



# **U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting**

## **Table of Contents**

- I. Program Overview**
- II. Roles, Responsibilities, and Qualifications of Program Partners**
- III. Plant Certification**
- IV. Producing and Certifying DOE ZERH MH**
- V. Maintaining Plant Certification**

## **Appendices**

- A. Documentation Requirements**
- B. Verification Methods**



# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting

## Program Overview

The U.S. Department of Energy (DOE) Zero Energy Ready Home program is a certification program for new homes that optimizes efficiency, health, quality, and durability. DOE defines a **Zero Energy Ready Home (ZERH)** as “a high-performance home that is so energy efficient that a renewable energy system could offset most or all of the home’s annual energy use.”

A **DOE ZERH Manufactured Home (ZERH MH)** is a home that meets all criteria in the *DOE Zero Energy Ready Home Program Requirements for Manufactured Homes* built by a plant that has been certified by an independent third party. A manufactured home is a home built in a factory according to the federal Manufactured Home Construction and Safety Standards (24 CFR 3280, 24 CFR 3282, 24 CFR 3285), commonly referred to as the HUD Code.

## I. Role, Responsibilities and Qualifications of Program Partners

### Quality Assurance Provider (QA Provider) for ZERH MH

#### Role

The Quality Assurance Provider for ZERH MH (“QA Provider”) oversees, coordinates, verifies, certifies, documents, and facilitates the participation of industry partners in meeting the program requirements. In carrying out these functions, the QA Provider for ZERH MH manages the process of assuring partners are meeting the program requirements, resolving issues as they arise and taking steps that facilitate program advancement and participation.

#### Responsibilities

The QA Provider for ZERH MH is responsible for several overlapping and related operations and actions, including:

- Establishing and enforcing procedures and methods that maintain a high level of quality control and consistent compliance with the program requirements.
- Establishing a quality control framework including a network of compliance agents (“Certifiers”) that monitor and enforce program requirements.
- Maintaining a detailed database of program information that documents compliance for plants and homes and provides the basis for helping to identify opportunities to grow and improve the program.
- Regular reporting to DOE on program characteristics, strengths, and weaknesses, and recommending program changes to improve program performance.
- Reaching out to program partners, including manufacturers, retailers, developers, community owners, lenders and other constituents providing education, training, and support to grow participation. In service of this role, develop and disseminate publications, training materials and other program documents.
- Working with partners on ways to increase program participation by developing value-added components (e.g., preferential lending products).
- Resolving issues as they arise, including quality lapses and problems that may arise that are hurdles to growing participation.
- Seeking ways to leverage program growth, including, for example, working with power companies on incentives and demonstrations that stimulate market growth.
- Managing the distribution of ZERH MH compliance certificates.
- Funding and supporting on-going program support and growth by tracking program participation, collecting and assessing program metrics, developing and fielding promotion programs, and soliciting partner participation.



# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting

## Capabilities

To carry out its duties, the QA Provider for ZERH MH possess the following capabilities:

- Recognized by U.S. EPA as an ENERGY STAR Quality Assurance Provider for Manufactured Homes.
- Possess the technical, organizational, and marketing skills required to carry out the program responsibilities.
- Understand the manufactured housing landscape, including industry methods and practices, and possess a familiarity with the industry groups, large and small, whose participation in the program is pivotal to success.
- Have a track record of successfully operating similar programs and a staff with skills that support program operations.

Recognition as a QA Provider

- For information on how to be recognized as a QA Provider for ZERH MH, see <https://www.energy.gov/eere/buildings/doe-recognized-zerh-certification-organizations>

## Plant Certifier

### Role

The Plant Certifier is an independent third party who is responsible for conducting the initial plant certification process, for monitoring the plant's conformance with program guidelines, and for verifying that certified homes meet program requirements. Certifiers must meet certain eligibility criteria and are approved and monitored by the QA Provider. The Certifier must be capable of reviewing the plant's building procedures and certifying the plant as capable of conforming to the program requirements.

Where the term Certifier is used in this document, it refers to individuals approved by the QA Provider to perform manufactured home plant certifications and related activities and/or designated representative(s) acting on behalf of the Certifier. The Certifier is fully responsible for upholding the responsibilities described herein and for the actions of any designated representatives. Any individual approving designs or conducting field inspections must be acting under the supervision of the Certifier.

