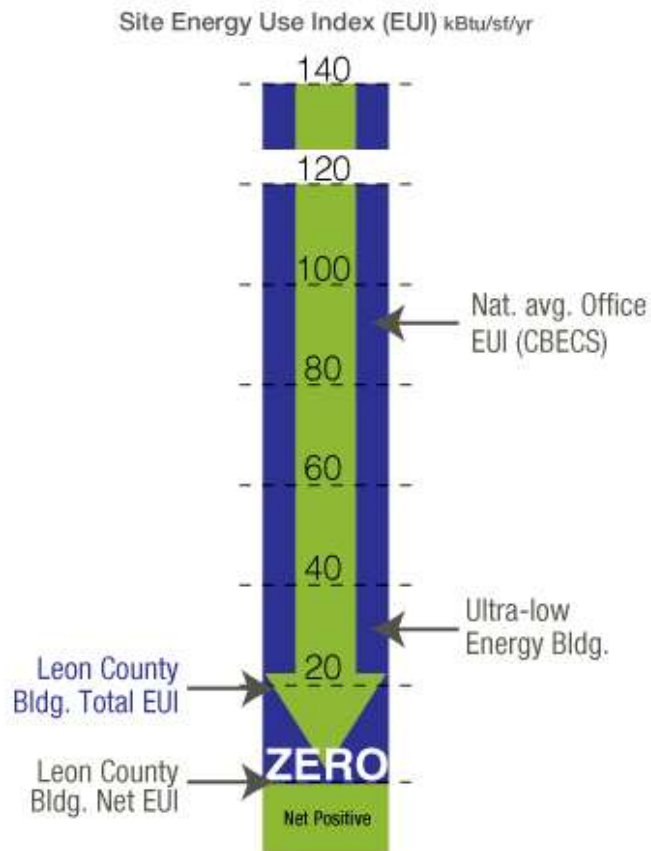
- Barnett Fronczak  
Barlowe Architects
- H2 Engineering



Photo: Leon County Cooperative Extension Office

# Leon County Cooperative Extension Office

$$\begin{array}{ccc} \mathbf{19} & - & \mathbf{19} & = & \mathbf{0} \\ \text{BUILDING'S} & & \text{RENEWABLE} & & \text{BUILDING'S} \\ \text{TOTAL EUI} & & \text{PRODUCTION EUI} & & \text{NET EUI} \end{array}$$



## Efficiency Measures:

- Closed loop geothermal (60 wells 30 feet deep)
- Replaced T12 magnetic ballasts with T8 electronic ballast system
- Lighting controls in private offices
- Operation set point adjustments
- Phasing in of morning ramp up to minimize peak loads



Photo: Leon County Cooperative Extension Office



# The Ramona Apartments

- Portland, OR
- 230,760 SF
- Multifamily residential
- Completed in 2011
- LEED Gold
- \$127/SF



