Flame Retardants in Furniture & Building Insulation Foams:

POLICIES & IMPLICATIONS IN NORTH AMERICA

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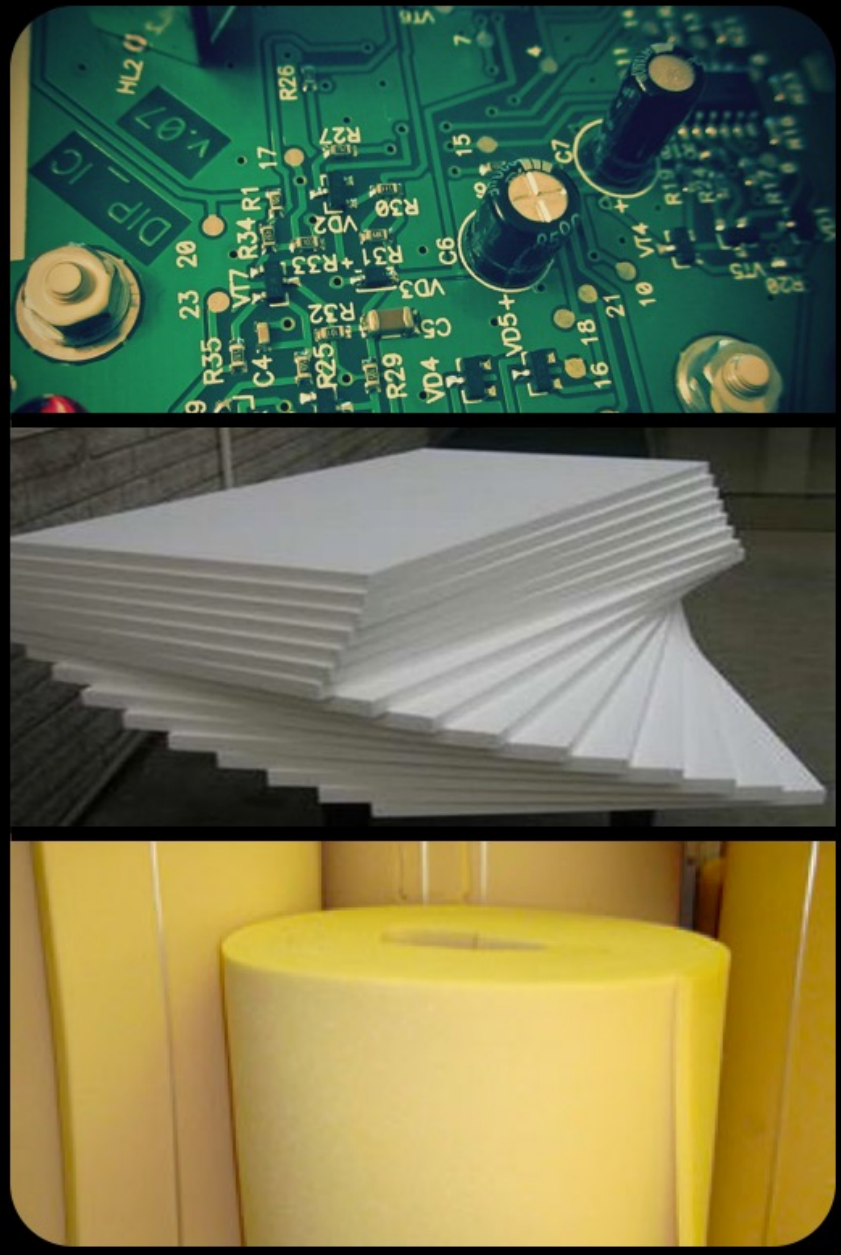
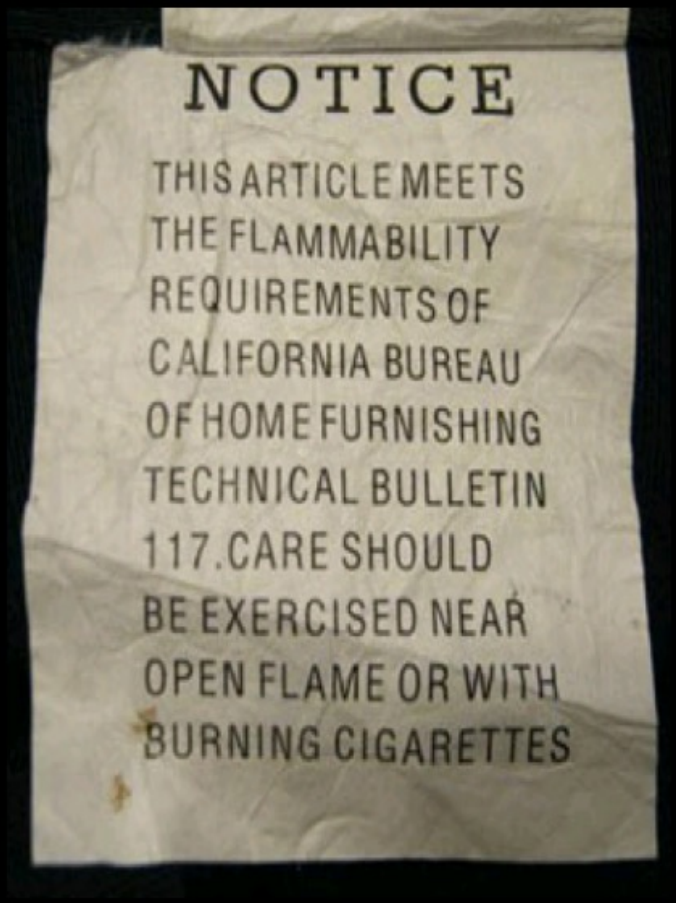
FLAME RETARDANTS USED TO MEET STANDARDS

