Guidelines for Healthier Homes

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Course Description

Guidelines for Healthier Homes

Health is a growing concern of homebuyers and builders.

Building professionals are not health professionals, but we have more influence on people's health than we may realize.

Review how ENERGY STAR and Indoor airPLUS contribute to healthy homes, and learn how to up your 'health' game a step further using new tools and findings.

Learning objectives

- Better understand how to protect human health through home design & construction
- Go beyond basic protection to optimize occupant health
- Identify established tools & resources to support healthy building choices
- Commit to including one new health intervention on your next project

How do buildings
impact human health?

What determines health outcomes?

>5%	Genetics/biology
≈20%	Lifestyle/behavior
≈20%	Medical care
≈55%	Physical & social environment

It's not your genetic code...

it's your zip code!

Source: https://www.cdc.gov/nchhstp/socialdeterminants/faq.html

Scary statistics

90% Time we spend indoors

75% Deaths caused by chronic disease, up from 13% in 1800

85% Of the 82,000 chemicals in use lacking available health data

Today's kids are the first generation expected to have shorter life expectancy than their parents

Source: Fitwel Ambassadors Training Video 2017

Reasons for Hope:

We know more now than we have ever known!

Research Example: LBNL Kitchen Exhaust

The New York Times

The Kitchen as a Pollution Hazard

BY PETER ANDREY SMITH JULY 22, 2013 3:19 PM Comment

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By midmorning, the smell of hot peanut oil dissipated and inside the tightly sealed laboratory known as Building 51F, a pink hamburger sizzled in a pan over a raging gas flame. Overhead, fans whirred, whisking caustic smoke up through a metallic esophagus of ductwork.

Lisa Haney

Woody Delp, 49, a longhaired engineer in glasses — the Willie Nelson of HVAC — supervised the green bean and hamburger experiments. He sat at a computer inside a kitchen simulator, rows upon rows of numeric data appearing on

Research Example: #THECOGFXSTUDY

The business case for healthy buildings: extrapolating workplace findings to dwellings

First objective:

Do No Harm

HUD's 8 Healthy Homes Principles

1. Keep it Dry
2. Keep it Clean
3. Keep it Safe
4. Keep it Well Ventilated
5. Keep it Pest-free
6. Keep it Contaminant-free
7. Keep the Home Maintained
8. Maintain Thermal Control

https://www.hud.gov/program_offices/healthy_homes/healthyhomes

9 Foundations of a Healthy Building

1. Ventilation
2. Air Quality
3. Thermal Health
4. Moisture
5. Dust & Pests
6. Safety & Security
7. Water Quality
8. Noise
9. Lighting & Views

Harvard's T.H. Chan School of Public Health – Center for Health and the Global Environment

https://9foundations.forhealth.org/

EPA: Human Health is affected by…

- Environmental Tobacco Smoke
  40,000 deaths/year just secondhand

- Biological contaminants
  mold, pollen, dander, bacteria, viruses

- Combustion byproducts
  Effective kitchen exhaust?

- Household products/practices
  Harder to clean surfaces = more chemicals

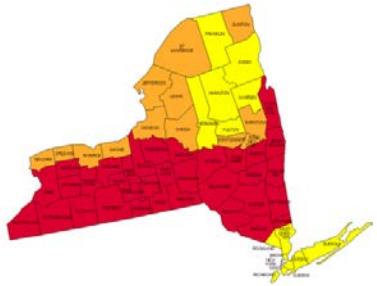
Source: EPA, CDC and others


Recessed mat helps collect Schnoodle debris

cont'd: Human Health is affected by…

- Toxic materials
  Living Building Institute resource
- Radon
  40,000 deaths/yr
- Safety and security
  Creative solutions
- Diet & Exercise
  Encourage movement, health

