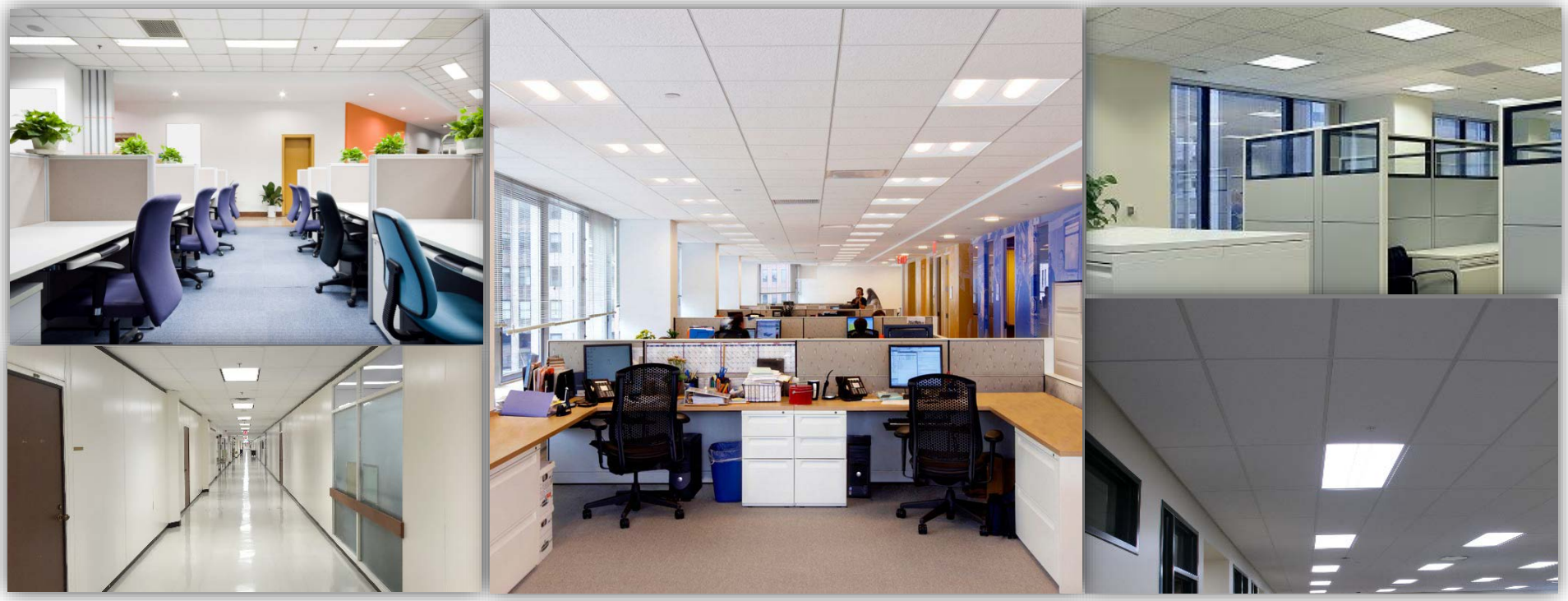
Adoption Campaign: PNNL - Interior Lighting Campaign

2017 Building Technologies Office Peer Review



U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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PNNL-SA-124201

Project Summary

Timeline:

Start Date: October 2014

Planned End Date: 2022 (from MYPP)

Key Milestones

1. 13 organizations recognized for ILC Exemplary Performance Recognition; 6/2016
2. 1 million high efficiency troffer systems goal surpassed; 1/2017
3. 3 New Interior Lighting Campaign categories added; 1/2017

Budget:

Total Project $ to Date

- DOE: $1,155K (FY14- 2/3/2017)
- Cost Share: No direct cost share, but in-kind support from industry.

Total Project $

- DOE: $1,673,461 through FY17 (out years TBD)
- Cost Share: $0; in kind support only

Key Partners:

Building Owners and Managers Assn
International Facility Management Assn
Illuminating Engineering Society of North America
U.S. General Services Administration
U.S. Federal Energy Management Program

Project Outcome:

Focus: *Recognition and guidance program designed to help facility owners and managers take advantage of savings opportunities from high efficiency interior lighting solutions.*

Driving Adoption of Technology Solutions (MYPP): *Partner with market leaders to drive the adoption of HIT applications capable of reducing building energy consumption by 10%.*

Purpose and Objectives

Problem Statement: Although lighting upgrades provide some of the easiest, most cost-effective energy-saving opportunities for building owners, a number of challenges impede action, including:

- Unfamiliarity with new, rapidly changing technology, approaches, and performance characteristics
- Lack of reliable, actionable information that demonstrates real-world applications of the technology and its cost-effectiveness
- Difficulty in quickly locating applicable utility incentives
- Lack of market recognition for exemplary energy practices.

Purpose: Work with industry partners and trade associations to provide resources, limited technical assistance and recognition to key market players.

