Energy Codes: A Health Perspective

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Outline

1. Health Benefits: Power Plant Emissions

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2. Health Benefits: Building Occupants

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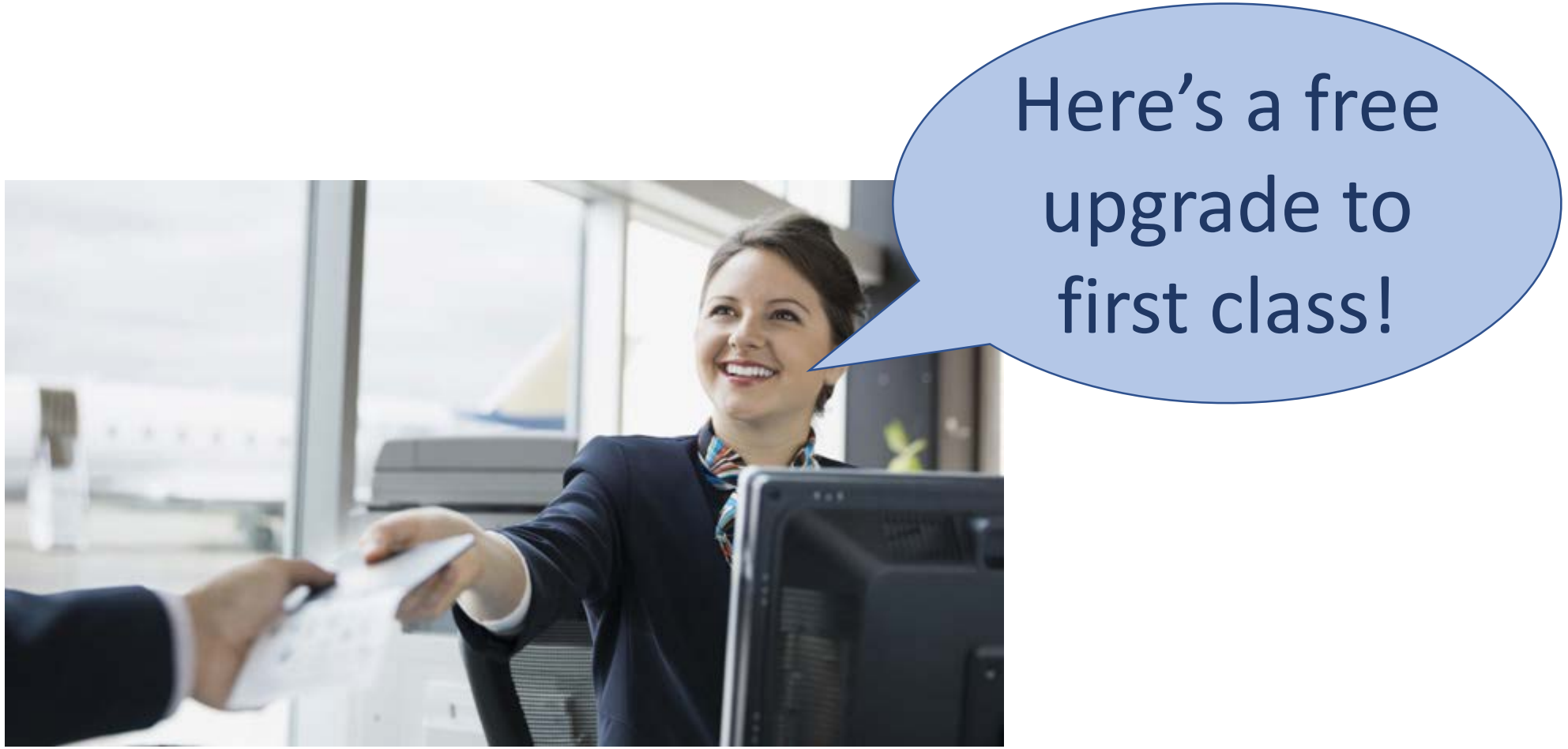
3. Ventilation Concerns

Many think codes just reduce *energy bills*, *grid load*, and *GHG emissions*. **Codes also promote human health.**