The 'Red' List



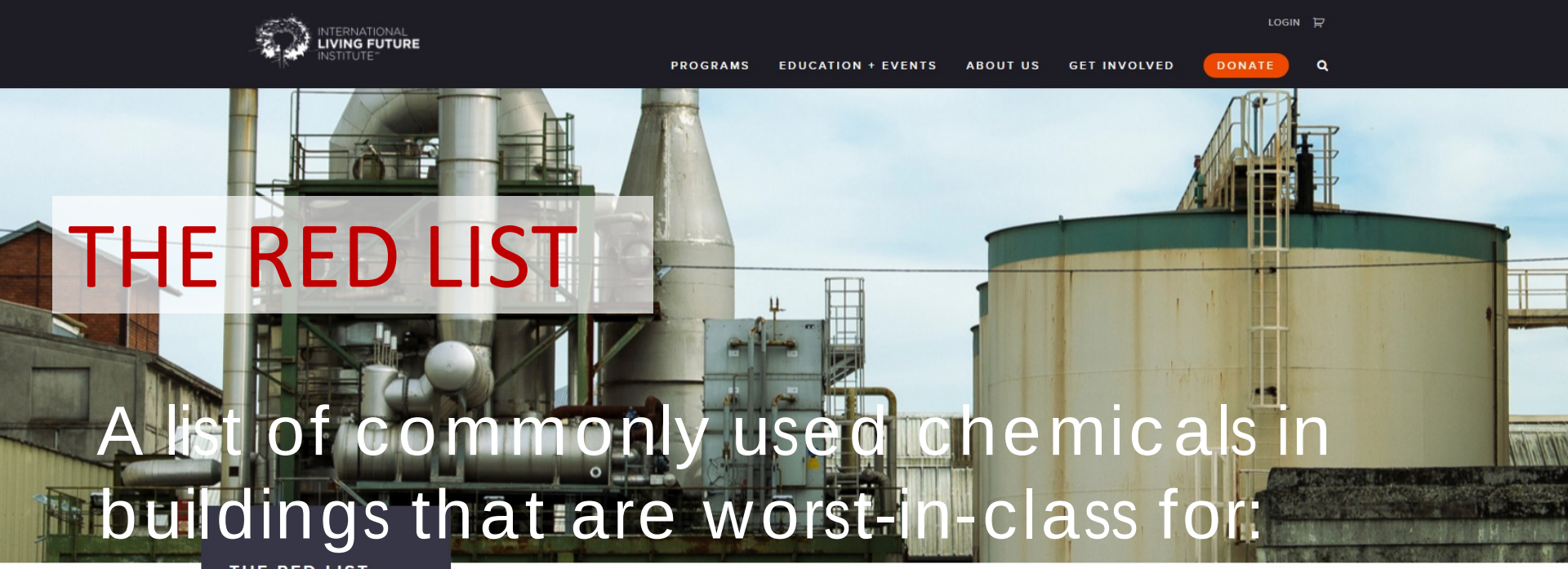
Source: EPA, CDC and others

Emerging topic: Toxic materials

- Asbestos
- Cadmium
- **Chlorinated Polyethylene & Chlorosulfonated Polyethlene**
- Chlorofluorocarbons (CFCs)
- Chloroprene (Neoprene)
- Formaldehyde (added)
- Halogenated Flame Retardants
- Hydrochlorofluorocarbons (HCFCs)
- Lead (added)
- Mercury
- Petrochemical Fertilizers and Pesticides
- **Phthalates**
- **Polyvinyl Chloride (PVC)**
- Wood treatments containing Creosote, Arsenic or Pentachlorophenol