Target Market and Audience: Commercial buildings lighting uses ~4.0 quads of primary energy annually; over 20% of total U.S. commercial building energy use. Over 75% of these lighting systems use linear fluorescent lamps, and most are in 1x4, 2x4, 2x2 troffer configurations. These are the systems we initially target because < 5% use high efficiency LED systems. Audiences targeted:

- Those who make decisions related to commercial building lighting system upgrades, both new construction and retrofit, including building owners, facility managers, and engineers. Includes Federal building operators.
- Those who influence purchases, including energy efficiency groups, utilities, ESCOs, and manufacturers of lighting and controls systems.

Purpose and Objectives (continued)

Planned Project Impact

Contribution to Energy Efficiency:

- Interior lighting applications offer substantial savings, for example
  - If all U.S. **troffers, high bay, low bay, and suspended luminaires** were replaced to comply with the ILC minimum requirements (105 lm/W), building owners could save ≈ **78.4 billion kWh** or ≈ **$8.3 billion** annually

Measuring Impact Toward BTO MYPP Goals:

- **MYPP Goal:** #2 - Driving Adoption of Technology Solutions
- **Outputs:** Recognition through web presence and exemplary performance recognition, technical assistance, guidance/specifications, case studies, number of ILC Participants and Supporters, and progress towards troffer pledge targets.
- **Measuring contributions:** Number of partners, recognition recipients, resources, luminaire categories, etc. Number of troffer goals:
  - **Near-term (by June 2016):** 100,000 troffers, later revised to 1 million (met Jan 2017)
  - **Intermediate (by April 2017):** at least 1 million troffers; tracking cost and benefits; recognize exemplary sites via recognition and case studies
  - **Long Term (by 2022):** 4.7 million luminaires in the ILC with annual energy savings of over 700 million kWh.

Approach

- Develop market partnerships with industry leaders
  - Partners help identify needed resources and provide additional market and technical expertise
  - Partners help test and refine design of resources
  - Peer exchange of information
  - Recognize industry leaders for their dedication (Participants and Supporters on ILC web site) and promote exemplary performance examples (ILC exemplary performance recognition)
  - Leverage support of and coordinate with other federal programs that support high efficiency lighting and controls
- Demonstrate it is possible and cost-effective to reduce EUI in buildings
- DOE provides tools and technical assistance; helps Campaign Organizers maximize participation
- Modeled after the successful Lighting Energy Efficiency in Parking (LEEP) Campaign

Adoption Campaign

Provides incentives for building owners and operators to choose and implement HITs. Adoption campaigns provide assistance and recognition for participants, help drive down costs, and enable CBI to share best practices and energy savings results from real projects that achieve significant energy savings.

2016 BTO MYPP, pg. 157

Approach (continued)

Key Issues:

- Long lead times for site selection → design → construction; many sites will not have been completed by end of campaign
- Participants do not always provide all needed site information when they join.

Distinctive Characteristics:

- Collaborative effort with industry that leverages resources developed by DOE and others.
- Offers "one stop shop" of guidance resources and technical assistance for building managers to address specific technology adoption questions/solutions
- Unique opportunity to gauge use of DOE resources
- Recognition submissions provide detailed data on building upgrades that can inform current state of technology adoption, cost-effectiveness, and hand-off strategies
- Documentation of successful technology adoption by industry leaders encourages others to do the same.

Progress and Accomplishments

Launched May 2015, ongoing

- 59 businesses commit to upgrade over 1.1 million existing lights to high efficiency LED systems (2/20/17 status)
- **Savings**
  - ~$13 million annual cost savings
  - ~123 million annual kWh savings
- Commitments from Target, MGM, CKE, DoD, Cleveland Clinic, GSA, Tutera, etc.
- Demonstrating it can be done!

Goal Timing	Number of Luminaires	Status Toward Goal
Near Term May 2015-June 2016 - Initial goal - Adjusted goal (set 8/2015)	 100,000 1 million	 Surpassed July 2015 655,000 as of 6/16
Intermediate By April 2017	 1 million	Surpassed January 2017 **(1,115,200)**
Long term By April 2022	 ≈5 million	Developing interim goals

Progress toward number of troffers goal

ILC Exemplary Project Recognition, 2016 BOMA International Conference & Exposition

Illuminating Engineering Society

BOMA International

IFMA International Facility Management Association

GSA U.S. General Services Administration

U.S. Department of Energy | Energy Efficiency & Renewable Energy

Progress and Accomplishments (continued)