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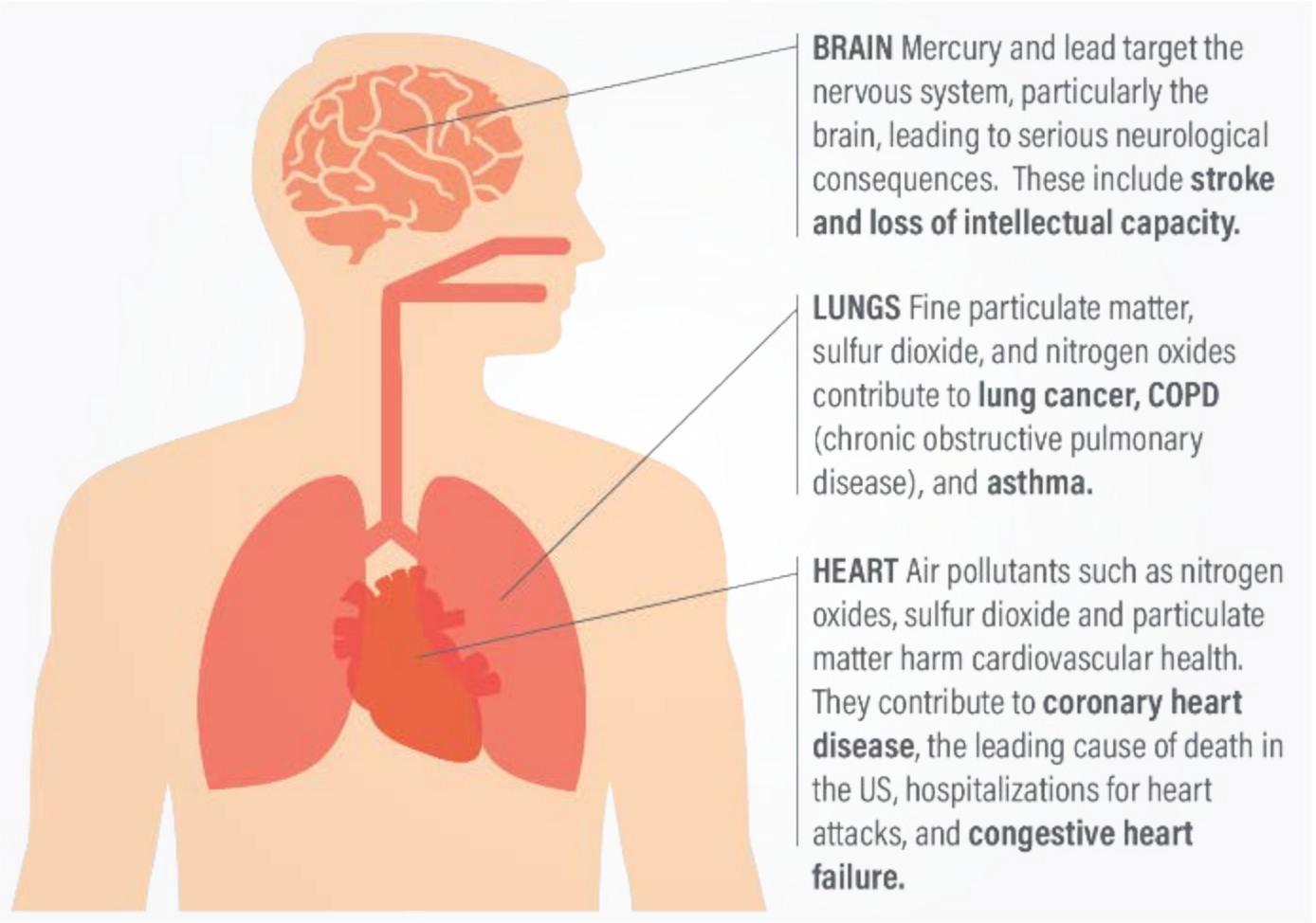
1. Health Benefits: Environment