The 'Red' List

LIVING BUILDING CHALLENGE℠



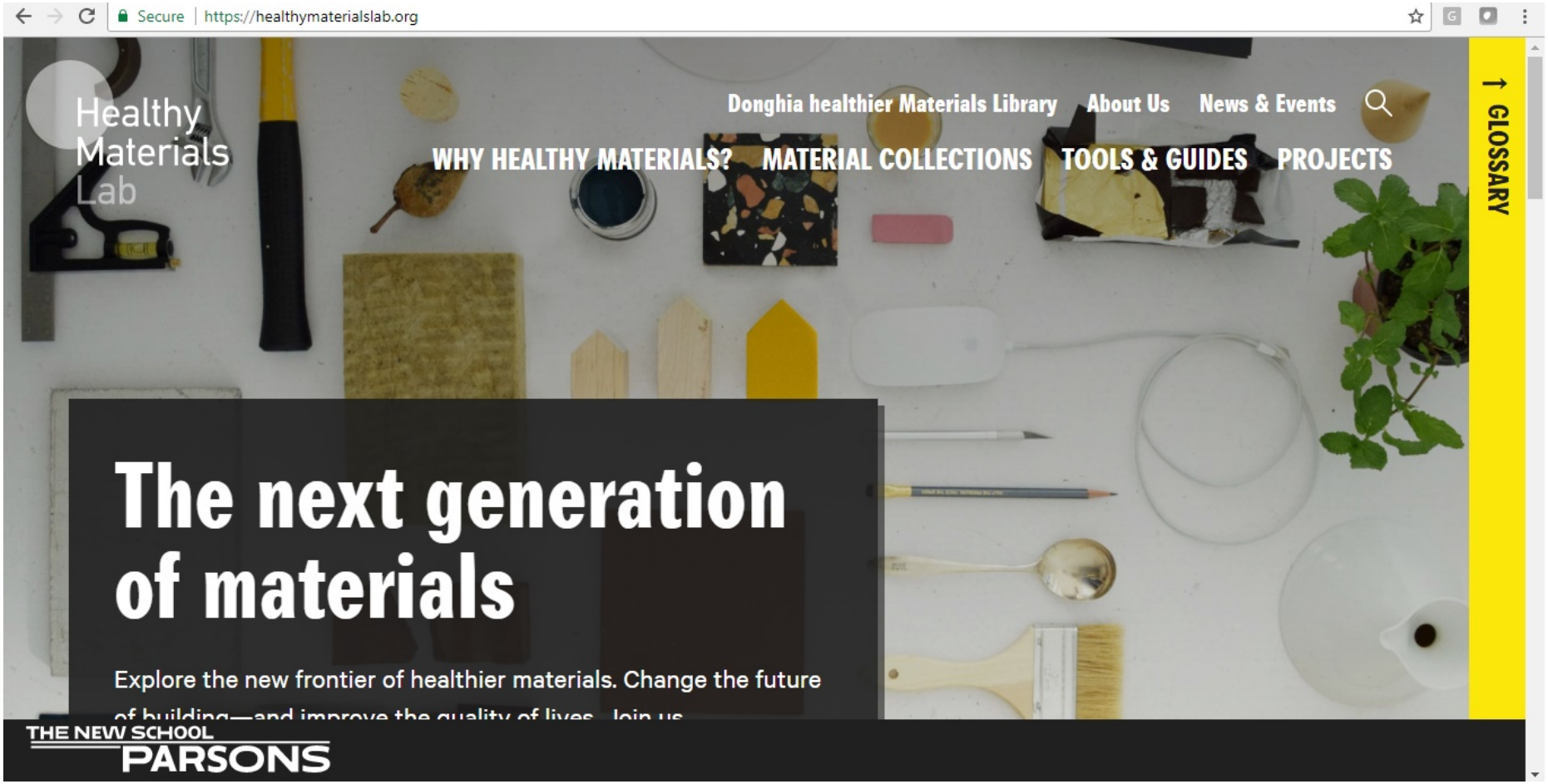
THE RED LIST

A list of commonly used chemicals in buildings that are worst-in-class for:

THE RED LIST

- Polluting the environment
- Bio-accumulating up the food chain until they reach toxic concentrations
- Harming construction and factory workers