59 ILC Participants (as of February 2017)

Argonne National Laboratory	Pacific Northwest National Laboratory
Baylor Scott and White Health c/o CBRE*	Panasonic - Arrow Electronics
CHRISTUS Health*	Plaistow Public Library
City of Gillette	Portland English Language Academy
City of Milwaukee	Sears Holdings Corporation
CKE Restaurants Holdings, Inc*	Stanford University School of Medicine
Cleveland Clinic*	Sustainable Technologies*
Columbia Association	Target*
Deddens Development	Teslights
Deutsche Asset & Wealth Management	The Wendy's Company
Encompass Contractors North America	T-Mobile*
Fayette Academy	Tutera Real Estate*
Forest City Realty Trust	U.S. Air Force
Golisano Institute for Sustainability / RIT	U.S. Air Force- 412th Civil Engineer Group
Gundersen Health System	U.S. Air Force- Kadena Air Base
JCPenney	U.S. Air Force- Nellis Air Force Base
Jervey Eye Group	U.S. Air Force- Vandenberg Air Force Base
Kilroy Realty Corporation	U.S. Army Reserve- 63d Regional Support Command
Kohl's Department Stores	U.S. Army Reserve- 81st Regional Support Command
Lamey-Wellehan	U.S. Army Reserve- 88th Regional Support Command
Las Vegas Sands Corp.	U.S. Army Reserve- 99th Regional Support Command*
Lawrence Berkeley National Laboratory	U.S. Army Reserve- 9th Mission Support Command*
Legacy Meridian Park Medical Center	U.S. Department of Energy
Lexington Co-operative Market	U.S. Dept. of Veterans Affairs, Perry Point VA Medical Center
M Riesco General Contractor	U.S. General Services Administration*
Macy's	U.S. Navy Sea Systems Command 05Z32
Mercy Health	U.S. Toy Co.*
MGM Resorts International	University of California, Berkeley
Northern Arizona University*	Yamaha Motor Corporation
Oregon National Guard	

- * Indicates 2016 Exemplary Performance Recognition
- *To date - 59 organizations have joined as an ILC Participant (note – some participating sites have requested to not be listed on the ILC website).*

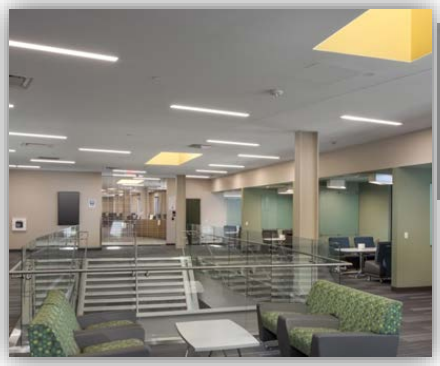
Progress and Accomplishments (continued)

2016 ILC Exemplary Project Recognition

Exemplary Performance Recognition	Category Range			
	kWh	Percent	Cost Effectiveness Range	Annual Monetary savings
Commercial Real Estate: - Tutera Real Estate	117,000	69%	$12,300 year	$12,300
Healthcare: - Baylor Scott and White Health - CHRISTUS Health - Cleveland Clinic	1.4 - 2.6 million	55% - 64%	1.5 - 4 year SPB	147,000 - 273,000
Higher Education - Northern Arizona University	77,600	46%	$6,600 / year	$6,600
Retail: - CKE Restaurant Holdings - Target - T-Mobile - U.S. Toy Company	26,400 - 618,000	65% - 73%	3-5 year SPB	$2,800 - $65,000
Federal Facilities: - U.S. Army Reserve - 99th RSC - U.S. Army Reserve - 9th MSC - U.S. GSA	125,400 - 2.7 million	55% - 82%	5 - 10 years SPB	$18,800 - $237,500
Other: - Clean Harbors	11,000	74%	2.5 - 3 years SPB	$950

See reference slide for additional information

2016 ILC Recognition for Exemplary Projects



Northern Arizona University
- 78,000 kWh annual savings
- 46% energy reduction

TARGET
- 26M kWh annual savings (all sites)
- $2.7 M energy reduction

U.S. General Service Administration New Carrollton Federal Building
- 2.7M kWh annual savings
- 82% energy reduction

CHRISTUS Health
- 1.45M kWh annual savings
- 61% energy reduction

Tutera Real Estate
- 117,000 kWh annual savings
- 69% energy reduction

 *See Reference slides to view additional ILC Recognized Projects.

Progress and Accomplishments (continued)

Tools and Resources

Resources and tools developed by the ILC and ILC partners.

Website

- New site developed (www.interiorlightingcampaign.org)

Specifications

- High Efficiency Troffer Specification
- Controls-Enabled LED Retrofit Kit Challenge Spec (draft for comment)
- New specifications may be introduced for recently added luminaire categories

Utility Incentives

- Troffer Lighting Incentives Database

Calculation Tool

- Lighting Project Evaluator
  - 182 projects to date; 222 users to date

Reports

- Standard M&V Plan for Lighting Retrofits

* Full list: https://interiorlightingcampaign.org/resources

Progress and Accomplishments (continued)

Tools and Resources Developed (continued)

Fact Sheets

- Better Buildings High Efficiency Troffer Lighting
- Upgrading Troffers to LED
- Wireless Occupancy Sensors Application Guide published by FEMP

Case Studies and Demonstration Results

- Commercial Advanced Lighting Controls (CALC) demonstrations
- GSA Green Proving Ground demo reports
- ILC Sites recognized for exemplary performance

