# Connecting Occupant Health Benefits and Energy Efficiency

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# EE and Health Benefits

Outdoor air quality

- Societal benefits e.g., reduced emissions from power plants ($SO_x$, $NO_x$, PM, ozone) → improved public health and reduced medical costs

Climate Change

- Societal benefits e.g., reduced extreme weather → reduced insurance costs for all

Indoor air quality

- Occupant benefits due to improved indoor environment - *my focus today*
- Societal benefits - reduced costs to hospitals → reduced insurance costs for all

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# A Growing Asthma Epidemic in the U.S.

Of the **21.8 million** people reported to have asthma in the U.S., approximately **4.6 million** cases are estimated to be attributable to dampness and mold exposure in the home.

Dust Mites: Serious Allergens in Your Home

FEBRUARY 22, 2016 | ADASERVICES, TIPS & TROUBLESHOOTING | AIR QUALITY PROBLEMS, DUST MITES, HEALTH HAZARD, INDOOR AIR POLLUTANTS, RESPIRATORY PROBLEMS

Dust mites scavenging a bed sheet for dead skin (magnified 500 x) TIME

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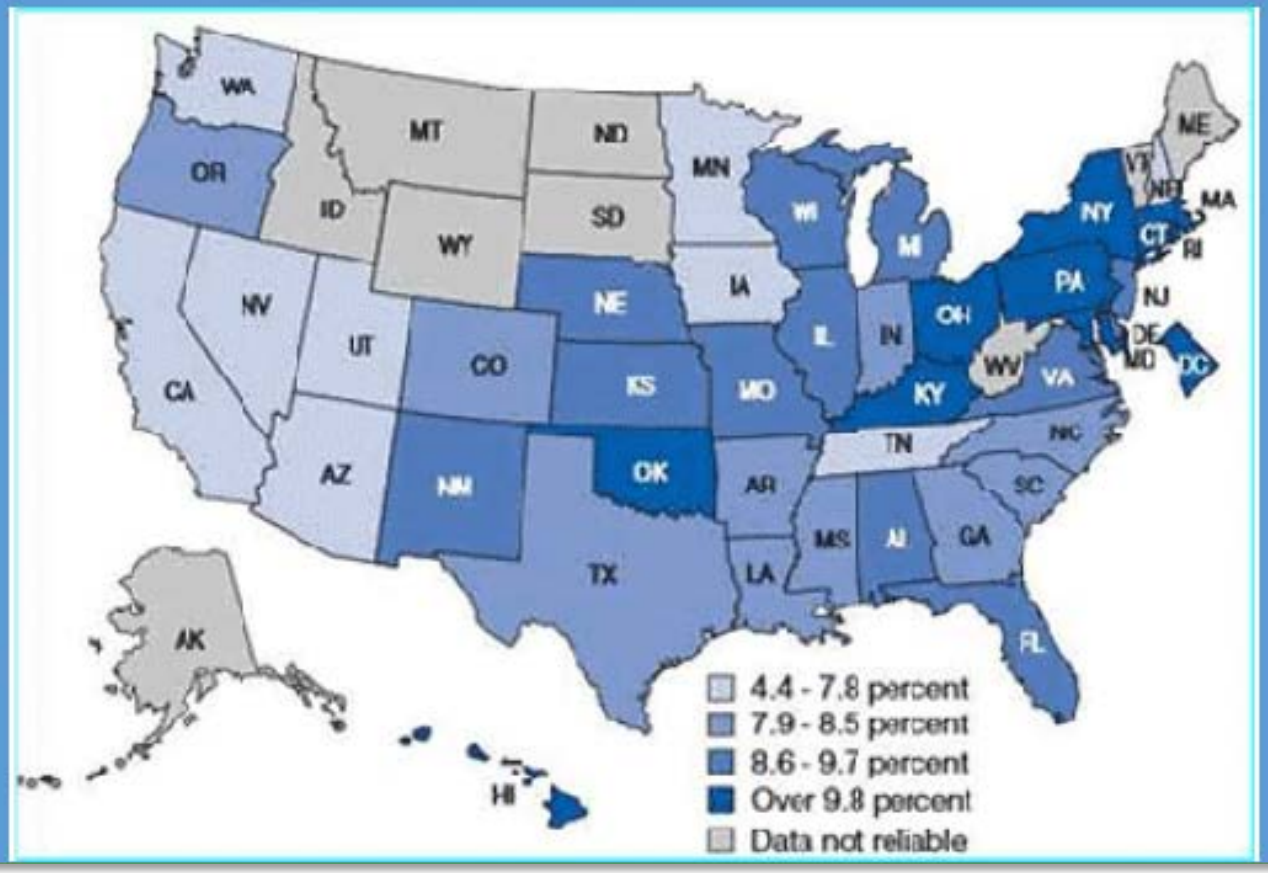
Courtesy of Larry Zarker, BPI