Some major product categories with flame retardants (in the US):

- Electronics (EEE)
  - circuit boards and other internal elements
  - plastic enclosures
- Building materials & insulation
- Transportation
- Furnishings



U.S. FURNITURE AND FLAME RETARDANTS



Technical Bulletin 117 (CA)
Enacted in 1975

- Open flame standard → led to use of FRs
- Additive FRs migrate out of products
- Associated with health risks
- No demonstrate fire safety benefit from complance with TB117

Babrauskas V. *et al.* (2011) *Fire Safety Science*

IMPROVED FIRE SAFETY WITHOUT FRs

NOTICE
THIS ARTICLE MEETS THE FLAMMABILITY REQUIREMENTS OF CALIFORNIA BUREAU OF ELECTRONIC AND APPLIANCE REPAIR, HOME FURNISHINGS AND THERMAL INSULATION TECHNICAL BULLETIN 117-2013. CARE SHOULD BE EXERCISED NEAR OPEN FLAME OR WITH BURNING CIGARETTES.

The upholstery materials in this product:
____contain added flame retardant chemicals
__X__contain NO added flame retardant chemicals

The State of California has updated the flammability standard and determined the fire safety requirements for this product can be met without adding flame retardant chemicals. The State has identified many flame retardant chemicals as being known to, or strongly suspected of, adversely impacting human health or development.

Mandatory January 1, 2015

- "Smolder" standard – FRs not needed
- This reflects the primary ignition source of lethal furniture fires in the U.S.
- A 2014 state law also requires disclosure of FR content

TB117-2013: http://bhfti.ca.gov/about_us/tb117_2013.pdf
SB1019 (Leno, 2014): http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB1019

POTENTIAL STANDARDS FOR N. AM. FURNITURE

- U.S. Consumer Product Safety Commission (CPSC)
  - Investigating potential furniture standard
  - Reviewing several petitions that would reduce use of hazardous FRs

- National Fire Protection Association (NFPA)
  - Developing a new test method, NFPA 277 "Standard Methods of Tests for Evaluating Fire and Ignition Resistance of Upholstered Furniture Using a Flaming Ignition Source"

- UL Canada (ULC)
  - Developing 1 – 2 potential standards for upholstered furniture
  - Seeking "harmonization" with the U.S.

