

Better Buildings, Better Plants

Low and No Carbon Showcase Buildings - Action Plan Template

Partner Profile and Highlights

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Low Carbon Pilot Background

Buildings and manufacturing plants account for roughly two thirds of U.S. CO₂ emissions, and therefore present a significant opportunity to meet carbon reduction goals. The Department of Energy (DOE), through the [Better Buildings Initiative](#), is working with interested partners on a [Low Carbon Pilot](#). The goal of this pilot effort is to demonstrate how to achieve carbon dioxide equivalent (CO₂e) operational emission reductions in buildings and plants. Partners will share their experiences, successes, and challenges pursuing low carbon strategies at two or more of their buildings or plants within a two-year timeframe. Low carbon strategies may include

implementing ultra-energy-efficient building and management practices, followed by a combination of installing on-site renewables, grid-interactive solutions, and investing in or purchasing renewables from off-site sources.

Importance of an Action Plan

Getting to low and no carbon can be challenging. To help you think through your low carbon strategy, DOE has developed this draft Action Plan Template, which you can use to help develop low carbon pathways for your selected showcase buildings. As this is a draft, DOE would like partner feedback on the usefulness of the template and ways to improve it. Please send feedback about this template to your Better Buildings account manager and Izzy Ballet (iballet@retechadvisors.com).

Through this pilot, we will work closely with you to understand your proposed path to low carbon as well as the opportunities and challenges you face. By the end of the pilot, this action plan can help expand efforts across your organization's portfolio.

This plan focuses on moving a building towards low operational carbon, which accounts for the carbon from buildings using energy from carbon-emitting sources. The pathway to low carbon priority waterfall below illustrates the pilot's focus on prioritizing energy efficiency, followed by on-site renewable energy generation or other non-carbon-based generation, off-site energy generation, and finally procuring offsets.

Pathway to Low Carbon – A Proposed Priority Waterfall



Action Plan Instructions

Feel free to adjust or change this plan to suit your building's needs and processes or use it as a resource to develop your customized roadmap. Instructions and prompts are given throughout the plan and *written in italics*. You may erase these instructions for your final version. If a

standalone plan doesn't work for your organization, feel free to share already developed planning documents. This plan can be updated over time and will be used to identify current barriers and opportunities. Once complete, please share this plan with your Better Buildings account manager and Paul Torcellini (paul.torcellini@nrel.gov). This plan will not be shared publicly in whole or in part without your expressed permission.

Goal Setting and Tracking

1. *What are your organization's current company-wide carbon related goals?*
 - a. In 2020 the Board established the goal of achieving 100% clean electricity by 2030 and phasing out the use of fossil fuels by 2040
2. *What methods or tools are being used for tracking progress towards these goals?*
 - a. **Developed an energy use baseline for all school district owned properties.** This has been completed and the Energy Management staff is continually updating this information.
3. *Are there specific protocols that you use for reporting data?*
4. *How do these goals translate into facility-level improvements or targets?*
 - a. Understanding of building energy usage – target EUI (19)_____
 - b. Minimizing heat losses and gains through efficient building envelope
 - c. Incorporation of efficient building systems with low-no carbon emissions
 - d. Preference for using renewable energy systems and evaluating energy generation capacity with target of 100% renewable energy
 - e. Implementing energy management within the building
5. *Other?* – Updating District Design Standards and Specifications in line with full electrification of building systems

Showcase Building Selection

Briefly describe the buildings that will be used for the pilot. If you are submitting more than 2 buildings, please add additional columns to the table.