Health effects of fossil fuel pollutants



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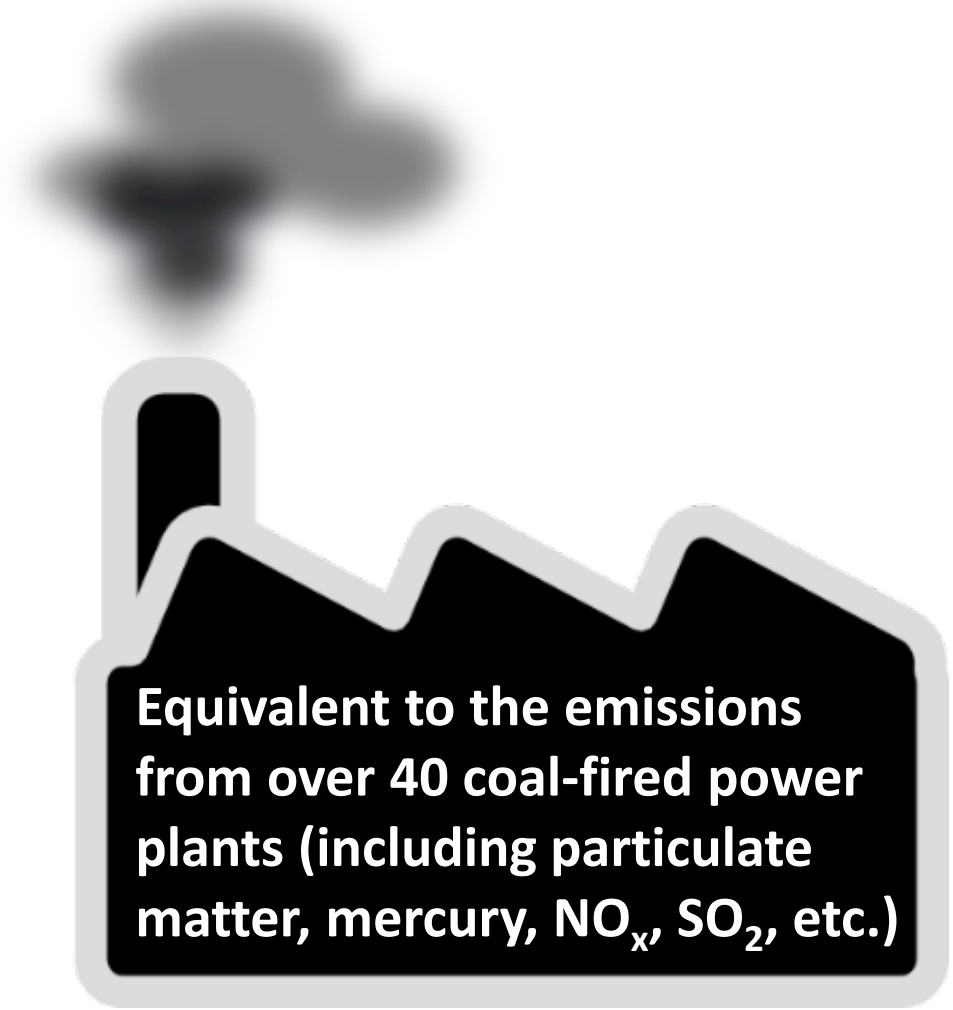
PSR
PHYSICIANS FOR SOCIAL RESPONSIBILITY

Source: aceee.org/sites/default/files/ee-health-1008.pdf

A 2015 ACEEE analysis shows that if states updated to current energy codes, it would avoid between 102 and 169 MMT of CO_2.

Table 1. National electricity, pollution, and cost savings from building energy codes

	Low Savings case	High Savings case
2020 electricity savings (million megawatt-hours [MWh])	36	48
2030 electricity savings (million MWh)	139	232
2030 savings as a percentage of		
Efficiency in target	35%	59%
2012 covered generation	5%	9%
2030 baseline sales	3%	5%
2030 carbon dioxide reductions (MMT)		
Electric sector emissions rate	76	126
Covered generation emissions rate	102	169
Financial		
Net savings (billion $)	149	228
Benefit–cost ratio	3.1	2.9



Equivalent to the emissions from over 40 coal-fired power plants (including particulate matter, mercury, NO_x, SO_2, etc.)

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Sources: aceee.org/white-paper/building-codes-111d, www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Use our calculator called **SUPR2** to estimate state-level saved energy; avoided SO_2, NO_x and CO_2; and saved dollars.