Webinars

- A Guide for Manufacturers and Distributors
- ILC Launch

* Full list: https://interiorlightingcampaign.org/resources

Progress and Accomplishments (continued)

Lessons Learned

- Significant industry interest in a variety of approaches/technologies
- More interest in recognition than we initially thought!
- Establishing a market facing participation target/goal for a campaign can be challenging given uncertainties and assumptions surrounding new technology adoption and the rate of campaign participation.
- Important information/data can be collected from campaign partners, including:
  - Performance and payback information on actual projects
  - Feedback on lessons learned from users that can be shared with others
  - This information/data can help identify new resource needs and serve as input to possible future code updates.
- "Campaigns" are successful when you have key partners with significant market share and parallel mission, market interest in the application, engagement and leadership by industry leaders, and recognition to help track and document success.

Project Integration and Collaboration

Broad collaboration and coordination

Federal programs

- Better Buildings
  - Lighting & Electrical Technology Solutions Team
  - Over 90 organizations; over 160 people on listserv; 15 regular participants
- Federal Energy Management Program
  - leverages the ILC to support federal adoption of high efficiency lighting
  - Resource development. Outreach to federal sector; “For Federal Users” page on ILC web site
- U.S. General Services Administration
  - Green Proving Ground demos help show innovative LED troffer system performance in real world buildings
- Building Energy Codes Program
  - Identify/address codes barriers, share data, coordinate on code proposals
- DOE Solid-State Lighting Program
  - Technical expertise
  - Next Generation Lighting Systems (NGLS)
- Clean Energy Ministerial
  - Global Lighting Challenge built on ILC model; uses ILC data

- Utility, efficiency groups, and DesignLights Consortium™
  - Serve as ILC Supporters; help recruit ILC Participants
  - Share utility incentive program information, share project data

Project Integration and Collaboration (continued)

Campaign Organizers: Primary planning and management team partners. Bi-weekly check in/planning calls.

Better Buildings U.S. Department of Energy; Illuminating Engineering Society; IFMA International Facility Management Association; GSA U.S. General Services Administration; BOMA International; FEMP Federal Energy Management Program

Partners and Collaborators: Includes Better Buildings Partners, utilities and regional energy efficiency groups, lighting designers, ESCOs.

ILC Supporters (examples)

Southern California Edison; SWEEP Southwest Energy Efficiency Project; WECC; nep; neea; SMUD; Pacific Gas and Electric Company; E Source; The University Financing Foundation, Inc.; MEEA Midwest Energy Efficiency Alliance The Source On Energy Efficiency; Franklin Energy Experience. Delivery. Results.; DLC; Efficiency Vermont; ComEd An Exelon Company powering lives

ILC Participants (examples)

Kohl's; Target; MGM Resorts International; Walmart Save money. Live better.; Legacy Health; Staples; Kimco Realty; CentraCare Health; Walgreens; U.S. Department of Energy Energy Efficiency & Renewable Energy

Project Integration and Collaboration (continued)

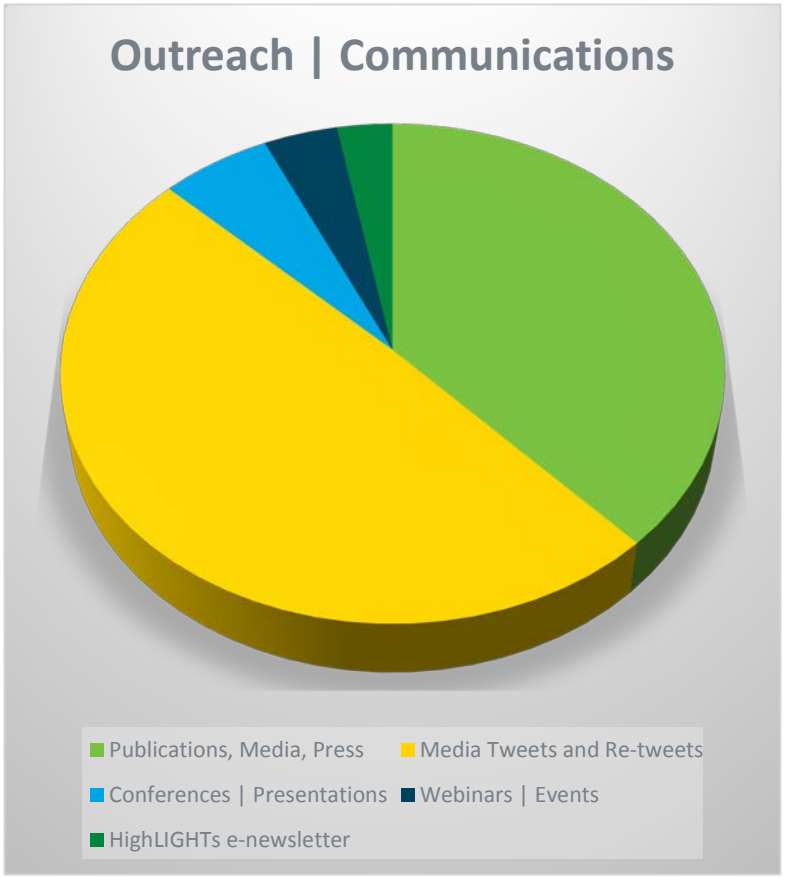
Communications (since launch)

