



Green Kitchen and Building Materials

*Professor Felicia Etzkorn
Department of Chemistry
Virginia Tech*

© Felicia A. Etzkorn 2015

Consumers Bewildered

- ❖ Certified wood?
- ❖ Recycled glass tiles?
- ❖ Concrete block made with fly ash?
- ❖ Natural linoleum? Bamboo flooring?
- ❖ Non-toxic adhesives?
- ❖ Mineral wool or natural insulation?
- ❖ Energy efficient windows?

M.Voith, *Chemical & Engineering News*, Nov. 17, **2008**, 15-23.

Recycled Oak Floors



- ✿ Baptist gym in Roanoke
- ✿ Red oak from Georgia
- ✿ Tongue-in-groove
- ✿ Total cost similar to new oak flooring

Wood-Mode Cabinets

- ✿ Certified wood by Kitchen Cabinet Manufacturers Assoc. "Environmental Stewardship Program"
- ✿ Solid brass knobs very durable



Wood-Mode Factory

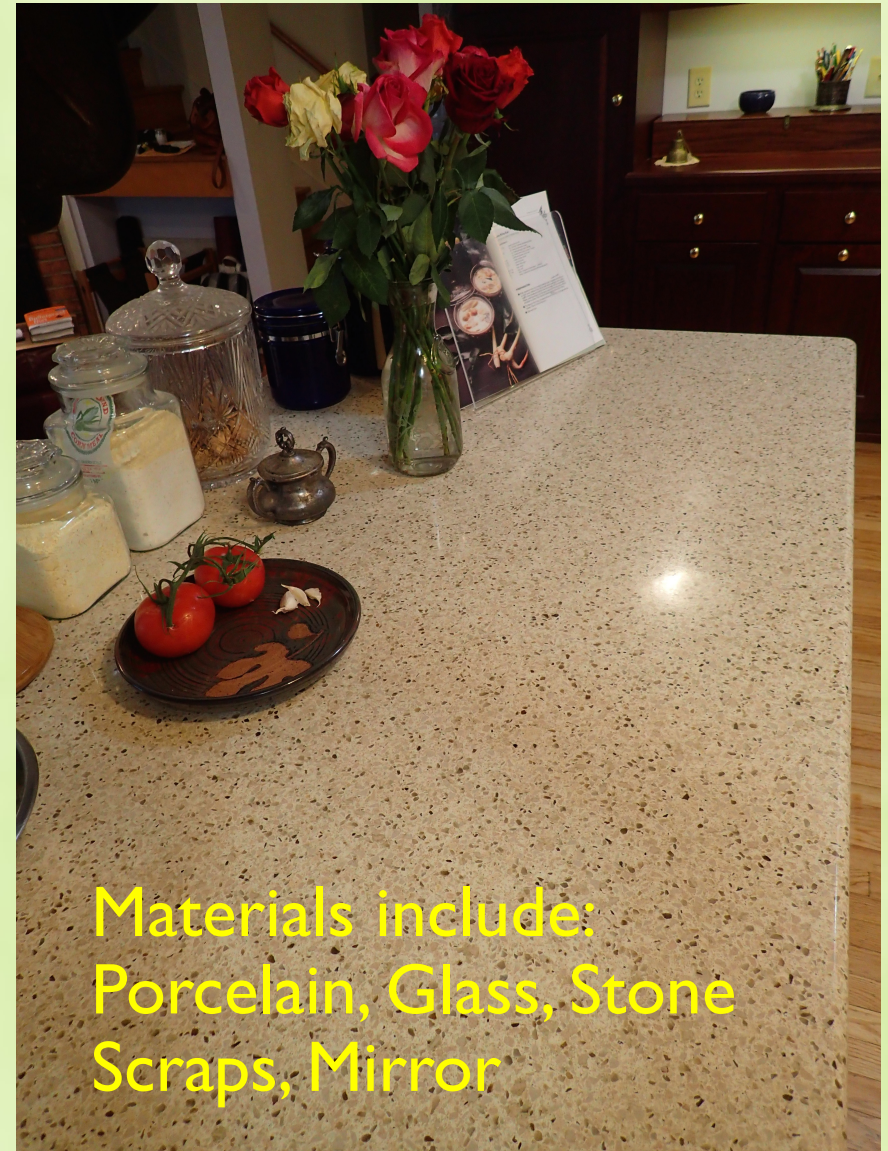
- ✿ 1989: Regenerative Thermal Oxidizer destroys 99.4% VOC emissions at 1,400 ° F
- ✿ No fossil fuel input.
- ✿ Sawdust and wood scrap fuel
- ✿ Eliminates wood waste
- ✿ Steam operates drying kilns, heat, AC, humidify office and factory
- ✿ Steam condensate re-circulated
- ✿ No emissions from wood fly ash