### Responsibilities

Among the specific responsibilities of the Plant Certifier are the following:

- Familiarize the plant production staff with program requirements and procedures.
- Certify that manufactured housing facilities have adopted practices and policies that conform to the program requirements.
- Review and approve plant processes and the plant's program-related documentation including home designs, DAPIA documentation, Quality Control Manual, and the Manufacturer's Installation Manual.
- Verify and document compliance of manufactured housing facilities with the program requirements on a continual basis by performing annual in-plant reviews and conducting ongoing quality control inspections of a sample of completed homes.
- Report to the QA Provider any program deviations and failures that are systemic and/or represent significant quality and compliance issues.
- Serve as the primary contact and resource of first resort for plants regarding issues and questions about the program.

Should a certified plant or their third-party Certifier elect to discontinue their affiliation, the existing Certifier shall coordinate with the plant to transfer knowledge and documentation on the plant's participation in the program to the new Certifier.

## Capabilities and Qualifications



# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting

The Certifier must have competency in the following areas as determined by the QA Provider:

- Manufactured housing design, construction, and installation methods, including quality control procedures.
- Building science and diagnostics (e.g., demonstrated by being credentialed as a Home Energy Rating System (HERS) rater, professional engineer, or architect, or equivalent).
- Document preparation and record keeping.

## **Home Manufacturer**

### **Role**

The manufacturer commits to learning about ZERH MH practices, incorporating the technical requirements into their building practices, assigning staff to manage their participation in the program, record keeping and reporting, marketing the benefits of ZERH MH homes, and managing their involvement in ways that assures consistent quality and performance.

### **Responsibilities**

Among the specific responsibilities of the home manufacturing plant are the following:

- Retain a Plant Certifier.
- Assign staff to oversee the design, reporting, quality checking, and delivery of ZERH MH.
- Incorporate ZERH MH technical requirements and associated building process changes into standard practice and modify construction documents.
- Report to the QA Provider on status of homes certified as DOE ZERH MH.
- Commit to tracking and reporting on program non-compliance and work to resolve issues.
- Promote ZERH MH to their network of retailers and community owner customers.

### **Qualifications**

To participate in the ZERH MH program, the manufacturing plant must:

- Be certified by U.S. Department of Housing and Urban Development (HUD) to produce homes conforming to the HUD standards.
- Be enrolled by U.S. Environmental Protection Agency (EPA) as an ENERGY STAR partner in good standing.
- Agree to register as a DOE ZERH Partner and participate in the plant certification process as described in Section III.

## **DOE ZERH Program**

Although DOE relies on the process established by QA Providers and Certifiers for home certification, DOE ZERH officials maintain the right to perform random oversight of certifiers and QA providers, and/or audits of program documentation.

## **II. Plant Certification**

Producing ZERH MH starts with certifying the plant. Plant certification is done once and may require several weeks to complete. The process involves registering as a ZERH MH partner and retaining an independent third-party plant Certifier approved by the QA Provider. Once certified, plants may produce ZERH MHs in accordance with the designs and installation procedures developed during the certification process. Some ZERH MH features are installed after the home leaves the plant and are subject to verification on site. The certification steps are described below.

### **Step 1. Register to become a ZERH MH Partner**



# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting

Who is responsible: **Plant representative**



The plant must review the **Partner Agreement** and register to become a ZERH MH Partner. The online form collects basic contact information for the plant. Partners' names and contact information are displayed on the [DOE ZERH Partner Locator Web site](#). (When available)

The plant then reviews the *Guidelines for Correctly Using the DOE Zero Energy Ready Home Name and Logo*. The logo and other materials to market and sell homes are available by logging into the plant's partner account.

## Step 2. Retain a ZERH MH Plant Certifier

Who is responsible: **Plant representative**

The plant must hire an independent, third-party consultant, called a Plant Certifier, (the "Certifier") who will certify that:

- the plant meets the requirements for producing ZERH MH;
- the plant's designs meet ZERH MH program requirements;
- the plant's documents accurately and thoroughly include reference to the program technical requirements; and,
- at least three (3) ZERH MH (qualification homes) produced by the plant conform to the technical requirements both in the plant and in the field.