Step 1

Select state	Texas	←Dropdown

Step 3

Results →

Step 2

Select between 1 and 10 measures from the dropdown. Any measure can be selected more than once and the results will be additive.

			Description of selected measure
1.	Building energy codes (low)	←Dropdown	Reflects state adoption of codes equivalent to the 2015 IECC for homes and ASHRAE Standard 90.1-2013 for commercial buildings, the current versions of the national model energy codes.
2.	Building energy codes (high)	←Dropdown	Reflects the adoption of the national models as they are updated on three-year cycles, i.e., states adopt codes equivalent to the 2015 IECC for homes and ASHRAE Standard 90.1-2013 for commercial buildings in 2017, then adopt the 2018 IECC and ASHRAE Standard 90.1-2015 in 2020, and adopt improved codes every three years through 2030. Also assumes better compliance rates.

1. Enter parameters

2. Get results

Source: State and Utility Pollution Reduction Calculator Version 2 (SUPR 2)
aceee.org/research-report/e1601

EPA's AVERT and COBRA tools allow users to calculate pollution at a county level and estimate health impacts.

Sources: www.epa.gov/statelocalenergy/avoided-emissions-and-generation-tool-avert; www.epa.gov/statelocalenergy/co-benefits-risk-assessment-cobra-health-impacts-screening-and-mapping-tool

Save Energy. *Protect Health.*

Reducing annual electricity use by **15%** with ***ENERGY EFFICIENCY*** would reduce air pollution, and...

+ Save more than ***SIX LIVES*** every day

+ Prevent nearly ***30,000 ASTHMA EPISODES*** each year

+ Save Americans up to ***$20 BILLION*** in avoided health harms annually

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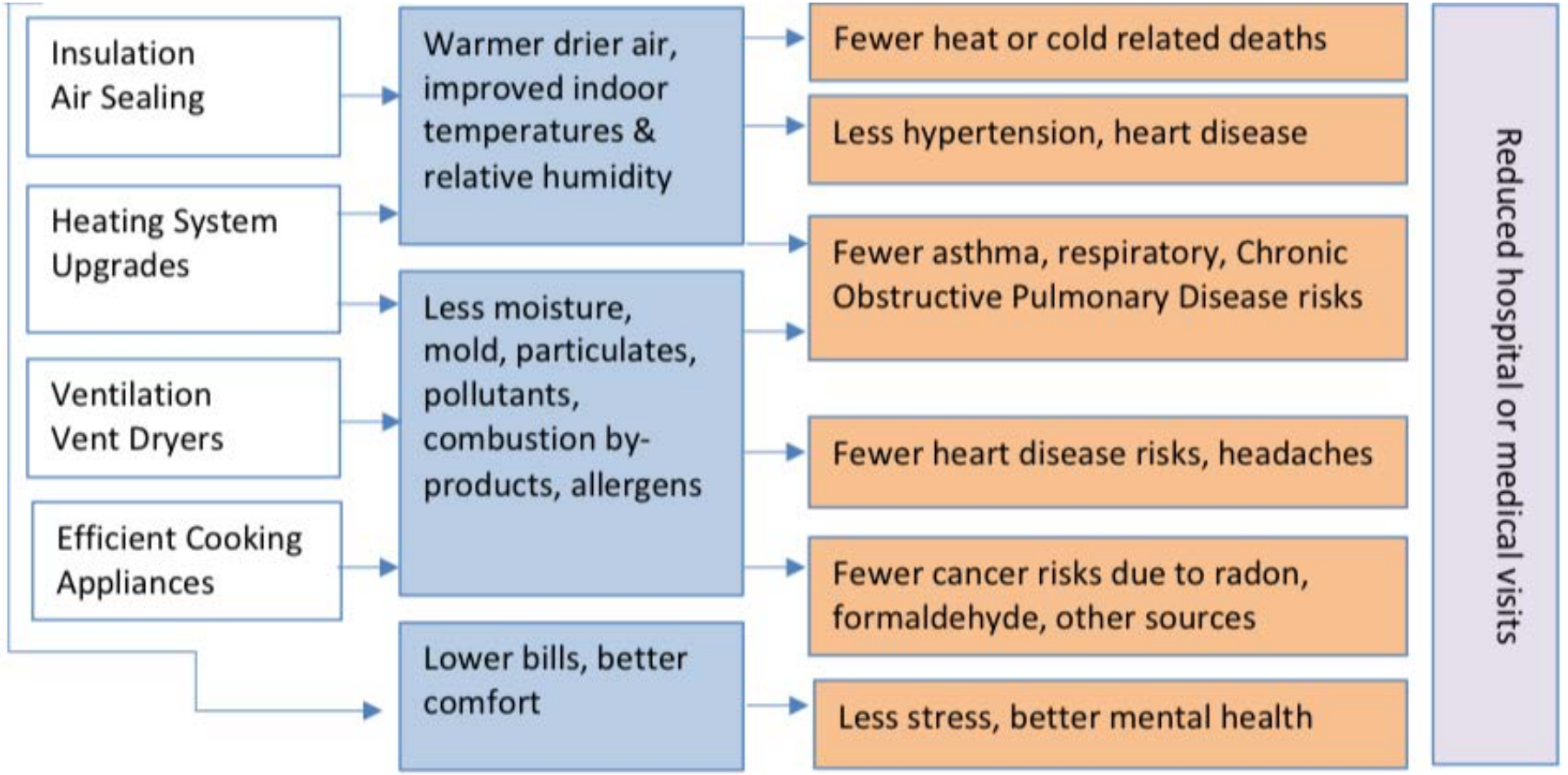
2. Health Benefits: Building Occupants