Resource: Healthy Materials Lab



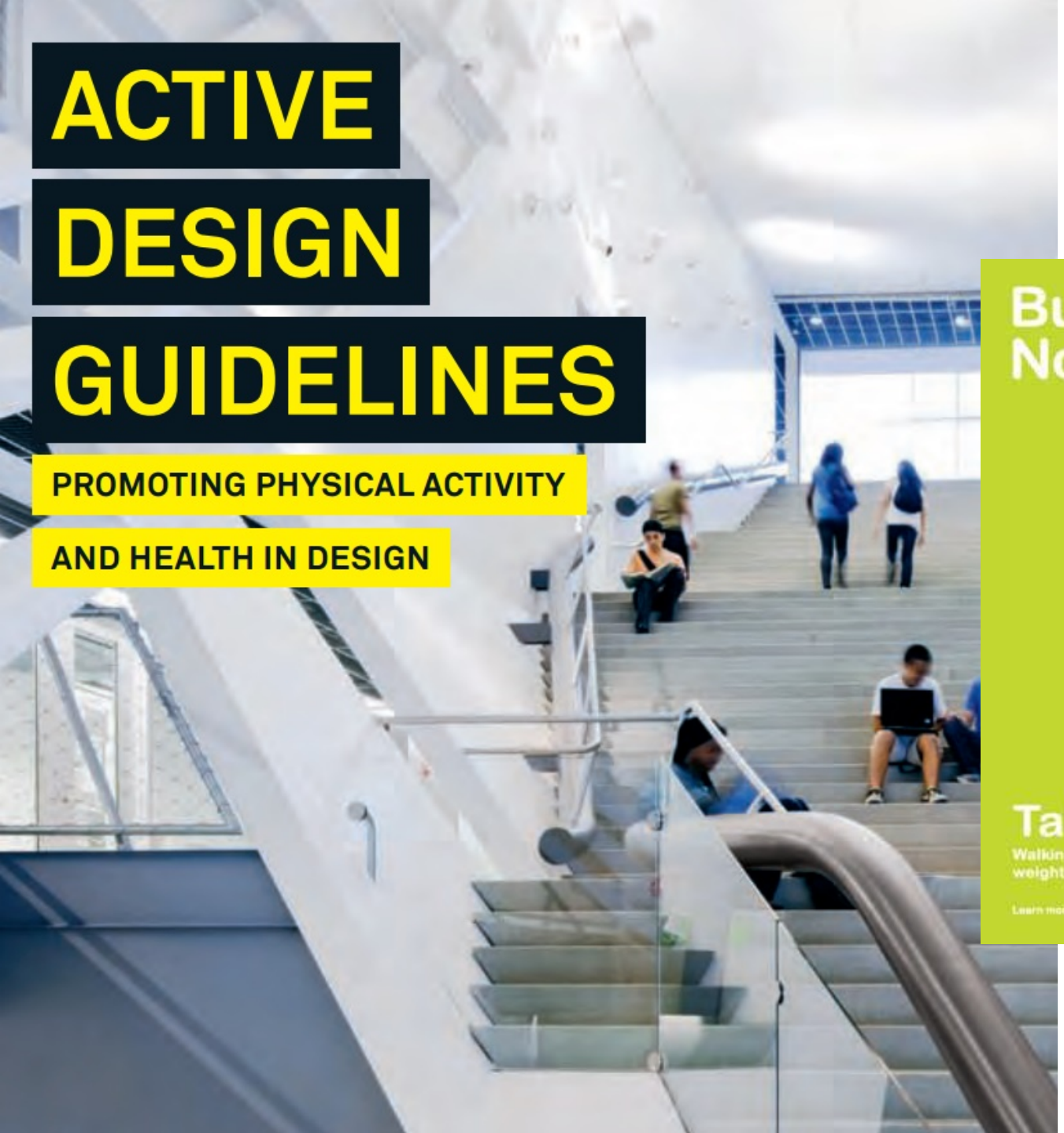
Emerging topic: Active Design

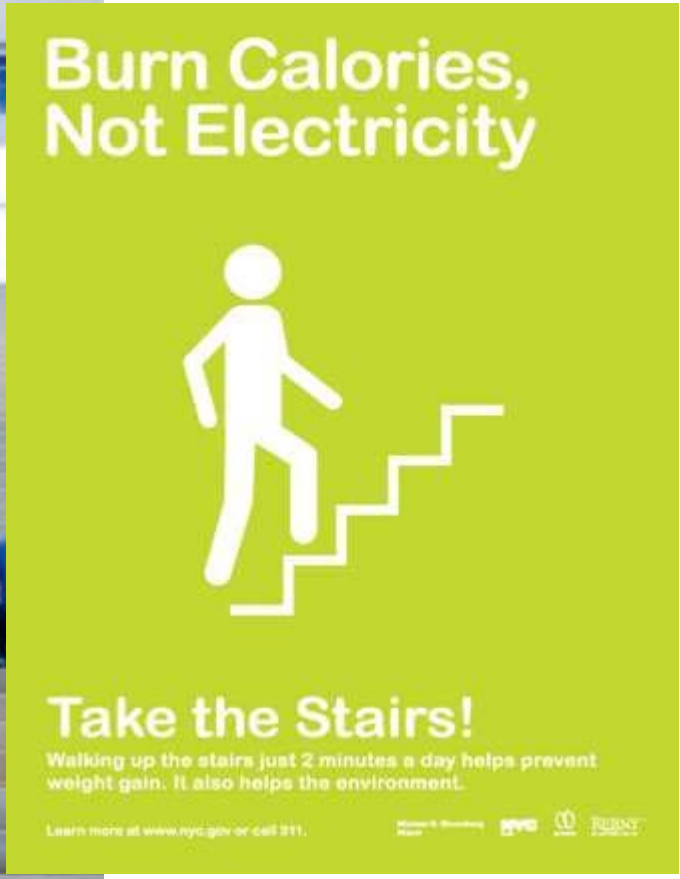
Physical inactivity rivals smoking as the leading cause of preventable death in the world. A 25% increase in physical activity could avert 1.3million deaths worldwide yearly.

Source: Fitwel Ambassadors Training Video

Solution: Design buildings so people enjoy MOVING, and have safe spaces in which to move!

Resource


ACTIVE
DESIGN
GUIDELINES
PROMOTING PHYSICAL ACTIVITY
AND HEALTH IN DESIGN


Burn Calories,
Not Electricity
Take the Stairs!
Walking up the stairs just 2 minutes a day helps prevent weight gain. It also helps the environment.
Learn more at www.nyc.gov or call 311.

Research fatigue?

Where do we start?

Tools Overview

Tools we can access today include…

- ENERGY STAR Homes
- Indoor airPLUS
- Green Communities 2015
- LEED v4
- WELL Building Standard (MF)
- Active Design Guidelines
- Fitwel (MF)

	ES	IAP	EGC 2015	LEED v4	WELL	Fitwel
Environmental Tobacco Smoke			✓	✓	✓	✓
Biological contaminants	✓	✓	✓	✓	✓	✓
Combustion byproducts	✓	✓	✓	✓	✓	
Household products/practices			✓	✓	✓	✓
Toxic materials		✓	✓	✓	✓	✓
Radon		✓	✓	✓	✓	
Safety and security						✓
Diet & Exercise			✓	✓	✓	✓

Indoor airPLUS
CONSTRUCTION SPECIFICATIONS

Indoor Air Plus Construction Specs

- ENERGY STAR Homes v3
- Moisture Control
- Radon
- Pests (light touch)
- HVAC Systems including filtration
- Combustion Pollutants
- Materials (paint, carpet, composite wood)

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Radon		✓	✓	✓	✓	
Safety and security						✓
Diet & Exercise			✓	✓	✓	✓

Enterprise Green Communities Criteria

In addition to IAP items...