Photo: Sally Painter Photography



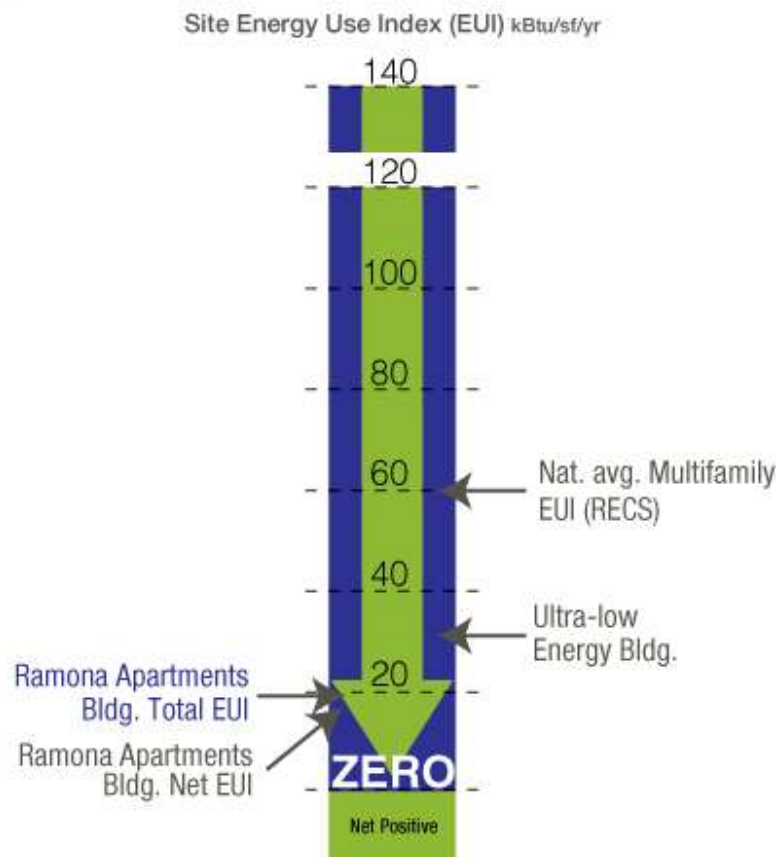
# The Ramona Apartments



- Nurture 247 Limited Partnership, Owner
- Turtle Island Development, Developer
- Ankrom Mosier - Architect
- PAE Consulting Engineers - MEP
- RDH Inc - Building Envelope

# The Ramona Apartments

$$\begin{array}{ccc} \mathbf{19} & - & \mathbf{1} = \mathbf{18} \\ \text{BUILDING'S} & & \text{RENEWABLE} & & \text{BUILDING'S} \\ \text{TOTAL EUI} & & \text{PRODUCTION EUI} & & \text{NET EUI} \end{array}$$



## Efficiency Measures:

- Zonal electric baseboard heat with electric controls in units
- Air to air heat pump in common areas
- Energy recovery on bathroom exhaust
- High performance envelope
- Green roof
- T8 and electronic ballasts in common areas
- Central hot water system
- 30 kWh PV array on roof



# TD Bank Branch - Ft. Lauderdale

- Fort Lauderdale, FL
- 3,970 SF
- Retail bank branch
- LEED Platinum



Photo: Turner Construction

# TD Bank Branch - Ft. Lauderdale



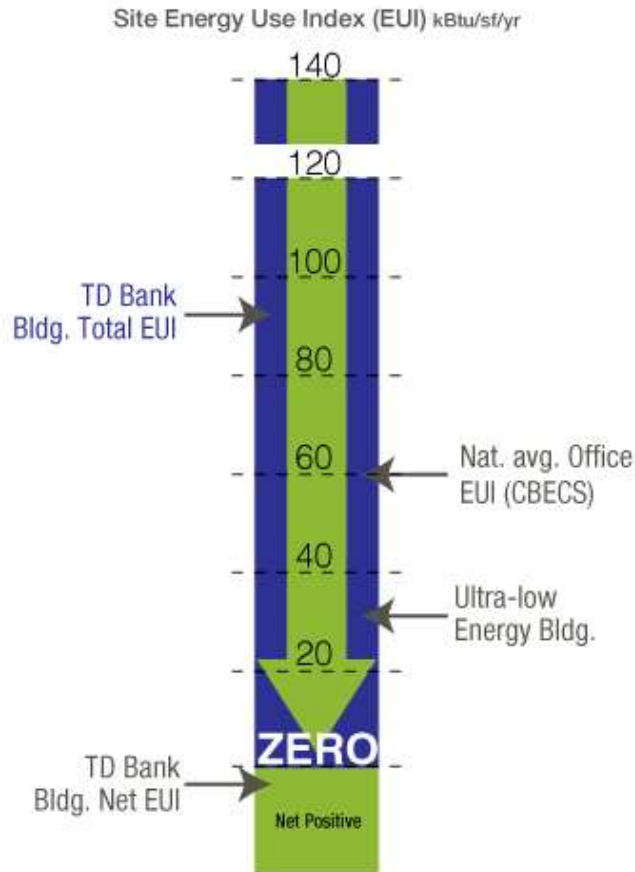
- TD Bank, Owner
- Bergmann Associates, Architect
- Turner Construction, Contractor
- Spiezle Architects, Energy Consultant
- Bohler Engineering, Civil
- Solular Energy, Solar Consultant



