



Developing Indoor Air Quality (IAQ) Guidelines including NO₂: A Perspective from CDPH

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Disclaimer

The findings and conclusions in this presentation are those of the presenter and do not necessarily represent the views or opinions of the California Department of Public Health or the California Health and Human Services Agency.

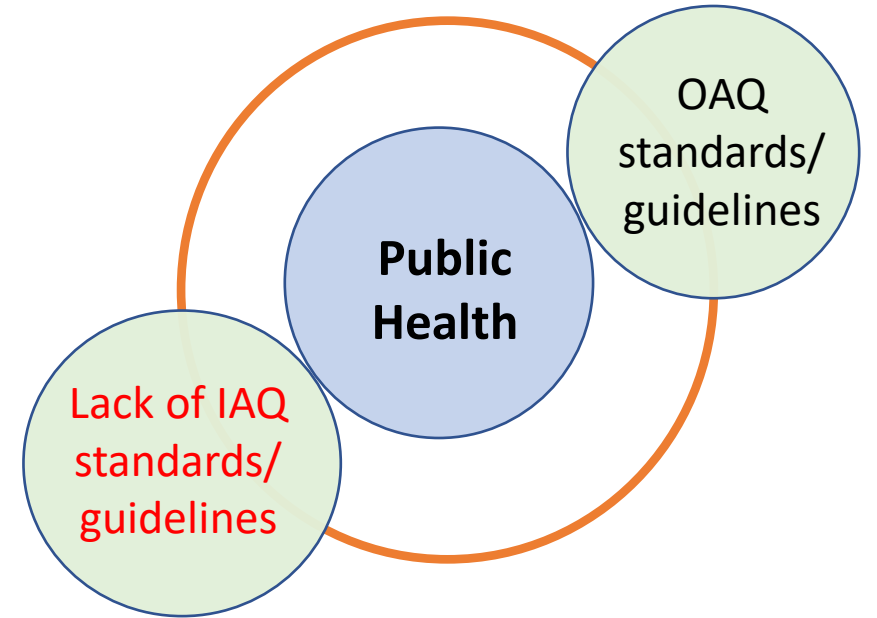
IAQ: Regulations/Guidelines Lag Behind OAQ

- Poor outdoor air in cities
 - ✓ Recognized as nuisance for centuries
 - ✓ Recognized as health hazard by 1900
- In 20th century, poor outdoor air quality (OAQ) linked directly to health effects
 - ✓ Major smog events: Los Angeles "Gas Attacks," 1943; Donora, PA 1948; The Great Smog of London, 1952
- U.S. Clean Air Act in 1970
 - ✓ National Ambient Air Quality Standards (NAAQS)
 - ✓ **NO_x** included as one of the six NAAQS pollutants
- Historically, IAQ not seen as harmful
- The EPA Total Exposure Assessment Methodology (TEAM) study in 1979 – 1985 found major sources of exposures to chemical pollutants were actually indoors



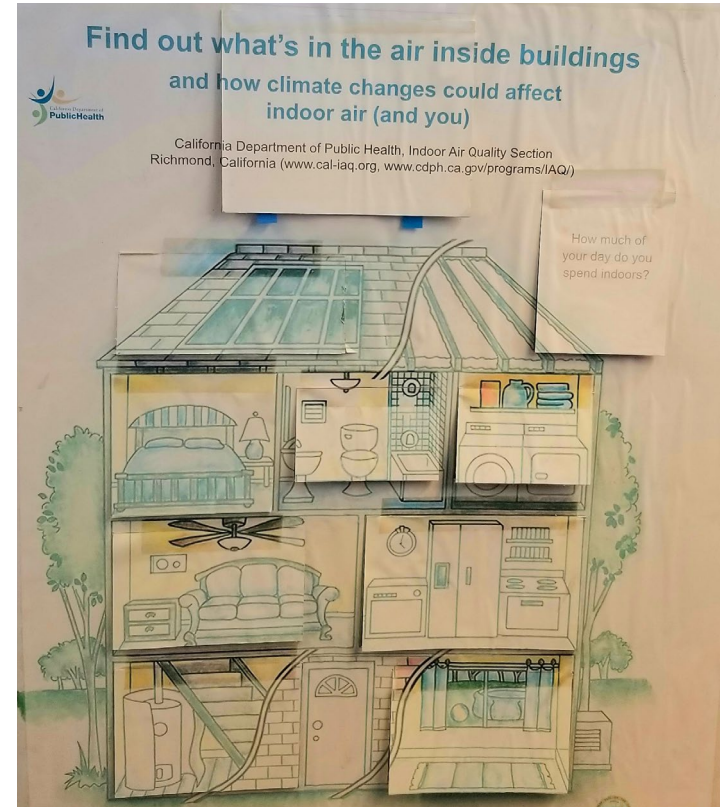
Increased Focus on Health Risks from Indoor Exposures