## Step 3. Complete Orientation Webinar and Training

Who is responsible: **Plant staff (management, design/engineering, production/quality control, and sales)**

The key plant personnel responsible for overseeing participation in and compliance with the program must participate in an orientation webinar and training session conducted by the QA Provider.

## Step 4. Design Homes to Meet ZERH MH Program Requirements

Who is responsible: **Plant design/engineering staff, Certifier**

The next step is for the plant to create home designs that meet ZERH MH requirements. Appendix A provides options and more detailed guidance for designing homes that meet ZERH MH requirements.

The Certifier verifies that the plant's proposed home designs comply with ZERH MH requirements, and that plant design and engineering staff fully understand the program technical and reporting requirements.

## Step 5. Incorporate ZERH MH Requirements into Design, Construction, Quality Control, Inspection, and Reporting Procedures

Who is responsible: **Plant engineering and production/quality control staff, Certifier**

The plant includes, and the Certifier verifies that, the ZERH MH features are incorporated into the plant's design, production, quality control and installation documents, including, as appropriate: the Design Approval Primary Inspection Agency (DAPIA)-approved designs, Quality Control Manual (QCM), and the Manufacturers' Installation Manual (MIM). The plant and Certifier together review the unique ZERH MH features contained in the DAPIA package with the plant's third-party approval and inspection agencies.

## Step 6. Assess Plant Performance through the Construction and Evaluation of Qualification Homes

Who is responsible: **Plant engineering and production/quality control staff, Certifier**



# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting

As part of the certification process, a plant must manufacture a minimum of three (3) homes (qualification homes) that meet ZERH MH requirements in Appendix A. With oversight by the Certifier, the plant's third-party Production Inspection Primary Inspection Agency (IPIA) shall inspect the homes for consistency with the DAPIA-approved packages and the plant's quality control (QC) personnel shall verify that the ZERH MH features are installed in accordance with the plant's Quality Control Manual. By observing the construction and completion of homes built to the ZERH MH requirements, the Certifier determines if the plant can produce compliant homes on a routine basis under the supervision of plant staff. The qualification homes do not necessarily have to be consecutive; they should be representative of the types of homes the plant intends to build and certify as ZERH MH.

## Step 7. Install Homes

Who is responsible: **Installer, plant representative, Certifier**

The three plant qualification homes are now installed in the field. The homes are then inspected in the field by the Certifier who verifies compliance with the site-related ZERH MH requirements in Appendix A. Any deficiencies identified by the Certifier must be corrected and the home re-inspected. Any design or installation changes resulting from these inspections must be recorded and used to update the ZERH MH specifications contained in the third-party-approved design package and Manufacturer's Installation Manual.

## Step 8. Establish Reporting System Account

Who is responsible: **Plant representative**

The plant representative will be contacted by the QA Provider to establish the plant's reporting account. This involves selecting a confidential password and logging into the account to confirm and/or enter plant information. Once the account is set up, the plant is responsible for recording information about their ZERH MH production, starting with the three qualification homes. The QA Provider's reporting system will be used to submit ZERH MH production data to DOE on behalf of the plant each calendar quarter.

The Certifier verifies the plant's ability to collect, track and archive information about homes in progress and completed homes using the reporting system.

## III. Producing and Certifying ZERH MH

Once a plant has been certified, it can proceed to manufacture ZERH MH based on the designs approved during the certification process. This is a simple, three-step process that builds directly on the knowledge and expertise developed during the plant certification process.

### Step 1. Manufacture and Inspect Homes in the Plant

Who is responsible: **Plant production/quality control staff**

The plant produces ZERH MH in accordance with the designs created during the plant certification process. The homes are inspected by the plant's third-party inspection agency. Plant quality control (QC) personnel use the new information in the plant's quality control manual to check all ZERH MH QC issues.

