

PLUG-AND-PLAY PV FOR AMERICAN HOMES



1 CSE's plug-and-play PV concept spans all aspects of residential solar, from the modules to how the system communicates with utilities.

2 Solar panels are an increasingly common sight on homes, but high "installation"-costs still affect adoption rates.

Fraunhofer Center for Sustainable Energy Systems CSE

Massachusetts Office
5 Channel Center Street
Boston, MA 02210

New Mexico Office
5600 University Boulevard SE, Suite A
Albuquerque, NM 87106

Contact



Christian Hoepfner, Ph.D.
Center Director
Phone: 617-575-7254
choepfner@fraunhofer.org

cse.fraunhofer.org

Overview

The Fraunhofer Center for Sustainable Energy Systems (CSE) is currently conducting a multi-year research and development project focusing on the development of plug-and-play solar photovoltaic (PV) systems that can be purchased, installed, and connected by homeowners without the need to engage outside consultants or contractors.

This project is funded by the US Department of Energy's SunShot Initiative as part of a larger DOE investment aimed at developing technology solutions that reduce the "soft" costs of residential solar PV systems – the non-hardware costs such as planning, installation, permitting, inspection, and interconnection that now account for a large part of the total cost of residential PV, and represent a significant barrier to the wider adoption of solar power in the United States.

Plug and Play PV is a pathway to install code-compliant PV systems faster, more easily, and safely.

The Vision

The vision for Plug and Play PV is a system that can be installed quickly and easily, with straightforward demonstration of code-compliance.

10 hours from purchase to commissioning:

- Purchase a pre-configured system, including wiring, from a retailer/distributor
- Install the system: either self-install or hire a contractor/handyman
- Lightweight PV modules are adhered to the roof
- Integrated electronics and touch-safe connectors make installation safe and straightforward
- On commissioning, the system sends data to the local jurisdiction and utility company-automating the permitting, inspection and interconnection processes



Project Focus

Fraunhofer CSE is developing technologies, components, systems, and standards that reduce the cost and complexity of residential solar PV deployment.

To accomplish this objective, CSE leverages its R&D capabilities in photovoltaics, building energy efficiency, and distributed electrical energy systems. The Center is supported by a multidisciplinary team of manufacturers, utilities, local governments, universities, and research institutions.

The ultimate aim is to develop a range of pre-configured systems that can be installed and commissioned by a homeowner within one day – with all permitting, inspection and interconnection processes done automatically in the background.

By removing these sources of “soft” cost, residential solar PV systems will be more cost competitive and attractive to homeowners, accelerating US solar adoption and production.

Field Deployments

Annual rooftop installations in Massachusetts will be used to demonstrate project progress. Research for this project will be carried out in Boston, Albuquerque, and at partner facilities throughout the United States.

Technology Features

Key features of CSE’s technology solution include:

- Lightweight solar modules
- Adhesive roof mounting
- Inherently safe rooftop wiring; Simple connection to the utility wiring at the meter socket
- Self-testing system components
- Communications protocol to easily obtain the necessary permissions needed to connect to the utility grid

Project Partnerships

CSE will leverage existing efforts by the City of Boston and the Commonwealth of Massachusetts to accelerate the deployment of solar PV systems, including the Solarize Massachusetts program, which aims to increase residential solar adoption and lower the cost of solar in Massachusetts.

Fraunhofer CSE’s team will also work with the national code and standards community to identify hurdles to system deployment, propose code changes, and develop technologies that ensure compliance with local building requirements and regulations.

Project Team

Fraunhofer CSE’s Plug and Play PV research is currently supported by a multidisciplinary group of partners, including the following manufacturers:

- Lumeta Solar
- 3L Power

CSE is actively looking for system integration partners.

In addition, the following team members will provide support with code, standards, demonstration, and validation:

- Sandia National Laboratories
- National Grid
- NSTAR
- Green Mountain Power
- Tufts University
- Vermont Law School
- Center for Environmental Innovation in Roofing
- City of Boston
- City of Worcester

3 Rooftop installations in the field will be used to demonstrate CSE’s technology solutions.

4 PV-ready smart meters and pre-configured systems capable of interfacing with utilities are a part of the plug-and-play PV concept.