Table 1 – Showcase Building Selection

SHOWCASE BUILDING	Showcase Building #1 <i>Marshall High School – Classroom Building</i>	Showcase Building #2 <i>Helen Bernstein High School – Classroom Building A-B</i>
YEAR BUILT	1970	2008
BUILDING AREA (ft ²)	288,173	249,278
BUILDING USE	Classroom/Instruction	Classroom/Instruction
PERCENT SAVINGS SINCE BASE YEAR (OPERATIONAL ENERGY – THIS VALUE CAN BE 0%)		
ADDITIONAL INFORMATION DESCRIBING THE BUILDING'S HISTORY/ NOTABLE CHARACTERISTICS	<p>The original buildings were constructed in 1930 in a collegiate gothic style with classes beginning in 1931. Since this time due to additional enrolment and the Sylmar earthquake, many alterations and additions have been made to the campus. Currently, the campus contains some original structures; a library complex built in the 1970s and a variety of modular and portable classroom buildings added over time and enrolment demands. The school complex houses about 2,700 students and about 110 staff in 288,000 square feet of classrooms, library, gymnasium, office, and auditorium.</p>	<p>The campus is comprised of two main buildings, Building A-B and Building C-D-E-F. The school was built on the former site of the Fox Television Center. APEX Academy (LOC 8690) is a charter school within the site. Richard Alonzo Community Day School (LOC 8670) is also within the Bernstein site (southwest corner of site). Since opening in 2008, the facility has not been upgraded.</p>

Data Reporting – Priority Waterfall

To understand the total amount of building energy being met by renewable sources we have developed the following tables. Fill out the table based on the total building energy being met by the identified renewable and carbon free sources from your base year. Even though the pilot has a timeframe of two years, your desired end goal can be further out to match your company's current goals or time frame. When filling out the table, the starting point and end goal columns should add up to 100%.

Showcase Building #1 Marshall HS – Classroom Building

Table 2 – Priority Waterfall

RENEWABLE/CARBON FREE SOURCE	DESCRIPTION	STARTING POINT (%)	END GOAL (%)
Energy efficiency	LEDs (Interior and Exterior Lighting upgrade), Mechanical Systems, Transformers	20%	30%
Beneficial electrification	HVAC systems, food services	20%	40%
On-site renewables	PV	0%	20%
Off-site renewables	Purchase of green energy from 100% renewable utility grid	0%	0%
Grid integration	Solar-Grid Integration	0%	5%
Power purchase agreements including utility offerings	PPA – not allowed under LADWP territory	N/A	N/A
Carbon capture and sequestration		0%	0%

Non-renewable carbon-free energy sources		0%	0%
Offsets	Purchased Offsets – LADWP's GAP	0%	5%
Non-met carbon load		60%	0%
Total		Column should add up to 100%	Column should add up to 100%

Showcase Building #2 Helen Bernstein HS – Classroom Building A-B

Table 2.1 – Priority Waterfall

RENEWABLE/CARBON FREE SOURCE	DESCRIPTION	STARTING POINT (%)	END GOAL (%)
Energy efficiency	LEDs (Interior and Exterior Lighting upgrade), Lighting Controls, Mechanical Systems upgrade, Transformers	20%	30%
Beneficial electrification	HVAC systems, food services	20%	40%
On-site renewables	PV	0%	20%
Off-site renewables	Purchase of green energy from 100% renewable utility grid	0%	0%
Grid integration	Solar-Grid Integration	0%	5%

Power purchase agreements including utility offerings	PPA – not allowed under LADWP territory	N/A	N/A
Carbon capture and sequestration		0%	0%
Non-renewable carbon-free energy sources		0%	0%
Offsets	Purchased Offsets – LADWP’s GAP	0%	5%
Non-met carbon load		60%	0%
Total		Column should add up to 100%	Column should add up to 100%

Current Barriers

Below is a list of common barriers identified by partners when implementing low carbon strategies. On a scale of 1-5, with five being a major barrier and one being a small barrier, select the barriers that your organization faces when implementing low carbon strategies. Feel free to add rows to the table to include barriers that are not currently listed. In the comments field, provide additional detail on your organization’s top 2-3 barriers.