# TD Bank Branch - Ft. Lauderdale

$$92 - 96 = -4$$

BUILDING'S TOTAL EUI      RENEWABLE PRODUCTION EUI      BUILDING'S NET EUI



## Efficiency Measures:

- High efficiency variable refrigerant flow HVAC
- Split system modulating digital scroll compressors and hot gas compressors for dehumidification
- Air-to-air heat exchanger
- Fan coil system
- Daylighting & photo controls
- Attention to plug load management
- 86 kW of PVs



Photo: Turner Construction

# VanDusen Botanical Garden Visitor Centre

- Vancouver, BC
- 19,000 SF
- Public assembly
- LEED platinum target
- Pursuing ILFI Living Building Certification

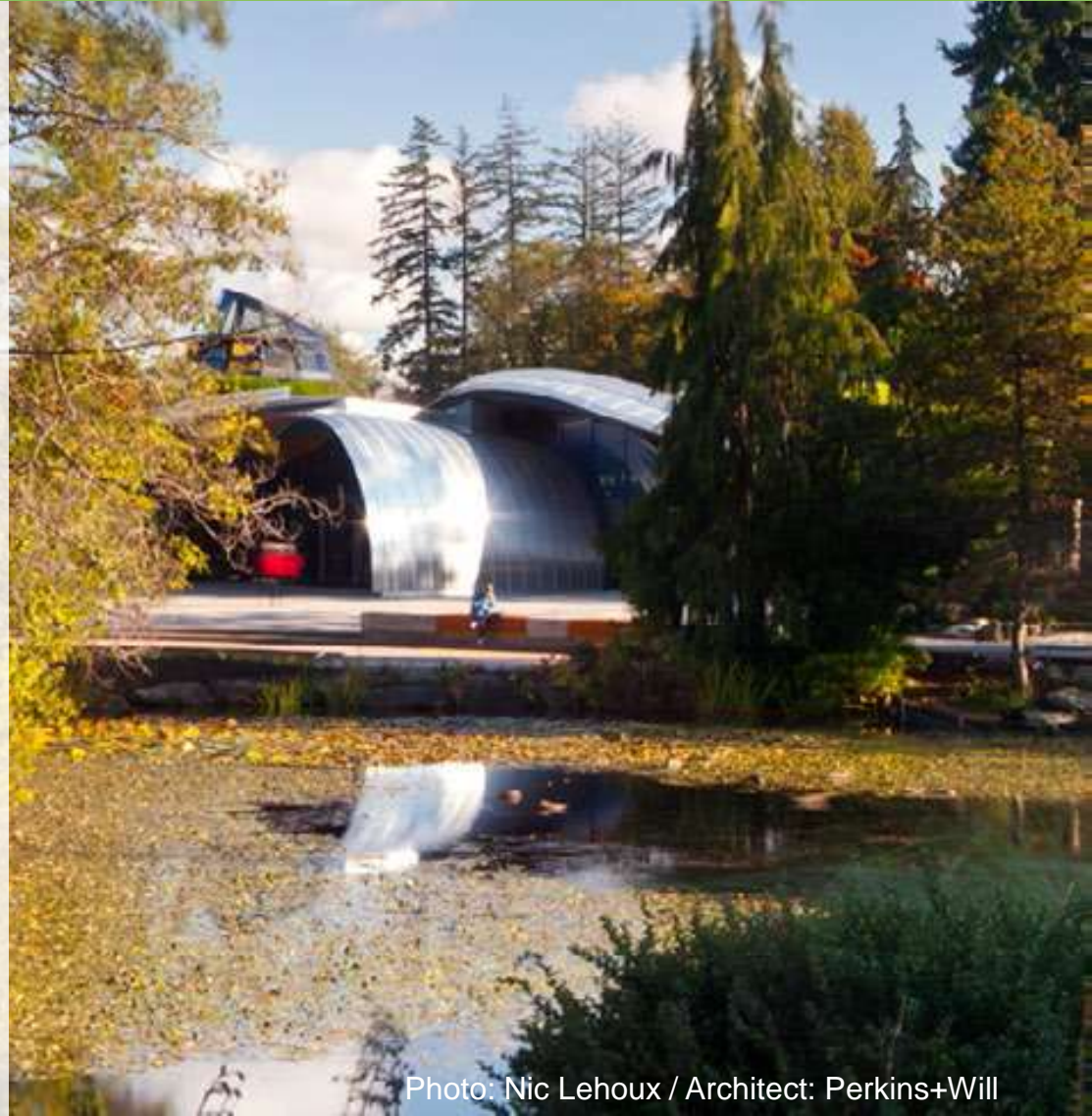