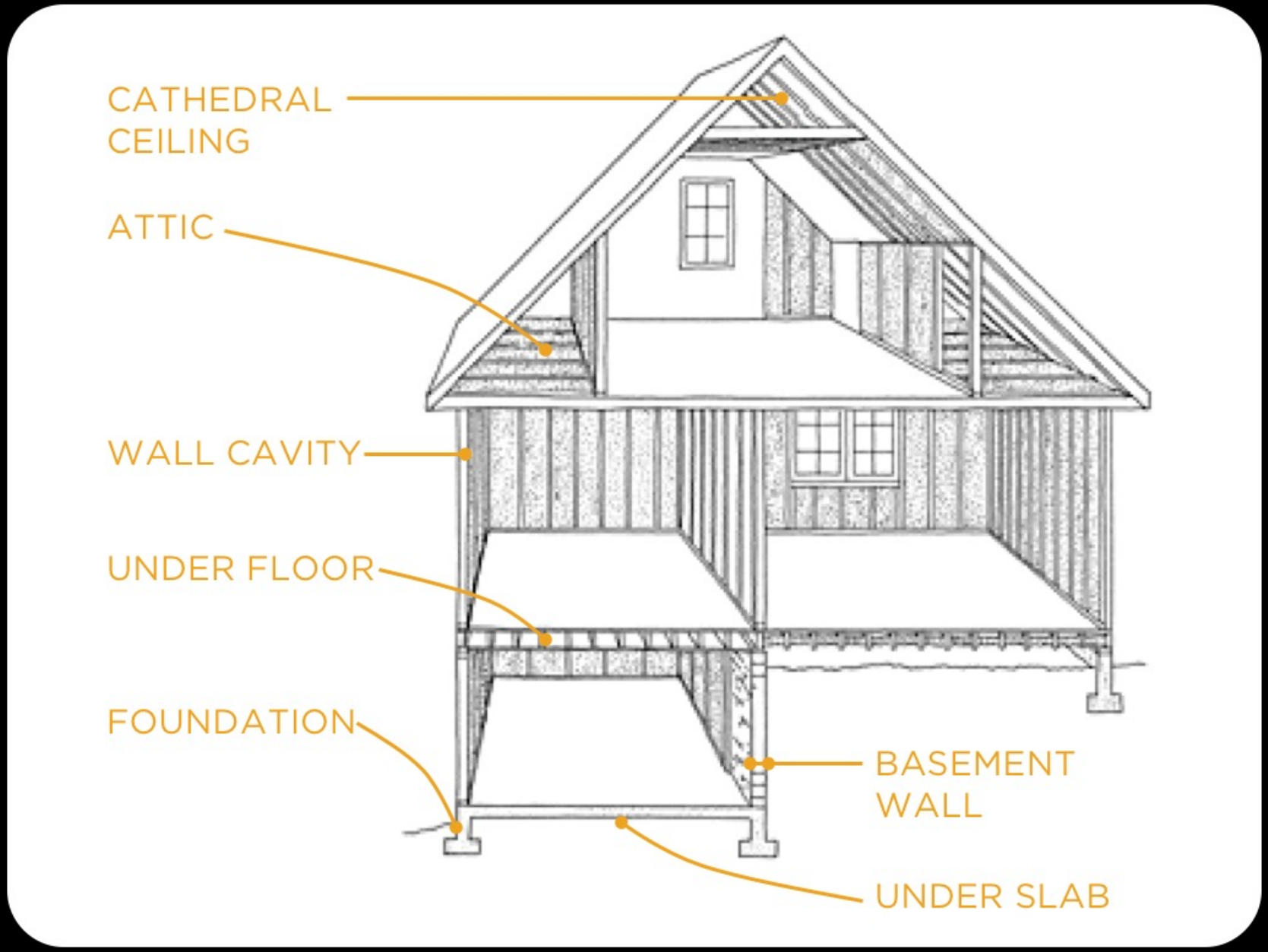
STANDARDS DON'T INCLUDE HEALTH/ENVIRONMENT

Flammability Standards:
- Only a performance requirement
- May not correlate to improved fire safety.

