

Federal Interagency Committee on Indoor Air Quality (CIAQ) Meeting Minutes October 16, 2019

Moderator: Laureen Burton, U.S. Environmental Protection Agency

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 - The next CIAQ meeting is scheduled for February 2020.

U.S. Department of Energy (DOE)

Agency Point of Contact: Chris Early, 202-586-0514, chris.early@ee.doe.gov

1.1 Home Improvement Expert

The DOE launched the Home Improvement Expert (HIE), an easy way for homeowners to get a quality job for energy equipment replacement and other retrofit projects. Homeowners can leverage expert recommendations from the Department of Energy to help ensure quality installations by attaching HIE checklists to vendor contracts and only accepting the work after vendors complete and sign the checklists. The HIE has five new fact sheets for homeowner indoor air quality (IAQ) upgrades: three whole-house ventilation strategies, bath exhaust fan, and kitchen exhaust fan. Approximately 40 manufacturing, big box, and financing partners have joined the program to promote this content to consumers. Here is the website: basc.pnnl.gov/home-improvement-expert.

1.2 Building Technologies Office's Better Buildings Residential Network

The Better Buildings Residential Network connects energy efficiency programs and partners to share best practices and learn from one another to increase the number of homes that are energy efficient. One upcoming call is—

Health and Energy Efficiency Are Trending – Learn What's Happening. October 24, 2019 1:00PM to 2:30PM EST with the following speakers: Bruce Tonn, 3 Cubed; Sara Hayes, ACEEE; Julie Michals, E4theFuture. In this Better Buildings webinar, learn how the increasingly prominent nexus of health and energy efficiency is spurring innovation in tools and approaches. Topics of discussion will include indoor air quality, technology, engagement best practices, and a new tool in the field – the Energy Plus Health Playbook. People can register at www.energy.gov/eere/better-buildings-residential-network/events/health-and-energy-efficiency-are-trending-learn.

At the American Council for an Energy Efficient Economy's Conference on Health, Environment, and Energy, January 21–23, 2020, in New Orleans, the Department of Energy's Johnathan Cohen will lead a session titled: *Health and Adaptation—The Impact on Resiliency from Home Performance Measures*, which will look at the health impacts from buildings in the context of resiliency and adaptation, and the role whole-home performance plays as a preventive strategy.

1.3 National Renewable Energy Laboratory New Report

A Guide to Zero Energy and Zero Energy Ready K–12 Schools. August 2019. This report outlines a process for achieving zero energy use in schools and includes information about IAQ in regards to commissioning, building envelope, HVAC and more: betterbuildingsolutioncenter.energy.gov/sites/default/files/attachments/NREL_ZE_K12_Study.pdf.

1.4 Building America Program

The Building America Program conducts applied research, development, and deployment in residential buildings related to energy efficiency and indoor air quality. You can find out about the ongoing projects on this web page: www.energy.gov/eere/buildings/building-america-research-teams.

www.epa.gov/indoor-air-quality-iaq/federal-interagency-committee-indoor-air-quality

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Building America Program New Home IAQ Study continues. Broadly, the study seeks to characterize IAQ and factors that impact IAQ in new homes built to current codes, including those with and without mechanical ventilation.

The University of Central Florida presented details of the internal moisture generation moisture balance approach to the ASHRAE 160 (Criteria for Moisture-Control Design Analysis in Buildings) project committee at the ASHRAE annual meeting in Kansas City, Missouri, in June. The University made a presentation with preliminary IAQ results for the Florida Environmental Health Association conference in July and did again at the Energy and Environmental Building Alliance conference in October.

1.5 A DOE demonstration project by enVerid Won the Product of the Year award at the 2019 Air-Conditioning, Heating, Refrigerating (AHR) Expo

The 2019 AHR Exp is the world's largest, most comprehensive gathering of over 70,000 HVAC industry professionals from around the globe each year. Legacy commercial HVAC designs rely on massive volumes of outside airflow to maintain indoor air quality, resulting in oversized equipment and often a 30–50 percent waste in HVAC energy consumption. To eliminate this waste, enVerid's HVAC load reduction technology cleans a building's indoor air at a nanoscopic molecular level, enabling the building to use far less outside air ventilation while improving indoor air quality. Buildings can then invest in smaller, less expensive HVAC systems and realize immediate capital cost savings while enjoying 20–30 percent ongoing annual energy savings for the life of the building. The key to the approach is low-cost scrubbing of all gas contaminants from indoor air using novel, efficient and regenerable sorbent materials to scrub the air.

1.6 Lawrence Berkeley National Laboratory (LBNL) Healthy Efficient Homes Research and Standards

Project Contacts: Iain Walker, iswalker@lbl.gov, and Brett Singer, bcsinger@lbl.gov

This project will produce innovative technologies, industry guidance and codes and standards that reduce the energy cost of IAQ and allow the building industry to achieve the energy savings in existing and new homes. This project also seeks to develop technologies to reduce the cost of implementing energy saving IAQ strategies. You can see more about this effort at this web page: energy.gov/eere/buildings/downloads/healthy-efficient-homes-research-standards.

2019

- Continue to develop smart ventilation algorithms.
- Multi zone/multi-family approaches.
- Low-cost applications for existing/simple systems.
- Complete New Home IAQ study with Building America teams.
- Range Hood Capture Efficiency Test in Home Ventilation Institute listings.
- Metrics and test methods for automatic and recirculating range hoods.

Beyond 2019

- Grid-integration and commercial/institutional building applications for smart ventilation.
- Range Hood Capture Efficiency in ASHRAE 62.2.

- Tech support to get smart ventilation credit in codes and standards.
- Smart homes – develop and evaluate sensors and controls to enable good IAQ with greater energy savings.
- Low-cost combined IAQ and energy retrofits for low-income housing.

Among many other activities, LBNL—

- is on the ASHRAE Technical Committee 4.3 Ventilation Requirements and Infiltration where there are plans for seminars on wildfires and indoor air.
- published an article “Ventilation and IAQ in New California Homes” in Home Energy magazine.
- developed a machine-learning algorithm for identifying cooking emissions
- joined the America Council for an Energy-Efficient Economy working group on Health Benefits of Energy Efficiency.
- continues to chair the ASHRAE (America Society of Heating Refrigeration and Air Conditioning Engineers) 62.2 Ventilation for Acceptable Indoor Air Quality committee.

1.6.1 LBNL New Reports and Journal Articles Attendance at the April 2019 Home Performance Coalition National Conference

This article summarizes the findings of 10 recent studies investigating whether increased carbon dioxide (CO₂) concentrations, with other factors constant, influence perceived air quality, health, or work performance of people.

[W. J. Fisk](#), [P. Wargocki](#), and [X. Zhang](#). 2019. “Do Indoor CO₂ Levels Directly Affect Perceived Air Quality, Health, or Work Performance?” *The ASHRAE Journal* 1–8.
eta-publications.lbl.gov/sites/default/files/ashrae_journal_-_september_2019_76_-_77.pdf

The following text is adapted from the article cited below:

This paper provides meta-analyses of the published findings relating the respiratory health of occupants of schools with visible dampness, water damage, visible mold, and/or mold odor. Eleven studies, all with cross-sectional designs, were included in the meta-analyses; however, analyses for some health outcomes were based on as few as four studies. These meta-analyses and the published literature not included in the meta-analyses suggest that dampness and mold in schools are associated with adverse respiratory health effects.