Photo: Nic Lehoux / Architect: Perkins+Will



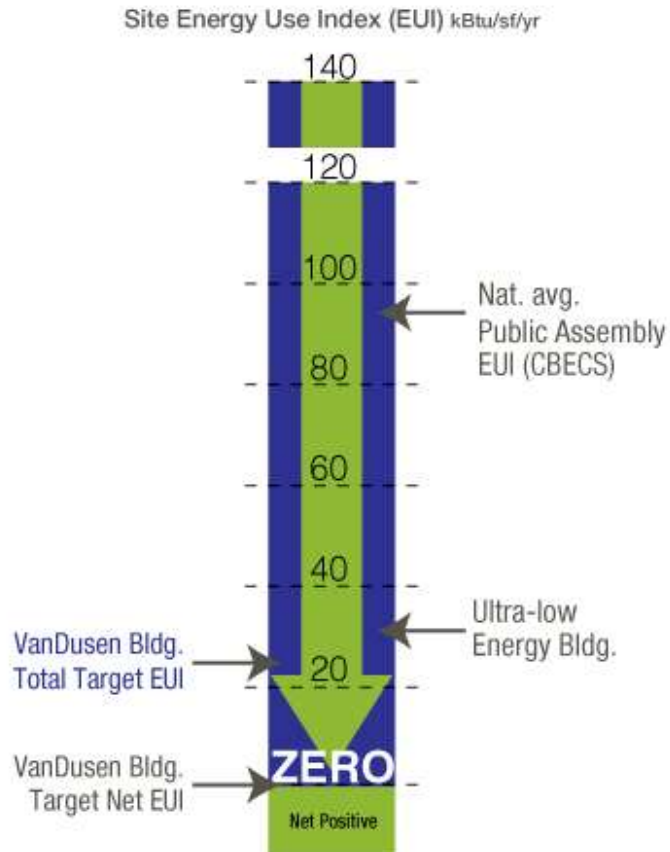
# VanDusen Botanical Garden Visitor Centre



- Vancouver Board of Parks and Recreation
- Busby Perkins + Will

# VanDusen Botanical Garden Visitor Centre

$$\begin{array}{ccc} \mathbf{25} & - & \mathbf{25} & = & \mathbf{0} \\ \text{BUILDING'S} & & \text{RENEWABLE} & & \text{BUILDING'S} \\ \text{TOTAL EUI} & & \text{PRODUCTION EUI} & & \text{NET EUI} \\ \text{(ESTIMATE)} & & \text{(ESTIMATE)} & & \text{(ESTIMATE)} \end{array}$$



## Efficiency Measures:

- Passive solar design
- Natural ventilation
- Ground source heat pump
- Green roof
- Exterior shading
- 11 kW PV array