- Design for Health & Health Action Plans
- Access to fresh local food
- Active design & Universal design
- Low-emitting adhesives, sealants, coatings, hard flooring
- Asthmagen-free materials option (no phthalates, PVC finishes)
- Smoking ban option
- Integrated pest management for MF

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Radon		✓	✓	✓	✓	
Safety and security						✓
Diet & Exercise			✓	✓	✓	✓

LEED® v4 for Homes

IAP + EGC plus:

- Airborne erosion control
- Air quality testing option
- CA Section 01350 for low-emitting products
- Composite wood No Added Urea Formaldehyde or Ultra Low Emitting Formaldehyde

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Safety and security						✓
Diet & Exercise			✓	✓	✓	✓

Beyond Do-No-Harm:

Health Optimization

WELL Building Standard

Health-focused standard for commercial and multifamily focused on:

1. Air
2. Water
3. Nourishment
4. Light
5. Fitness
6. Comfort
7. Mind

WELL – uncharted territory?

- Water
  - Testing for organic, inorganic, and agricultural contaminants
  - Drinking water promotion
- Light
  - Light levels, color temperature, and circadian lighting design
  - Blackout shades for better sleeping

WELL – uncharted territory?

- Comfort
  - Ambient noise levels, exterior and interior sources
- Mind
  - Biophilic design
  - Health and wellness awareness (education of occupants)

	ES	IAP	EGC 2015	LEED v4	WELL	Fitwel
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Fitwel

Developed by CDC + GSA to address workplaces.

Meant to be do-able for all, with a much lower bar to entry than WELL, and used for benchmarking as well as certification.

Available for buildings, tenant spaces, and now multifamily.

Fitwel's 7 Health Impact Categories

1. Impacts community health
2. Reduces morbidity + absenteeism
3. **Social equity for vulnerable populations**
4. Increases physical activity
5. Promotes occupant safety
6. Provides healthy food options
7. **Instills feelings of well-being** stress, emergency procedures

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Safety and security						✓
Diet & Exercise			✓	✓	✓	✓

We do not have to do everything at once.

It is OK to pick and choose strategies.

Choosing the best strategies

Example: **Smoke Free Building**

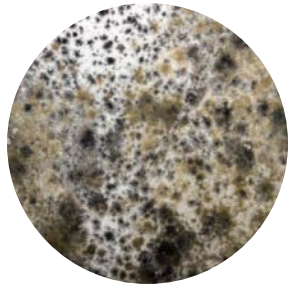
BEST
- WELL : Smoking ban

BETTER
- LEED v4: ban in public areas; compartmentalization required; points for nonsmoking
- IAP: silent (targets homebuilders)

GOOD
- EGC 2015: points for nonsmoking

Choosing the best strategies

Example: **Biological Contaminants**



BEST?

- WELL : IAQ testing mandatory; air & water borne; pest management
- LEED v4: water managed systems; stringent ventilation; pest mgmt

BEST?

- IAP: detailed building science mold prevention measures; pest mgmt
- EGC 2015: water managed systems; pest mgmt

Indoor airPLUS Version 1 (Rev. 04) Verification Checklist

Home Address:		**City:**		**State:**	**Zip:**	
Climate Zone (1-6):		**Radon Zone (1-3):**				

