

Healthy Indoor Environment Protocols For Home Energy Upgrades


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<http://www.epa.gov/iaq/homes/retrofits.html>



United States
Environmental Protection
Agency

Healthy Indoor Environment Protocols for Home Energy Upgrades



health
safety
energy efficiency

GUIDANCE FOR ACHIEVING SAFE AND HEALTHY
INDOOR ENVIRONMENTS DURING HOME ENERGY
RETROFITS

Healthy Indoor Environment Protocols For Home Energy Upgrades

Officially Launched Today!

<http://www.epa.gov/iaq/homes/retrofits.html>

The cover features the EPA logo in the top left corner. The title is prominently displayed in white text on a blue background. Below the title, there are three images: a family of four smiling, a family sitting on a porch, and a checklist with 'health', 'safety', and 'energy efficiency' items. To the right of these images is a photograph of a green house with a brick chimney. At the bottom, a blue banner contains the subtitle in white text.

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Outline

- What is **Healthy Indoor Environment Protocols for Home Energy Upgrades?**
- How the Protocols relate to DOE Guidelines
- Why EPA developed the Protocols
- How the Protocols are organized
- Priority issues addressed in the Protocols
- Examples from the Protocols
- How EPA recommends the Protocols be used

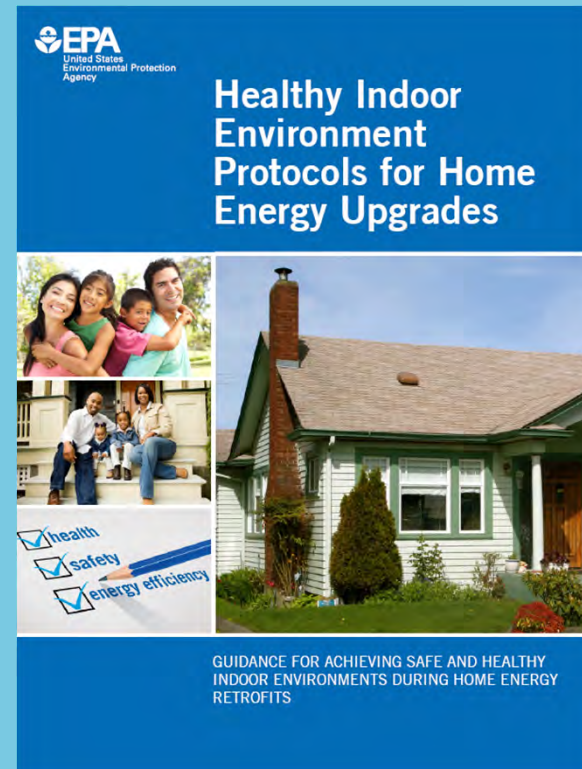
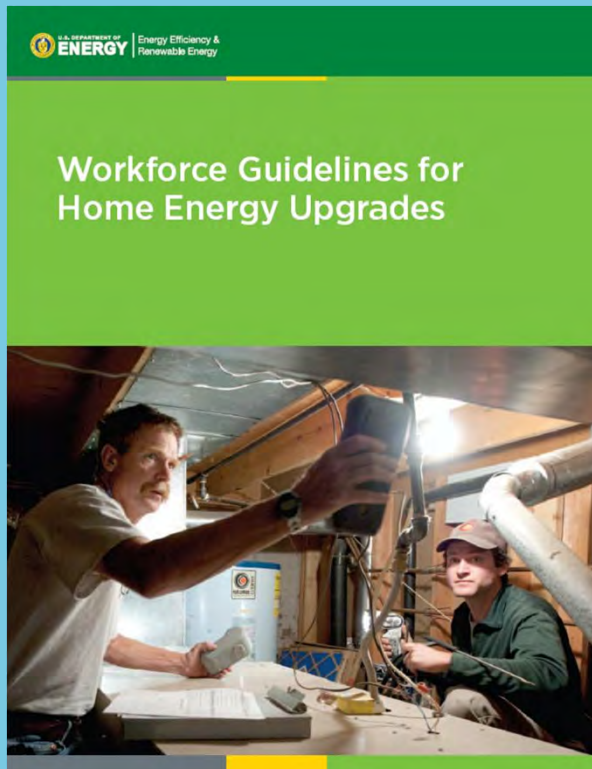
What is Healthy Indoor Environment Protocols for Home Energy Upgrades?