Photo: Nic Lehoux / Architect: Perkins+Will



# Walgreens Evanston Store

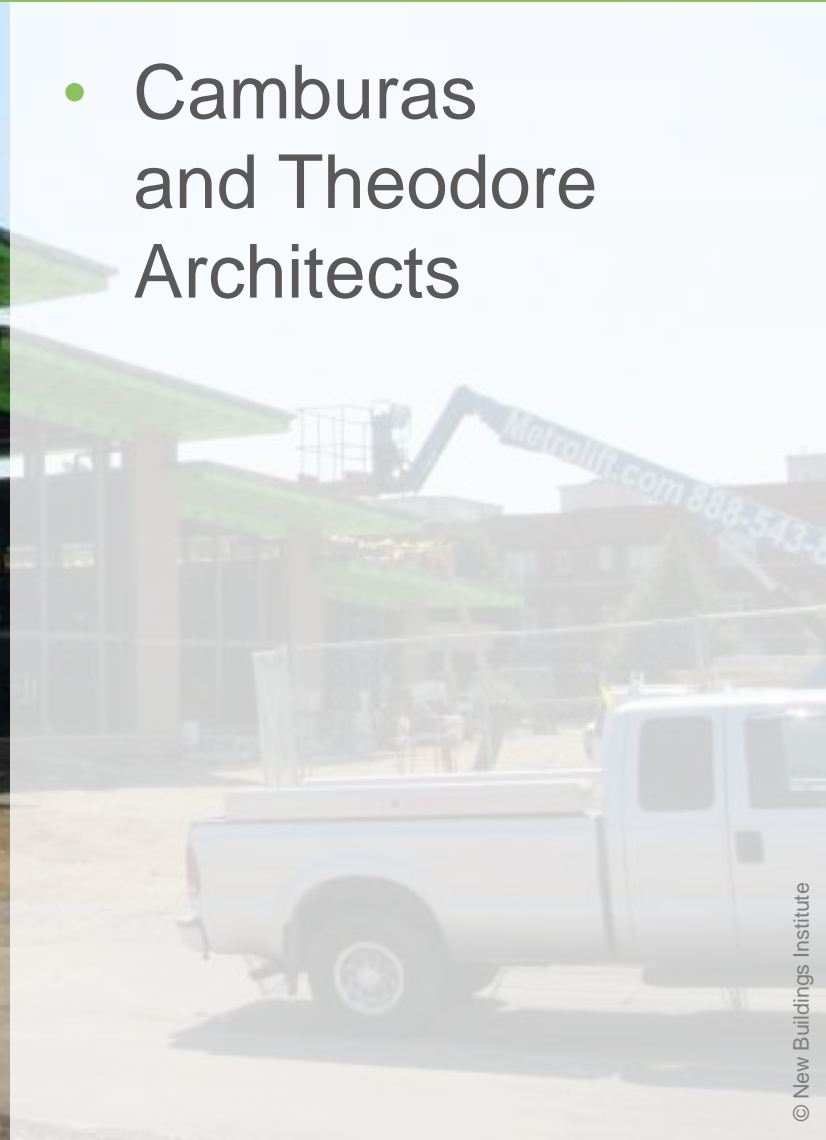
- Evanston, IL
- 14,000 SF
- Retail location
- Under construction



