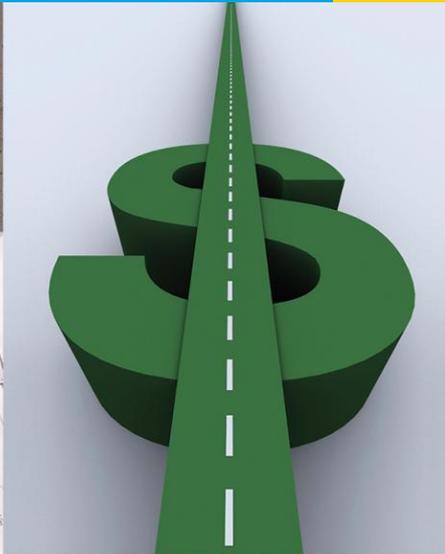


Commercial Building Energy Alliances

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

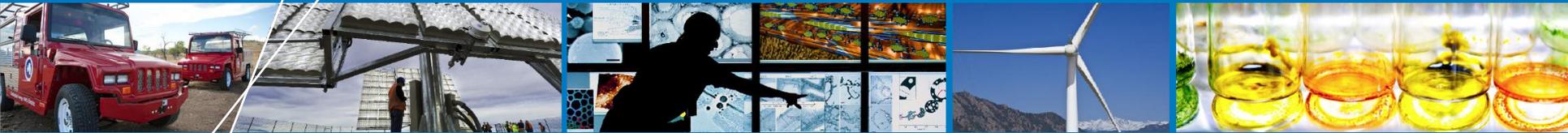


**CBEA Efficiency Forum -
Executive Exchange With
Commercial Stakeholders**

May 24, 2012

National Renewable Energy
Laboratory (NREL)
Golden, Colorado

Welcome to NREL



Commercial Building Energy Alliance

May 24, 2012

Dr. Dan E. Arvizu
Laboratory Director

We Are Part of DOE's National Lab Complex



National Renewable Energy Laboratory is operated for the U.S. Department of Energy by the Alliance for Sustainable Energy, LLC

National Renewable Energy Laboratory— Who We Are

The DOE's only national lab dedicated to energy efficiency and renewable energy

- Leading clean-energy innovation for 34 years
- 2547 employees with \$388.6M annual budget
- Several major world-class multi-million dollar partnering facilities, dozens of additional research labs
- Campus is a living model of sustainable energy
- Operated by Alliance for Sustainable Energy, LLC (MRIGlobal, Battelle, CU-Boulder, CSU, CSM, Stanford, MIT)



Scope of Mission



Energy Efficiency

Residential Buildings
Commercial Buildings
Personal and Commercial Vehicles



Renewable Energy

Solar
Wind and Water
Biomass
Hydrogen
Geothermal



Systems Integration

Grid Infrastructure
Distributed Energy
Interconnection
Battery and Thermal Storage
Transportation



Market Focus

Private Industry
Federal Agencies
Defense Dept.
State/Local Govt.
International

A Profound Transformation is Required

Today's Energy System

- Dependent on non-domestic sources
- Subject to price volatility
- Increasingly vulnerable energy delivery systems
- 2/3 of source energy is wasted
- Significant carbon emissions
- Role of electricity increasing

TRANSFORMATION

Sustainable Energy System

- Carbon neutral
- Efficient
- Diverse supply options
- Sustainable use of natural resources
- Creates economic development
- Accessible, affordable and secure

