EPA United States Environmental Protection Agency





EPA Tools to Assess and Improve Indoor Environmental Quality

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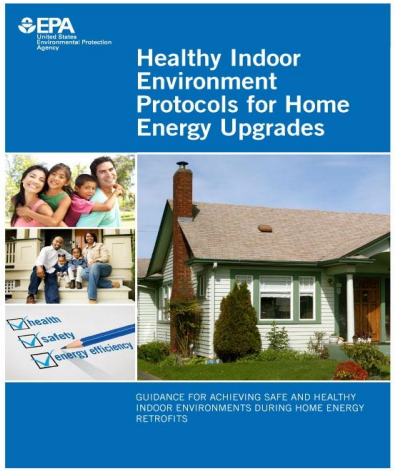
EPA Indoor Air Quality Programs Promoting Healthy Homes

- Healthy Indoor Environments Protocols for Home Energy Upgrades
- Indoor airPLUS
- Radon
- Asthma

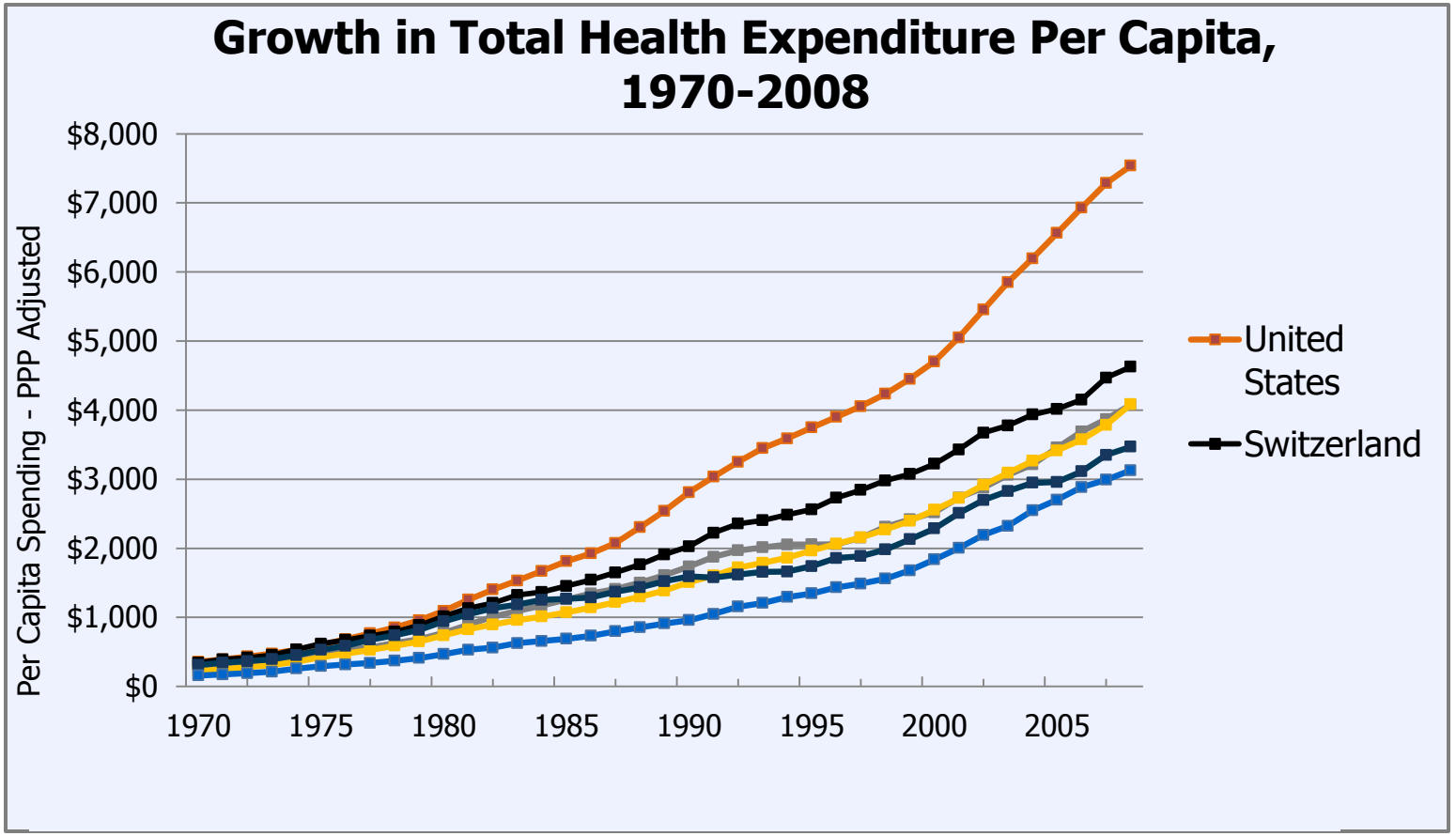


EPA Indoor airPLUS QUALIFIED HOMES

The Opportunity

- Energy upgrades in over 1 million homes in the next 7 years
- We are “touching” a large number or homes and families

Rising Health Care Costs



THE HENRY J. KAISER FAMILY FOUNDATION

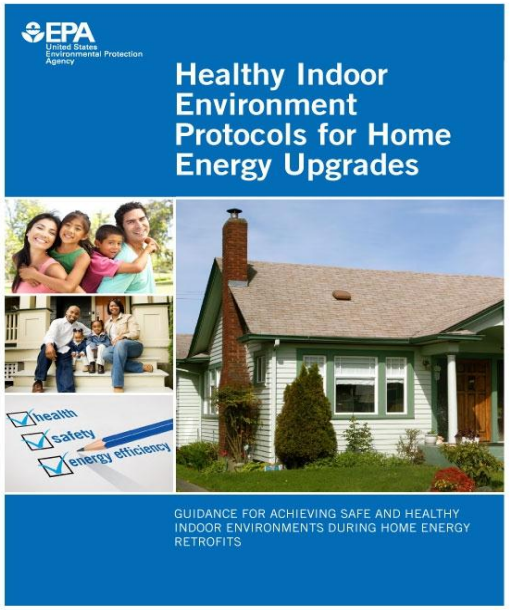
Housing-Based Health Threats