- Practical, voluntary guidance on maintaining and improving indoor air quality and indoor environments during home energy upgrades, retrofits or remodeling
- Applies to existing single-family and multi-family low-rise residential buildings
- Developed in collaboration with the White House Council on Environmental Quality (CEQ) Recovery Through Retrofit Initiative and the U.S. Department of Energy (DOE) initiative to develop **Guidelines for Home Energy Professionals**



Recovery Through Retrofit Workforce Development Guidelines:

DOE



EPA

**U.S. EPA: Healthy Indoor Environment Protocols for
Home Energy Upgrades and
DOE: Guidelines for Home Energy Professionals
– Two Complementary Documents**

- Intended for voluntary adoption by
 - weatherization assistance programs
 - federally funded housing programs
 - private sector home performance contractors
 - others working on residential energy upgrade or remodeling efforts

EPA Protocols and DOE Guidelines – Two Complementary Documents

- Together, the two complementary documents:
 - provide a robust and practical set of resources for home energy upgrade contractors, trainers, and program administrators
 - help improve the quality of the work performed in this expanding industry
 - promote occupant health and safety

Why EPA developed Healthy Indoor Environment Protocols for Home Energy Upgrades

- Millions of American homes will be upgraded or remodeled in the coming years to improve their energy efficiency
- Home energy upgrade activities might negatively affect indoor air quality if the appropriate home assessment is not made before work begins or if work is performed improperly
- EPA developed the protocols to provide practical guidance on improving or maintaining indoor air quality and indoor environments during home energy upgrades or remodeling

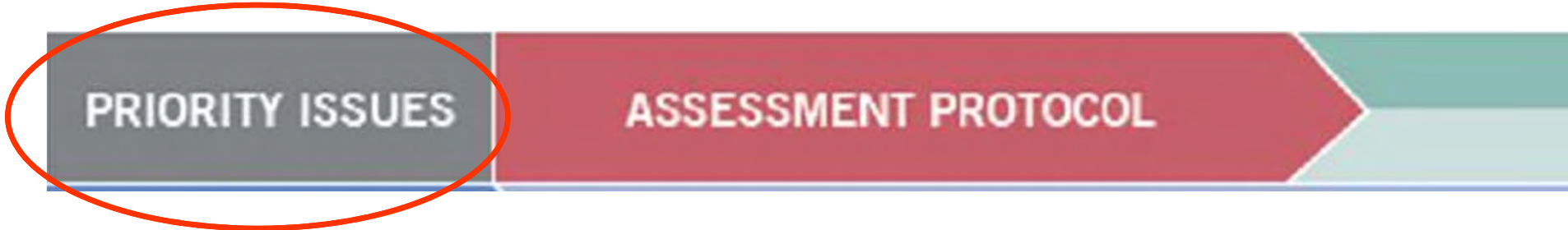
What Can Go Wrong?

Examples of Unintended Consequences

- **Combustion safety problems** (house pressure changes: back-drafting, spillage, moisture, etc.)
- **Moisture/mold problems** (insufficient ventilation, improper vapor barrier/insulation installation, etc.)
- **Increased exposure** to:
 - Asthma triggers (mold, pests, VOC's, etc.)
 - Chronic health risks, including radon, lead, formaldehyde, etc.
- **Comfort problems** (loss of RH control)

How the Document is Organized

- Document identifies priority indoor environmental issues and includes the following:
 - **Assessment Protocols** to evaluate existing conditions and potential for additional concerns that may arise from energy upgrades.
 - **Minimum Actions** during energy upgrades to help ensure work does not introduce new IAQ concerns or make existing conditions worse.
 - **Expanded Actions** to promote healthy indoor environments that can be taken during many home energy upgrade projects (with sufficient resources).