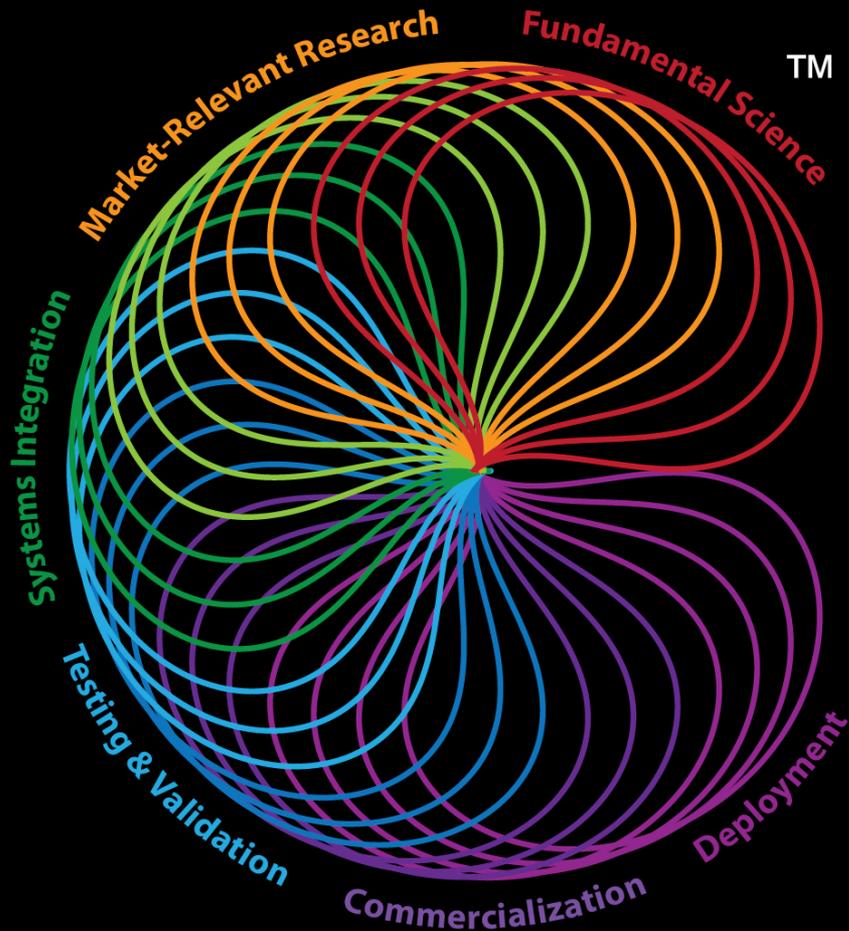
Enable Innovation, Integration, & Adoption

Reducing Investment Risk

- Basic and applied technology innovation
- Accelerate technology market introduction and adoption
- Integrate technology at scale
- Collaboration in unique research and testing “partnering” facilities
- Providing analysis and expertise to inform decisions



innovation Through *Deliberate Science*



Spectrum of Energy Innovation

From Science through Deployment

- Comprehensive approach to innovation
- Collaboration with private industry
- Connects science to the marketplace
- Delivers market-relevant technologies and competitive clean-energy products

innovation Impact



ABENGOA SOLAR

ALSTOM



JOHNSON
MATTHEY



FedEx

JCPenney



PHOTON SOLAR POWER
The Art of The Sun

Walmart
Save money. Live better.



SkyFuel



SIEMENS

OPTONY
Solar for Life™

novozymes

Ascent
SOLAR



SPECTROLAB

A BOEING COMPANY



labsphere

Xcel Energy

KONARKA

DELPHI



OPTIMA
BATTERIES
THE ULTIMATE POWER SOURCE™



RAYOVAC

PLANAR



GENENCOR
A Danisco Division

CALPINE

DAIMLERCHRYSLER



CATERPILLAR

MiaSolé
Thin-film solar

Pardee Homes
Where smart solutions live.



Innovation for the Future

Integration:

- Integrating renewable energy at all scales

Solar:

- Lowering cost of solar energy systems by 75% by 2020

Biofuels:

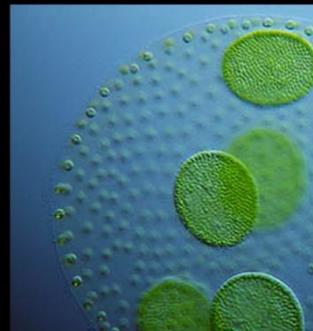
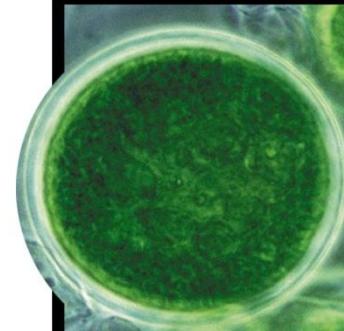
- Advanced biofuels – enabling cost-effective refining into transportation fuels

Wind:

- System and component reliability, resource modeling and forecasting

Efficiency:

- Whole building systems integration
- Battery performance



Efficiency/Integration Innovation

Buildings

- Whole building systems integration
- Computerized building energy optimization tools
- Advanced HVAC (Heating Ventilating and air conditioning)
- Cost effective ultra energy efficient retrofits