Making Homes Warmer Reduces Health Care Costs

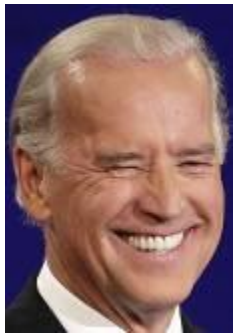
- 30% increase in number of underweight infants and toddlers in ER after coldest months
- Infants in families receiving fuel assistance are 32% less likely to require hospitalization than families who do not receive Low Income Home Energy Assistance Program (LIHEAP)

Healthy Indoor Environment Protocols for Home Energy Upgrades

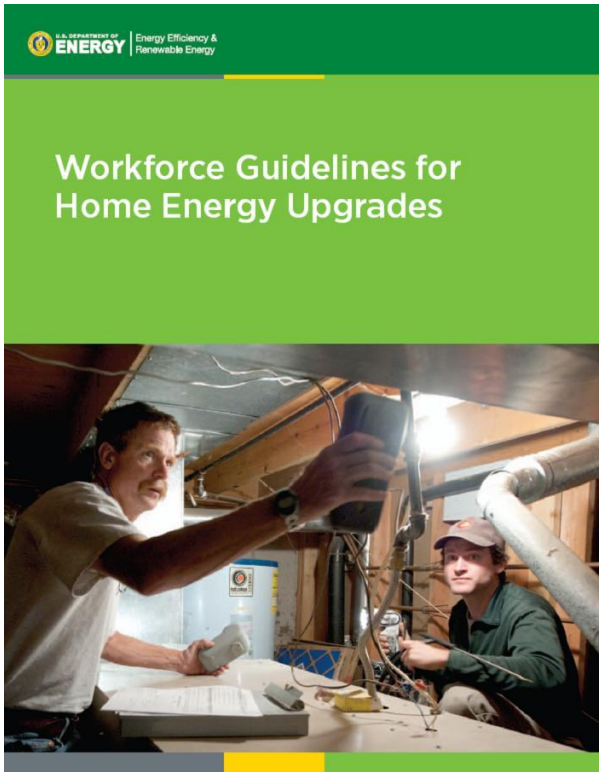
- Practical, voluntary guidance on maintaining and improving indoor air quality and environments during home energy upgrades, retrofits or remodeling
- Applies to existing single-family and multi-family low-rise residential buildings