# Asthma Prevalence Intensity in Children (0-17)




Courtesy of Larry Zarker, BPI

# What Does Asthma Cost the US?

Yearly asthma costs = $56 billion

Direct costs = $50 billion (primarily hospital stays) or about $3,300 per person / year

Indirect costs = $6 billion (e.g., lost pay due to sickness, reduced work output)

Asthma Allergy Foundation of America – May 2015

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RESEARCHANDMARKETS
THE WORLD'S LARGEST MARKET RESEARCH STORE

The Indoor Air Quality Market totaled $7.8 billion in 2015, should total $8.3 billion in 2016, **and is expected to grow to $10.8 billion by 2021,** increasing at a compound annual growth rate of 5.3% from 2016 to 2021.

www.researchandmarkets.com/publication/mg23nzp/3877143

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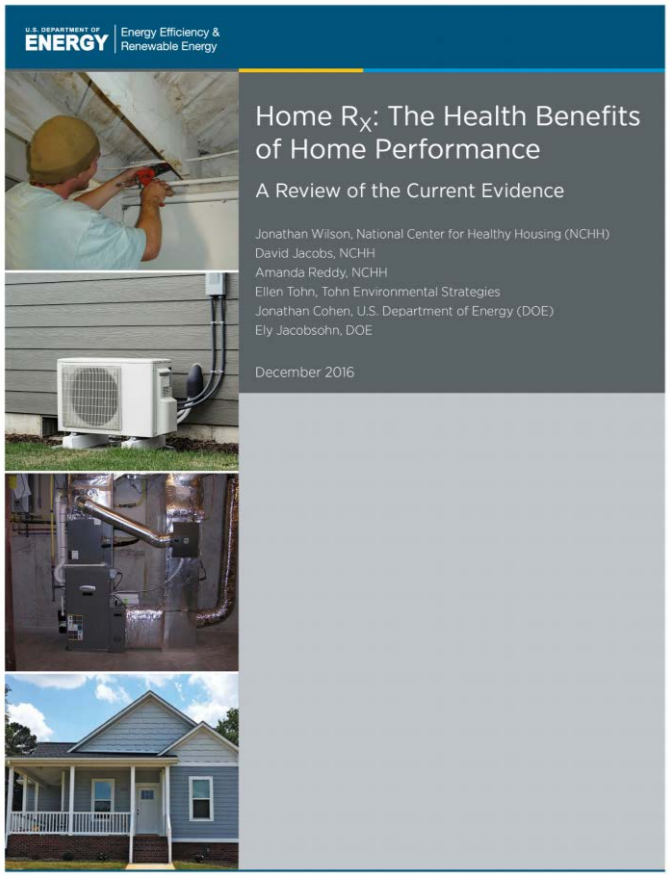
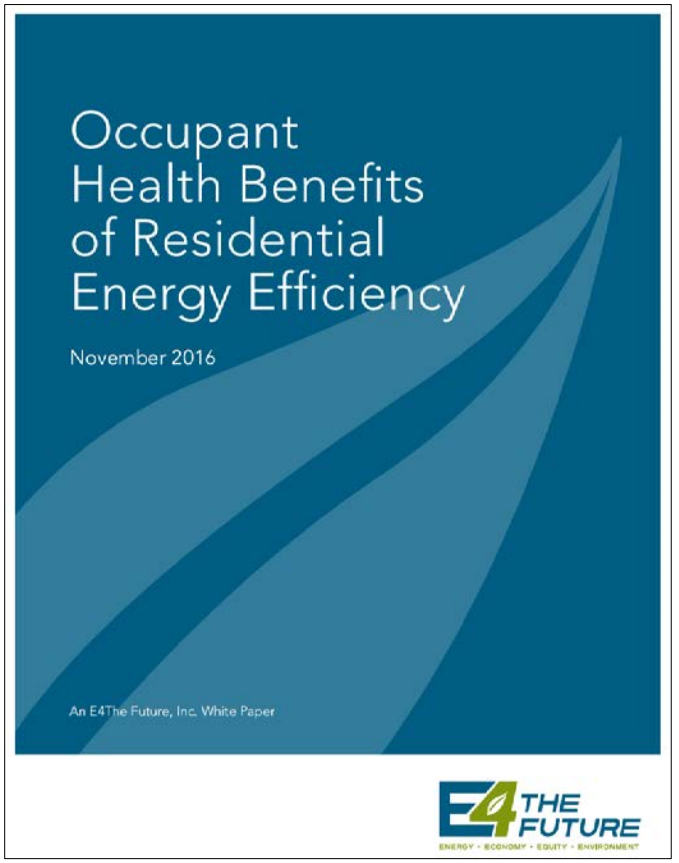
# Recent Reports