<http://www.wood-mode.com/history>

Kitchen Countertops

- ✿ ECO™ by Cosentino
- ✿ Durable surface
- ✿ 75% recycled
- ✿ Resin from corn oil



Materials include:
Porcelain, Glass, Stone
Scraps, Mirror

Stained Glass Cabinet Windows

✿ Black Dog Salvage in Roanoke, VA



Appliances

- ✿ Natural gas oven and stove
- ✿ EPA Energy Star refrigerator, dishwasher



- ✿ Salvage doors



Stainless Steel Sink & Faucet

✿ Reused originals

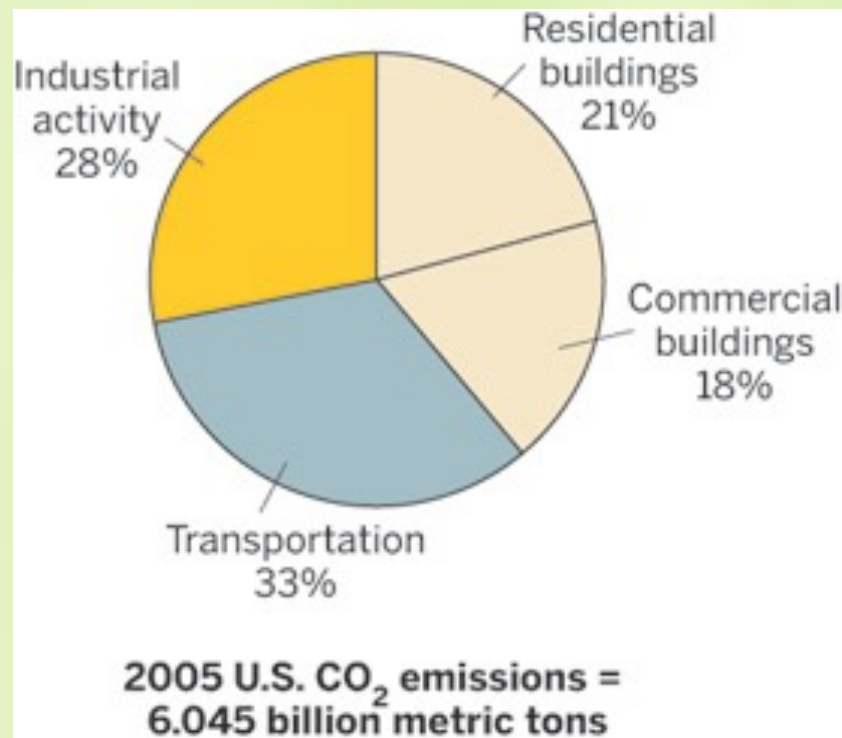


Paint and Floor Finish

- ✿ Zero volatile organic compound (VOC) wall paint
- ✿ Water-based polyurethane floor finish
- ✿ (Caution: contains N-methylpyrrolidone – suspect reproductive toxin and teratogen in CA)
- ✿ Isopropanol (rubbing alcohol) possible substitute?