[W. J. Fisk](#), [W. R. Chan](#), and [A. L. Johnson](#). 2019. Does Dampness and Mold in Schools Affect Health? Results of a Meta-Analysis. *Indoor Air* 1–8.
eta-publications.lbl.gov/sites/default/files/fisk_et_al_indoor_air_2019_school_damp_and_health.pdf

The following text is adapted from the article cited below:

This study is intended to demonstrate the potential for energy savings while providing acceptable IAQ for zero net energy homes. It uses the concept of smart ventilation, where ventilation systems are designed and controlled to produce the same, or better, IAQ compared to simple, continuously operated ventilation systems. The key energy saving principle for smart ventilation is that ventilation is shifted in time to when the energy required to condition the air is lower. A variety of smart ventilation

controls based on outdoor temperature, occupancy and auxiliary fan sensing were developed and assessed across homes built to the 2016 Title 24 Prescriptive standards in California climate regions. Computer simulations were used. On average, the smart controls reduced occupant pollutant exposure by 0-10 percent, and they increased ventilation rates by roughly 20 percent. Occupancy-based controls that accounted for contaminants released by building materials and furnishings during unoccupied times were generally ineffective, with very low energy savings. Performance was improved somewhat through use of a 1-hour pre-occupancy flush out period, though savings were still marginal compared to temperature-based controls.

[B. D. Less](#), [S. M. Dutton](#), [X. Li](#), [J. D. Clark](#), [I. S. Walker](#), and [M. H. Sherman](#). 2019. "Smart Ventilation for Advance California Homes – Single Zone Technology Task." *Lawrence Berkeley National Laboratory* 1–153. eta-publications.lbl.gov/sites/default/files/walker_-_smart_ventilation_for_adv_ca_homes_2001206_0.pdf

The following text is adapted from the article cited below:

LBNL developed and simulated the energy performance of smart ventilation controls based on outdoor temperature in homes located in California climate regions, designed to comply with the 2016 Title 24, Part 6 California Energy Code prescriptive requirements. The smart controls shift ventilation rates in time, but ensure an annual occupant pollutant exposure equal to, or less than, what would be experienced in a home with a constant ventilation rate. Computer simulations were conducted. Controller performance varied substantially by climate zone, airtightness and house prototype. The best controls averaged about one-third of ventilation-related energy savings that increased to about 48-55 percent. The vast majority of site energy savings were for heating end-uses (>90% of total savings). Whole house ventilation rates increased between 0 and 42 percent, with typical increases in the 15-20 percent range.

[B.D. Less](#), [S. M. Dutton](#), [I. S. Walker](#), [M. H. Sherman](#), and [J. D. Clark](#). 2019. "Energy Savings with Outdoor Temperature-based Smart Ventilation Control Strategies in Advanced California Homes." *Energy and Buildings* 194:317–327. eta.lbl.gov/publications/energy-savings-outdoor-temperature

National Institute of Standards and Technology (NIST)

NIST Net-Zero House

Project Contact: Lisa Ng, 301-975-4853, lisa.ng@nist.gov

The NIST Net-Zero Energy Research Test Facility (NZERTF) is a two-story, four-bedroom house incorporating energy-efficient construction, space conditioning systems and appliances, as well as solar water heating and solar photovoltaics to meet the house's energy needs. For general information on the house, view the following video: www.youtube.com/watch?v=xSzu83fyQaQ. All publications can be found at the NIST NZERTF web page: www.nist.gov/el/nzertf/. Studies on thermal performance of the small duct, high velocity distribution system as compared to a conventional air-to-air heat pump have been completed in collaboration with Hyojin Kim, Ph.D., at The Catholic University of America. A report on that work will be released this fall. Presentations will also be submitted to Indoor Air 2020 to be held in Seoul, Korea, from July 20–24. A tracer gas system that measures both SF₆ and CO₂ has been installed in the home in order to obtain continuous air change rate measurements and conduct CO₂ injections for

investigation of demand-controlled ventilation and other control approaches. Plans for installing a CO₂ heat pump water heater and a geothermal heat pump are underway.

Do-It-Yourself (DIY) Spray Polyurethane Foam (SPF) Application

Project Contact: Dustin Poppendieck, 301-975-8423, dustin.poppendieck@nist.gov

A DIY SPF application was performed in the NZERTF to replace removed SPF during system upgrades. A study was performed to determine if EPA SPF ventilation guidelines are applicable to a DIY SPF application event. Airborne and settled flame retardant concentration data showed that polyethylene sheet enclosures may not completely isolate the SPF application area, but in this application with adequate exhaust ventilation, they did protect the rest of the building from the flame retardant. A summary of this work was recently published in *Building and Environment* (doi.org/10.1016/j.buildenv.2019.04.033).

Cigarette Butt Emissions

Project Contact: Dustin Poppendieck, 301-975-8423, dustin.poppendieck@nist.gov

Globally, around five trillion cigarette butts are disposed of per year. The U.S. Food and Drug Administration (FDA) has regulatory authority over cigarettes and associated waste. FDA funded an interagency agreement with the National Institute of Standards and Technology (NIST) to conduct an investigation into airborne emission of non-smoldering cigarette butts. The FDA-funded effort examined over 1,600 butts to determine (1) the initial distributions of emitted target chemicals in the cigarette butt and (2) the influence of environmental parameters (temperature, relative humidity, aqueous saturation, UV, and airflow rate) on airborne emissions. Further work examining 500 butts (funded by NIST) was done to determine airborne emission rates for target chemicals from cigarette butts in a simulated indoor environment. Both efforts demonstrated non-smoldering butts can be a significant source of airborne chemicals, including nicotine. Two journal papers that summarize this work have been submitted.

Real-Time Outdoor Air Infiltration Rates

Project Contact: Lisa Ng, 301-975-4853, lisa.ng@nist.gov

NIST has completed a Cooperative Research and Development Agreement (CRADA) with the National Center for Healthy Housing, and Beetle Management, Inc., titled “Determination of real-time infiltration rates in homes using low-cost sensors.” The objective of this collaboration was to investigate the use of air pressure sensors to estimate real-time infiltration rates in a home, in part to control mechanical ventilation systems. The development of such a method is intended to overcome some of the challenges and limitations that exist with tracer gas methods for determining infiltration rates. NIST conducted a series of tracer gas tests at the Indoor Air Quality Test House and the NZERTF on the NIST campus. Using the data and a detailed multizone airflow model of the home, NIST and the CRADA partners developed a simplified model of the house that can be used to estimate real-time air infiltration rates. The report can be found here: doi.org/10.6028/NIST.TN.2046.

ASHRAE Standard 62.2

Project Contact: Steven Emmerich, 301-975-6459, steven.emmerich@nist.gov

The committee responsible for American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 62.2 on residential ventilation and IAQ will meet in February in Orlando to work on proposed changes that may be included in the 2022 version of the standard. Topics being addressed include changes to multifamily housing requirements, kitchen hood capture efficiency, and ventilation requirements for use of unvented combustion heaters.