11 conferences presentations (4,300+ attendees)

- Better Buildings Summit (5/15 & 5/16)
- Consortium for Energy Efficiency (6/15)
- ACEEE National Symposium on Market Transformation (3/16)
- Federal Utility Partnership Working Group (5/16)
- LIGHTFAIR International (4/16)
- BOMA International Conf. & Expo (6/16)
- Energy Exchange (8/15 & 8/16 (2 presentations))
- IFMA World Workplace (10/16)
- US DOE SSL Technology Dev. Workshop (11/16)

8 webinars (350+ attendees)

- Midwest Energy Efficiency Alliance
- Consortium for Energy Efficiency
- Better Buildings Webinars (six events)



100 Tweets & Re-tweets

77 Publications, Press, Media

- ILC Organizers Newsletters & Trade Press, Energy.gov, Better Buildings Bulletins, FEMP Digest, LEDs Magazine, The Grid, Sustainable Technologies, Supporting Manufacturers, 2016 ILC Recognized sites, EC&M, EERE Amped Up, LD+A Magazine, Energy Manager Today, Buildings.com, Sustainability & Efficiency FMJ, etc.

Next Steps and Future Plans

Next Steps:

- Finalize and promote *Controls-Enabled LED Retrofit Kit Challenge Specification*
- Promote new luminaire categories added to ILC in January 2017
  - High bay, low bay, linear suspended; collecting data from Participants now
  - Expands recognition and guidance to new building sectors
  - Increases understanding of barriers and opportunities in these categories
- Promote new recognition category for Supporters announced February 2017
  - Number of Troffer Systems Impacted via Energy Efficiency/Utility Program
- BOMA 2017 International Conference & Expo, June 24-27, 2017
  - 2017 ILC Exemplary Performance Recognition Event

Future Plans:

- Recognition options for new categories releasing June 2017
- Determine if specifications are needed for new luminaire categories
- Controls Enabled LED Retrofit Kit - Final release April, 2017
- Next Generation Luminaire Systems Competition will use spec in demo

Impacts to BTO's goals:

- **Supports:** Partner with market leaders to drive the adoption of HIT applications capable of reducing building energy consumption by 10%

REFERENCE SLIDES

Project Budget

Project Budget

Variances: No variances

Cost to Date: $1,155K (FY17 through 2/3/17)

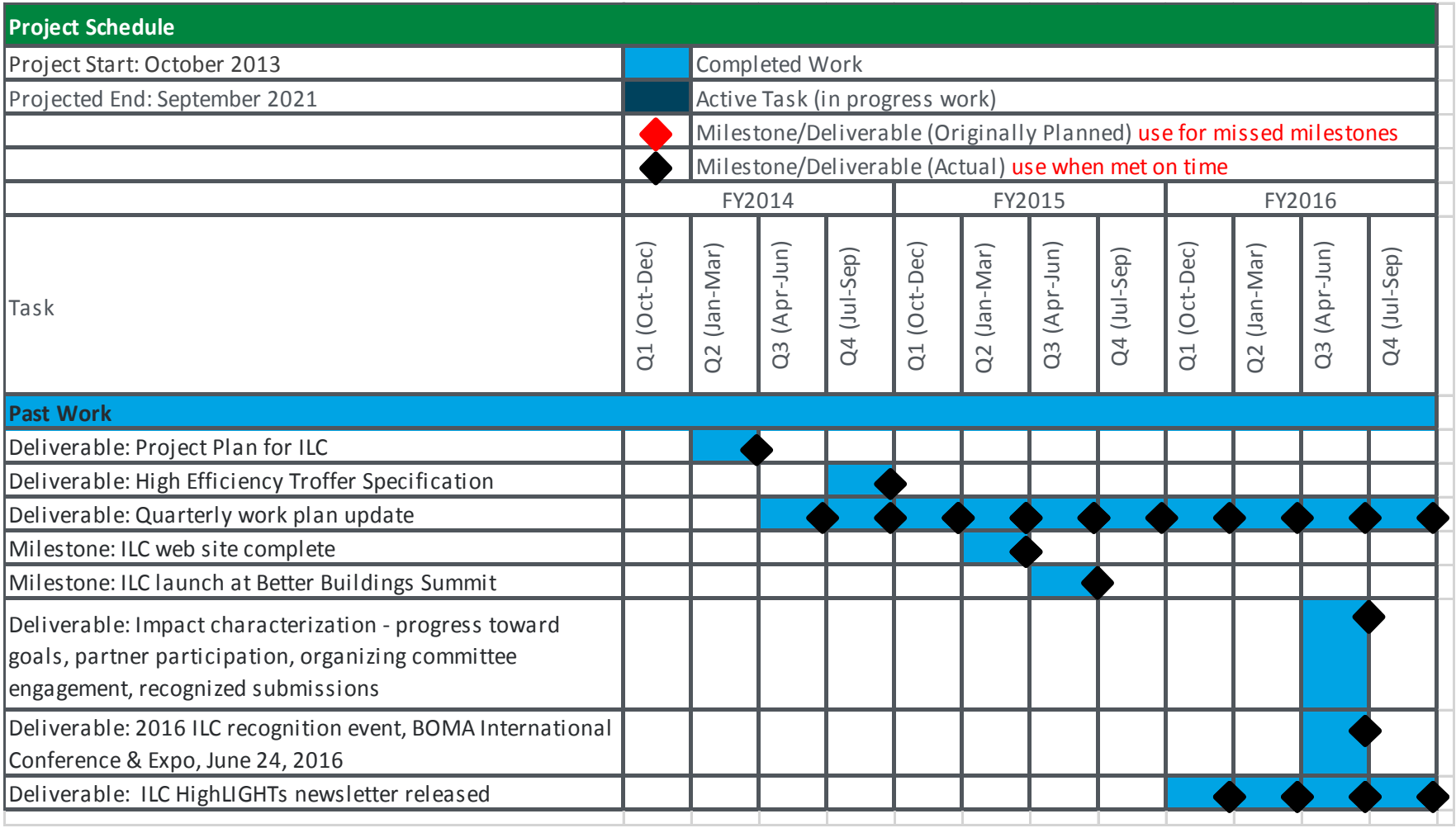
Additional Funding: Strong industry collaboration and in-kind support, but no other direct funding sources. The Federal Energy Management Program funds technical assistance, outreach, and resources development for federal participants.