Grid Integration

Interconnection Standards

- IEEE Standards Development
- Standards Testing and Validation

Smart-Grid Data Hub

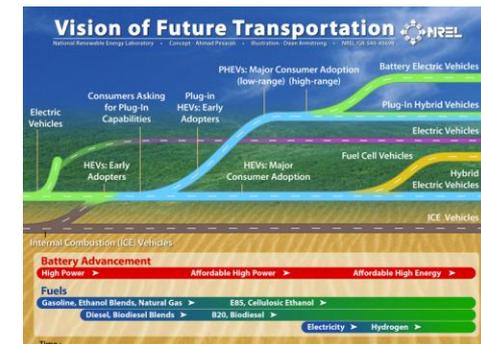
RE Grid Integration

- Power Electronics for Interconnection monitoring and control
- Grid-to-vehicle interface



Advanced Vehicles

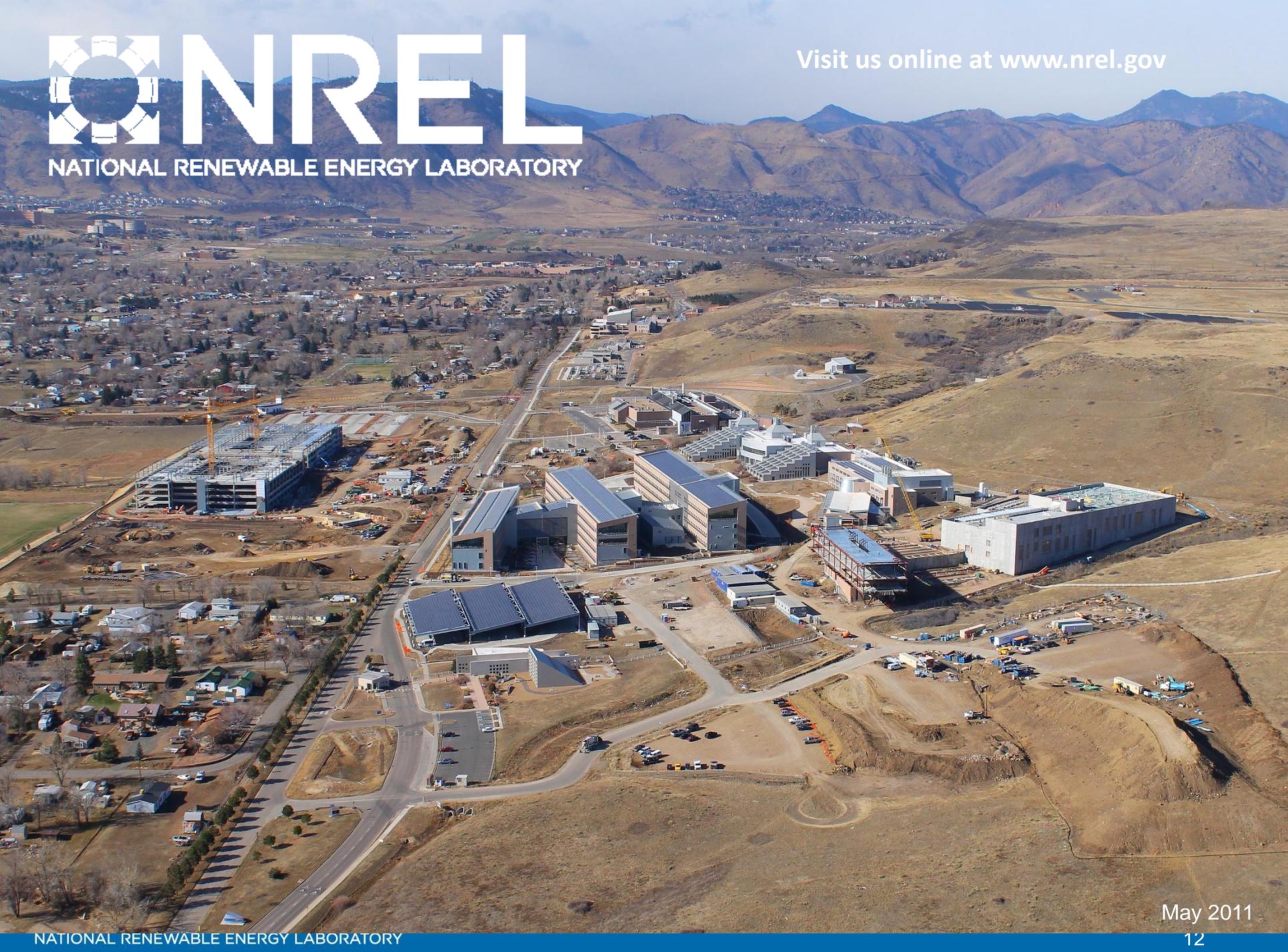
- Fuels utilization
- Component technologies
- Electric vehicle-to-grid interface