Table 3 – Current Barriers

BARRIER	HIGH LOW RATING (1-5)	COMMENTS
Financing	3	Utilities will not accept third party agreements such as PPAs. LAUSD is working with vendors on Energy Services Agreements to resolve this.
Access to data and information	2	Access to data and information is not a major barrier as data is maintained by various departments within Facilities Services. Internal coordination efforts needed to distribute data

Data analysis and reporting	1	Data analysis and reporting are not major barriers as Energy Management Unit is responsible for this task
Measuring carbon reductions	2	Joint responsibility is shared between Energy Management and Sustainability Initiatives Unit. Internal coordination efforts needed to distribute data
Engaging employees, occupants, and customers	3	Employee, occupant, and student engagement may be a challenge to implement in a timeline due scale, but this is an ongoing process through LAUSD's Sustainability Awareness and Outreach programs
Partnering with utilities	1	Not a barrier as LAUSD is in constant collaboration with utility providers for current and future programs
Operational challenges	3	Operational changes due to systems upgrades are met by M&O teams, but ongoing training and education on operating new systems may change this
Electrification	4	Full electrification is met with initial skepticism as performance against gas-powered systems is compared as well as life cycle cost assessments, but ongoing training and education on new electric systems may change this
Acquiring expertise	2	Not a major barrier as LAUSD has in-house experts in all major disciplines related to implementing low carbon strategies, as well as remaining in constant collaboration with outside organizations and groups that share the same goal such as NREL, US DOE, USGBC, LA100 and utility providers, etc.
<i>*Other (Fill in) - Add rows as appropriate</i>		

Turning Plans into Action - Implementation Strategies

As mentioned in the introduction, the goal of this pilot is to work with industry leaders to explore low carbon pathways and demonstrate what is possible, the remaining challenges that exist, and showcase successful solutions. Understanding the specific strategies, you are planning and barriers that you anticipate, will help inform DOE's strategy moving forward. **Please use the tables below** to share details on your implementation strategies as they relate to, energy efficiency, on-site renewables, off-site renewables, grid integration, PPA's/utility offerings, and offsets. Table entries may get long - that is okay.

For the implementation time frame, we are considering **short as two years** (duration of the pilot), **medium two to six years**, and **long term as more than six years**.

1. Energy Efficiency

- ▶ How do you plan on incorporating ECM's in your low carbon strategy? See examples populated in the table for reference. If financing continues to be a prominent barrier, consider viewing the [Better Buildings Financing Navigator](#) to explore financing options.

Table 4 – Energy Efficiency

SHOWCASE BUILDING	STRATEGY TO BE ACCOMPLISHED	IMPLEMENTATION TIME FRAME (SHORT, MEDIUM, LONG)	POTENTIAL BARRIERS FOR THIS STRATEGY	WHAT IS NEEDED TO OVERCOME THIS BARRIER? LIST SPECIFIC RESOURCES, TECHNICAL ASSISTANCE, ETC.,
Office Building 1	Example: Replace windows - Remove single pane windows and replace with low-e glazing/triple pane	Short	Need to work with the tenant to redo interior finish.	Engage with tenant to discuss project timeline
Classroom Building (Marshall & Bernstein HS)	Replace existing glazing with more efficient glazing	Long	M&O does not accept dual glaze windows	Make a case study of the efficiency created and present it to the M&O Director and CFE for approval

	Replace lighting with LEDs; install occupancy sensors/daylighting sensors/schedule	N/a (existing buildings have LEDs and occupancy sensors)	N/a	N/a
Cafeteria Building (Marshall & Bernstein HS)	Electrify kitchen equipment	Medium	M&O is researching electrification of kitchen equipment – need list of products	Technical resources and list of products that can accomplish the replacement of gas-powered equipment with electric ones.
Classroom Building (Marshall & Bernstein HS)	Install heat pump systems at end of HVAC life	Long	Heat pumps may not provide enough heating as existing HVAC	Technical resources, availability of products that can provide same output at the existing HVAC
Classroom Building (Marshall & Bernstein HS)	Install plug load controls	Medium	Theft of plug load controls	Fixing the equipment to the wall structure
Classroom Building (Marshall & Bernstein HS)	Add roof insulation upon roof replacement; design roofing to accommodate PV	Long	No major barriers: new roofs will be designed to be solar ready	N/a
Classroom Building (Marshall & Bernstein HS)	Future window replacement	Long	Have low priority compared to other energy efficiency measures due to longer pay back	Make a case study of the efficiency created and present it to the M&O Director and CFE for approval
Bernstein HS Pool	Use waste heat from AC to heat pool at Helen Bernstein HS	Long	Lack of technology that makes economic sense	Research and identify products that offer a faster payback