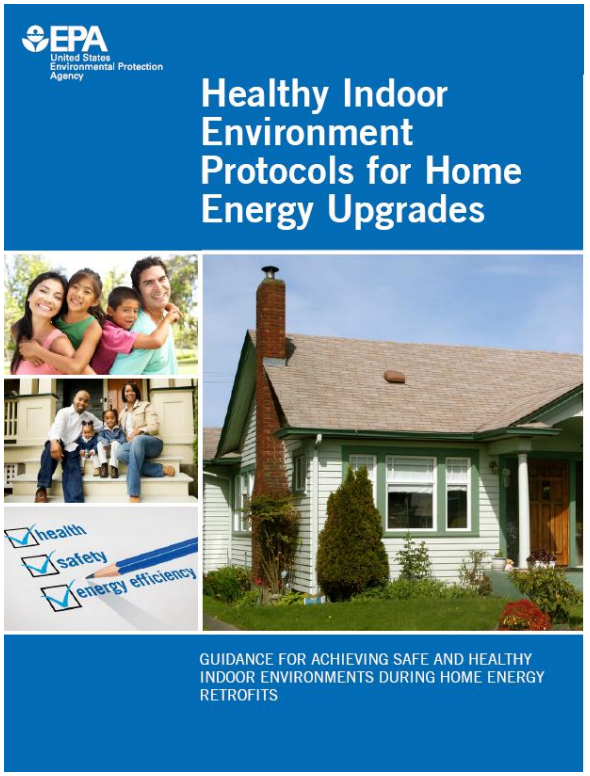


Recovery Through Retrofit
Workforce Development Guidelines



MIDDLECLASS TASK FORCE
THE VICE PRESIDENT of the UNITED STATES





EPA & DOE 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

Why Energy Upgrade Providers Need EPA's Protocols

What Can Go Wrong?

- **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)

Healthy Indoor Environment Protocols for Home Energy Upgrades

PRIORITY ISSUES	ASSESSMENT PROTOCOL	HEALTHY INDOOR ENVIRONMENTS	
		Minimum Actions	Expanded Actions

Priority health issues related to Home Energy Upgrades

Healthy Indoor Environment Protocols for Home Energy Upgrades

PRIORITY ISSUES	ASSESSMENT PROTOCOL	HEALTHY INDOOR ENVIRONMENTS	
		Minimum Actions	Expanded Actions

What to look for during the Home Energy Audit

Healthy Indoor Environment Protocols for Home Energy Upgrades

PRIORITY ISSUES	ASSESSMENT PROTOCOL	HEALTHY INDOOR ENVIRONMENTS	
		Minimum Actions	Expanded Actions

Minimum Actions to ensure the Home Energy Upgrades "Don't Make it Worse"

Healthy Indoor Environment Protocols for Home Energy Upgrades

PRIORITY ISSUES	ASSESSMENT PROTOCOL	HEALTHY INDOOR ENVIRONMENTS	
		Minimum Actions	Expanded Actions

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

Priority Indoor Air Quality Issues

***Contaminants*:**

- Asbestos
- Belowground Contaminants (Except Radon)
- Building Products/Materials Emissions
- Carbon Monoxide (CO) & Other Combustion Appliance Emissions (Nitrogen Oxides, Volatile Organic Compounds [VOCs] and Particulates)
- Environmental Tobacco Smoke (ETS)
- Garage Air Pollutants (CO, Benzene and other VOCs)
- Lead
- Moisture (Mold and Other Biologicals)
- Ozone
- Pests
- Polychlorinated Biphenyls (PCBs)
- Radon
- Wood Smoke and Other Solid Fuel Emissions

Priority Indoor Air Quality Issues (cont.)