- Why having IAQ standards/guidelines are important
 - ✓ People spend an average of 90% of time indoors
 - ✓ Most exposures may occur indoors, even if the pollutants are formed outdoors
 - ✓ Chemical emissions and exposures indoors
 - ✓ Airborne transmission indoors of COVID & other infectious agents
 - ✓ IAQ can be worse than OAQ
 - ✓ Public health focuses on prevention strategies and health promotion



Setting IAQ Legal Limits/Standards/Guidelines Could Be Challenging

- Almost all existing indoor regulations/enforceable exposure limits are for workplaces at higher levels
- Possible substances of concern maybe not yet identified
- Multiple indoor pollutants and challenges in developing substance-specific IAQ guidelines
- Some examples of successful regulations –
 - ✓ CARB Composite Wood Products Airborne Toxic Control Measure, formaldehyde emission limits
 - ✓ CARB Air Cleaner Regulation, ozone emission limits



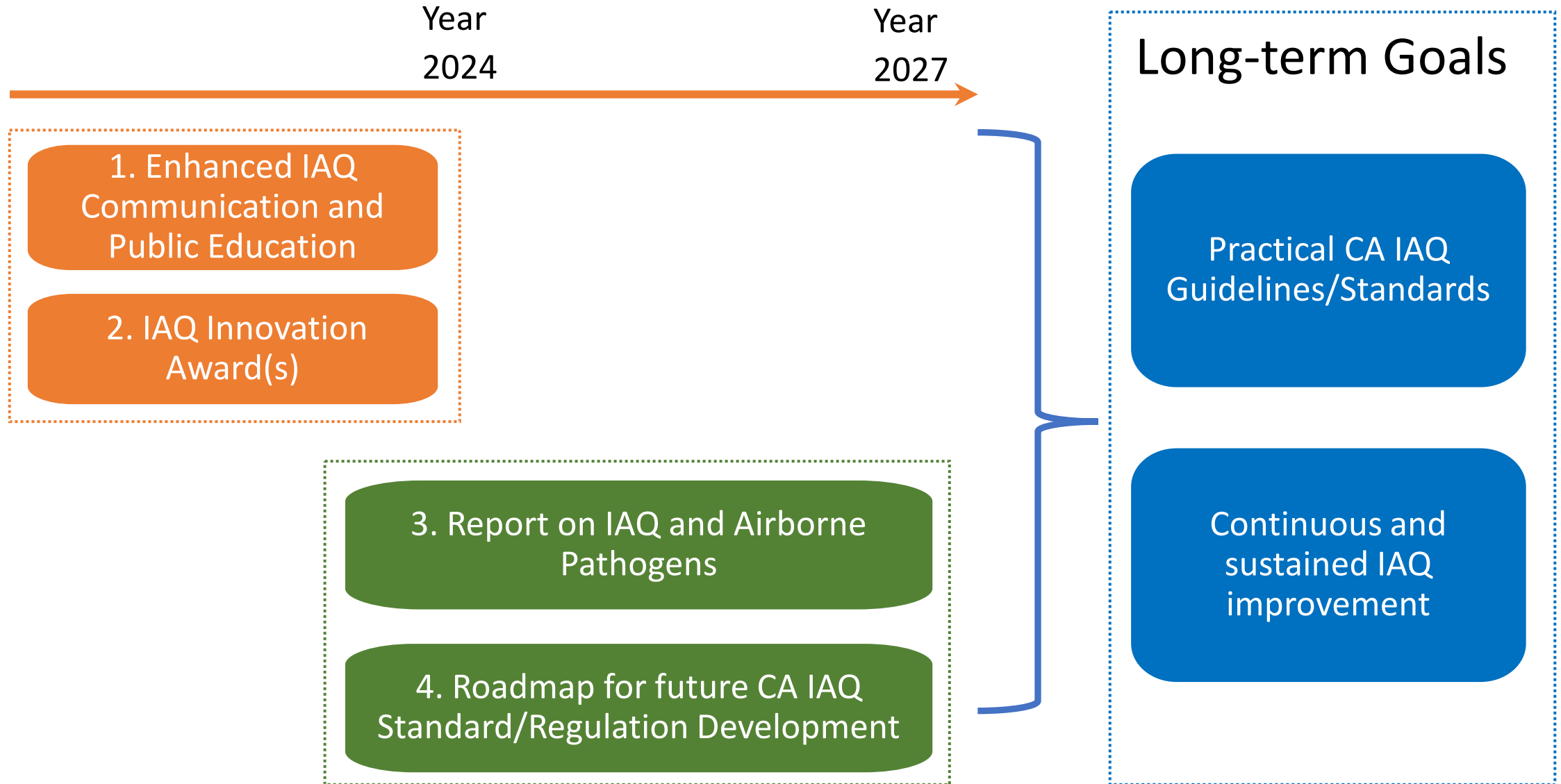
Air Quality Section in CDPH - Mission statement (2021)

