Connecting Occupant Health Benefits and Energy Efficiency

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Julie Michals
Director of Clean Energy Valuation
Outdoor air quality
  • Societal benefits e.g., reduced emissions from power plants (SO$_x$, NO$_x$, PM, ozone) $\rightarrow$ improved public health and reduced medical costs

Climate Change
  • Societal benefits e.g., reduced extreme weather $\rightarrow$ reduced insurance costs for all

Indoor air quality
  • Occupant benefits due to improved indoor environment - *my focus today*
  • Societal benefits - reduced costs to hospitals $\rightarrow$ reduced insurance costs for all
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.

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
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
Recent Reports


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

- Insulation
- Air Sealing
- Heating System Upgrades
- Ventilation Vent Dryers
- Efficient Cooking Appliances

- Warmer drier air, improved indoor temperatures & relative humidity
- Less moisture, mold, particulates, pollutants, combustion by-products, allergens
- Lower bills, better comfort

- Fewer heat or cold related deaths
- Less hypertension, heart disease
- Fewer asthma symptoms, respiratory risks, COPD
- Fewer heart disease risks
- Fewer cancer risks due to radon, formaldehyde, other sources
- Less stress, better mental health

- Reduced hospital and medical visits
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 **CO₂, VOCs, and airborne mold**
- Some increases in radon and formaldehyde observed
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
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

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\frac{\text{BENEFITS}}{\text{COSTS}} \uparrow \quad \frac{\text{BENEFITS}}{\text{COSTS}} \downarrow
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Thank you!

Julie Michals

j michals@e4thefuture.org