EE improves health of building occupants



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

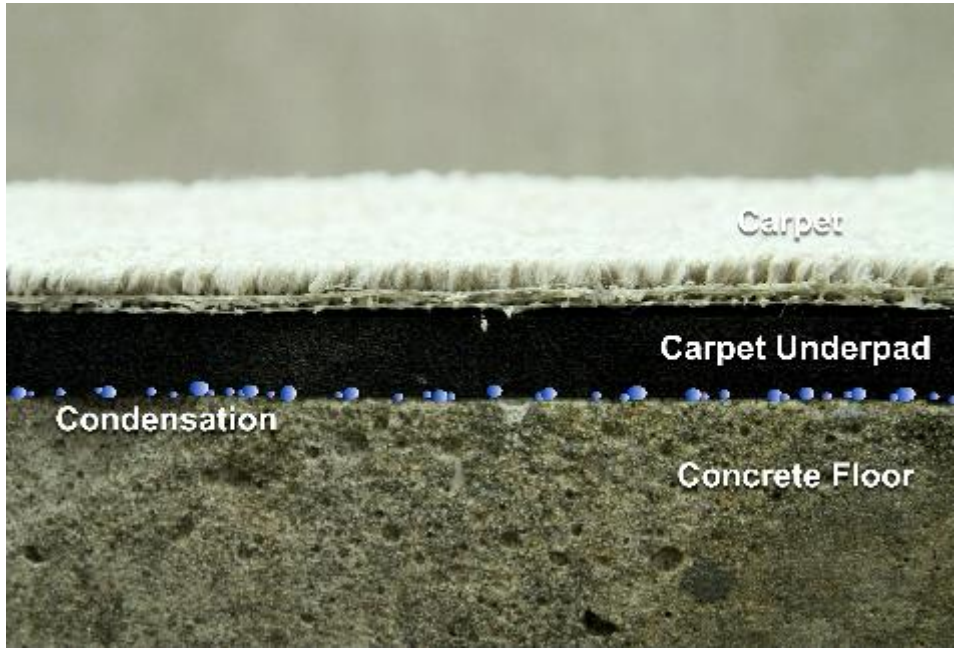
Air sealing & stringent thermal envelope requirements help prevent mold, mildew, fungal growth and dust mites.