Voluntary Standards Organizations (VSOs):
- Insufficient active representation from public health/environmental expertise
- Labor & consumers are typically underrepresented
- Participation requires time, $$

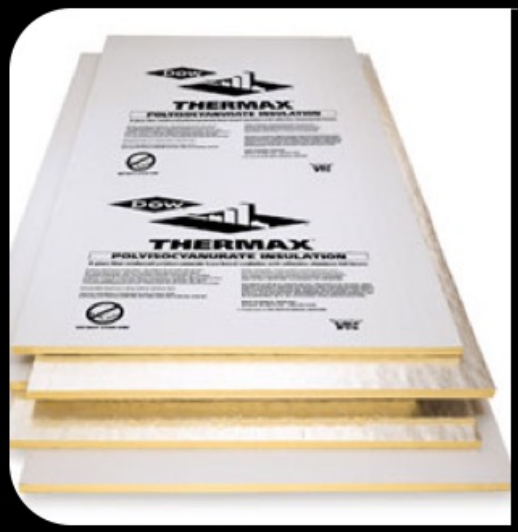
New furniture standards could lead to continued FR use.

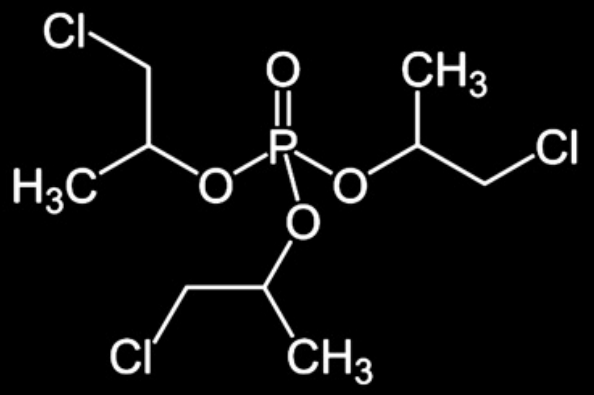
BUILDING INSULATION REDUCES ENERGY USE



POLYURETHANE AND POLYISOCYANURATE:

TCPP (*tris* (1-chloro-2-propyl) phosphate)



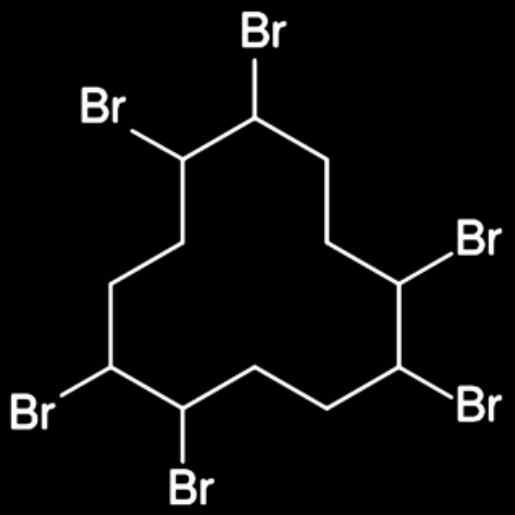


- accumulates in liver and kidneys
- affects nervous system development
- potential carcinogen

Crump *et al*, 2012; Dishaw *et al*, 2011; van der Veen & de Boer, 2012

POLYSTYRENE (XPS AND EPS):

HBCDD (hexabromocyclododecane)



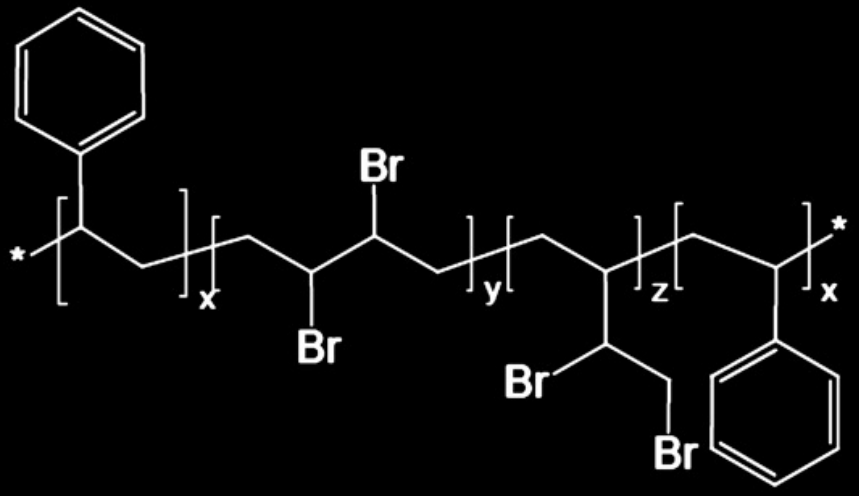
- bioaccumulative
- thyroid disruption
- affects developing nervous system
- developmental neurotoxicity in mice
- banned in 160 countries