Photo: Camburas and Theodore

# Walgreens Evanston Store

- Camburas and Theodore Architects

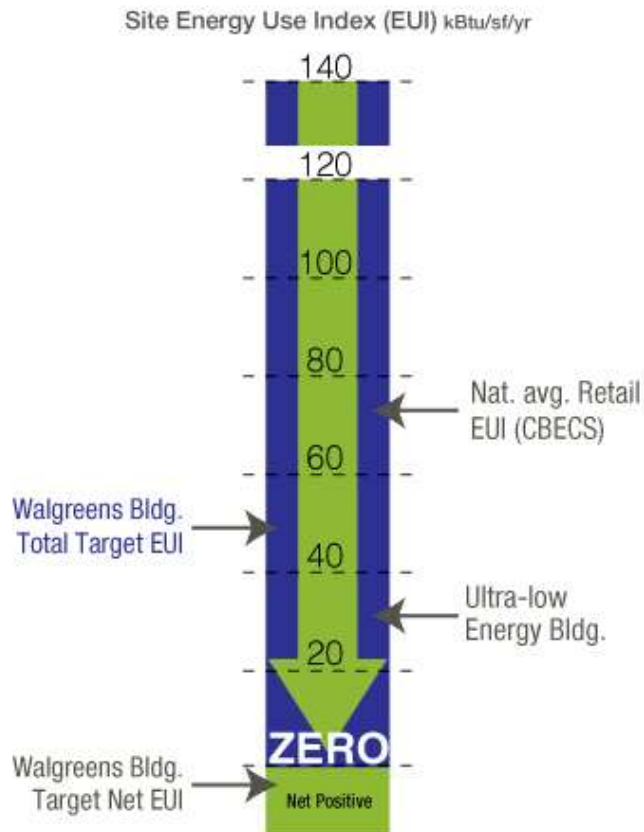




# Walgreens Evanston Store

$$49 - 54 = -5$$

BUILDING'S TOTAL EUI (ESTIMATE)      RENEWABLE PRODUCTION EUI (ESTIMATE)      BUILDING'S NET EUI (ESTIMATE)



## Efficiency Measures:

- Building massing (geometry and orientation)
- Excellent insulation and windows
- Exterior shading, automated interior shades & operable windows
- Dedicated outside air ventilation system
- Demand ventilation controls
- All LED lighting
- Daylight harvesting controls
- Refrigerated case doors
- Heat recovery from refrigeration systems
- Ground source (geothermal) heat pump heating and cooling
- Natural (CO<sub>2</sub>) refrigerant
- Solar PV & Wind turbine

# Conrad N. Hilton Foundation Headquarters

- Agoura Hills, CA
- 22,240 SF
- Office
- Targeting LEED Platinum



Photo: Nick Merrick © Hedrich Blessing



# Conrad N. Hilton Foundation Headquarters

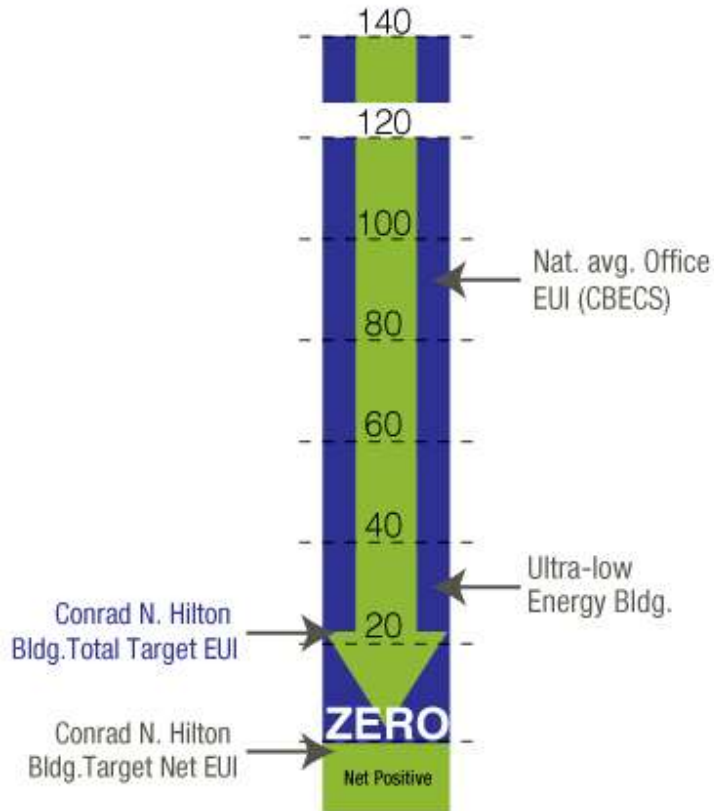


- ZGF Architects
- WSP
- KPFF
- David Nelson & Associates
- Stantec
- Van Atta Associates
- Davis Langdon
- Rocky Mountain Institute

# Conrad N. Hilton Foundation Headquarters

$$\begin{array}{ccc} \mathbf{22} & - & \mathbf{24} = \mathbf{-2} \\ \text{BUILDING'S} & & \text{RENEWABLE} & & \text{BUILDING'S} \\ \text{TOTAL EUI} & & \text{PRODUCTION EUI} & & \text{NET EUI} \\ \text{(ESTIMATE)} & & \text{(ESTIMATE)} & & \text{(ESTIMATE)} \end{array}$$