Priority health issues related to Home Energy Upgrades



What to look for during the Home Energy Audit



Minimum Actions to
ensure the Home
Energy Upgrades
“Don’t Make it Worse”



Expanded Actions
to further improve
IAQ in Home
Energy Upgrades
(funds permitting)

Example Page

HEALTHY INDOOR ENVIRONMENT PROTOCOLS FOR HOME ENERGY UPGRADES

PRIORITY ISSUES	ASSESSMENT PROTOCOLS	Minimum Actions	Expanded Actions
	Measures to help home energy retrofit contractors identify common indoor air quality and safety concerns in homes. This document is not a guide to diagnosing occupant health problems or building-related illnesses.	Critical actions intended to ensure work does not potentially cause or worsen indoor air quality or safety problems for occupants or workers (i.e., “Do No Harm”). EPA recommends these protections for ALL retrofit projects.	Additional actions to promote healthy indoor environments that can be taken during energy-efficiency retrofit projects. EPA recommends considering these improvements when feasible.

CONTAMINANTS

ASBESTOS




Determine potential asbestos hazard. Consider the age of the structure; homes built after 1930 and before the 1970s especially may have asbestos insulation. Asbestos may also be present in other building materials in homes built or renovated prior to the 1990s.

Note

Possible sources of asbestos are:

- Attic insulation (especially vermiculite).
- Wall insulation (e.g., vermiculite, insulation blocks).
- Insulation on steam pipes, boilers and furnace ducts.
- Vinyl flooring (including 9-inch by 9-inch or 12-inch by 12-inch floor tiles, vinyl sheet flooring and the mastics and other adhesives used to secure the flooring).
- Cement sheet, millboard and paper used as insulation around furnaces and wood- or coal-burning appliances.
- Door gaskets in furnaces and wood- or coal-burning appliances (seals may contain asbestos).
- Soundproofing or decorative surface materials sprayed on walls or ceilings, including popcorn ceilings.
- Patching and joint compounds and textured paints on walls and ceilings.
- Roofing, shingles and siding (including cement or adhesives).
- Artificial ashes and embers (used in gas-fired fireplaces).
- Transite (cement and asbestos) combustion vent or transite flue.
- Original plaster or plaster that is old enough to potentially contain asbestos.

If suspected asbestos-containing material (ACM) is in good condition, do not disturb.

If suspected ACM is damaged (e.g., unraveling, frayed, breaking apart), immediately isolate the area(s). For example, separate work area in question from occupied portions of the building using appropriate containment practices AND do not disturb. For suspected ACM that is damaged or that must be disturbed as part of the retrofit activity, contact an asbestos professional for abatement or repair, in accordance with federal, state and local requirements. Only a licensed or trained professional may abate, repair or remove ACM. 

Note

Typically, trained professionals can repair asbestos by:

- Sealing or Encapsulating: Treating the material with a sealant that either binds the asbestos fibers together or coats the material so fibers are not released. Pipe, furnace and boiler insulation can often be repaired this way.
- Covering or Enclosing: Placing a protective layer over OR around the ACM to prevent release of fibers. Exposed insulated piping may be covered with a protective wrap or jacket.
- Removing: Removing ACM may be advantageous when remodeling OR making major changes to a home that will disturb ACM, or if ACM is damaged extensively and cannot be otherwise repaired (by covering, enclosing, sealing or encapsulating).

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Priority Indoor Air Quality Issues

Contaminants:

- Asbestos
- Belowground Contaminants
- Building Products/Materials Emissions
- Carbon Monoxide & Other Combustion Emissions
- Environmental Tobacco Smoke
- Garage Air Pollutants
- Lead
- Moisture
- Ozone
- Pests
- PCBs
- Radon
- Wood Smoke Emissions

Priority Indoor Air Quality Issues (cont.)