Covaci et al, 2006; Marvin et al, 2011; US EPA 2008

HBCDD REPLACEMENT IN POLYSTYRENE:

PolyFR (brominated styrene butadiene copolymer)

Great Lakes SOLUTIONS a Chemtura business	ALBEMARLE®	ICL Industrial PRODUCTS
"Emerald Innovation 3000"	"GreenCrest"	"FR-122P"
10,000 tons/2014	Began production/2014	10,000 tons/2014



U.S. EPA, U.S. OSHA, Chemical Watch

SAFER ALTERNATIVES MAY BE AVAILABLE...

Mineral Wool

Expanded Cork

Cellulose - boards & spray-in

Wool

Aerogel Blankets

Avoiding Toxic Chemicals in Commercial Building Products (Building Green, 2012)
Guide to Healthier Energy Efficient Housing Products (BlueGreen Alliance, 2016)
U.S. Department of Energy (DOE): http://energy.gov/energysaver/insulation-materials

...BUT SOMETIMES ALTERNATIVES ARE NOT FEASIBLE

LIVING BUILDING CHALLENGE™

SPECIFIC EXCEPTIONS TO THE RED LIST

I10-E12 9/2010 HFRs in Foam Insulation

Foam insulation with HFRs are allowed in the following applications where space is limited and alternative products either cannot provide the required R-value performance and/or are required by code.

- Structural Insulated Panels (SIPS)
- Insulation in hollow metal doors
- Spray insulation for renovation projects
- Under slab insulation
- Roof and exterior insulation

Foam insulation in these cases must still meet all other Red List requirements.

Foam insulation is not allowed in cavity-fill applications where many alternative Red List-compliant options are on the market without HFRs.

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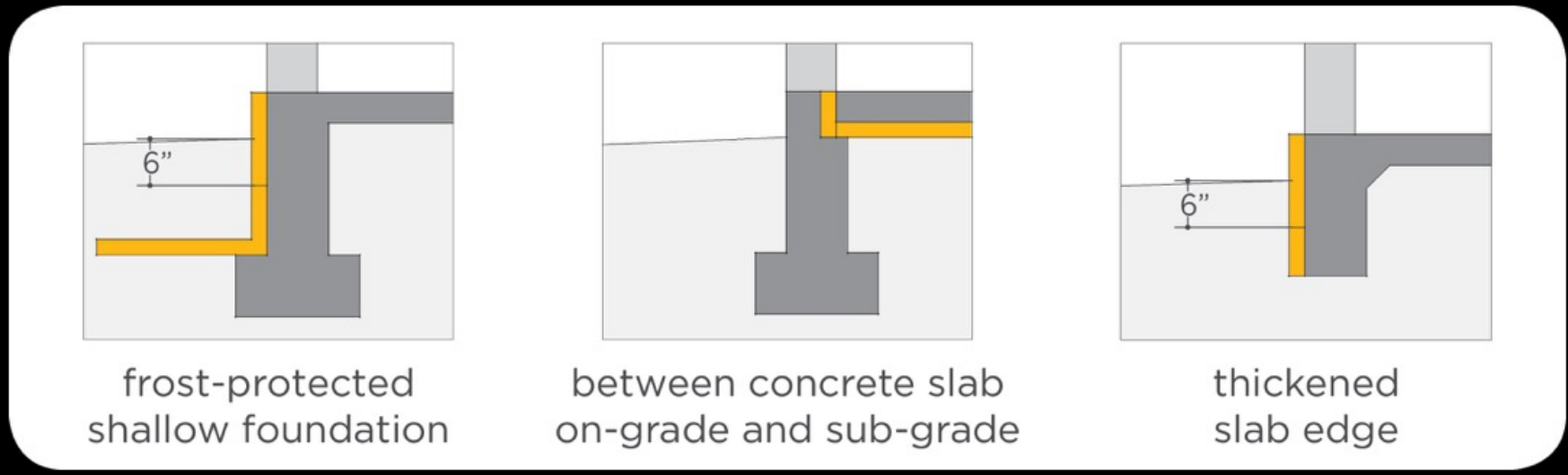
BELOW-GRADE INSULATION