Critical Building Systems for Healthy Indoor Environments:

- Heating, Ventilating and Air Conditioning (HVAC) Equipment
- Combustion Safety
  - Vented Combustion Appliances
  - Unvented Combustion Appliances
- Source Ventilation
- Whole-House Ventilation for Distributed Contaminant Sources
- Multi-Family Ventilation

Safety:

- Home Safety
- Jobsite Safety

Appendices:

- Worker Protections
- Client Education

Example Issue - Pests

Assessment:

- Identify evidence of mice, squirrels or other rodents; termites; birds; bats; cockroaches or other pests. 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.

Note

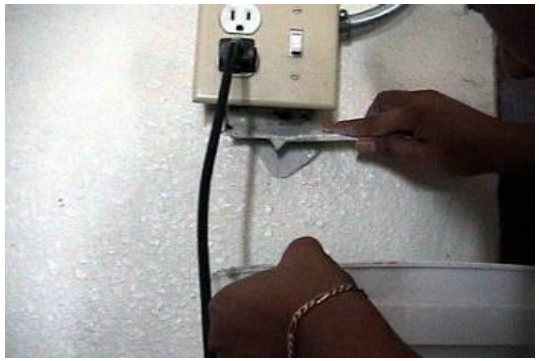
Termite and some other types of pest infestations are often an indication of moisture problems. See Moisture for diagnosing moisture problems.

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 (e.g., Greenpro, Greenshield or equivalently trained IPM professional).
- In areas with evidence of rodent infestations, patch with pest-resistant materials (e.g., copper mesh, hardware cloth, sheet metal, concrete) exterior holes that are larger than ¼ inch by ⅜ inch before applying air sealing materials (e.g., caulk or foam) OR before insulating.
- Advise owner/resident to regularly clean/fix screens or dampers over exterior air intakes and exhausts (e.g., at least semi-annually or when replacing HVAC filters). 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 AND, if feasible, apply boric acid or gels in holes for roach issues. Follow relevant state pesticide applicator standards.

  Note

  Some states require that pest management professionals be licensed.
- Provide sealable outside garbage cans OR advise clients to use them.

Healthy Indoor Environment Protocols for Home Energy Upgrades

Selected Minimum Actions (Abbreviated Examples)

Carbon Monoxide (CO)	• 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	• 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

Relationship to DOE Weatherization Guidance 11-6

- 11-6 is consistent with EPA's Healthy Indoor Environment Protocols for Home Energy Upgrades
- 11-6 requires as minimums:
  - CO testing and repairs to poorly performing equipment
  - Lead Safe Work Practices
  - ASHRAE 62.2 Enhanced Ventilation