Budget History					
FY 2014 – FY 2016 (past)		FY 2017 (current)		FY 2018 – FY 2022 (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
$950,511		$722,950*		$1,673,461**	

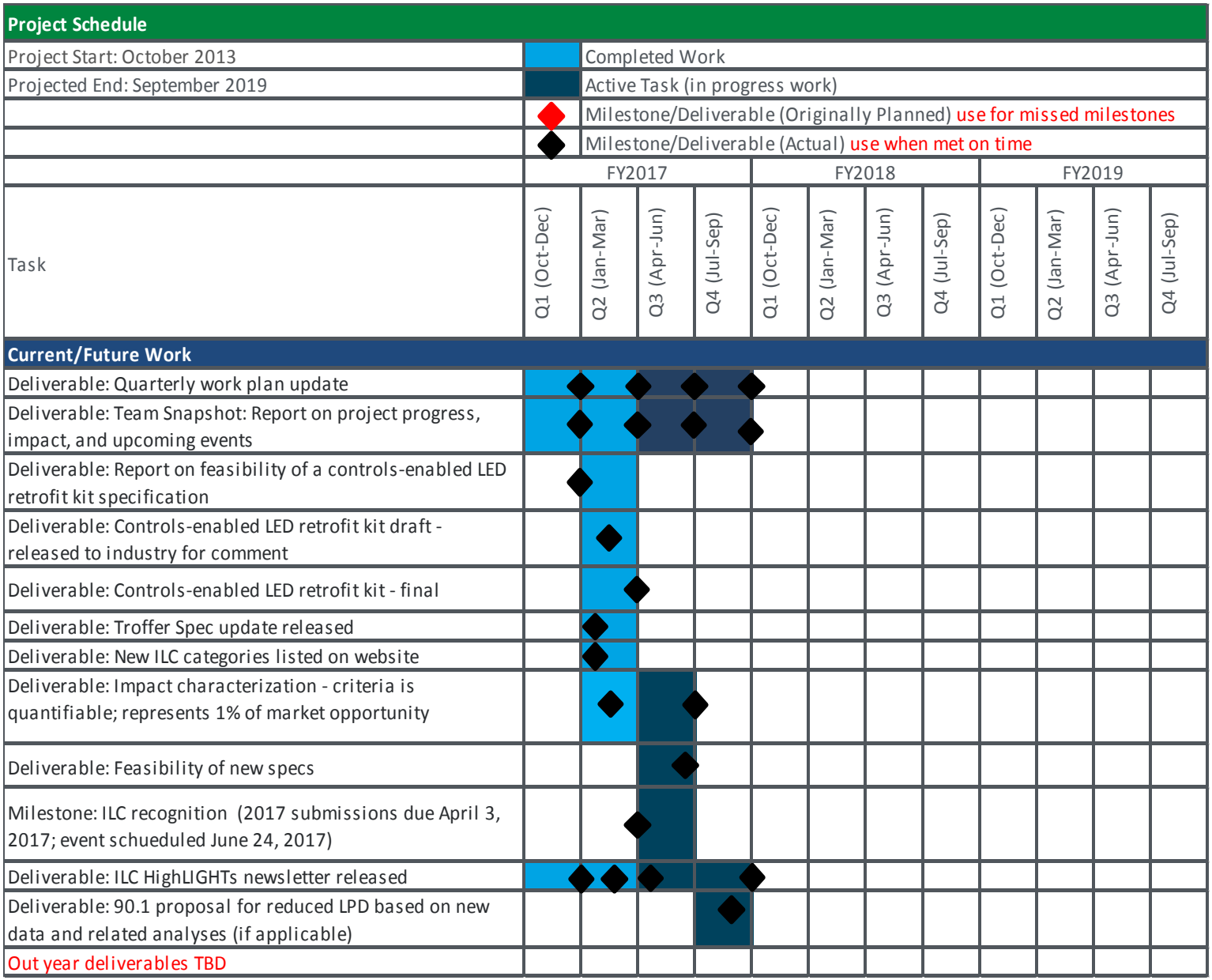
* Includes $130K planned carryover for FY18.