ASHRAE Position Documents

Project Contact: Andrew Persily, 301-975-6418, andyp@nist.gov

The IAQ Position Document Committee has met several times this year as they continue to work on updating that document. The new version of the Position Document is expected to be published in early 2020.

ASHRAE has initiated a revision of its Position Document on Environmental Tobacco Smoke, which is expected to be approved and published in 2020.

ASHRAE has approved a new Position Document on Resiliency in the Built Environment in June 2019. The position document can be downloaded at www.ashrae.org/about/position-documents.

ASHRAE Standard 189.1

Project Contact: Andrew Persily, 301-975-6418, andyp@nist.gov

The 2017 version of ASHRAE/ICC/IESUSGBC SSPC 189.1, Standard for High-Performance Green Buildings Except Low-Rise Residential Buildings, was approved for publication late last year and includes 75 individual revisions to the 2014 version. The standard constitutes the technical content of the 2018 International Green Construction Code, which was just published late in 2018 and is available from the International Code Council and ASHRAE. Standard 189.1-2017 itself will only be available outside of the U.S. and Canada per an agreement between AIA, ASHRAE, ICC, IES and USGBC. In the area of indoor environmental quality, revisions that have been incorporated into the 2017 standard (and therefore the 2018 IgCC) include a restriction on the indoor use of unvented combustion devices, a requirement for occupant surveys to assess satisfaction with indoor environmental quality, and improvements to lighting quality through daylighting and glare control.

The committee holds monthly web meetings, which are open to all interested parties. More information on the 189.1 committee activities can be found on the ASHRAE website, where you can sign up for notifications of public reviews and other information at www.ashrae.org/resources--publications/free-resources/listserves.

ASHRAE Green Guide version VI

Project Contact: Lisa Ng, 301-975-4853, lisa.ng@nist.gov and Tania Ullah, 301-975-8410, tania.ullah@nist.gov

The sixth revision of the ASHRAE Green Guide is underway. Version VI will target more experienced building professionals, whereas the previous versions contained more introductory content. NIST is

taking the lead editorial roles on the IEQ and Water Efficiency chapters. To participate in the revisions, the proposed chapters are similar to Version V as follows:

1. Introduction
2. Green Building Rating Systems
3. Project Strategies and Early Design
4. Commissioning
5. Architectural Design and Planning Impacts
6. Conceptual Engineering Design
7. Sustainable Sites
8. IEQ
9. Energy Conversion and Distribution Systems
10. Energy Sources
11. Lighting
12. Water Efficiency
13. Smart Building Systems
14. Operation, Maintenance, and Performance Evaluation
15. Residential Applications
16. GreenTips
17. Existing Buildings

ASTM: D22.05 Subcommittee on Indoor Air

Project Contact: Dustin Poppendieck, 301-975-8423, dustin.poppendieck@nist.gov

The subcommittee has several efforts underway. Efforts continue to test a draft of WK62732 (New Standard Performance Evaluation of Consumer-Grade Indoor Air Quality Sensors and Sensing Devices) for carbon dioxide and PM_{2.5} sensors. This work will likely start the ballot process in the next year. Existing standards are continually undergoing review and revision on a 5-year rotation. At the next meeting in Houston on October 22, 2019, there will be time set aside to discuss future directions and standard needs of the communities the committee serves (industry, regulatory agencies, equipment manufacturers, testing labs and the public). Feel free to give input on your needs by joining or contacting a committee member.

Section 6 of Standard D6245 Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation was revised and published in 2018. A revision of the entire standard is now underway. Anyone interested in participating in the revision should contact Andrew Persily at andyp@nist.gov.

Consumer Product Safety Commission (CPSC)

Agency Point of Contact: John Gordon, 301-987-2025, jgordon@cpsc.gov; Charles Bevington, 301-987-2009, cbevington@cpsc.gov

www.epa.gov/indoor-air-quality-iaq/federal-interagency-committee-indoor-air-quality

The CIAQ was established by Congress in 1983 to coordinate federal IAQ research and exchange air quality-related information among stakeholders (federal, state, local, research community, private

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sector, general public). A variety of federal agencies and departments (EPA, CPSC, DOE, National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), others) co-chair CIAQ, which holds public meetings roughly every 6 months to exchange information on air quality-related issues and projects. Some recent federal updates have included emerging technologies (additive manufacturing), occupancy and air quality-related sensor technologies, smart ventilation, building for energy efficiency and good IAQ, the home microbiome and IAQ, school IAQ, and IAQ policies (including those for radon). CIAQ participants respond to stakeholder questions and provide updates on issues. Agency updates and notes are posted on the EPA website after each meeting.

Participating in CIAQ allows CPSC the benefit of interacting with other federal agencies and stakeholders. In addition, CPSC can communicate with other federal agencies on ongoing projects, such as 3D printers, nanomaterials, mold and wearable technology. The CIAQ also enables the coordination of efforts to address subject matter that multiple federal agencies oversee that is of interest to CPS. Examples include—

1. Working with the NIST and NIOSH on several projects on nano and 3D printers.
2. Cosponsoring with stakeholders through the National Nanotechnology Coordination Office (NNCO) a series of conferences on “Quantifying Exposure to Engineered Nanomaterials (QEEN) from Manufactured Products.”
3. Working with EPA to complete the evaluation of nanomaterial release from engineered nanomaterial.
4. Contracting with the University of Cincinnati on nano and mold projects.

Nano Materials

Project Contact: Joanna Matheson, 301-987-2564, jmatheson@cpsc.gov

The University of Cincinnati is performing a follow-up study to the TERA literature review on three nanomaterials of interest. The University of Cincinnati is reviewing recent literature (2016–2019), filling in data gaps, and determining the appropriate dose metrics for *in vivo* and *in vitro* studies for nano silver, nano titanium dioxide, and carbon nanotubes. The University of Cincinnati is also performing a literature review on the emerging nanomaterials nano alumina, nano cellulose, and graphene. Final reports are expected by September 2020. The University of Cincinnati is also starting a literature review on the applications and uses of Fire-Retardant (FR) nanomaterials in consumer products and the potential for consumer exposure.