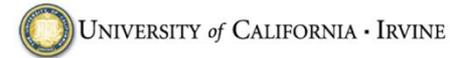
NREL

NATIONAL RENEWABLE ENERGY LABORATORY

Visit us online at www.nrel.gov



A special thank you to our Steering Committee members present today



The Power of CBEA

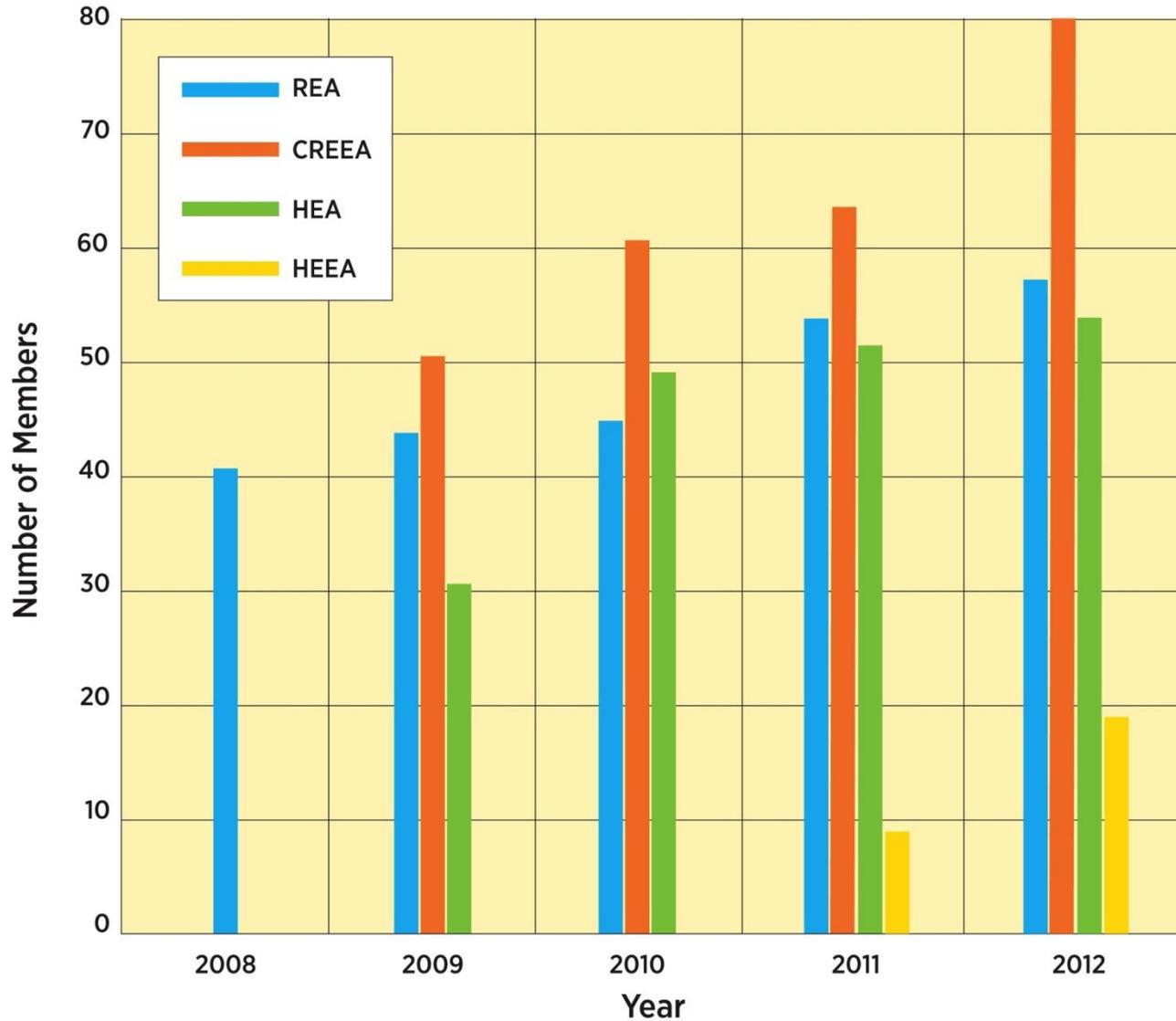


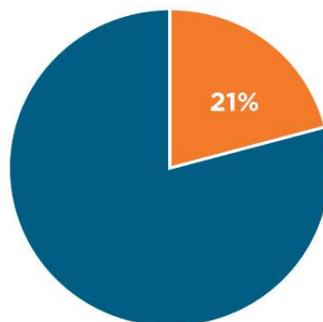
ALONE



TOGETHER

CBEA Growth – 2008-2012





80 Members
5.3+ Billion Sq. Ft.

Building Owners and Operators

AtSite
Bank of America
Big Rock Partners, LLC
Calvert Group, Ltd.
Cassidy Turley
CB Richard Ellis Group, Inc.*
CC Frost Properties, Ltd.
Colliers International*
Community Services Agency & Development Corporation
Core Properties, Inc.
Corporate Office Properties Trust
Cushman & Wakefield Inc.*
Dacra Development
Denver West
Edens & Avant
First Potomac Realty Trust
Forest City Enterprises, Inc.
GE Capital Real Estate
Glenborough, LLC*
Green Leaf Inn, LLC

H&R Block Inc.
HAL Real Estate Investments, Inc.
Hilton Worldwide
Hines
Hyatt Hotels Corp.
IBM
InterContinental Hotels Group
Jones Lang LaSalle*
Kimco Realty Corp.
Liberty Property Trust
Living City Block
Marriott International, Inc.
Mesa Lane Partners, LLC
MGM Resorts International*
New York Times Company
Newmark Grubb Knight Frank Global Corporate Services*
Opus Corp.
Prologis Inc.
Prudential Financial, Inc.
Regency Centers Corp.
RREEF America LLC

Ryan Companies US, Inc.
Schaad Companies
Sharpe Properties Group, LLC
Simon Property Group, Inc.
Southbrook Church
Stream Realty Partners, L.P.
Studley
Sunset Development Company
The JBG Companies
The Malcolm Bryant Corp.
The PNC Financial Services Group, Inc.
The Related Companies, L.P.
The Walt Disney Co.*
The Westfield Group
Tishman Speyer Properties
Transwestern Property Co.
Twentieth Century Fox Film Corp.