Classroom Building (Marshall & Bernstein HS)	Add continuous insulation to walls and roof	Short	Low payback	Make a case study of the efficiency created and present it to the M&O Director and CFE for approval
Classroom Building (Marshall & Bernstein HS)	Building controls that integrate building loads, battery storage, on-site PV, and EV charging to provide demand flexibility	Long	Hard to integrate with existing building management system	Technical resources, availability of products that can integrate with existing BMS

2. On-site Renewables

- ▶ *How do you plan on incorporating on-site renewables in your low carbon strategy? Explore the Better Buildings [Renewable Energy Resource Hub](#) for additional guidance.*

Table 4.1 – On-site Renewables

SHOWCASE BUILDING	STRATEGY TO BE ACCOMPLISHED	IMPLEMENTATION TIME FRAME (SHORT, MEDIUM, LONG)	POTENTIAL BARRIERS FOR THIS STRATEGY	WHAT IS NEEDED TO OVERCOME THIS BARRIER? LIST SPECIFIC RESOURCES, TECHNICAL ASSISTANCE, ETC.,
Classroom building (Marshall & Bernstein HS)	Install rooftop and carport solar	Medium-Long	Space and cost	In the process of overcoming this barrier with the Solar Industry proposals and outcomes

3. Off-site Renewables

- ▶ *How do you plan on incorporating off-site renewables in your low carbon strategy?*

Table 4.2 – Off-site Renewables

SHOWCASE BUILDING	STRATEGY TO BE ACCOMPLISHED	IMPLEMENTATION TIME FRAME (SHORT, MEDIUM, LONG)	POTENTIAL BARRIERS FOR THIS STRATEGY	WHAT IS NEEDED TO OVERCOME THIS BARRIER? LIST SPECIFIC RESOURCES, TECHNICAL ASSISTANCE, ETC.,
Classroom building (Marshall & Bernstein HS)	Buying renewable power from utility companies	Long	Depends on what the utility companies can offer	Engage with utility companies to discuss the options for buying 100% RE at competitive rate

4. Grid Integration

- ▶ *How do you plan on using grid integration in your low carbon strategy?*

Table 4.3 – Grid Integration

SHOWCASE BUILDING	STRATEGY TO BE ACCOMPLISHED	IMPLEMENTATION TIME FRAME (SHORT, MEDIUM, LONG)	POTENTIAL BARRIERS FOR THIS STRATEGY	WHAT IS NEEDED TO OVERCOME THIS BARRIER? LIST SPECIFIC RESOURCES, TECHNICAL ASSISTANCE, ETC.,
Classroom building (Marshall & Bernstein HS)	As available by the utility companies	Medium-Long	Utility rate	Lower rates/incentives and support by the utility company. Will couple this with on-site solar project

5. PPA's / Utility Offerings

- ▶ *How do you plan on using PPA's or working with your local utility?*

Table 4.4 – PPA’s / Utility Offerings

SHOWCASE BUILDING	STRATEGY TO BE ACCOMPLISHED	IMPLEMENTATION TIME FRAME (SHORT, MEDIUM, LONG)	POTENTIAL BARRIERS FOR THIS STRATEGY	WHAT IS NEEDED TO OVERCOME THIS BARRIER? LIST SPECIFIC RESOURCES, TECHNICAL ASSISTANCE, ETC.,
Classroom building (Marshall & Bernstein HS)	Solar installation	Medium-Long	PPA is currently not allowed under DWP service territory	We need to change the ordinance or use a different type of acceptable agreement

6. Offsets

- ▶ *How do you plan on incorporating offsets in your low carbon strategy?*

Table 4.5 – Offsets

SHOWCASE BUILDING	STRATEGY TO BE ACCOMPLISHED	IMPLEMENTATION TIME FRAME (SHORT, MEDIUM, LONG)	POTENTIAL BARRIERS FOR THIS STRATEGY	WHAT IS NEEDED TO OVERCOME THIS BARRIER? LIST SPECIFIC RESOURCES, TECHNICAL ASSISTANCE, ETC.,
Classroom Building (Marshall & Bernstein HS)	Offset solar	Short	None	Execution of GAP (Green Access Plan) with utility company