Include adequate utility room space for a solar hot water storage tank on a floor plan of the utility room when building a Renewable Energy Ready Home (RERH). Space requirements for solar water heating and photovoltaic system components should be taken into account early in the house design process.

**DOE Zero Energy Ready Home Notes**

The U.S. Department of Energy (DOE) [Zero Energy Ready Home National Program Requirements](https://www. energystar.gov/) includes in Exhibit 1, Mandatory Requirements, Item 7 Renewable Ready, that all homes must meet the requirements in the Consolidated Renewable Energy Ready Home (RERH) Checklist.

The RERH Checklist requires builders to

- Install and label a 3’ x 3’ x 7’ area in the utility room adjacent to the existing water heater for solar hot water tank.

Note: Homes equipped with an ENERGY STAR qualified whole-home gas tankless water heater or an ENERGY STAR qualified heat pump water heater are exempt from this provision. (See the Compliance tabs for additional details and exceptions.)

See the [Compliance Tab](https://www.energystar.gov/) for related codes and standards requirements, and criteria to meet national programs such as DOE’s Zero Energy Ready Home program, ENERGY STAR Certified Homes, and Indoor airPLUS.
A renewable energy-ready home (RERH) is one that is built with the wiring and plumbing conduit and other components in place to facilitate the future installation of solar photovoltaic panels and/or solar water heating panels. Some energy-efficiency programs, like the U.S. Department of Energy’s DOE Zero Energy Ready Home Program, require homes to be renewable-energy ready.

When constructing a home to be renewable energy ready, the solar hot water storage tank is one of two major components of a solar water heating system that are installed in the utility room. Typically, a domestic hot water solar system with an 80- to 120-gallon storage tank will require approximately 9 square feet of floor space with 7 feet of total vertical clearance. The builder should designate a space no less than 3 ft x 3 ft wide by 7 ft high and locate it near the home’s hot water heater so that any pipe running between the two components can be kept to a minimum. Since the pipe run or pipe chase of the solar hot water system will terminate directly above this space, it should be free of all electrical wiring and service panels as well as windows. Labeling this area as an RERH component is recommended, as is recording its location on a plumbing riser diagram. Once installed, the solar hot water storage tank should become the primary source of hot water, whereas the home’s existing water heater should serve as a backup heating source.

The second major component installed in the utility room is the plywood panel for mounting system components including the pumping package. This panel is described in the guide Mounting Surface for Pumps and Gauges. Additional details on all of the solar water heating system components and requirements can be found in the EPA’s Renewable Energy Ready Home (RERH) Solar Water Heating Specification, Checklist and Guide.

**How to Designate Utility Room Space for the Hot Water Tank**

1. To meet the requirements of the DOE Zero Energy Ready Home program, designate a dedicated space for the future solar hot water storage tank, 3 ft wide, 3 ft deep, and 7 ft high. Locate the space adjacent to the home’s hot water heater.
2. Label the space by placing a 10 in. x 6 in. label or sign on the wall where the water tank will be located that reads “Renewable Energy Ready Home – Future Hot Water Storage Tank.”
3. Record the tank location on the utility room floor plan to be provided to the homeowner. See Figure 1.
4. Record the tank location on a plumbing riser diagram.
5. This dedicated tank space should meet floor load requirements calculated as specified in the guide Adequate Structural Ratings for New Construction.

![Figure 1](image-url) The utility room floor plan should include the location of the existing hot water heater, designated space for a future hot water storage tank, electrical outlet, and pump package mounting panel.
Ensuring Success

Ensure adequate utility room early in the house design process to allow for ample space for solar water heating and photovoltaic system components.

Confirm with local code officials early in the design process what steps are needed to ensure that installation of solar water heating panels will meet with local codes, homeowner’s association covenants, and historic district regulations. See the article on building codes and regulations related to solar water heating systems at Energy.gov for additional information.

Protect the electrical and mechanical components of the solar water heating system from bulk moisture, high temperatures, and direct sunlight. The utility room should be properly ventilated and maintain average indoor temperatures.
Climate

The **DOE Zero Energy Ready Home PV-Ready Checklist (Revision 07)** is required only under the following condition related to climate (See the [Compliance Tab](#) for other exceptions):

- Location, based on zip code, has at least 5 kWh/m²/day average daily solar radiation based on annual solar insolation using the [PVWatts online tool](#). See map below.

In climates where freezing temperatures are likely to occur, a closed-loop anti-freeze system with heat exchanger will keep outdoor water pipes from bursting.
Training

Right and Wrong Images
None Available
None Available
Compliance

The Compliance tab contains both program and code information. Code language is excerpted and summarized below. For exact code language, refer to the applicable code, which may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our webmaster if you find broken links.