USAA Real Estate Co.*
U.S. Department of Energy
U.S. General Services Administration*

U.S. Navy CNIC Facilities and Acquisitions
Vornado Realty Trust
Webster Development, LLC

Winstanley Enterprises
Wright Runstad & Co.
Wyndham Hotels and Resorts, LLC

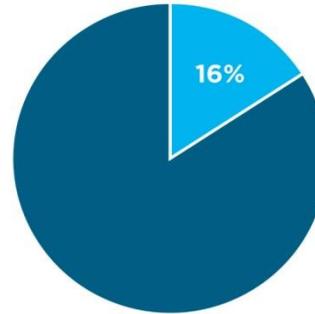
Other Members

American Hotel & Lodging Association**
American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)**
BOMA International**
Green Parking Council
Illuminating Engineering Society of North America (IES)
International Facility Management Association (IFMA)
International Council of Shopping Centers

NAIOP (Commercial Real Estate Development Association)**
National Association of Real Estate Investment Trusts (NAREIT)
National Multi Housing Council
Sustainability Roundtable Inc.
The Bullitt Foundation
The Real Estate Roundtable

* Steering Committee Members
** Ex Officio Steering Committee Members

Note: Market share percentages in pie charts are approximate, based on CBECS 2003 baseline U.S. sector's total square footage.



58 Members
2.3+ Billion Sq. Ft.

Retailers

A&P
 Applebee's International, Inc.
 Arby's Restaurant Group
 Army & Air Force Exchange Service
 Belk, Inc.
 Best Buy Co., Inc.
 BJ's Wholesale Club, Inc.
 Boston Market Corp.
 Chipotle Mexican Grill, Inc.
 CKE Restaurants, Inc.
 – Includes: Carl's Jr./Green Burrito, Hardee's/Red Burrito
 Costco Wholesale Corp.
 Crate and Barrel
 Einstein Noah Restaurant Group, Inc.
 – Includes: Einstein Bros Bagels, Noah's Bagels, Manhattan Bagel
 Food Lion, LLC
 Ford Motor Co.
 Fresh & Easy Neighborhood Market
 Harris Teeter Inc.
 jcpenny*
 John Deere
 Kohl's Department Stores*
 Lamey-Wellehan Shoes
 Lowe's Companies, Inc.*
 Macy's, Inc.