Climate Impact

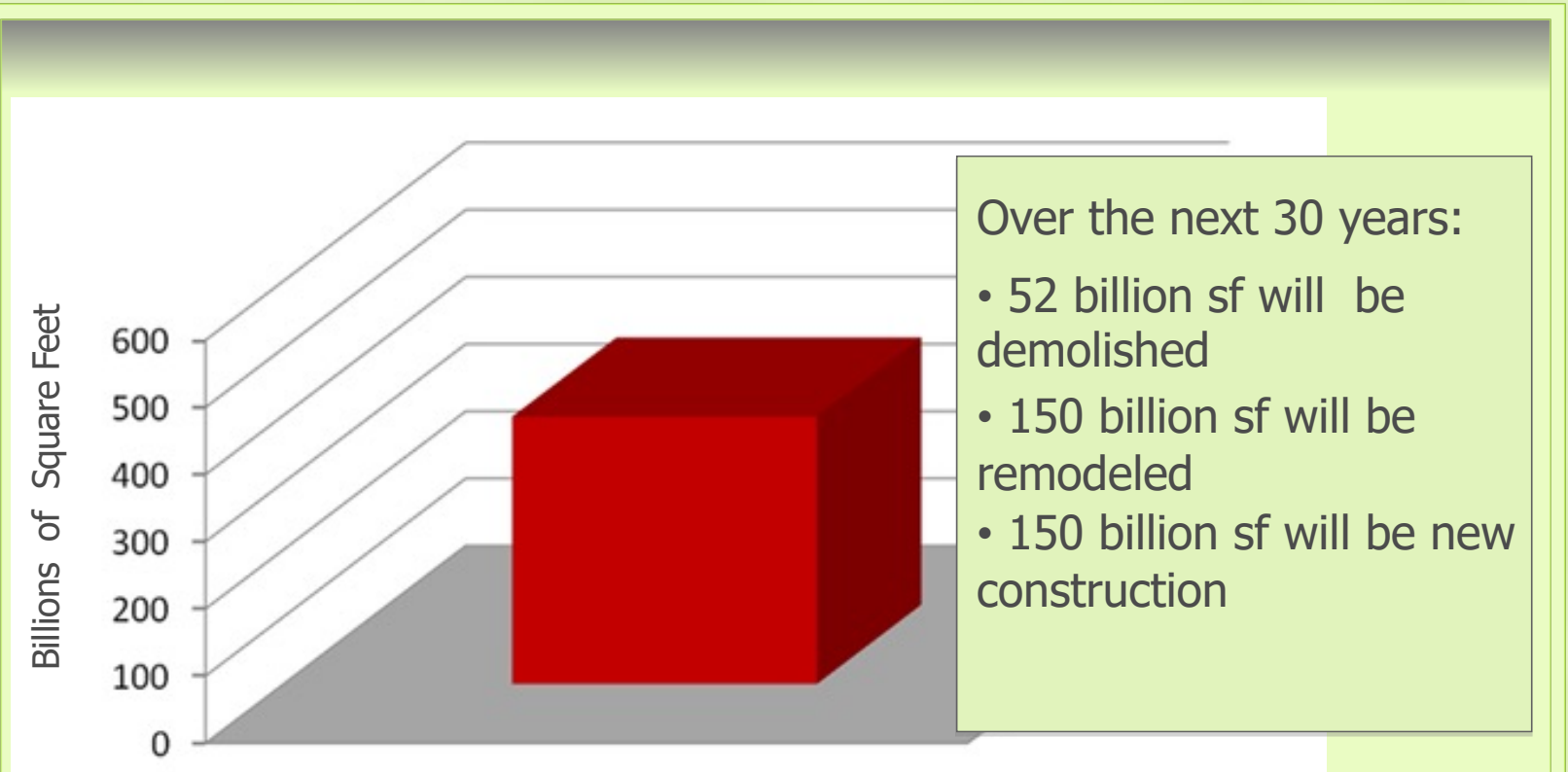


Buildings are responsible for 39% of CO₂ emissions in the U.S.