DOE Zero Energy Ready Home (Revision 07)

Exhibit 1 Mandatory Requirements.
Exhibit 1, Item 1) Certified under the ENERGY STAR Qualified Homes Program or the ENERGY STAR Multifamily New Construction Program.
Exhibit 1, Item 7) Provisions of the DOE Zero Energy Ready Home PV-Ready Checklist are Completed.

DOE recommends but does not require solar thermal water systems. See the DOE Zero Energy Ready Home Solar Hot Water-Ready Checklist (Encouraged).

2009, 2012, 2015, and 2018 IECC

Section 401.3 A permanent certificate shall be posted on or near the electrical distribution panel that lists types and efficiencies of water heating, heating, and cooling equipment, as well as insulation R values, and window U and SHGC factors.


Section R101.4.3 (Section R501.1.1 in 2015 and 2018 IECC). Additions, alterations, renovations, or repairs shall conform to the provisions of this code, without requiring the unaltered portions of the existing building to comply with this code. (See code for additional requirements and exceptions.)


Section N1101.3 (Section N1107.1.1 in 2015 and 2018 IRC). Additions, alterations, renovations, or repairs shall conform to the provisions of this code, without requiring the unaltered portions of the existing building to comply with this code. (See code for additional requirements and exceptions.)

Appendix J regulates the repair, renovation, alteration, and reconstruction of existing buildings and is intended to encourage their continued safe use.


Follow the requirements for solar water heating systems found in the IMC, Chapter 14, Solar Systems (Solar Thermal Systems in 2018 IMC).
Case Studies

1. **Case Study: Rural Development, Inc., Wisdom Way Solar Village, Greenfield, MA**
   - Author(s): PNNL, ORNL
   - Organization(s): PNNL, ORNL
   - Publication Date: December, 2010
   Case study about a 20-unit community of energy-efficient duplexes in Massachusetts that incorporated solar water heating and photovoltaics.

References and Resources*

1. **2009 IECC - International Energy Conservation Code**
   - Author(s): International Code Council
   - Organization(s): ICC
   - Publication Date: January, 2009
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

2. **2009 IRC - International Residential Code for One and Two Family Dwellings**
   - Author(s): International Code Council
   - Organization(s): ICC
   - Publication Date: January, 2009
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

   - Author(s): International Code Council
   - Organization(s): ICC
   - Publication Date: January, 2012
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

4. **2012 IRC - International Residential Code for One and Two Family Dwellings**
   - Author(s): International Code Council
   - Organization(s): ICC
   - Publication Date: January, 2012
   Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

5. **2015 IECC - International Energy Conservation Code**
   - Author(s): International Code Council
   - Organization(s): ICC
   - Publication Date: May, 2014
   Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.
2015 IRC - International Residential Code for One and Two Family Dwellings
Author(s): International Code Council
Organization(s): ICC
Publication Date: May, 2014
Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

Author(s): International Code Council
Organization(s): ICC
Publication Date: November, 2017
Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems, and service water heating systems in homes and commercial businesses.

8. 2018 IRC - International Residential Code for One and Two Family Dwellings
Author(s): International Code Council
Organization(s): ICC
Publication Date: August, 2017
Code for residential buildings that creates minimum regulations for one- and two-family dwellings of three stories or less. It brings together all building, plumbing, mechanical, fuel gas, energy and electrical provisions for one- and two-family residences.

Author(s): Department of Energy
Organization(s): DOE
Publication Date: June, 2012
Website with consumer and contractor information about building codes and regulations for solar water heating systems.

10. DOE Zero Energy Ready Home National Program Requirements (Rev. 07)
Author(s): U.S. Department of Energy
Organization(s): DOE
Publication Date: May, 2019
Standard requirements for DOE’s Zero Energy Ready Home national program certification.

Author(s): Aldrich
Organization(s): CARB, Steven Winter Associates, SWA
Publication Date: March, 2013
Brochure on specifications for solar thermal systems.

12. Solar Hot Water for Homes
Author(s): FSEC
Organization(s): FSEC
Publication Date: July, 2014
Website with information for consumers about solar thermal systems for homes.

Author(s): U.S. Environmental Protection Agency
Organization(s): EPA
Publication Date: May, 2011
Specifications to assist builders in designing and constructing homes equipped with a set of features that make the installation of solar energy systems after the completion of the home’s construction easier and less expensive.

*Publication dates are shown for formal documents. Dates are not shown for non-dated media. Access dates for referenced, non-dated media, such as web sites, are shown in the measure guide text.

Contributors to this Guide
The following authors and organizations contributed to the content in this Guide.

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