Critical Building Systems:

- HVAC Equipment
- Combustion Safety
- Source Ventilation
- Whole-House Ventilation
- Multi-Family Ventilation

Safety:

- Home Safety
- Jobsite Safety

Appendices:

- Worker Protections
- Client Education



Example Issue – Pests

Assessment Protocols

- Identify evidence of pest infestations. Note the location and identify pest-contaminated materials (e.g., nests, feces). Determine whether rodenticides or pesticides are being used.
- Remove pest-infested materials OR determine if professional assistance is needed to do so before conducting energy retrofit work in pest-infested areas.

Example Issue – Pests

Minimum Actions (“Don’t Make it Worse”):

- Alert owner of any termite infestations and inform owner of the need to seek assistance from an integrated pest management (IPM) professional.
- In rodent-infested areas, patch with pest-resistant materials (e.g., copper mesh, sheet metal, concrete) exterior holes that are larger than $\frac{1}{4}$ inch by $\frac{3}{8}$ inch before applying air sealing materials (e.g., caulk or foam) OR before insulating.
- Remove clutter, eliminate wood piles near house, and remove bushes, trees or other vegetation closer than two feet from the structure.

Pest Exclusion



Example Issue – Pests

Expanded Actions (“If Funds Available ...”):

- Protect air intakes from potential bird and pest entry (e.g., cover openings with ½-inch screen or galvanized mesh).
- Protect exhaust vents from rodent, bird and pest entry (e.g., cover openings with louvers). Avoid creating conditions that can clog exhaust, particularly dryer vents.
- Follow IPM guidelines for roach control. Follow relevant state pesticide applicator standards.

Selected Minimum Actions (Abbreviated Examples)

Asbestos	<ul style="list-style-type: none">• If suspected ACM is in good condition, don't disturb• For suspected ACM that is damaged or that must be disturbed as part of the retrofit activity, contact an asbestos professional for abatement or repair, in accordance with federal, state and local requirements• Do not saw, sand, scrape or drill holes in ACM
Below Grade Contaminants	<ul style="list-style-type: none">• Repair or replace failed or unattached sewer vent system components• Fill dry drain traps; if soil gas vapor intrusion suspected follow state or local standards to assess and mitigate
Building Product/ Material Emissions	<ul style="list-style-type: none">• Minimize occupant & worker exposures (isolation and ventilation, protective equipment, manufacturers' guidance)• Consider least toxic materials (low-VOC content/emissions)• Ensure adequate ventilation; ventilate with as much OA as possible prior to re-occupancy

Selected Minimum Actions (Abbreviated Examples)

Carbon Monoxide (CO)	<ul style="list-style-type: none">• Investigate CO sources, take actions to reduce• Install CO alarms in all homes• Minimize air movement between garage and house• Combustion safety
Garage Pollutants	Seal walls/ceilings/doors connecting to living areas; seal utility penetrations; decouple garage from AHU serving home
Lead	Follow EPA RRP – lead safe work practices, state/local regs
Moisture	<ul style="list-style-type: none">• Repair roof leaks before insulating or air sealing attic• Address pooling near foundation before insulating basement• Manage rainwater in retrofits (flashing and drainage planes)• Proper HVAC sizing and condensate drainage• Prevent condensation in the enclosure
Ozone	Remove ozone-producing air cleaning equipment
PCBs	Replace old fluorescent light ballasts containing PCBs with new energy-efficient fixtures

