



# OLR RESEARCH REPORT

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## **PROCEDURES FOR INSTALLING RESIDENTIAL RENEWABLE ENERGY SYSTEMS**

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You asked for a description of the steps a homeowner would need to take to install a renewable energy system in order to reduce his or her dependence on the electric grid. This report focuses on photovoltaic (PV) systems with a capacity of ten kilowatts or less, the most common type of residential renewable energy system.

### **SUMMARY**

A homeowner would need to select an installer, who in most cases would be responsible for taking the steps described in this report.

Renewable energy systems typically require a building permit and must, among other things, be inspected by the municipal electric inspector. Depending on where the system is located and its design, the system may need other local approvals, such as a zoning variance.

Renewable energy systems must meet industry interconnection standards to tie into the grid, which can involve additional inspections and tests. The system must meet standards established by Underwriters Laboratories, among other entities. The customer must also carry \$300,000 of liability insurance for each system.

## **CHOOSING AN INSTALLER**

A homeowner will need to select an installer, who in most cases will take responsibility for taking the steps described in this report. The homeowner can ask him or her to do a site analysis to determine whether his or her home is an appropriate location for a renewable energy system.

If a residential solar project will be funded through the Connecticut Clean Energy Fund, the installer the homeowner chooses must be certified by the Connecticut Energy Finance and Investment Authority. There are currently more than 70 approved installers. The website, <http://www.ctcleanenergy.com/Portals/0/Solar%20PV%20Program%20Contractors.pdf>, has a list of certified installers. While the electric companies work with homeowners on the installation of renewable energy systems, they cannot recommend an installer or system manufacturer.

## **MUNICIPAL APPROVALS**

### ***Building Permits and Code***

Renewable energy systems typically require a building permit. The permits are issued under the state building code, which is administered by municipal building inspectors. One component of the building code is the electric code. In the case of residential PV systems, the municipal electric inspector must approve the installation before the electric company can connect the system to the grid.

Other than the building code, Connecticut does not have statewide requirements on how municipalities regulate a renewable energy system. Depending on a municipality's zoning ordinance, a homeowner may need to obtain a variance if the height of the renewable energy system exceeds the maximum allowed in the zone where the home is located. (This is generally not an issue with PV systems, but may be relevant if the homeowner wants to install a wind turbine.)

### ***Historic Districts***

CGS § [7-147a](#) et seq. allows municipalities to establish local historic districts with additional zoning powers. Buildings cannot be erected or altered in an historic district until after the historic district commission approves the application for a certificate of appropriateness concerning the exterior architectural features. A certificate is required whether or not

a building permit is required. And the municipality cannot issue a building permit for erection of a building or structure or for alteration of an exterior architectural feature in an historic district until the certificate is issued.

### ***Village Districts***

CGS § [8-2j](#) additionally allows municipal zoning commission to establish village districts in areas of distinctive character, landscape, or historic value that are specifically identified in the municipality's plan of conservation and development. It requires that zoning regulations establishing such districts protect the distinctive character, landscape, and historic structures within the districts. It allows them to regulate new construction, substantial reconstruction, and rehabilitation of properties within such districts and in view from public roadways. The regulations must provide that (1) proposed modifications to existing buildings relate harmoniously to their surroundings and (2) all structures visible from public roadways are designed to be compatible with the elements of the area of the village district in and around the proposed modification.

### **INTERCONNECTION STANDARDS**

It is impractical in virtually all cases for a home to go entirely off the grid. Most renewable energy systems, including solar and wind systems, rely on resources that are intermittent. Renewable energy systems must meet industry interconnection standards to tie into the grid and several types of systems, including residential PV systems, cannot operate when there is an outage on the grid that affects the home.

Connecticut Light and Power and United Illuminating use the same interconnection standards for certified systems with a generating capacity of up to 10 kilowatts that use an inverter, including solar PV systems. These standards are available at <http://www.clp.com/Templates/Content.aspx?id=4294985597&terms=interconnection#Certified Inverter>. The equipment used in the system must meet standards established by Underwriters Laboratories (UL1741) and the system must meet various Institute of Electrical and Electronic Engineers (IEEE) standards.

Under the standards, the customer must submit an interconnection application to the electric company. The application must include the contact information for the homeowner or other legal applicant. The customer must agree to the company's terms, conditions, and requirements, including the interconnection standards.

The company will acknowledge receipt of the application within three business days. Within another ten business days it will inform the customer whether the application is complete, and if not what is missing. The company will make a good faith effort to tell the customer within 15 business days after receiving a completed application whether the system can be connected safely with the grid.

When the system is completed, the customer must have it inspected or certified by the local electrical inspector. Within ten business days after the system is installed, the customer must return a "certificate of completion" to the company. The certificate must include a copy of the municipal electric inspector's approval of the system. The electric company can inspect the system, within ten business days of receiving this certificate, to insure that all equipment has been installed correctly.

Before the system is connected to the grid, the electric company may inspect it and conduct a commissioning test (this test checks to see that the system works as designed). There is no charge for the electric company staff witnessing the test so long as it is completed in one day. If the test is completed successfully, the company will provide a form that will allow the system to be energized (turned on). If the company does not schedule an inspection within ten business days of receiving the certificate of completion, it is considered to have waived the right to witness the commissioning test.

The standards include procedures for resolving disputes between the parties, including appeals to the Department of Energy and Environmental Protection (formerly the Department of Public Utility Control).

The customer is responsible for operating, maintaining, and repairing the system so that it complies with the standards. The electric company can disconnect the system if it is not operated in accordance with the standards. The company can also temporarily disconnect the system during outages or in an emergency situation. The customer must also carry \$300,000 of liability insurance for each system.

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