In most parts of the United States, insulating the exterior edge of a slab can reduce heating bills by 10% to 20%.

- US Department of Energy

Safer Insulation Solution

INFORMED CHANGE TOWARDS SAFE AND AFFORDABLE INSULATION MATERIALS

Collaborative initiative to update codes to allow safe use of affordable insulation without hazardous flame retardants

- 2018 International Residential Code (IRC)
- Possible state and local code updates

Participating organizations include:

SIEGEL & STRAIN Architects
NRDC
GREEN SCIENCE POLICY INSTITUTE
Development Center for Appropriate Technology
PERKINS + WILL
ZGF
SAN FRANCISCO FIREFIGHTERS CANCER PREVENTION FOUNDATION
EDF ENVIRONMENTAL DEFENSE FUND
National Center for Healthy Housing
SF Environment
MARTIN HAMMER, ARCHITECT
hbn HEALTHY BUILDING NETWORK
Fire Science and Technology Inc.
INTERNATIONAL LIVING FUTURE INSTITUTE
USGBC CALIFORNIA
SERA
INTEGRAL GROUP

THERE IS PRECEDENT TO CHANGE U.S. CODES

Changed to allow the use of foam plastic insulation without flame retardants:

- 2001 – Sweden
- 2004 – Norway

No accidental EPS fires in Norway since codes were updated

97% of XPS and EPS in Sweden and Norway does not contain flame retardants

Remberger 2004; Posner 2010; POPRC 2011

REVIEW MAKES THE CASE FOR REDUCED FRs

- ASTM E84 testing is required for all foam plastic building insulation in the U.S.
- This requirement cannot be met without added FRs

However:

- ASTM E84 performance "not a significant factor" in fire spread in wall cavities
- No correlation between ASTM E84 performance and fire outcome:
  - Time to flashover
  - % of specimen area destroyed

Steiner Tunnel Test, or ASTM E84

Babrauskas, V. *et al.* (2012) *Building Research & Information*

2018 INTERNATIONAL RESIDENTIAL CODE (IRC) PROPOSAL RB152-16

- Jan. 11: Proposal Submitted
- Apr. 17 – 27: Committee Action Hearing, Louisville, KY

  → DISAPPROVED
- July 22: Modified proposal (Public Comment) submitted
- Oct. 23 – 24: Public Comment Hearing, Kansas City, MO

MANY COMPANIES SUPPORT CODE UPDATES

goo.gl/mma8H1

CONCLUSIONS

- FRs are not needed in building insulation in many applications
  - Need to increase use of safer alternatives AND change code requirements
- Human health and ecological impacts are not effectively considered in code development
- Improved flammability standards would benefit public health

American Public Health Association
Policy Statement 20156:
Reducing Flame Retardants in Building Insulation to Protect Public Health

www.apha.org/policies-and-advocacy/public-health-policy-statements

WHAT CAN SCIENTISTS DO?

- More information is needed on FR emissions, exposures, and hazards from insulation
  - Lifecycle perspective
  - Installed and in-use
  - Tox data
- Where possible, more involvement in codes/standards processes

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The Green Science Policy Institute Team
Safer Insulation Solution partners, including DCAT & USGBC CA
Eden Brukman, Concenter Solutions


With improved flammability standards
we can have a healthier world
For More Information:
Google: Green Science Policy
www.GreenSciencePolicy.org