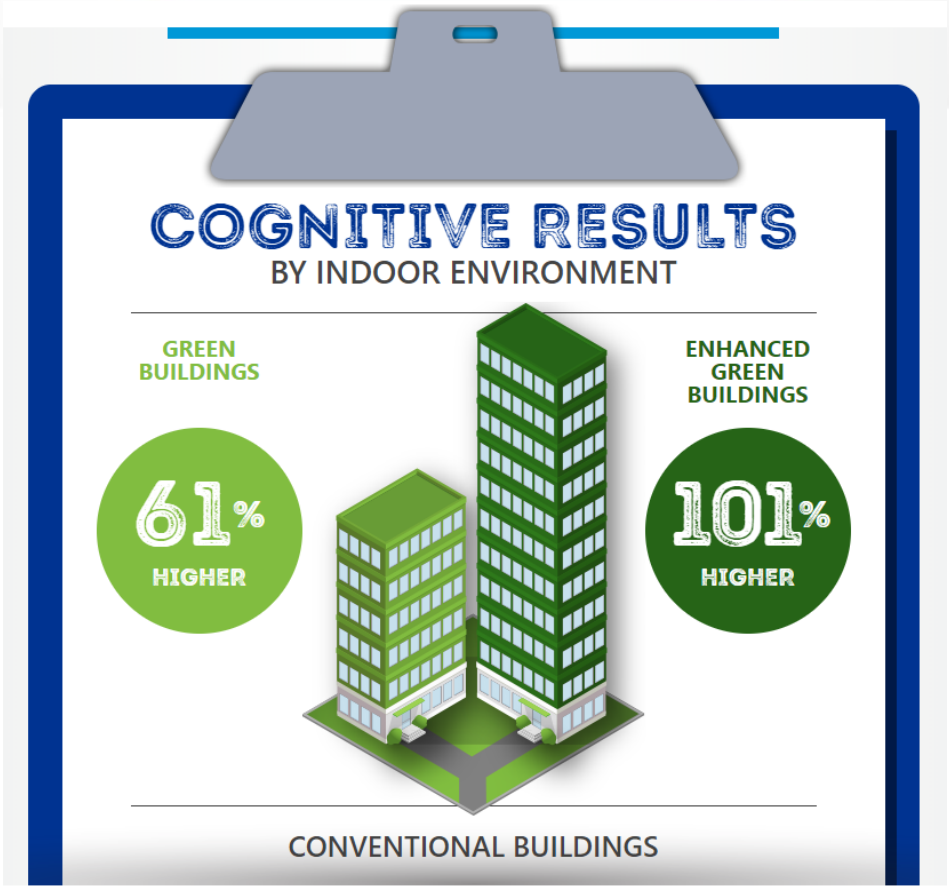
Section		Requirements (Refer to full Indoor airPLUS Construction Specifications for details)	Must Correct	Builder Verified	Rater Verified	N/A
ENERGY STAR V3		***Note:*** **The Rev. 04 checklist reflects only the additional Indoor airPLUS requirements and their corresponding section numbers that must be met after completing the ENERGY STAR requirements. ENERGY STAR remains a prerequisite for Indoor airPLUS qualification.**				
		ENERGY STAR Version 3 (or 3.1, 3.2) Program Requirements must be followed and the home shall be ENERGY STAR certified in conjunction with Indoor airPLUS qualification.	☐		☐	
Moisture Control	1.1	Drain or sump pump installed in basements and crawlspaces. In EPA Radon Zone 1, check valve also installed.	☐	☐	☐	☐
		Exception Applied: ☐ Slab-on-grade foundation ☐ Free-draining soils				
	1.2	Layer of aggregate or sand (4 in.) with geotextile matting installed below slabs AND radon techniques used in EPA Radon Zone 1.	☐	☐	☐	☐
		Exception Applied: ☐ Slab-on-grade foundation ☐ Free-draining soils ☐ Dry climate				
	1.4	Basements/crawlspaces insulated, sealed and conditioned.	☐	☐	☐	☐
		Exception Applied: ☐ 100-year flood zone ☐ Marine climate ☐ Dry climate ☐ Crawlspace sealed with capillary break and active dehumidification ☐ Raised pier foundation with no walls				
	1.7	Protection from water splash damage if no gutters.	☐	☐	☐	☐
		Exception Applied: ☐ Rainwater harvesting system ☐ Dry climates				
	1.11	Supply piping in exterior walls insulated with pipe wrap.	☐	☐	☐	☐
		Exception Applied: ☐ Dry climate AND climate zone 1-3 ☐ Air barrier insulation in wall cavity				
	1.14	Hard-surface flooring in kitchens, baths, entry, laundry, and utility rooms.	☐	☐	☐	
Radon	2.1	Radon-resistant features installed in Radon Zone 1 homes in accordance with Construction Specification 2.1.	☐	☐	☐	☐

Let's expand our definition of '**High Performance**' to include **Improving Human Health**

Next Level **Healthy Home Guidelines**

1. Increase fresh air to 62.2-2013 +

- ≈ 50% > 62.2-2010
- Use ERV or HRV to minimize energy impacts
- Distribute air effectively
- Filter outside air MERV 13+
- Train end users on filters, maintenance, and what to do in event of poor outdoor air quality (fire, family of skunks)