McDonald's Corp.*
 Office Depot
 OfficeMax Inc.
 Panda Restaurant Group, Inc.
 – Includes: Panda Express, Panda Inn, Hibachi-San
 PETCO Animal Supplies, Inc.
 PetSmart, Inc.
 Publix Super Markets
 REI
 Rutter's Holdings, Inc.
 Safeway Inc.
 Sears Holdings Corp.
 Sonic Corp.
 Staples, Inc.*
 Starbucks Coffee Company
 SUPERVALU INC.*

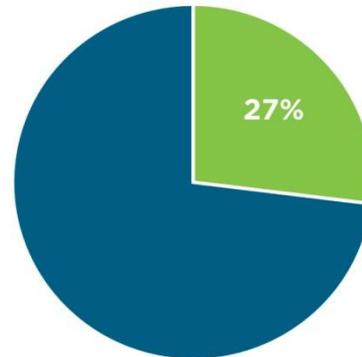
Target Corp.*
 The Home Depot, Inc.*
 The Stop & Shop Supermarket Co.
 Toyota Motor Sales, U.S.A., Inc.
 U.S. General Services Administration
 Walgreen Co.
 Walmart Stores, Inc.*
 Wawa, Inc.
 Weis Markets
 Wendy's Quality Supply Chain Coop, Inc.
 Whole Foods Market, Inc.*
 Yum! Brands*
 – Includes: KFC, Pizza Hut, Taco Bell

Other Members

American Institute of Architects (AIA)
 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)**
 Illuminating Engineering Society of North America (IES)**
 International Facility Management Association (IFMA)
 National Association of Convenience Stores
 Professional Retail Store Maintenance Association
 Retail Industry Leaders Association
 Unified Foodservice Purchasing Co-op, LLC

* Steering Committee Members
 ** Ex Officio Steering Committee Members

Note: Market share percentages in pie charts are approximate, based on CBECS 2003 baseline U.S. sector's total square footage.



54 Members
0.5+ Billion Sq. Ft.

Hospitals and Healthcare Facilities

Adventist HealthCare	Health Care REIT	Partners HealthCare
Advocate Trinity Hospital	HealthSouth	PeaceHealth
A.O. Fox Memorial Hospital	Hospital Corporation of America*	Practice Greenhealth
Ascension Health*	IASIS Healthcare	Providence Health & Services*
Bon Secours St. Francis Health System	Inova Health System	Rush University Medical Center
Boulder Community Hospital	James J. Peters VA Medical Center	San Luis Valley Regional Medical Center
Catholic Health Initiatives (CHI)	Johns Hopkins Health System	Sinai Health System
Clarion Hospital	Kaiser Permanente	St. Mary's Medical Center
Cleveland Clinic*	Lake Health	Summa Health System
Dartmouth-Hitchcock Medical Center	Legacy Health System	Texas Children's Hospital
Dignity Health	Mayo Clinic	Texas Medical Center Central Heating and Cooling Services Corporation (TECO)*
Geisinger Health System	Metro Health Hospital	TRICARE Management Activity (TMA)*
Gundersen Lutheran Health System*	NewYork-Presbyterian Hospital	
Hackensack University Medical Center	North Shore-Long Island Jewish Health System	
	Palomar Pomerado Health	

Other Members

American Society for Healthcare Engineering (ASHE)
American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)**
Illuminating Engineering Society of North America (IES)
International Facility Management Association (IFMA)
VHA (formerly Voluntary Hospitals of America)

* Steering Committee Members
** Ex Officio Steering Committee Members

Note: Market share percentages in pie charts are approximate, based on CBECS 2003 baseline U.S. sector's total square footage.