The Air Quality Section (AQS) promotes healthy indoor and outdoor air for all Californians, through multidisciplinary expertise in chemistry, physics, engineering, epidemiology, exposure assessment, and microbiology.

IAQ Standards/Guidelines Development

- ✓ Emission/source control standard - CDPH Standard Method for VOC emission testing and evaluation (also known as CA 01350)
- ✓ CDPH Statement on Building Dampness, Mold, and Health
- ✓ Technical guidance documents on ventilation and filtration during COVID
- ✓ *State Interagency Task Force on IAQ (and airborne pathogen)*

IAQ Task Force - Expected Deliverables



No Current State Regulation on Indoor NO₂

- Conducted survey among State agency members in IAQ Task Force

- Only CARB has recommended maximum indoor NO₂ exposure levels published in 1994

[\(Combustion Pollutants in the Home. Indoor Air Quality Guideline no. 2, and Supplement\)](#)

Participating State Agencies

California Department of Public Health (CDPH, host)

California Air Resources Board (CARB)

California Department of Education (CDE)

California Energy Commission (CEC)

California Department of Community Services and Development (CSD)

Department of General Services (DGS)

California Department of Housing and Community Development (HCD)

Office of Planning and Research (OPR)

Is It Now Feasible to Update the Indoor NO₂ Guideline in California?

- We have more scientific evidence on health effects of (indoor) NO₂
 - ✓ Human health risk assessment for ambient nitrogen dioxide (Health Canada, 2016)
 - ✓ Integrated Science Assessment (ISA) for Oxides of Nitrogen – Health Criteria (U.S. EPA, 2016)
- We have better understanding about indoor NO₂ sources and exposures
 - ✓ Over 60% of households in California cook with gas
 - ✓ Pollutant concentrations and emission rates from natural gas cooking burners without and with range hood exhaust in nine California homes (Singer et al. 2017)
- We have more technical pathways for controlling indoor NO₂
 - ✓ Building electrification
 - ✓ More effective kitchen/exhaust ventilation

More Discussion Beyond NO₂ Guideline Values

- How can we set monitoring requirements for meeting the indoor NO₂ guideline?
 - ✓ Continuous real-time monitoring
 - ✓ Calibration, detection limit and reliability of current low-cost sensors
- Will there be potential **equity or security issues with electrification?**
 - ✓ Initial cost of electrification
 - ✓ Ongoing higher cost of electricity vs. gas
 - ✓ System resilience and security



Thank you!

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The Air Quality Section (AQS) promotes healthy indoor and outdoor air for all Californians, through multidisciplinary expertise in chemistry, physics, engineering, epidemiology, exposure assessment, and microbiology. AQS activities include:

- identifying public health concerns in indoor or outdoor air,
- developing measurement solutions to assess contaminant exposures,
- conducting research to support technical and policy solutions, and
- providing technical guidance.

Airborne Infections

Low-Cost Samplers

Microplastics & FR

Mold & Dampness

Vaping & Tobacco

Ventilation & Air Cl...

VOCs & Formaldeh...

Wildfire Smoke

Other Resources

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