** Includes funds through FY17 since funding is TBD after that.

Project Plan and Schedule



Project Plan and Schedule



ILC Supporters (as of February 2017)

1-Stop Enterprises	EmilyGrene	LEDVANCE	
Access Green, LLC	Encentiv Energy	Leviton Manufacturing, Inc.	
Acuity Brands Lighting	EnerGreen Sites	LG Electronics	
ADC Energy USA, Inc.	Energy Conservation Works	Light / Process / Design	REVCO Lighting + Electrical Supply
ALB Energy Solutions	Energy Focus, Inc	LightEdison	Revelation Energy & Lighting
Alloy LED	Energy Sciences Resource Partners	Los Angeles Cleantech Incubator	Rexel USA
Alphalite, Inc.	Energy Solutions	LOUVERS INTERNATIONAL	Robert Bosch LLC
ALSET LED	Engineered Tax Services	LUX LED Solutions	Robinson Sustainable Builders, LLC
Anixter International	Envirobrite	MaxLite	Rockwell Financial Group
ARVA, LLC	Evergreen Consulting Group	Midwest Energy Efficiency Alliance (MEEA)	RTK Energy, LLC
Artificial Sky	EvoEnergies	Mirus Lighting	Sacramento Municipal Utility District (SMUD)
Axlen Lights	Facility Innovations Group	Molex	Samsung
Beimini Sustainable Resources LLC	Finelite, Inc.	National Co+op Grocers	Seventhwave
BioStar Lighting	Focus on Energy	National Energy Solutions, Inc	Silver Spark Lighting, Inc.
BlueRock Energy Services	Franklin Energy Services	National Grid	Smart City Infrastructure
BRIGHT FOOTPRINT, LLC	Georgia Power	National Retrofitting Group	Smart Tracked
BSA LifeStructures	Golisano Institute for Sustainability / RIT	NetZero USA for Industry	Southern California Edison
Buckeye Energy Solutions Team LLC	Gorgeous Lighting Co., Ltd.	New Buildings Institute	Southwest Energy Efficiency Project (SWEEP)
Budget Lighting Inc.	Graybar Electric	Noribachi	Southwestern Electric Power Company
Cape Light Compact	Greentek Energy Systems	Northeast Energy Efficiency Partnerships, Inc. (NEEP)	Studio T+L, LLC
Capital Tristate	Groom Energy	Northwest Energy Efficiency Alliance (NEEA)	Summit Systems Inc.
CLEAResult	H.E. Williams, Inc.	NUR Manufacturing	Sustainable Solutions LED
Columbia Lighting Inc	Hawaii Energy	Ohyama Lights	Sustainable Technologies
ComEd	HeSaLight	Okapi Architecture	Synergy Electrical Sales
Comfort Lighting Inc	Hubbell Lighting	Orion Energy Systems, Inc.	Telser Lighting Associates
Concord Light	Innovative Energy Solutions Corp.	Orion Lighting Solutions	Teslights LLC
Correlate	Institute for Market Transformation	Pacific Gas & Electric, Co.	Thayer Corporation
Cree, Inc.	International Association of Lighting Designers	Pamela Tresp, Lighting Consultant	The DesignLights Consortium
Current, powered by GE	Jeff Miller & Company, Inc.	Partner Energy	The Energy Alliance Group of North America
DECO Lighting	Joule Energy	Pearl Street LED Lighting Systems	The University Finance Foundation (TUFF)
DesignLights Consortium	Kaw Southwind Energy, LLC	Penn Lighting Associates	UpGrade Athens County
DiVi Energy	Kenall Manufacturing	Pepco	Valley Electrical Contracting Inc.
E Source	KGP Design	Philips Lighting	Vansant & Gusler, Inc.
Eaton (formerly Cooper Lighting)	Krypton Lighting LLC	PURE LED SOLUTIONS	Welkin Consultants, LLC
Eco Revolution	LED City	Quiet Light Solutions, LLC	Wilco Electric Inc.
EDF Climate Corps	LED Energy Solutions	RAY LIGHTING	Wyndsor Lighting, LLC.
Efficiency Vermont	LED Living Technology Inc.	Retail Industry Leaders Association (RILA)	Yardi Systems