We continue to work on projects with NIOSH, EPA and NIST:

- NIOSH is—
 - Completing the evaluation of nanomaterials in and released from laser printers and the potential toxicity of the released materials. Multiple publications have been produced from these studies, including www.ncbi.nlm.nih.gov/pmc/articles/PMC4791579 and www.ncbi.nlm.nih.gov/pmc/articles/PMC4749083.

www.epa.gov/indoor-air-quality-iaq/federal-interagency-committee-indoor-air-quality

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- Continuing a multiyear project that will assess toxicological responses to aerosolized emissions from Fused Deposition Modeling (FDM) 3D printers.
 - The Phase 1 study consisted of characterizing emissions from ABS, PLA, and polycarbonate filaments with and without multiwalled carbon nanotubes (MWCNTs); designing and constructing a 3D printer exposure system for in vitro and in vivo exposure studies; and performance of the in vitro studies. A manuscript was recently accepted for publication for the in vitro results; these studies consisted of exposing human small airway epithelial cells to 3D printer emissions to investigate cytotoxicity, apoptosis, and oxidative stress and inflammatory markers.
 - The Phase 2 studies are continuing with a focus on characterizing emissions from ABS and PLA filaments with other types of engineered nanoparticles (other than MWCNTs); developing a high-throughput emission generation method for toxicology studies, optimized for inhalation exposure; investigating pulmonary and microvascular responses, liver toxicity, neurotoxicity, as well as the biodistribution and biopersistence of emissions, after inhalation of PC filament emissions in rats; evaluating responses in a murine experimental model of asthma; and, evaluating the toxicological effects on the reproductive system after exposure to PC filament emissions in vitro using commercially available human placental cells. Initiating a project in collaboration with the EPA that evaluates several 3-D printers during operation and during feedstock recycling tasks to understand factors that influence release of emissions. Specifically, the aims of this project are to evaluate the influence of FFF 3-D printer design, FFF feedstock filament; and recycling plastics to make filament and FFF 3-D printing with recycled filaments.
- EPA is—
 - Completing the evaluation of nanomaterial released from engineered nanomaterial (ENM) surface coatings applied to outdoor surfaces and assessing the effect that aging may have on the release of nanomaterials from the treated surfaces. Publications on this work include www.ncbi.nlm.nih.gov/pubmed/30903905, www.ncbi.nlm.nih.gov/pubmed/28938214 and www.ncbi.nlm.nih.gov/pubmed/26826852.
 - Continuing a multiyear collaborative project with NIOSH on characterizing commercially available and commonly purchased FDM filament materials and quantifying the composition and release of organic and inorganic chemicals and materials from FDM printer filaments, waste and printed objects.
 - The Phase 1 work involved compositional characterization of commercially available FDM filament materials; the compositional characterization of particulate and gaseous/aerosol elements released during the FDM printing process (e.g., identifying the size distribution, agglomeration, chemical content, metal content, nanoparticles/nanotube content; identifying VOCs and SVOCs and emission rates); and, the accumulation and composition of particulate matter in areas adjacent to the FDM printer during and after operation will also be assessed.
 - The Phase 2 studies are commencing that will include identification of post-print processing procedures for various FDM filament materials; compositional characterization of products and/or waste materials created from the printing process as well as substances released

from printed products and post-print modified products under relevant and intended use conditions for the product lifecycle; and, the determination of product fragility under foreseeable use scenarios.

- NIST continues its projects on—
 - Developing an air dispersion method for multi-walled carbon nanotubes (MWCNT), which could be applied to more complex systems as a protocol for generating controls for particle counting and sampling.
 - Developing a bioassay validation program.
 - Performing a long-term (multiweek) release, accumulation and continuous monitoring study using multiple consumer-grade 3D printers to support downstream exposure assessment.

Portable Generator Safety

Project Contact: Janet Buyer, 301-987-2293, jbuyer@cpsc.gov

New Updates

There are no new updates since the last update (delivered August 15, 2018). We continue to work on the projects with a plan for evaluating the effectiveness of PGMA and UL voluntary standards.

Previous Update (August 15, 2018)

In November 2016, the CPSC voted to approve a notice of proposed rulemaking (NPR) to reduce the risk of carbon monoxide (CO) poisoning deaths and injuries associated with portable generators.

- The proposed rule limits portable generators' CO emission rates.
- The proposed rule's CO emission rates, which are technically achievable using existing and proven emission control technologies that are already in the marketplace, are expected to lower the CO emission rate from that of current generators by nominally 90 percent.
- The *Federal Register* (FR) notice with information about the proposed rule is available at www.federalregister.gov/documents/2016/11/21/2016-26962/safety-standard-for-portable-generators.
- The comment period closed April 24, 2017.
- The comments can be viewed by going to www.regulations.gov and typing CPSC-2006-0057 on the search line.

Staff also have been participating in development of voluntary standards to address the hazard:

- On January 24, 2018, UL announced that UL 2201 has received ANSI approval.
 - This standard has requirements for—
 - reduced CO emissions

- shutoff when the CO concentrations around the generator reach either of the following at a location 1 foot above the approximate center of the top surface of the portable generator
 - Instantaneous reading of 400 ppm
 - Rolling 10-minute average of 150 ppm
- On April 20, 2018, in a separate voluntary standard by the PGMA, G300 standard *Safety and Performance of Portable Generators* also received ANSI approval.
 - This standard has a requirement for a CO-sensing shutoff system that will shut the generator off when CO concentrations around the generator reach either of the following at a location 1"-2" above the approximate center of the top surface of the portable generator
 - Instantaneous reading of 800 ppm
 - Rolling 10-minute average of 400 ppm
- Staff has an interagency agreement with NIST to estimate the effectiveness of the CO hazard mitigation requirements in these standards. The plan for this evaluation is published in NIST TN 2048 (available online at dx.doi.org/10.6028/NIST.TN.2048). It was open for public comment from July 9 to Sept 9, 2019. CPSC and NIST are evaluating the comments and will revise the plan as appropriate before executing the plan. An additional report was published the same time as the plan, NIST TN 2049 (available online at dx.doi.org/10.6028/NIST.TN.2049). This report documents testing that was done on generators that were shutoff using the shutoff criteria in both voluntary standards.

ASTM D22 Indoor Air Sub-Committee Spray Polyurethane Foam (SPF) Activities

Project Contacts: Charles Bevington, 301-987-2009, cbevington@cpsc.gov; Adrienne Layton, 301-987-2590, alayton@cpsc.gov

New Update

There are no new updates since the last update (delivered June 5, 2019). We continue to work on the projects with ASTM and will deliver these reports when they are ready for release.

Previous Update (June 5, 2019)

ASTM Air Quality/Indoor Air (D22.05) subcommittee, CPSC has been involved in providing technical support for the development of voluntary standards to test for chemical emissions from SPF insulation and other products:

- **WK61814** Practice for Full- Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products
- **WK58354** New Standard Measuring Chemical Emissions from Spray Polyurethane Foam (SPF) Insulation Samples in a Large-Scale Spray Room
- **WK58356** New Standard Conducting emission and fate modeling for Spray Polyurethane Foam (SPF) insulation in an indoor environment
- **D7297-2014** Practice for Evaluating Residential Indoor Air Quality Concerns

- **WK28325** New Standard Estimating Inhalation Exposure Concentrations in Low-rise Residential Buildings Resulting from Volatile Organic Compounds Emitted by New Building Products and Furnishings and from Use of Consumer Products

An interagency agreement (IAG) was completed with NIST to conduct chamber testing of SPF samples.

- The IAG has helped to develop methods that will characterize and quantify releases of amines and other compounds to aid in ASTM standard development. The final report is on the NIST website: NIST Technical Report 1921.

CPSC is developing hazard communication materials for products such as SPF.

Mold Projects

Project Contact: Eric Hooker, 301-987-2516, ehooker@cpsc.gov

New Update

There are no new updates since those delivered on August 15, 2018. CPSC continues to work on these projects and will deliver these reports when they are ready for release.

Previous Update (August 15, 2018)

CPSC contracted with TERA to perform a review on the health risks of common mold species likely to be found in and around the home.