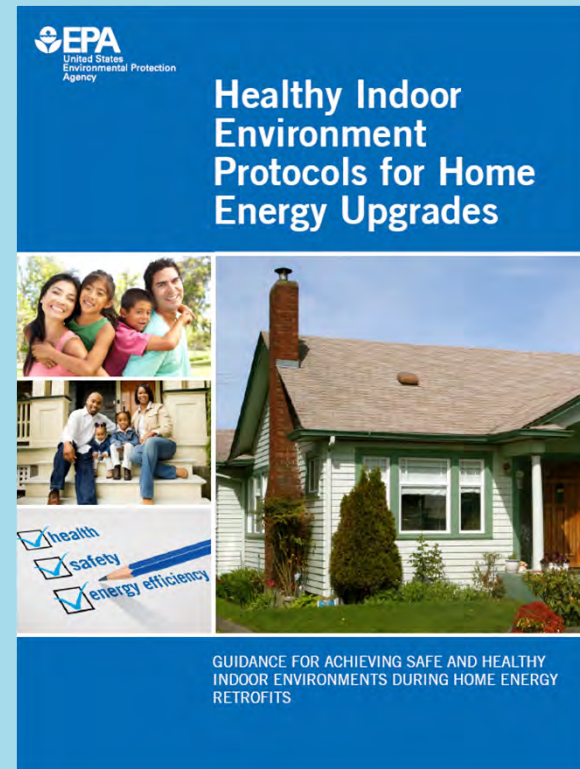
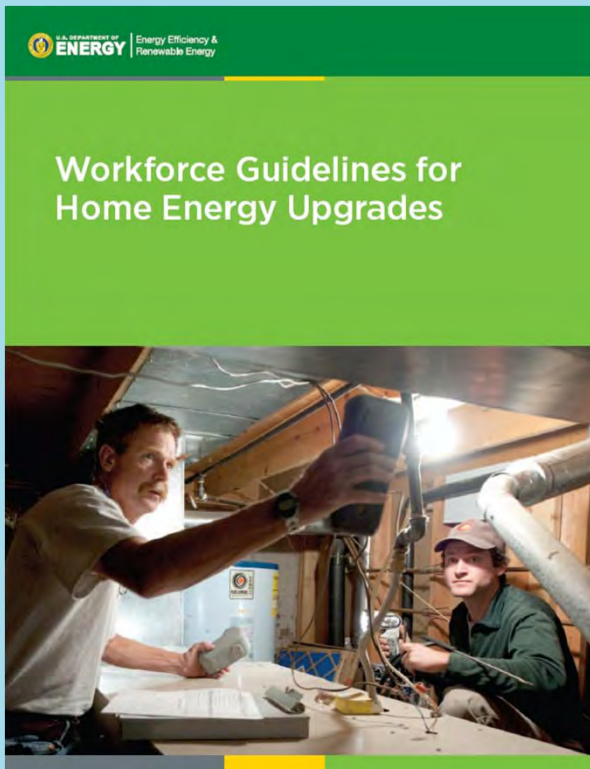
Selected Minimum Actions (Abbreviated Examples)

Vented Combustion Appliances	<ul style="list-style-type: none">• Safety inspection – proper clearances, vent condition, etc.• Evaluate backdrafting potential with influences of exhaust and ventilation equipment (before and after retrofit measures affecting envelope leakage and airflows)• Address depressurization & potential backdrafting problems
Unvented Combustion Appliances	<ul style="list-style-type: none">• Verify kitchen exhaust fan vents to outdoors.• With occupant's permission, remove unvented space heaters used as primary heat source, replace with code-compliant heating system• Unvented heaters used as secondary heat source must be in conformance with ANSI Z21.11.2.
Source Ventilation	Meet ASHRAE 62.2 for existing buildings (bath; dryer; kitchen)
Whole-House Ventilation	Install added ventilation to meet ASHRAE 62.2 for existing buildings
Home Safety	Working CO and smoke alarms in all homes



Recovery Through Retrofit Workforce Development Guidelines:

DOE



EPA

EPA Protocols and DOE Guidelines – Two Complementary Documents

- Developed in conjunction with one another -- complementary and mutually supportive
- DOE and EPA collaborated closely to develop these two documents
- DOE and EPA fully support the home energy upgrade industry going above and beyond the Minimum Actions (e.g., Expanded Actions)
 - Aware that financial or programmatic constraints may impede this

How EPA Recommends the Protocols Be Used

EPA recommends that these protocols are voluntarily adopted, in whole or in part, for the following purposes:

- Develop or enhance standardized training program requirements
- Inform revisions to program funding rules if and where needs are unmet (i.e., specify allowable expenses for health and safety as appropriate)



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