SOURCE: Energy Information Administration

Opportunity to Build Green

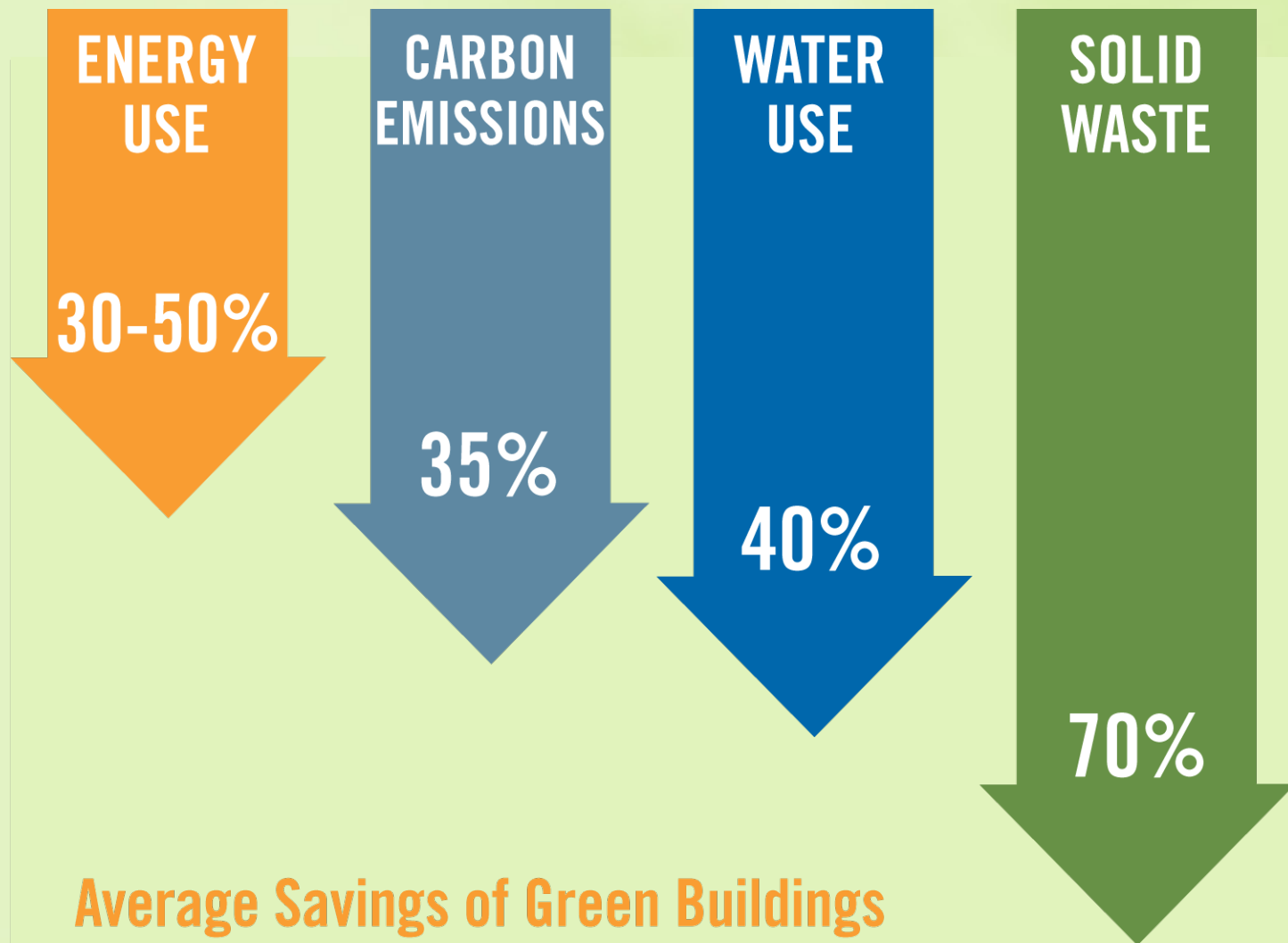
- ✿ Current US building stock is approx. 300 billion sq. ft.



Therefore, by the year 2035, three-quarters of building stock will be new or renovated vs. 2005

J.Yudelson, *The US Green Building Market*, **2010**.

Multiple Green Building Savings



Average Savings of Green Buildings

J.Yudelson, *The US Green Building Market*, **2010**.



Green Building Materials

- ✿ Energy efficiency
- ✿ Durability
- ✿ Life-cycle analysis
- ✿ Embodied energy
- ✿ Toxicity of end products
- ✿ Principles of Green Chemistry