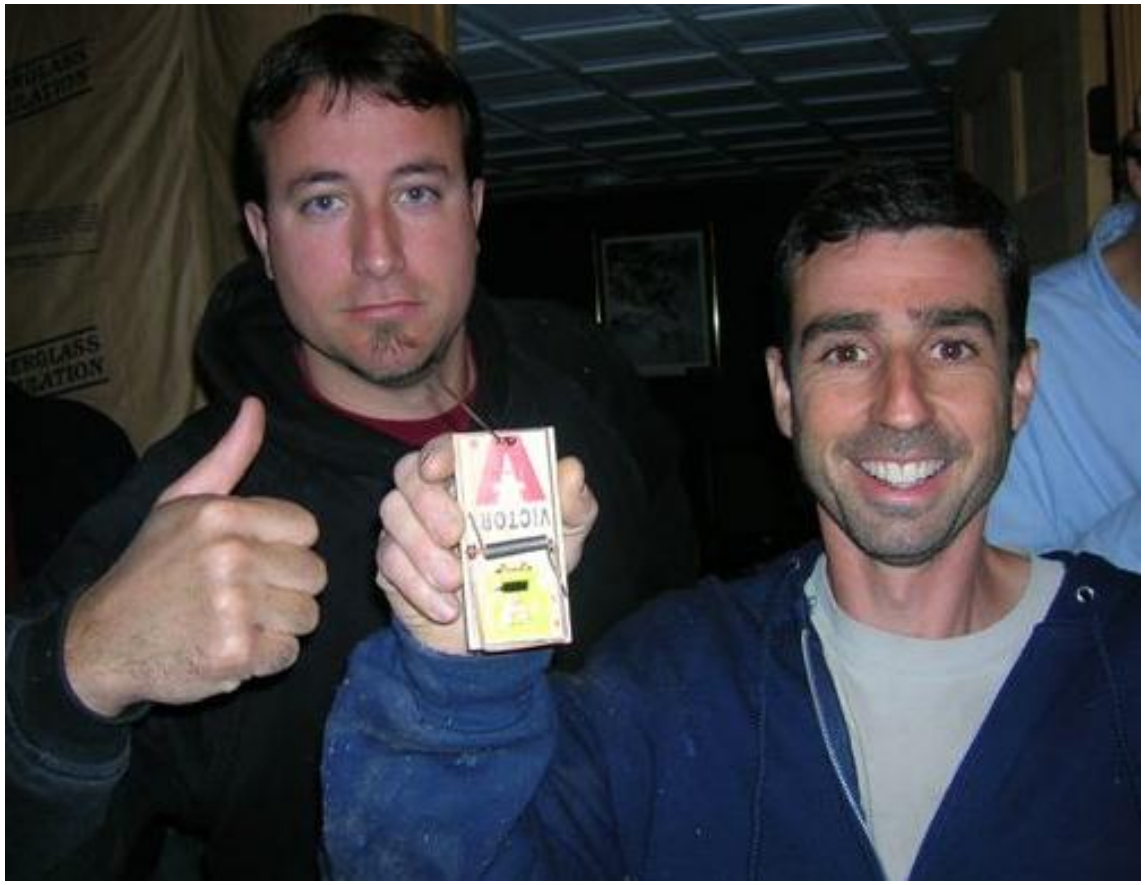
Relationship to DOE Weatherization Guidance 11-6

- 11-6 Allows Funds to Be Spent On - Examples
  - Asbestos: Testing; removing siding to allow insulation, encapsulation on pipes
  - CO: Testing, detectors, repairs or replacement if high CO
  - Electrical Repairs: Minor repairs
  - Injury Prevention: Minor repairs to protect WAP workers
  - Lead: RRP & Lead Safe Weatherization Training
  - Moisture: Minor repairs to allow weatherization and achieve durability
  - Pests: Removal when pests would prevent Weatherization; exclusion.
  - Radon: Testing in high radon areas; precautionary measures
  - Smoke & CO Detectors
  - Spray Foam precautions

Possible Applications

- Inform federal & state **weatherization** program health and safety practices
- Inform **utility** energy efficiency program standards and practices
- Inform **HUD** and **state housing** funded energy upgrade standards
- Develop or enhance standardized **training programs**
- Inform **private renovation and energy contractor** practices

The New Public Health Workforce



Healthy Indoor Environment Protocols for Home Energy Upgrades

And This…

EPA Tools to Assess and Improve Indoor Environmental Quality

For more information

Visit:

Indoor airPLUS : www.epa.gov/indoorairplus

Healthy Home Environment Protocols for Home Energy Upgrades:
http://www.epa.gov/iaq/homes/retrofits.html