- Two reports, “Review of the Health Risks of Mold, Basic Mold Characteristics” and “Review of the Health Risk of Mold, Health Effects of Molds and Mycotoxins” can be found online at www.cpsc.gov/Research--Statistics/Chemicals. Those reports were used by TERA to develop the Mold Tool, a dashboard to perform a preliminary hazard assessment on mold. The tool was delivered to CPSC in September 2017.
 - The tool is intended to be used during an interview with a consumer who is complaining about a product that developed mold.
 - The tool guides the interviewer in detailed questions about mold incidents and stores the responses in a database that can be mined to identify trends in mold occurrences.
 - The tool also has a feature meant to identify a possible mold genus through a series of questions about the appearance and growth conditions of the mold.
- CPSC staff have requested a project authorization to have the Mold Tool peer reviewed and to contract a programmer to fix the bugs and improve usability.
- Staff is considering options for putting the mold identification feature of the Mold Tool on the CPSC’s public website.

Emerging Technologies/3D Printers

Project Contact: Treye Thomas, 301-987-2560, tthomas@cpsc.gov

New Update

CPSC met with NIOSH, EPA, and FDA on August 20, 2019, regarding 3D printers.

Previous Update (March 20, 2019)

Since the update on August 15, 2018, CPSC has continued to work on the projects with 3D printers and will deliver these reports when they are ready for release.

There are devices that can be used by the public to determine the presence of chemicals in the indoor environment. The National Academies of Sciences, Engineering, and Medicine held a workshop on “citizen scientists” using such devices: nas-sites.org/emergingscience/meetings/personal-environmental-exposure-measurements-making-sense-and-making-use-of-emerging-capabilities.

The beta version of an exposure tool is available, which was developed through an interagency agreement with NIST and is based on the NIST CONTAM model. This exposure tool will predict exposure over time based on source strength: www.nist.gov/el/energy-and-environment-division-73200/nist-multizone-modeling.

Previous Update (August 15, 2018)

CPSC staff are interested in consumer 3D printing and potential air contaminant (VOC and particle) release.

- Previously, staff have reviewed publications with 3D printer emission data and estimated preliminary risk from exposure to emitted VOCs to determine potential health and safety issues to consumers (SOT poster).
- CPSC student interns have investigated potential risks associated with 3D printing in primary schools.
- Staff also have joined the ASTM F42.06/ISO TC261 Additive Manufacturing workgroup, which works primarily on definitions and terminology.
- Staff are developing interagency agreements with EPA and NIOSH to conduct studies on the composition of materials in 3D printer filament and the release of various compounds, including VOCs, during printing. For more information, see the Nano Materials section of these minutes.

U.S. Department of Housing and Urban Development (HUD)

On October 10, 2019, HUD announced the award of approximately \$8.4 million to universities, a public health organization and one private company to develop new and improved methods to identify and control residential health hazards including lead-based paint, and pest infestations. Under the Lead Technical Studies Grant Program, approximately \$2 million was awarded to three institutions and

www.epa.gov/indoor-air-quality-iaq/federal-interagency-committee-indoor-air-quality

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approximately \$6.4 million was awarded under the Healthy Homes Technical Studies Grant Program to seven institutions (see abstracts below).

1. Healthy Homes Technical Studies Grant Awards

1.1 The George Washington University researchers will study the impact of federal housing assistance on residential environmental exposures. Prior research from the study team suggests housing assistance programs are important social and health policy tools since housing assistance is associated with improved physical and mental health for children and adults. However, it is unclear which attributes of housing assistance are contributing to improved health. This study investigates the impact of HUD housing assistance on exposure to indoor environmental contaminants such as lead, secondhand tobacco smoke, and pesticides. This will be accomplished through extensive analysis of a unique dataset that links HUD administrative data (1999–2016) with those from the National Health and Nutrition Examination Survey (1999–2016). The research also includes the development of a housing environmental quality index using American Housing Survey data.

Principal Investigator: Ami Zota, Sc.D.

HUD Contact: Veronica Helms, Veronica.E.Helms@hud.gov

1.2 The National Center for Healthy Housing, partnering with the University of Illinois Indoor Climate Research and Training Institute, will study the effectiveness of the installation of kitchen range hoods to reduce moisture and gas stove generated levels of NO₂ and other contaminants compared with the effectiveness of bath fans, the latter being the more common approach to achieving compliance with ASHRAE Ventilation Standard 62.2, in 120 single-family homes undergoing weatherization. The main objective of the study is to offer evidence-based guidance to homeowners, energy and housing programs, and policy makers on how to improve indoor air quality in homes with gas stoves in a cost-effective manner. The researchers will use information about building tightness to control for the effects of energy efficiency measures, which could affect infiltration rates and contaminant levels. The study will also track the costs of the bathroom ventilation systems as compared to the kitchen exhaust hoods.

Principal Investigator: Jonathan Wilson, jwilson@nchh.org

HUD Contact: J. Kofi Berko, J.Kofi.Berko@hud.gov

1.3 The University of Massachusetts Lowell researchers will study the effectiveness of portable high-efficiency air filtration units in improving indoor air quality and reducing asthma symptoms and healthcare utilization among 100 older adults (age 55+) with asthma living in smoke-free public or other federally assisted housing. The research will be conducted in units with gas stoves, which are known to emit contaminants that can trigger asthma. Using a stepped wedge design to evaluate the impact of this intervention separately and in combination with the improvements seen with the typical multifaceted educational and environmental interventions, the study will fill a major knowledge gap by measuring both PM and NO₂ concentrations in homes that cook with gas stoves and document the reductions in both pollutants when using HEPA/activated charcoal air purifiers. The study will gather data on the effectiveness of air purifiers, as well as document changes in respiratory health measures following the air purifier intervention. The potential benefit of adding subsequent standard multifaceted environmental and educational interventions will also be assessed.

Principal Investigator: David Turcotte, Ph.D., David_Turcotte@uml.edu

HUD Contact: Brenda Reyes, Brenda.M.Reyes@hud.gov

1.4 The University of Illinois Chicago researchers will (1) identify predictors of water lead levels in tap water of homes with private wells, and (2) characterize the cost and efficacy of interventions to reduce tap water lead in homes with private wells. Few states have any regulations to test well water for lead content. UIC will generate information to inform prioritization of homes with private wells for water lead testing. A pilot study suggests that age of home, water corrosivity, plumbing composition, and well composition and condition may be predictors of lead in the tap water of homes with private water wells. They will also generate information on the costs and efficacy of three different approaches to removing lead from tap water of homes with private wells. Partner organizations include the Illinois Association of Groundwater Professionals, Illinois Department of Public Health, Champaign-Urbana Public Health District, Jackson County Health Department, Kane County Health Department, Peoria City/County Health Department and the Whiteside County Health Department.