https://energy.gov/eere/buildings/downloads/home-rx-health-benefits-home-performance-review-current-evidence

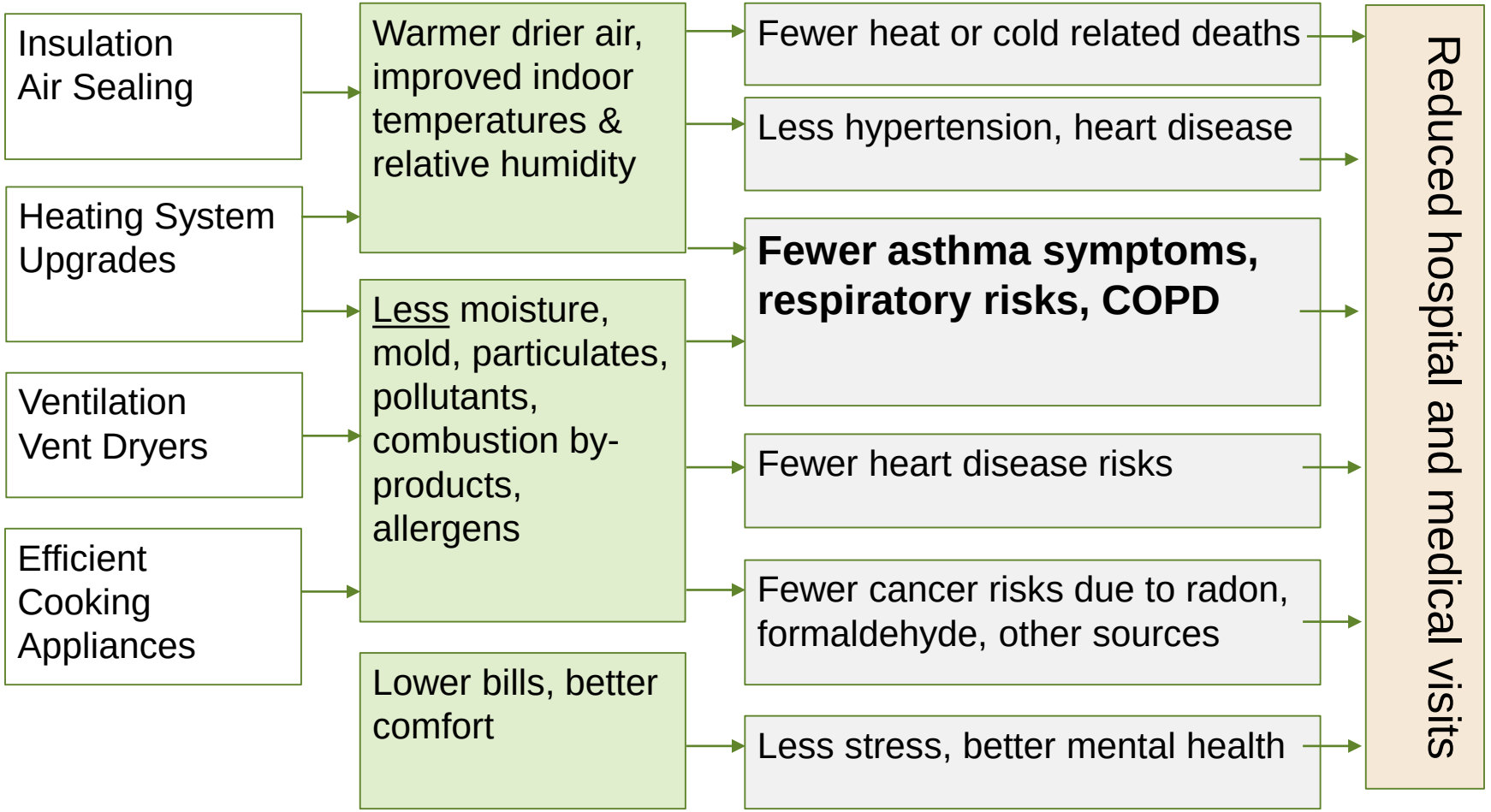



https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf

# E4TheFuture Report – Scope

- Reviews 14 studies that examined occupant health or indoor environmental benefits of residential EE and/or ventilation upgrades
- Discusses ways programs monetize occupant health co-benefits;
- Identifies research gaps; and
- Highlights innovative programs combining EE and health-focused home repairs

# How EE can Reduce Health Risks

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# Study Findings – EE & Health Benefits

- More studies in **low-income single family** homes.
- **Improvements strongest in vulnerable groups:** low-income households & those with pre-existing health conditions
- **Fewer asthma symptoms and respiratory related ED** visits after EE
  - 12% fewer asthma ED visits after weatherization
  - 23% less uncontrolled asthma when Wx added to home visits
  - Installation of ventilation → fewer asthma respiratory symptoms
- EE with **home repairs and client education** can produce greater improvements in asthma and indoor air quality
  - 46% drop in # homes reporting mold; 36% drop moisture
- Improvements in **$CO_2$, VOCs, and airborne mold**
- **Some increases in radon and formaldehyde** observed

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# Integrated Health & EE Programs