### Step 2. Report Homes and Issue ZERH MH Certificate

Who is responsible: **Plant representative**

Manufacturers stipulate that a home complies with the ZERH MH program by issuing a ZERH MH Certificate to the homebuyer. The Certificate functions as a certification mark for compliance with ZERH MH program requirements. The home should also display the ENERGY STAR Certified Home and, as





# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting

applicable, QA Provider labels, as proof of ENERGY STAR compliance which is a ZERH MH prerequisite.

In all cases, it is the plant's responsibility to ensure that all homes earning a Certificate meets ZERH MH program requirements when installed in their final location.

Every home that receives the DOE ZERH MH label must be reported by the plant in the QA Provider's reporting system. The QA Provider will report certified homes to DOE on a quarterly basis.

## Step 3. Conduct Periodic Field Evaluations to Verify Performance

Who is responsible: **Certifier**

To ensure that the homes are performing as designed, a plant must at all times retain an accredited Certifier responsible for conducting field evaluations on no less than two percent (2%) of its ZERH MH installed on a homeowner's site, or a minimum of one home each calendar year, whichever is greater. If the plant fails to conduct this field verification it will be deemed "inactive." See Section V below for more information.

## IV. Maintaining Plant Certification

To maintain certification and good standing with the program, plants must coordinate with the Certifier on periodic in-plant reviews and field evaluations on a sample of homes. Furthermore, plants must respond to QA Provider requests for information and documentation.

### Periodic-In Plant Reviews

The Certifier is required to visit the manufacturing plant at least twice per calendar year to verify ongoing compliance with program requirements and procedures. These periodic in-plant visits entail reviewing with plant staff any changes to program technical requirements or compliance verification procedures; reviewing any changes needed to plant documentation, including DAPIA-approved plans, QC manuals/travelers, and Manufacturer's Installation Manual; and, verifying that filed documents correspond to home records in the reporting system. The Certifier should document and archive the plant's compliance with program requirements through copies of documentation, photographs, and videos.

### Field Evaluations

To verify ongoing conformance with program requirements, the Certifier is responsible for visually inspecting in the field a sample of completed homes. A home is considered *completed* on the date entered by the plant in the reporting system record.

- **Inspection sample:** A minimum of two percent (2%) of certified homes shall be visually inspected in the field by the Certifier or the Certifier's designated field agent. The sample size shall be determined on the first day following the end of each calendar quarter and based on a cumulative total of all homes subject to inspection that have been completed to date.
- **Inspection schedule:** Inspections shall be conducted prior to the end of the next quarter (within 90 days).
- **Identifying and selecting homes for the sample:** The plant is responsible for maintaining information about certified homes in its reporting system account. The Certifier is responsible for monitoring ZERH MH completions, for notifying the plant when it is time to conduct site visits and for completing and documenting field inspections. The Certifier shall make every effort to select homes representative of the type of certified homes the plant has built. Homes selected for inspection should represent as wide a cross-section as possible of the following:
  - Production dates
  - Retailers, installers, mechanical equipment (HVAC) contractors and trim-out crews



# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting

- Geographical regions and HUD thermal zones

The homes inspected cannot be one of the three qualification homes completed as part of the initial plant certification process.

- **Rejecting altered homes:** If, in the opinion of the Certifier, a home has been modified by its owner following installation such that it no longer complies with program requirements, that home shall not be inspected.
- **Gaining access to homes:** The Certifier, plant or retailer shall arrange with the homeowner to conduct the inspection and provide access to the home. It is preferable but not required that access to the home be provided prior to occupancy and completion of the final inspection. Contact information for the homeowner and retailer should be available in the reporting system record.
- **Field inspection process:** Once on site, the Certifier (or the Certifier's field representative) follows the steps below to conduct a visual inspection and complete a **Field Inspection Worksheet**. The format of this template can be customized by the Certifier but must include, at minimum, the information indicated.
  1. Verify the required labels are affixed to the home.
  2. Visually inspect the home for compliance with program requirements, including but not limited to, proper installation of ductwork. In the case of site-installed heat pumps, the manufacturer name, brand, and model number of the equipment shall be recorded and compared with the data in the home's reporting system record.
  3. Document all findings, including any discrepancies, on the Field Inspection Worksheet and submit the completed and signed Inspection Worksheet to QA Provider and to the home manufacturer. Photographs and videos may be taken to document compliance.
- **Follow non-compliance procedures:** In the event of non-compliance of any home in the sample, the following protocol shall apply:
  1. After documenting the failure(s) on the Inspection Worksheet, determine whether the cause was due to a systemic failure at the plant, or is an isolated case. Inform the plant and/or retailer as to corrective actions required. The home must then be repaired under the authority of the plant and re-inspected by the Certifier.
  2. Within 45 days of the failure, select and inspect two additional homes of a similar type to the one that failed. If, in the judgment of the Certifier, the failure was set-up related, select homes installed by the same crew. If both homes pass, then resume remainder of quality control inspections, if any.
  3. If one of the additional homes fails, repeat Steps 1 and 2 on a second pair of homes. If one of the new homes fails, repeat Steps 1 and 2 again. If a failure is found in one or more of the third pair of homes, then cease review and notify the QA Provider immediately. If in the opinion of the QA Provider, failures are not adequately addressed, plant certification may be suspended.

