

Research Needs:
Draft Research Gaps and Potential
Research Topics
Commercial and Residential

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Outline of Presentation

- ❑ Links between Energy and IEQ:
 - ❑ Which changes will bring about needs for IEQ research (regulatory and non-regulatory)?
- ❑ Outline of Input Needs
 - ❑ Scenarios: what are major changes in California's buildings (2011-2021) to move towards low energy – regulatory and product driven (early adopters important)?
 - ❑ Research Priorities: What are IEQ research topics that will need to be addressed?

Part III

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Key health issues Commercial and Residential

<i>PRIORITY</i>	1	2	3
<i>ILLNESS OR PROBLEM</i>			
Asthma	3	1	
ETS	2		
Dampness	1	1	* *
VOCs			2
Mold		2	
Flame retardants	1		*
SBS	1		
Communicable disease	1		
Roadway/ambient pollution		1	1
Upper respiratory infections		1	
Indoor Combustion		1	
Discomfort		1	

Goals for Topics (from 2002 Roadmap)

Related to four broad goals:

- identifying IEQ problems and opportunities;
- developing and evaluating energy-efficient technologies for improving IEQ;
- developing and evaluating energy-efficient practices for improving IEQ; and
- encouraging or assisting the implementation of technologies or practices for improving IEQ.

Examples of priority topics and categories from 2002 IEQ Roadmap

- Benchmarking IEQ in various building types
- Characterize ventilation rates and IEQ conditions in energy efficient and conventional new housing.
- Characterize ventilation and air-flow performance in existing buildings as a function of region, building type, HVAC system type.
- Characterize IEQ in small (< 2500 m²) commercial buildings.
- Compare health outcomes among students in schools with very high and very low ventilation rates.

Research Topics, Gaps Benchmarking

- Small and medium commercial sector problems (D Bennett study)
- Benchmarking/energy performance and its determinants
- Benchmarking IEQ and its determinants
- Determining associations between energy performance and IEQ

Research Topics, Gaps: diverse building types

- Small and medium commercial
- Early childhood education/daycare (see CARB/UCB study in progress)
- Health care, laboratories, retail, other special uses?
- Other Building types?

Gap: reliable forecast of future building inventory re: energy performance and IEQ

- Sorting out alternative future scenarios for buildings of the future:
- High performance envelopes and H, V and AC systems as well as more efficient lights.
- Higher plug loads as screens get more numerous and larger.
- Lower electric illumination loads as LEDs replace e-intensive sources.
- High tech monitoring, feedback, communication
- New indoor pollutant sources from building materials and consumer products

Pollutant Source Removal (Residential and Commercial)

- Other indoor formaldehyde sources and sinks
- Low toxicity and low reactivity cleaning products
- SVOCs in building materials and furnishings
- Effective methods of dust removal from surfaces and furnishings
- Demonstration of moisture control methods
- ETS in multifamily homes
- Others?

Gaps: Behavior/Motivation

- Energy consumption: Behavior modification and its determinants
- IEQ-relevant behavior and its modification; “hard” law and “soft” law, comfort and health concern, cost
- Sources (e.g., comp wood; pesticides; flame retardants; ventilation for combustion make-up air or exhaust)
- Ventilation technology and practices
- Motivation / incentives / requirements / convenience / comfort / cost
- Education/feedback/Information delivery on energy use and IEQ

Questions to focus on....

- What are the most important research gaps?
- What are the most promising research opportunities?
- What research would have the largest impact?