Mold/mildew on walls

Black mold on concrete floor

Source: BUILDING ENERGY CODES: Creating Safe, Resilient, and Energy-Efficient Homes
https://www.imt.org/wp-content/uploads/2018/02/non-energy_benefits_of_energy_codes_report.pdf
Authors: Ryan Meres, RESNET & Eric Makela, NBI

For example, codes require slab edge insulation, which prevents mold from growing in carpeted basements.



warm air + cold concrete = condensation

condensation + nutrients = mold

Source: BUILDING ENERGY CODES: Creating Safe, Resilient, and Energy-Efficient Homes
https://www.imt.org/wp-content/uploads/2018/02/non-energy_benefits_of_energy_codes_report.pdf
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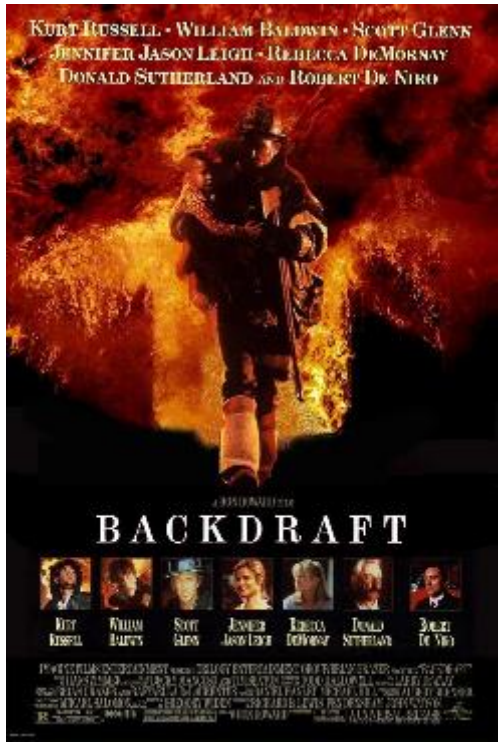
Energy codes prevent duct leakage, which could cause backdrafting and pull hazardous gases into the house.

Hazardous gases could come back into the house here



(this is a different backdraft)

Source: BUILDING ENERGY CODES: Creating Safe, Resilient, and Energy-Efficient Homes
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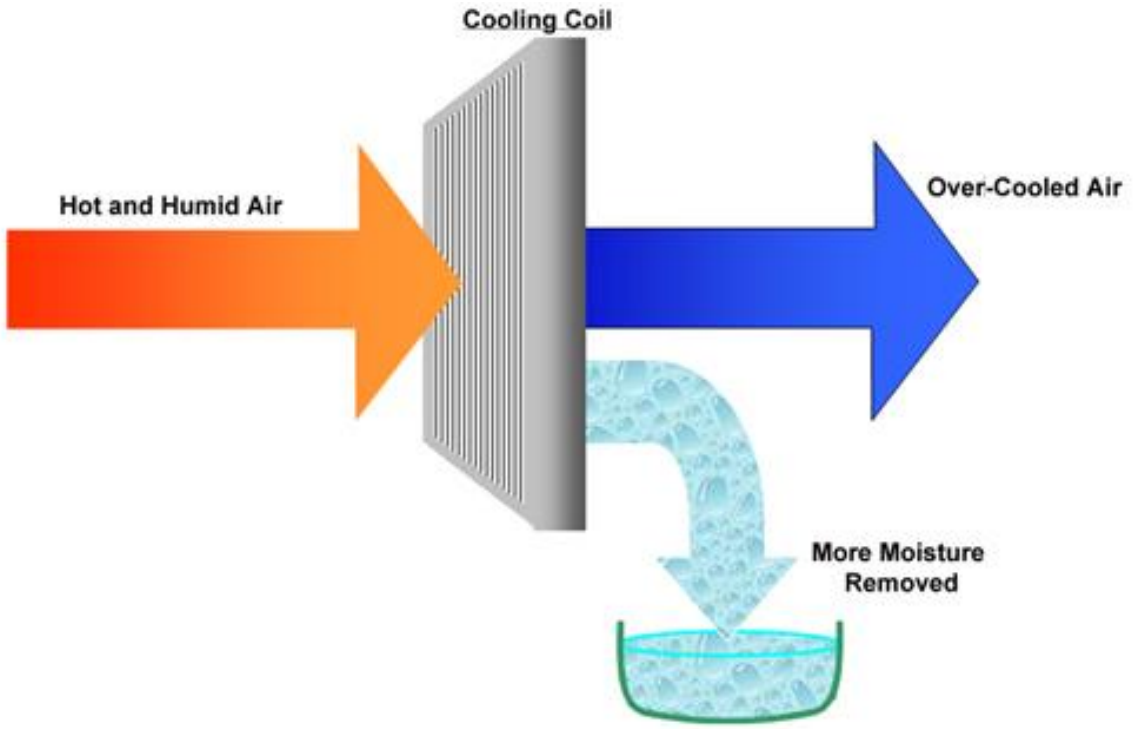
Requiring contractors to use ACCA Manual J to size an HVAC system helps prevent humidity issues.