## QA Provider Sampling of Documentation

The QA Provider will collect documentation for each plant on an as-needed basis for selected completed homes to verify compliance with the program requirements and procedures, and to gather feedback for program improvements. Plants are responsible for providing this documentation to the QA Provider upon request.

## Change in Plant Status

Plants must maintain active participation in the program. A plant is considered "**inactive**" if the plant:





# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting

1. Has not certified at least one home in the past 12 consecutive months;
2. Is not in good standing with regard to 2% field evaluations; and,
3. Has not completed an in-plant review with the Certifier in the past 12 months.

An inactive plant must cease use of the DOE ZERH MH name and logo, including removal from marketing and point-of-sale materials. A plant may become reinstated as active by completing the periodic in-plant review with the Certifier and building and certifying one home. If a plant has been inactive for more than 24 months, the Certifier may, at his or her discretion after consulting with the QA Provider, require that the plant undergo recertification.

The plant's Certifier, after consulting with the QA Provider, may rescind a plant's certification if they determine that the plant is not in conformance with the program requirements, or is compromising the integrity of the DOE ZERH MH brand.



# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting Appendix A Documentation Requirements

1. **Archive of home information (ARC)**—The QA Provider will collect detailed information about each home qualifying for ZERH MH designation. The database will enable the QA Provider to track homes, investigate compliance issues, report program status to DOE, and assess opportunities to improve program performance. Data collected will include:
  - Date of home manufacture
  - Home serial number
  - Plant name and location
  - Retailer name and location
  - Address of the home, when sited
  - DOE Zero Energy Ready Home Manufactured Homes Version
  - Other details as required by the verification protocol (e.g., site installed heat pump type and product manufacturer).
2. **Inclusion in Design Approval Primary Inspection Agency (DAPIA) package or the Quality Control Manual (QCM)**—The DAPIA package and QCM are the home manufacturer's documents that provide details of construction and quality oversight protocols, respectively. The DAPIA and QCM are approved and stamped by the DAPIA's engineer. Including details of ZERH MH construction in either of these documents establishes an official chain of verification and an auditable trail.
3. **Manufacturer's Installation Manual (MIM)**—The MIM is provided with the home and stipulates methods, approved by the manufacturer, for the home installation. This document is required to be modified to include installation steps and procedures required for the proper completion of ZERH MH features.



# U.S. DOE Zero Energy Ready Home Manufactured Homes Version 1: Certification, Enforcement and Reporting Appendix B Verification Methods

1. **Items in DAPIA package inspected as part of In-Plant Primary Inspection Agency (IPIA) process.** Relying on the IPIA to inspect the ZERH MH items is a first line of verification as it leverages the HUD standards oversight process. What the manufacturer includes in the DAPIA package is confirmed by a third party under HUD's aegis.
2. **In-plant inspection and testing by trained plant personnel (INSP).** Manufacturers routinely test building systems to verify performance (e.g., water line seals). The testing regime can be expanded to include ZERH MH technologies. Tests can be every home or representative samples.
3. **Field inspection by manufacturer's representative (FIELD).** ZERH MH measures installed at the home site may need to be inspected either for every home or representative samples. Depending on the measure, inspections can be the responsibility of the manufacturer, their representative or the manufacturer's Certifier.