19 Members

Colleges and Universities

Arizona State University*
Clark Atlanta University
Cornell University*
Duke University*
Grand Valley State
University

Loyola University
Massachusetts Institute of
Technology
Portland State University*
Stanford University*
Tulane University*

University of California, Davis
University of California,
Merced
University of California
System*

University of Hawaii at
Manoa
University of Maryland*
University of South Carolina
University of Utah
University of Wisconsin*

Other Members

Energy Efficiency Building
Hub (EEB Hub)

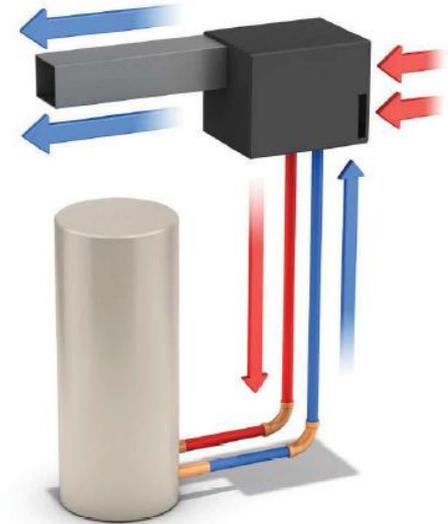
* Steering Committee Members

** Ex Officio Steering Committee
Members

Note: Market share percentages in pie charts are approximate, based on
CBECs 2003 baseline U.S. sector's total square footage.

Technical	
Lighting and Electrical	Linda Sandahl 503-417-7554 linda.sandahl@pnnl.gov
Space Conditioning	Michael Deru 303-384-7503 michael.deru@nrel.gov Alt: Bill Goetzler
Refrigeration and Food Prep	Bill Goetzler 781-270-8351 wgoetzler@navigant.com
Plug and Process Loads	Feitau (Tau) Kung 303-275-4357 feitau.kung@nrel.gov
Laboratories	Paul Mathew 510-486-5116 pamathew@lbl.gov

Market	
Team Lead: Diane Vrkic 415-738-4730 dianevrkic@waypointbuilding.com	
Leasing	Andres Potes 919-943-7291 potes_andres@bah.com
Financing	Patrick Finch 774-270-1905 patrickfinch@waypointbuilding.com
Training	Andres Potes Srinivas Katipamula srinivas.katipamula@pnnl.gov



Sources: Thermo Scientific, Labconco

High Efficiency Exterior Lighting Campaign



In partnership with:



The Opportunity:

- \$4 billion annual energy savings if all parking lots and structures met DOE lighting specifications
- Energy savings of over 30%, reduced maintenance, user satisfaction

Campaign Goals:

- Spur widespread use of proven lighting specifications and resources
- Document best practices and resulting energy savings to facilitate replication



LED bi-level parking lot lighting



LED parking structure lighting

Participant (Building owner/manager) role:

- **Evaluate** the business case with the help of Lighting Campaign resources
- **Build or retrofit** at least one parking lot or parking structure to meet the spec
- **Report** expected and actual energy savings (kWh/ft²)
- **Share** feedback to improve these resources and enable replication by others

Resources:

- Lighting specifications
- M&V guidance
- Gateway demonstrations
- Financial tools

Recognition and best practices via the Better Building Solution Center:

- Greatest energy savings: single site, and portfolio-wide
- Best implementation model across a portfolio
- Best application of controls

Official Launch Fall 2012

Commercial /alliances
Buildings. /resources
Energy. /webinars
gov /technologies

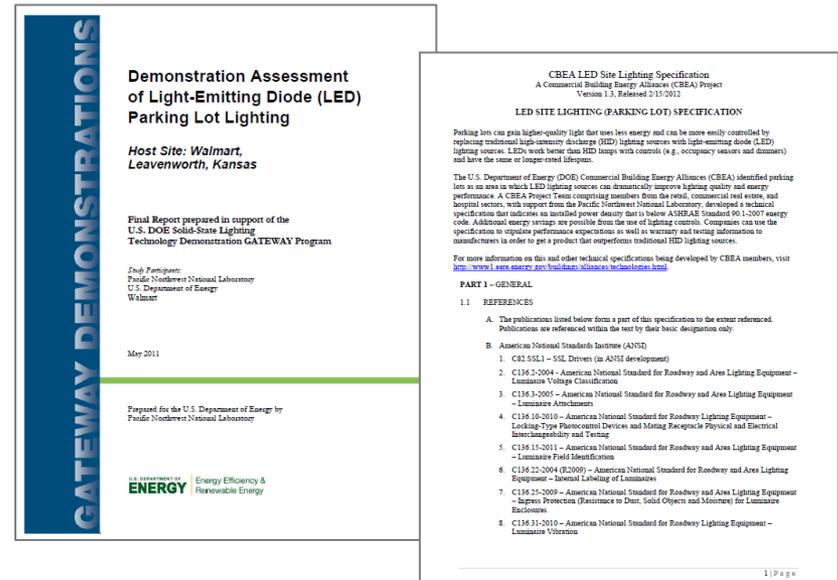
Walmart and the CBEA Site Lighting Specification

