Better Buildings® U.S. DEPARTMENT OF ENERGY

Fact Sheet

LOW CARBON PILOT

An increasing number of organizations have set aggressive goals for carbon dioxide emission reductions. While there are known strategies for meeting some of the goals, innovation is critical for meeting the most aggressive goals. The U.S. Department of Energy (DOE), through Better Buildings and Better Plants, launched the Low Carbon Pilot to understand and demonstrate how to achieve real carbon dioxide emission reductions. Over two years, DOE is working with interested partners to demonstrate real world pathways to achieve low carbon emissions from building and manufacturing operations and share these solutions with the market.

What is a Low Carbon Building or Plant?

Low Carbon Buildings	Low Carbon Plants
A low carbon building has achieved many of the scope 1 and 2 GHG emissions reduction measures required for a carbon neutral building. These buildings are ultra-efficient, may be grid-interactive, and powered by a mix of on-site and off-site renewables and other low carbon energy generation to move towards zero (or negative) annual carbon dioxide emissions. For off-site renewable energy generation, we would like to see particular attention paid to hourly matching of off-site generation and on-site consumption.	A low carbon industrial plant is on track to achieve deep decarbonization in scopes 1 and 2 GHG emissions. These plants are ultra-efficient and plan to lower their facility's carbon dioxide emissions through the implementation of emerging or transformational technologies that may not yet be commercialized. In terms of power procurement, the goal is to run the plant on low carbon resources, or for local renewable generation that results in renewables on the grid near the plant.

What are the goals of this pilot?

Through this pilot, DOE is working with partners to showcase real world pathways representing different examples of how organizations have achieved low carbon buildings or plants. Partners are working with DOE to demonstrate what is possible, remaining challenges, and successful solutions. By the end of the pilot, DOE and partners will:

- Convene a community of organizations dedicated to carbon dioxide emission reduction
- Understand the correlation between carbon dioxide emission reduction, energy efficiency, savings, and resilience
- Obtain data and experience for a future initiative addressing the integration of renewables
- Inform DOE's R&D investments by identifying needs for transformational technologies
- Inform partners of new DOE technologies and research that can contribute to the mission
- Include feedback from employees, customers, tenants, and others about the comfort and usability of the building/plant

What do partners commit to?

Partners agree to transparently share their experiences, successes, and challenges pursuing low carbon emissions strategies at two or more buildings/plants in two years. Over the course of the pilot, partners will develop a wedge or bridge analysis showing how their carbon savings were achieved and any future plans for further reductions. Partners will work with DOE to document their work toward low carbon status, as well as their successes and barriers, to show new pathways for other organizations to replicate.

What does DOE commit to?

DOE provides technical assistance and guidance for optimizing carbon reduction pathways including helping to establish baselines and setting goals. In addition, DOE will work with partners to collect, share, and highlight options that have been used to measure and reduce operational carbon, and

recognize partners for their success and leadership.

What are the benefits of participation?

In addition to reducing energy costs, partners that make progress toward carbon goals also increase the resilience of their facilities while better preparing them to meet organization-wide sustainability goals. The Low Carbon Pilot gives partners the opportunity to:

- Receive guidance and technical assistance for optimizing carbon reduction pathways
- Network with peers to share real-world challenges and solutions through webinars, conferences, and other events
- Earn recognition for their progress and leadership in demonstrating pathways to low carbon buildings

Understanding that pathways will vary among partners, DOE is offering a framework for options to reduce carbon dioxide emissions.

1. **Demonstrate superior energy efficiency** – The building/plant is ultra-efficient - accomplished through any combination of design strategies, advanced energy technologies, building management, and operational practices.

   Possible ways to measure ultra-efficiency in buildings could include:
   a. Achieving and demonstrating building level energy savings that showcase best practices.
   b. Using 40-60% less energy than a typical building in the same sector.
   c. Measuring energy efficiency performance against advanced targets such as high scores in ENERGY STAR Portfolio Manager or comparisons to the Advanced Energy Design Guides.
   d. Meeting an energy use intensity that goes beyond the ASHRAE 90.1-2019 standard.

   Possible ways to measure ultra-efficiency in plants could include:
   a. Achieving and demonstrating plant level energy savings that showcase best practices.
   b. Achieving ISO 50001 certification at the platinum level.
   c. Achieving the Better Plants goal of at least 20% energy reduction for energy intensive partners and 30% for non-energy intensive partners.

2. **Act as a grid asset** – Because carbon intensity and source energy varies by time of use, buildings/plants can further reduce carbon emissions by interacting with the electric grid, becoming responsive to the availability of carbon-free electricity, and minimizing grid congestion. Opportunities include:
   a. Installing smart-enabled technologies including storage that enable dynamic demand management.
   b. Shifting loads away from peak power times and carbon intensive periods.
   c. Feeding renewable and other low carbon electricity onto the grid in high demand periods.

3. **Use low carbon energy supplies** – In recent years, it has become better recognized that "100% renewable" does not always lead to commensurate emissions reductions.[1] Purchasing renewable electricity certificates does not necessarily lead to renewable generation near the building or plant and the certificates could be produced over a thousand miles away. Compounding the challenge, even local renewable purchase power agreements

[1] *See* Jacques A. de Chalendar and Sally M. Benson, *Why 100% Renewable Energy Is Not Enough*, Joule, May 24, 2019, https://www.cell.com/joule/fulltext/S2542-4351(19)30214-4.

do not necessarily lead to temporal matching of renewable generation and consumption from the building or manufacturing operation. Low carbon energy supply opportunities include:

a. Low carbon energy including solar, wind, biomass, geothermal, hydrogen, nuclear, generation with carbon capture, and waste-to-energy, among others. Preference is given to on-site low carbon generation or directly purchased generation as close to the site as possible to ensure the facility is actually powered by electricity generated from these low carbon sources.
b. Temporal matching of energy consumption by the facility and renewable generation.
c. Purchase of new renewable energy through a utility or a bilateral contract with independent power producers. Focus should be on the direct purchase of renewable power that creates clear additionality, for example, causing more renewables to be brought on to the grid.
d. Deployment of emerging energy technologies including carbon capture, energy storage, and other advanced technologies.
e. Use of low carbon energy sources, carbon mitigation strategies, or offsets that create clear additionality.
f. Consideration of the importance of grid stability and attention paid to low carbon generation that provides important ancillary services and keeps the grid stable 24/7/365.

4. **Plan a pathway to Zero Carbon** – The building/plant will develop a plan for tracking and reducing operational carbon dioxide emission to eventually achieve zero or low carbon status (while including emissions from on-site combustion and electricity consumption). Plans may also include pathways to electrification and reducing embodied carbon.

Where do I get more information?

For more information, check the homepage here.