Source:
#THECOGFXSTUDY

United Technologies

IMPROVED PRODUCTIVITY

PER PERSON PER YEAR

THE INCREASED

PRODUCTIVITY

OF AN EMPLOYEE IS MORE THAN

150×

GREATER THAN

THE RESULTING ENERGY COSTS

ON AVERAGE, GREENHOUSE GAS EMISSIONS EQUIVALENT TO

0.03

ADDITIONAL CARS

ON THE

ROAD / BUILDING / YEAR

AT THE HIGHEST VENTILATION RATE (40 CFM/PERSON) WITH AN ENERGY RECOVERY VENTILATOR.

2. Improve kitchen exhaust

- Exhaust at source (hood)
- Capture hood over all burners
- Remote-mount fan for quieter operation
- Provide integrated makeup air to keep pressure <-5Pa
- Train end users

3. Avoid a new Chemical of Concern

Resource: Known 3rd Party Proxies

VOCs limits;
Phthalate limits;
Formaldehyde limits

floor score

VOCs limits;
No Phthalate limits

CALIFORNIA PROPOSITION 65 WARNING

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

(California law requires this warning to be given to customers in the State of California.)

For more information: www.watts.com/prop65

Phthalates & hundreds more;
see Wikipedia for list!

$$$ A reminder about Asthma $$$

- People/yr treated for asthma: 15.4 million
- US total annual cost in 2015: $81.9 billion
- Asthma-related mortality cost: $29 billion/year
- Missed work & school days: $3 billion/yr
  - 8.7 million workdays lost
  - 5.2 million school days lost

Mt. Sinai Study on Green Buildings

- 2-yr study of effects of green building on building residents with asthma
- Evaluated ER visits, sleepless nights, days with reported symptoms
- Days with asthma symptoms decreased, 6.9 to 3.4 at 6 months and 2.2 at 12 mos

COGNITIVE RESULTS

BY INDOOR ENVIRONMENT

GREEN BUILDINGS

61% HIGHER

ENHANCED GREEN BUILDINGS

101% HIGHER

CONVENTIONAL BUILDINGS

4. Strive for Radon 0-2 pCi/L

World Health Organization:
Reducing radon from
4 pCi/L to 2 pCi/L cuts risks
of lung cancer in half.

NO SAFE LEVEL!

- Test your own home!
- Question radon map boundaries
- Use recommended passive prevention strategies
- Prepare for future changes
- Educate end users in the importance of ongoing testing

5. Optimize Lighting Temp & Intensity

Lighting affects our:

- Alertness
- Productivity
- Decision-making
- Sleep - Circadian Rhythm

SIMPLIFIED LIGHTING STRATEGY		
	DAYTIME	EVENING
Intensity	300-500 lux, or 28-46 lumens/SF	10-150 lux, or 0.9-14 lumens/SF
Color Temperature	8000-9000 K (very blue!)	2000 K (warm)

6. Manage Noise, Manage Stress

TARGET LEVELS
20 dB Bedrooms
40 dB Living rooms

- Use air sealing and sound attenuation to separate multi-dwelling units
- Choose fans based on sone ratings
- Remote-mount fans
- Study ‘free area’ for grilles and louvres to avoid whistling
- Test background sound!

7. Link to Nature, Manage Stress

Biophilic Design: bringing nature indoors

- Views to outdoors
- Benches, roof gardens
- Murals, pictures
- Living walls
- Patterns from nature

In Summary…

Guidelines for Heathier Homes

- Buildings affect human health in a number of well-established ways... and some ways we are just beginning to understand.
- Indoor airPLUS, LEED, WELL, Fitwel, Green Communities, the Active Design Guidelines and others are good tools already available to address health risks.
- Draw from these resources to start positively influencing human health TODAY.

Healthy people... an investment worth making!

Thank you!
Any Questions?

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