Principal Investigator: Samuel Dorevitch, M.D., M.P.H., sdorevit@uic.edu

HUD Contact: Eugene Pinzer, Eugene.A.Pinzer@hud.gov

1.5 The Illinois Institute of Technology researchers will investigate the effectiveness of stand-alone air filtration for improving indoor air quality (IAQ) and chronic obstructive pulmonary disease (COPD) outcomes in a high-risk urban cohort of 80 U.S. military veterans with COPD. Additional secondary goals of the study are to (1) investigate housing-related factors that may contribute to COPD exacerbation, (2) investigate the utility of using low-cost sensors for indoor air pollution epidemiology studies and for providing actionable or useful information on the quality of their indoor air to patients and their physicians, and (3) evaluate the costs and benefits of using stand-alone air filtration to improve IAQ and COPD outcomes. Participants will be recruited from the Jesse Brown Veterans Affairs Medical Center (JBVAMC) through the West Side Institute for Science and Education (WISE) using a community-based participatory process in which stakeholders, including patients, physicians, and local nonprofits, will assist in the development of research objectives, recruitment, retention, and dissemination of results.

Principal Investigator: Brent Stephens, Ph.D., brent@iit.edu

HUD Contact: Brenda Reyes, Brenda.M.Reyes@hud.gov

1.6 North Carolina State University researchers will work with public housing agencies and the Lumbee Tribe to test a new pest control protocol for eradicating cockroach infestations and reducing cockroach allergen levels in homes in both urban and rural communities in North Carolina. Community members and pest management professionals will be included to help ensure the success of the study and the future application of study findings. The study consists of three aims: Aim 1 will develop and validate a new pest eradication protocol by assessing the efficacy and cost of several practices (gel bait application, IGR sprays), then whole-home treatments, and finally resident participation. Aim 2 will extend and generalize the most efficacious inner-city cockroach elimination protocol to rural homes in eastern North Carolina and tribal homes (Lumbee Tribe). IEQ measures will include reductions in cockroaches, allergens and endotoxin. Aim 3 will demonstrate a proof-of-concept transformative community participatory intervention model with early intensive PMP inputs and sustainability through community participation.

Principal Investigator: Coby Schal, Ph.D., coby@ncsu.edu

HUD Contact: J. Kofi Berko, J.Kofi.Berko@hud.gov

1.7 Virginia Polytechnic Institute and State University researchers will assess the efficacy and cost of Assessment-based Pest Management (APM) protocols for controlling cockroaches and bed bugs in public and other HUD-assisted housing. The researchers will study how the determination of pesticide resistance among cockroach populations can be incorporated into pest management protocols and they will test the efficacy of different heat systems for bed bug control. The study intends to determine the costs of an APM baiting protocol for German cockroach control, the cockroach population resistance profiles for resistance management recommendations, the efficacy of different whole heat-systems for bed bug eradication and provide pest management training and contract writing seminars to managers, facilities staff and public housing residents.

Principal Investigator: Dini Miller, Ph.D., dinim@vt.edu

HUD Contact: Veronica Helms, Veronica.E.Helms@hud.gov

2. Lead Technical Studies Grant Awards

2.1 QuanTech was awarded funding for the development of a test kit for lead clearance testing. This study builds on previously awarded HUD-sponsored work, Enhancing the Performance of Spot Test Kits for Lead Based Paint Using Solid-Phase Dilution. The main objective of this study will be to develop a fast, on-site procedure to determine clearance after lead hazard control work. The test kit will be based on previous research developing a test kit to determine the presence or absence of lead-based paint. It will potentially decrease the amount of time necessary to obtain clearance and reduce costs for relocation. The test kit will be based on the previous work using the rhodizonate color change to pink in the presence of lead.

Principal Investigator: Gary Dewalt, Ph.D., fgdewalt@comcast.net

HUD Contact: Eugene Pinzer, Eugene.A.Pinzer@hud.gov

2.2 Boston University researchers will study the effects of take-home contamination on children's blood lead levels. This pilot study will characterize 60 homes of low-wage construction workers living with a child. The study will evaluate interventions to reduce take-home contamination, and the effectiveness in reducing metals in household dust and residents' blood. Intervention groups will be assigned to different combinations of customized home assessment, take-home prevention training and professional cleaning. Collaborators will include the Massachusetts Coalition for Occupational Safety and Health, Brazilian American Center, Vietnamese Health Collaborative, New England Carpenters Training Fund, and New England Region Laborers' Health & Safety Fund of North America.

Principal Investigator: Diane Ceballos, Ph.D., ceballos@bu.edu

HUD Contact: Brenda Reyes, Brenda.M.Reyes@hud.gov

2.3 The University of Illinois at Chicago (UIC) researchers will evaluate the existing HELP program in Galesburg, IL. The HELP Program provides services to communities with documented lead problems and is being offered to the City of Galesburg in rural Illinois as a pilot program. Services provided to eligible households prioritize pre-1978 housing units where an EBL child resides. Homes are selected according

to age and condition of the structure, number of children 1–6, and relative degree of poverty. Eligible households will receive a risk assessment and be eligible for lead service line replacement and lead hazard remediation. Comparisons will include lead service line replacement, dust lead and health outcomes, and calculations of costs and benefits. The study will help determine the incremental benefits of lead service line replacement as well as dust lead and health outcomes using an existing analytical predictive lead risk model to assess the program outcomes.

Principal Investigator: Apostolis Sambanis, Ph.D., asamba2@uic.edu

HUD Contact: Brenda Reyes, Brenda.M.Reyes@hud.gov

3. Lead Hazard Control Grant Healthy Homes Supplement Awards

HUD awarded \$30 million in Healthy Homes Supplements to its FY 2019 Lead Hazard Control grantees, to address indoor environmental quality issues in homes in **addition to the \$289 million for lead hazard control work** in those homes. See

[www.hud.gov/press/press_releases_media_advisories/HUD No 19 145](http://www.hud.gov/press/press_releases_media_advisories/HUD_No_19_145).

HUD Contact: Yolanda Brown, yolanda.a.brown@hud.gov

4. Healthy Homes Production for Tribal Housing Grant Awards

HUD awarded \$5 million in FY 2019 Healthy Homes Production for Tribal Housing grantees to federally recognized tribes to address indoor environmental quality issues in tribal homes. Of the six grants, four were awarded to tribal organizations in Alaska. See

[www.hud.gov/press/press_releases_media_advisories/HUD No 19 145](http://www.hud.gov/press/press_releases_media_advisories/HUD_No_19_145).

HUD Contact: Michelle Miller, Michelle.M.Miller@hud.gov

5. Federal Lead Action Plan

HUD has posted its 4th Quarter FY 2019 HUD Implementation Plan under the Federal Lead Action Plan (the HIP FLAP) identifying HUD's accomplishments and plans for accomplishing the Department's objectives under the FLAP.

HUD Contact: Warren Friedman, Warren.Friedman@hud.gov

6. American Healthy Homes Survey II (AHHS II)

The AHHS II survey field work ended July, 2019 with a total of 703 housing units participating. We expect some preliminary results by December, with full results available in mid-2020. Data and samples were collected by XRF for lead-based paint and dust wipes for LBP hazards. Water samples were collected for lead and other metals in water. Air samples were collected for formaldehyde. Dust samples were collected for mold analyses by SQPCR. Observations were attempted to identify lead service lines if they were visible. Wipe samples were collected for pesticide analyses.