**Examples of program elements:**

- Basic weatherization, education, IAQ assessment, action plan
- Leveraged funding: CAP agency, health-care providers, local utility
- Hospital connects asthma patients (high ER utilizers) and home mobility concerns to community action agencies
- State legislation allows reimbursement for home assessments (acceptable credentials: BPI's HHE, and Health Home Specialist)

**Examples of existing programs:**

- WA Weatherization Plus Health Program
  Kansas MO - Children's Mercy Hospital Healthy Home Program
- VT Healthy Homes Initiative (NeighborWorks of Western Vermont and Rutland Regional Medical Center)

**BPI's Healthy Home Evaluator (HHE) Credential**

- Assesses home-based environmental health and safety hazards by integrating qualitative observations with quantitative diagnostics

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# Integrated Health + EE Programs and Cost-Effectiveness

- Increasing recognition of health related non-energy benefits: **the value ≠ $0**
- Participant impacts → symmetry of costs and benefits
- Opportunity to leverage health industry and 'share' home assessment costs i.e., coordinate healthy home and energy audit assessment

$$\frac{\textbf{BENEFITS} \uparrow}{\textbf{COSTS}} \qquad \frac{\textbf{BENEFITS}}{\textbf{COSTS} \downarrow}$$

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# Thank you!

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