Jim McClendon - Director of Engineering

- Collaborated with CBEA team to develop the specification
- Conducted research on customer satisfaction and security implications
- Adopted the specification across Walmart's new building portfolio
- Over 400 CBEA member sites have applied the specification to date with savings of over 50 TWh
- What's Next? Encouraging broader adoption through BOMA/GPC/IFMA Campaign



Leavenworth, Kansas



Colliers International and the CBEA Green Lease Library

John Scott – Exec VP of Property Management

- Collaboration with 7 green leasing stakeholders (e.g. BOMA, IMT)
- Aggregated top green leasing resources into a website
- Hosted a green leasing webinar
- 11 CBEA member organizations have implemented green leasing practices
- What's Next?
 - Sharing best practices within and beyond CBEA
 - Identifying additional leasing barriers to be addressed by CBEA

www.greenleaselibrary.com

GREEN LEASE LIBRARY



Welcome to the Green Lease Library, a centralized resource for commercial green leasing resources

Guidance

How to develop, negotiate, and implement green leases
[Click Here](#)



Best Practices

Successful green lease case studies
[Click Here](#)



Toolkits

Sample green lease language and templates
[Click Here](#)



What are Green Leases?

Green leases (also known as aligned leases, high performance leases, or energy efficient leases) align the financial and energy incentives of building owners and tenants so they can work together to save money, conserve resources, and ensure the efficient operation of buildings.

Why Are Green Leases Important?

Building leases lay out how energy costs are divided between tenants and owners. Often, these leases are not structured in a way that promotes energy savings. Under most gross leases, for example, tenants have no incentive to save energy in their leased premises because energy costs are based on tenant square footage. Under most net leases, building owners have no incentive to invest in efficiency for their building systems because the operating expenses are passed through to tenants, who would therefore receive all of the energy cost savings.

Green leases promote energy efficiency by creating lease structures which equitably align the costs and benefits of efficiency investments between building owners and tenants.

U. S. Department of Energy Green Leasing Webinar

On March 26, the DOE Building Technologies Program hosted a webinar with a panel of experts to discuss tools and best practices for implementing green leasing in commercial buildings.

Click [here](#) to view the webinar materials and selected clips.

About the Green Lease Library

This website is the result of a collaboration among several stakeholders in the green leasing community (see below), and is maintained by the [Institute for Market Transformation](#). The website's purpose is to consolidate green leasing resources to provide a one-stop-shop for all audience types-- from building owners and tenants to lawyers and building raters. The green lease library is organized by resource type, and resources are tagged by relevance to audience and building types.

CBEA has a lot of tools available and great members... so why are we here?

- ✓ Input on bridging the gap from current success to energy savings potential

Yesterday: CBEA members took stock of our projects – barriers and opportunities

- ✓ A performance spec, alone, does not spur adoption
- ✓ Package with commissioning and M&V requirements

Today: Breakouts with expert stakeholders - reality check on proposed solutions

- ✓ Small size and interactive to allow all attendees to weigh-in
- ✓ Structured to get actionable feedback on CBEA projects: keep to the topic
- ✓ Promote relevant ideas vs. selling your specific products and services
- ✓ Have ideas beyond the CBEA projects? Save for your open mic slot

Tonight: Optional tours & dinner to see NREL facilities and learn from each other

Ahead: Keep engaged with CBEA and let us know how to improve this event!

CBEA Rooftop Unit Air Conditioner (RTU) Challenge

Fall 2010: DOE with CBEA input drafts stretch RTU spec: performance + features

- 18 IEER: up to 50% energy reduction relative to ASHRAE 90.1 requirements
- \$1 billion annual energy savings if all 10-20 ton units in U.S. were replaced

Jan 2011: Spec released - a “challenge”, but feasible

May 2012: Deadline to *Enter* the RTU Challenge

Apr 2013: Deadline to *Meet* the RTU Challenge

What does DOE offer participating manufacturers?

- ✓ Evaluation of the candidate product
- ✓ Test data into DOE modeling & decision tools
- ✓ Potential field demonstrations
- ✓ Public Recognition

Who from CBEA announced their support for the spec?



Did manufacturers respond?

Welcome to the Participating Manufacturers!



The new degree of comfort.™



turn to the expertsSM



DAIKIN McQUAY®



Congratulations on Meeting the RTU Challenge Specification!

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

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