HUD Contact: Eugene Pinzer, Eugene.A.Pinzer@hud.gov

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U.S. Environmental Protection Agency (EPA), Indoor Environments Division (IED)

IAQ Science

Wildfire Smoke: A Guide for Public Health Officials 2019 Update Released

EPA recently issued new wildfire guidance, the 2019 *Wildfire Smoke: A Guide for Public Health Officials*, which is now available for download. The guide provides state, tribal and local public health officials with information they need to be prepared for smoke events and, when wildfire smoke is present, to communicate health risks and take measures to protect the public. Chapters in the Guide provide information about—

- the health effects of wildfire smoke;
- air quality impacts of wildfire smoke, both outdoors and indoors;
- strategies for reducing smoke exposure, particularly in residences and other buildings;
- communicating air quality conditions during smoke events; and
- recommendations for public health actions.

Several fact sheets have also been developed to accompany the Guide and make it easier to communicate information about wildfire smoke to the public.

Both the 2019 version of the Guide and associated fact sheets are available for download at www.airnow.gov/wildfire-guide.

The 2019 version of the Guide is the product of an interagency collaboration that includes the California Air Resources Board, California Office of Environmental Health Hazard Assessment, U.S. Centers for Disease Control and Prevention, U.S. Forest Service, and U.S. Environmental Protection Agency. This version includes updates related to preparedness, exposure reduction strategies, and ash cleanup both indoors and out.

EPA Guidance on Air Cleaners and Filters in the Home Featured in ASHRAE Journal

EPA's updated guidance on air cleaners and filters in the home was featured in the September 2019 issue of *ASHRAE Journal*. The technical feature article, "New Guidance for Residential Air Cleaners," authored by Lew Harriman, Brent Stephens, and Terry Brennan, highlights recommendations from the EPA guidance documents as well as the 2018 *ASHRAE Residential Indoor Air Quality Guide* for the selection and use of residential HVAC filters and portable air cleaners. It closes by describing the landscape of ASHRAE and other industry standards and practices that could be improved to encourage the effective use of air cleaners and filters in residences.

To access the *ASHRAE Journal* article and EPA's *Guide to Air Cleaners in the Home* and *Residential Air Cleaners: A Technical Summary*, visit www.epa.gov/indoor-air-quality-iaq/air-cleaners-and-air-filters-home.

Radon

National Radon Action Plan (NRAP)

IED continues to support the growing national network of federal agencies, private sector, nongovernmental organizations (NGOs) and states to prevent lung cancer deaths through the NRAP. Along with its founding members, the American Lung Association has brought in supporting organizations (those who have signed a declaration of support) and emerging potential partners (organizations identified to help drive progress) to increase the mitigation of existing homes and the construction of new homes with radon-reducing features. The NRAP expands the efforts under the Federal Radon Action Plan to focus on actions that go beyond federal governmental actions alone.

The NRAP presents a long-range strategy for eliminating avoidable radon-induced lung cancer in the United States. The Plan's near-term goals are to reduce radon risk in 5 million homes and to save 3,200 lives by 2020. While the 2020 goals offer bold and important milestones, the NRAP's ultimate goal is to eliminate avoidable radon-induced lung cancer in the United States by incorporating radon testing, radon mitigation and radon-resistant construction into the systems that govern purchasing, financing, constructing, and renovating homes and other buildings. Progress for NRAP strategies can be tracked at www.radonleaders.org/resources/nationalradonactionplan.

Some highlights include—

- NRAP Leadership Council held their face-to-face meeting on July 17 in Washington, D.C. Meeting topics included strategy team updates, radon in workplaces, and tools/messaging on radon risks in order to reach out to low income/EJ Communities.
- Recent work with states, industry and NGOs to collaboratively push for more radon policies.
- Tracking progress and reporting on NRAP strategies.

Credentialing of Radon Service Providers

As part of EPA's role to support state programs and to promote the availability of the best possible radon services to consumers, EPA issued a *Federal Register* (FR) Notice seeking public feedback on a proposed approach for developing voluntary criteria for organizations that credential radon service providers. These criteria will establish an ongoing and open evaluation process for organizations wanting to credential radon service providers. For more information about EPA's proposal, visit www.epa.gov/radon.

State Indoor Radon Grants (SIRG)

EPA awarded \$8M to states and tribes in FY19 to support radon programs under the State Indoor Radon Grants (SIRG) Program.

The SIRG Summary Report (for activities conducted during FY17 and FY18) was published in April 2019. This report highlights the important work SIRG grantees are undertaking across the country to advance risk reduction and aims to outline the overall progress to state and tribal programs and highlight activities aligned with Congressional priorities and high-impact strategies. The report is available at www.epa.gov/sites/production/files/2019-04/documents/sirg_fy17_house_report_summary_final.pdf.

Building Codes

EPA continues to collaborate with industry and states to actively engage in efforts to promote adoption of radon-resistant new construction (RRNC) practices by international, national, state and local building codes. These efforts are mandated by the Indoor Radon Abatement Act and are also a key component of the National Radon Action Plan.

- EPA held a Radon Codes Summit in May to bring together codes and radon experts to discuss pathways forward and potential for RRNC adoption nationwide for schools.
- EPA hosted a webinar titled “Radon Protections in New Homes,” which addressed common mistakes in design and installation of passive systems and new radon policy. (The [webinar](#) is available on the Indoor AirPLUS website.)
- In collaboration with the American Association of Radon Scientists and Technologists (AARST), EPA succeeded in maintaining the RRNC requirements and the radon testing for commercial buildings in the International Green Construction Code (IgCC). The code published in 2018 requires radon new construction features be included, testing, and remediation of high levels. The 2018 code also references and relies on AARST/ANSI standards.
- EPA developed several proposals for the ICC-700/ASHRAE-189.1 National Green Building Standard, which have passed through committee votes positively and are now in public comment. The proposals would require radon-reducing features and testing in green-rated homes, including multifamily buildings and during renovations.
- EPA developed a proposal for the International Residential Code (IRC) that included a testing component in the appendix, but it failed to pass the committee vote. EPA is now responding to committee comments in the form of a public comment.
- EPA opposed a proposal to change appendix F of the IRC that would allow the option of installing a side vent radon mitigation system. The proposal to allow a side vent radon mitigation system, RB-286, passed the committee vote and will undergo a vote for final approval in October 2019. EPA will attend the IRC hearing in October to continue to oppose this change.

Asthma

Technical Assistance Webinars

In July, EPA hosted two technical assistance learning opportunities:

- July 23 webinar, “*Opportunities for In-Home Asthma Care in Native Communities: A Northwest Initiative and Tribal Pilot Project*,” featured presentations on collaborative work in the Northwest to ensure that Native children who need in-home environmental asthma care can receive it.
- July 30 webinar, “*Collecting and Analyzing Data to Make Your Case*,” featured presentations on criteria and processes designed to collect and analyze data effectively. Presentations focused on how programs are using data to support and demonstrate real results in children with uncontrolled asthma and the difference data makes in sustaining asthma intervention programs for long-term success.

Both webinars, along with the questions and answers via the discussion forum, are archived on www.asthmacommunitynetwork.org.

Community of Practice

On September 25–26, in Washington, D.C., EPA in partnership with CDC and HUD convened the Financing Environmental Interventions at the Asthma Community of Practice meeting. This event brought together 65 leaders, representing federal agencies, regional, state, and community-based asthma programs, to identify successful, systems-level approaches for financing environmental interventions in homes to improve asthma outcomes. Community of Practice members include private payers, state Medicaid programs, health care providers and community-level practitioners who are leading innovative work to expand delivery of, and reimbursement for, in-home asthma care for the families they serve.