Properly sized cooling coils will remove more moisture from the air

Source: BUILDING ENERGY CODES: Creating Safe, Resilient, and Energy-Efficient Homes
https://www.imt.org/wp-content/uploads/2018/02/non-energy_benefits_of_energy_codes_report.pdf
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40% of asthma is associated with home exposures (e.g., mold spores, pollutants, pests).

1 in 10 school-aged children has asthma

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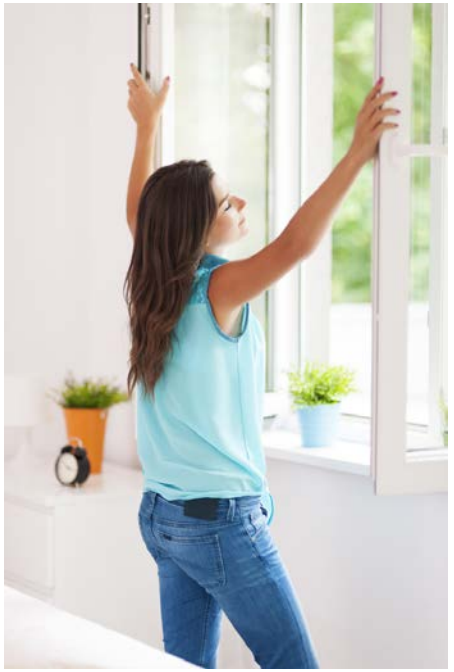
Source: www.cdc.gov/vitalsigns/asthma/index.html

3. Ventilation Concerns

IECC ventilation rates are based on ASHRAE 62.2-2010, which is less stringent than -2013 & -2016.



Philosophy 1: We don't have sufficient evidence to increase ventilation in homes. Leave it to the homeowner to control.

Philosophy 2: Energy codes make homes tighter. Strict ventilation requirements prevent buildup of $PM_{2.5}$, NO_2, ozone, etc.

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ACEEE is starting to investigate some key industry concerns regarding ventilation, including:

1. Current codes are optimized for energy and not health
2. Standards like ASHRAE 62.1 and 62.2 are not widely adopted
3. Even when adopted, they are often not met
4. The tighter the building envelope gets, the more important ventilation becomes

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Resources for ventilation debate:

Advocates for increased residential ventilation:

- Journal Article: www.ncbi.nlm.nih.gov/pubmed/21392118
- ASHRAE 62.2-2016 Standard: www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2

Advocates for minimal residential ventilation:

- BSC Article: buildingscience.com/documents/insights/bsi069-unintended-consequences-suck
- BSC Standard: buildingscience.com/documents/special/ventilation-new-low-rise-residential-buildings

Both sides:

- 2018 Article: www.energyvanguard.com/blog/update-residential-ventilation-debate
- 2013 Article: energyvanguard.com/blog/62474/Lstiburek-Has-New-Ventilation-Standard-Resistance-May-Not-Be-Futile
- 2013 Article: www.greenbuildingadvisor.com/blogs/dept/musings/how-much-fresh-air-does-your-home-need

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Recap

1. Health Benefits: Power Plant Emissions

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2. Health Benefits: Building Occupants

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3. Ventilation Concerns

Energy codes reduce power plant emissions (particulate matter, mercury, NO_x, SO_2, etc.)

Energy codes reduce pollutants within a building (mold, mildew, fungus, hazardous gases, etc.)

As buildings become tighter, do we need more stringent ventilation standards?

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2018 Conference on Health, Environment and Energy

Hyatt Centric French Quarter, New Orleans, LA

December 3-5, 2018

https://aceee.org/conferences

Registration opens August 6. Book your hotel room now!