2016 ILC Sites Recognized for Exemplary Performance

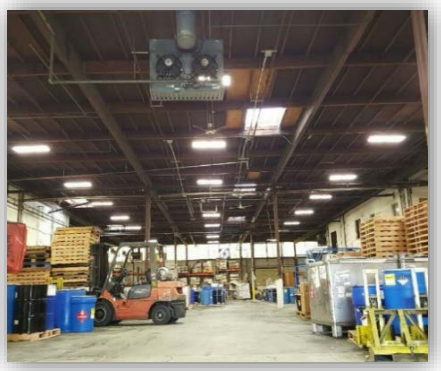
Recognized Site	Recognition Category
Baylor Scott and White Health	Exemplary Sector - Healthcare
CHRISTUS Health	Exemplary Sector - Healthcare
CKE Restaurants Holdings, Inc.	Highest Absolute Annual Savings for Troffer Lighting Retrofits - Small Project Highest Percentage of Annual Savings for Troffer Lighting Retrofits - Small Project Special Recognition Categories - Largest Number of Facility Projects
Cleveland Clinic	Highest Absolute Annual Savings for Troffer Lighting Retrofits - Large Project
Northern Arizona University	Special Recognition Categories - Best Use of Lighting Controls in a Single Building Exemplary Sector - Higher Education
Sustainable Technologies	Highest Percentage of Annual Savings for Troffer Lighting Retrofits - Medium Project
Target	Highest Absolute Annual Savings for Troffer Lighting New Construction - Medium Project Highest Absolute Annual Savings for Troffer Lighting New Construction - Large Project Highest Percentage of Annual Savings for Troffer Lighting New Construction - Medium Project Highest Percentage of Annual Savings for Troffer Lighting New Construction - Large Project Special Recognition Categories - Largest Portfolio-wide Annual Absolute Energy Savings
T-Mobile	Highest Absolute Annual Savings for Troffer Lighting Retrofits - Medium Project
Tutera Real Estate	Exemplary Sector - Commercial Real Estate and Hospitality
U.S. Army Reserve - 99th Regional Support Command	Exemplary Sector - Federal Government
U.S. Army Reserve - 9th Mission Support Command	Highest Percentage of Annual Savings for Troffer Lighting Retrofits - Small Project
U.S. General Services Administration	Highest Absolute Annual Savings for Troffer Lighting Retrofits - Large Project Highest Percentage of Annual Savings for Troffer Lighting Retrofits - Large Project Special Recognition Categories - Best Use of Lighting Controls in a Single Building
U.S. Toy Co.	Highest Percentage of Annual Savings for Troffer Lighting Retrofits - Medium Project Exemplary Sector recognition - Retail, Food Service, or Grocery

2016 ILC Recognition for Exemplary Projects

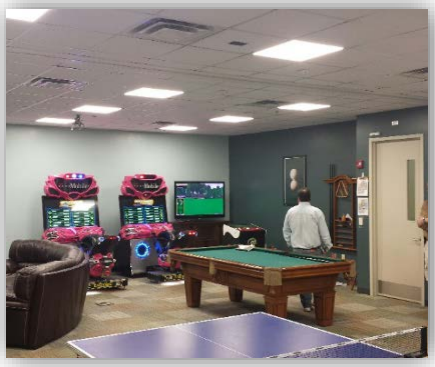
Baylor Scott and White Health
- 1.43M kWh annual savings – Dallas site
- 61% energy reduction – Grapevine site

Cleveland Clinic
- 2.6M kWh annual savings
- 55% energy reduction

CKE Restaurants Holdings, Inc.
- 1.9M kWh annual savings (all sites)
- 53% energy reduction (average site)



Clean Harbors Environmental
- 11,000 kWh annual savings
- 74% energy reduction



T-Mobile
- 65,000 kWh annual savings
- 56% energy reduction

2016 ILC Recognition for Exemplary Projects

U.S. General Service Administration Byron Rodgers Federal Building

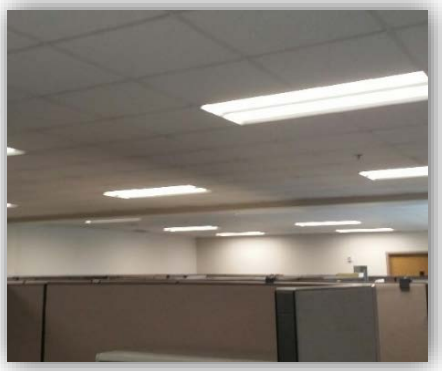
- 477,000 kWh annual savings
- 59% energy reduction

U.S. Toy Co. Headquarters

- 54,000 kWh annual savings
- 53% energy reduction

U.S. Army Reserve –9th Mission Support Command

- 125,000 kWh annual savings
- 62% energy reduction



U.S. Army Reserve –99th Regional Support Command

- 184,000 kWh annual savings
- 51% energy reduction