Site Energy Use Index (EUI) kBtu/sf/yr



## Efficiency Measures:

- Daylighting and views
- 1,000 SF Solar thermal heating system
- 115 kW photovoltaic array
- Water cooled chilling
- Passive downdraft HVAC chimney system
- Automated shading devices





# Camden Friends Meetinghouse

- Camden, DE
- 2,864 SF
- Public Assembly
- Completed 2008



Photo: Re:Vision Architecture

# Camden Friends Meetinghouse



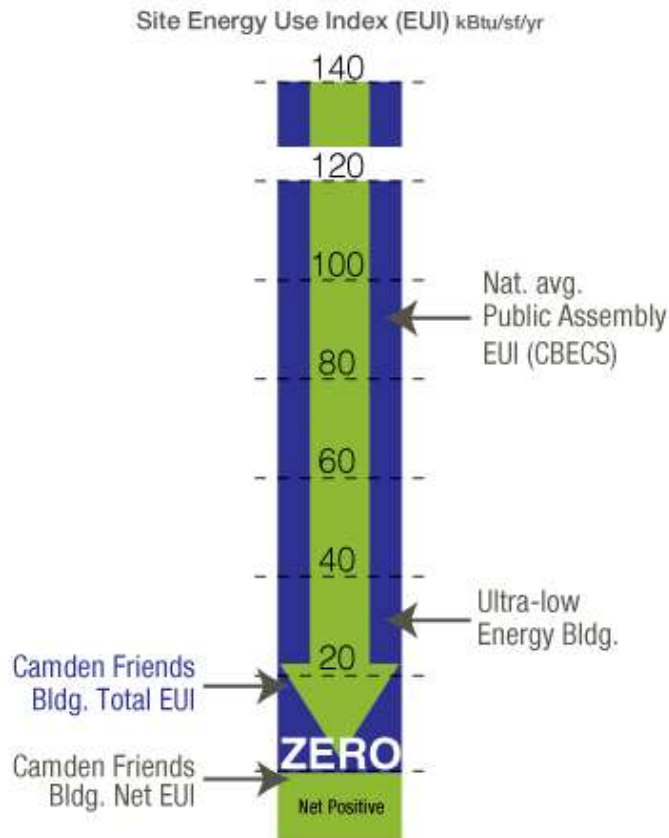
- Re:Vision Architecture





# Camden Friends Meetinghouse

$$\begin{array}{ccc} \mathbf{18} & - & \mathbf{20} = \mathbf{-2} \\ \text{BUILDING'S} & & \text{RENEWABLE} & & \text{BUILDING'S} \\ \text{TOTAL EUI} & & \text{PRODUCTION EUI} & & \text{NET EUI} \end{array}$$



## Efficiency Measures:

- Passive solar design
- Daylighting
- 12 kW PV array
- Thermal envelope
- Ground source heat pump



Photo: Re:Vision Architecture

# Eight Buildings verified ZNE from Living Building Challenge



getting to zero national forum

at the  
**2013 NASEO Annual Meeting**

Framing the policies, programs and projects that will drive zero net energy buildings



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RECOGNITION UNDER LIVING BUILDING  
CHALLENGE**





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CHALLENGE**

**ZHOME – NET ZERO ENERGY, PETAL  
RECOGNITION UNDER LIVING BUILDING  
CHALLENGE**



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BUILDING  
CHALLENGE**

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CERTIFICATION UNDER LIVING BUILDING  
CHALLENGE**





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**ZHOME – NET ZERO ENERGY, PETAL  
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ZHOME – NET ZERO ENERGY, PETAL  
RECOGNITION UNDER LIVING BUILDING  
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TYSON LEARNING CENTER – NET ZERO  
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BERTSCHI SCHOOL – NET ZERO ENERGY,  
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IDEAS Z2 OFFICE BUILDING – NET ZERO  
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