2020 National Environmental Leadership Award in Asthma Management

Each year, EPA honors exceptional asthma programs through the National Environmental Leadership Award in Asthma Management. For 2020, EPA has revised the application to align with a program shift toward recognizing whole-community asthma care systems. When the revised application is launched in November 2019, there will be an integration of the three categories (providers, plans and communities in action) into one award application. The streamlined application maintains the three main topic areas: Comprehensive Asthma Management (includes Management and Operations, Integrated Health Care Services and Tailored Environmental Services); Getting Results; and Evaluation and Sustainability. This remains the only national award for excellence in comprehensive asthma care, and the winners are selected through a highly competitive process that includes an expert review panel with representatives from EPA, CDC, HUD and other leaders in asthma care.

Please stay tuned for the announcement of the application launch in November 2019, and feel free to forward it to your stakeholders as appropriate.

Join AsthmaCommunityNetwork.org

Asthma tools and resources are available year-round on www.asthmacommunitynetwork.org to help programs maximizing their impact. If you or your stakeholders are not already members of the Network, we encourage you to join today and engage with over 1,100 asthma programs across the nation working to improve the impact and sustainability of their programs.

Comprehensive IAQ Interventions in Homes

Indoor airPLUS: New Homes

In April 2019, EPA's Indoor airPLUS (IAP) program hit another record for quarterly labeled homes, which now total over 19,000 homes across the United States. EPA released Revision 4 of the Construction Specifications in early 2018 and continues to share program updates in various industry forums around the country.

On August 20th, EPA's IAP program announced winners for the 2019 Indoor airPLUS Leader Awards, which largely focus on the efforts of partners to educate the public about IAQ through the use of Indoor airPLUS sales tools and public marketing efforts. The awardees, including the distinguished Indoor airPLUS *Leaders of the Year*, were recognized at the 2019 Energy & Environmental Building Alliance

www.epa.gov/indoor-air-quality-iaq/federal-interagency-committee-indoor-air-quality

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Summit on October 2 in Denver, CO (summit.eeba.org). EPA's Indoor airPLUS also sponsored the Healthy Homes track of the conference, which was attended by about 400 high-performance builders, raters, manufacturers, and allied stakeholders.

The Indoor airPLUS program is working on updated program requirements to be included in the Indoor airPLUS Version 2 (V2) Construction Specifications, anticipated to be released for public comment in 2020. Additionally, the program is working on the "re-release" of a partnership category for allied organizations such as manufacturers, service providers, or other IAQ stakeholders interested in supporting EPA's mission and developing IAP brand awareness. The revised "IAP Advocate Partnership" is also slated for release in late 2019 or early 2020.

Indoor airPLUS: Existing Homes (IAP-X)

As part of IAP V2, the Indoor airPLUS program will include a labelling opportunity for existing homes. An EPA existing homes indoor air quality (IAQ) label will also provide new opportunities for home performance contractors and healthy home evaluators to partner with EPA to improve IAQ in the vast segment of existing homes throughout the country. IAP-X is expected to be released for public comment along with V2 of new homes.

Energy Savings Plus Health Guidance Updates

EPA is updating its guidance for single-family (2011) and multifamily (2016) housing to address IAQ concerns and technology advancements during energy upgrades, through voluntary guidance that gives best practices for improving IAQ in conjunction with energy upgrade work. These updates include references to building codes, industry standards and URLs; best practices and technical guidance; recent developments in pollutant control (e.g., particulate matter, radon, moisture); and general formatting for improved usability by industry stakeholders. The end result will be guidance that will not only help users improve their IAQ, but also will provide an opportunity to market improvements in existing homes.

Comprehensive IAQ Interventions in Schools

Indoor Air Quality, Healthy Green Cleaning and Preventive Maintenance in Schools

On October 30, 2019, IED's *IAQ Tools for Schools* Program will host a webinar titled "*Insights from the Experts: IAQ Preventive Maintenance Today for Healthy Green Cleaning Tomorrow*." This webinar will feature a live discussion to recap the strategies outlined in three webinars on healthy green cleaning in schools that were rebroadcasted during October, Children's Health Month. The rebroadcasted schools webinars are archived and available on demand:

- Clean Bill of Health: How Effective Cleaning and Maintenance Can Improve Health Outcomes in Your School, www.epa.gov/iaq-schools/indoor-air-quality-master-class-professional-training-webinar-series
- Green Cleaning for Improved Health: The Return on Investment (ROI) of Green Cleaning in Schools, www.epa.gov/iaq-schools/forms/webinar-green-cleaning-improved-health-return-investment-green-cleaning-schools
- Green, Clean and Healthy: Effective Cleaning and Preventive Maintenance for a Healthier School Environment, www.epa.gov/iaq-schools/indoor-air-quality-knowledge-action-professional-training-webinar-series

www.epa.gov/indoor-air-quality-iaq/federal-interagency-committee-indoor-air-quality

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The October 30, 2019, live webinar will feature a discussion with school district speakers who will reflect and expand on the strategies outlined in the webinars rebroadcasted during October. Participants will hear how these healthy green cleaning best practices are integrated into IAQ preventive maintenance and learn how to utilize EPA guidance to yield a high return on investment, increase equipment longevity, and reduce unexpected and often costly repairs. Participants will also have an opportunity to have their questions answered by school district representatives who have successfully implemented green cleaning and IAQ preventive maintenance strategies. Register for the October 30 webinar at register.gotowebinar.com/register/860053789567804683?utm_content=&utm_medium=email&utm_name=&utm_source=govdelivery&utm_term=.

EPA is promoting a suite of resources titled *Indoor Air Quality Tools for Schools: Preventive Maintenance Guidance Documents* to help school personnel take a holistic, proactive approach to IAQ issues. The guidance leads school personnel through the steps to develop and implement an indoor air quality (IAQ) preventive maintenance plan and offers a framework to make the case for an IAQ preventive maintenance plan and gain buy-in from the school community. The resources are available online at www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-preventive-maintenance-guidance-documents.

EPA staff will facilitate and present during sessions at the upcoming Virginia State Plant Managers Association (VSPMA) and ISSA Green Clean Schools Track conferences on the *Indoor Air Quality Tools for Schools: Preventive Maintenance Guidance Documents*. The sessions will address the dynamic intersection of IAQ, preventive maintenance and energy efficiency. These sessions will provide knowledge and tools to support maintaining and improving healthier, stronger and safer cleaning programs that promote learning.

Expanding the Reach for School IAQ Training

EPA continues to actively deliver technical assistance to the schools community through two professional training webinar series; the 10-part *IAQ Master Class Professional Training Webinar Series*, and the subsequent series, *IAQ Knowledge-to-Action Professional Training Webinar Series*. Since the launch in 2015, more than 3,000 participants have generated nearly 6,000 views of the trainings. All webinars are available “on demand.” Register to view the webinars at www.epa.gov/iaq-schools/indoor-air-quality-master-class-professional-training-webinar-series. EPA is eager to drive even more action in school districts through spreading the IAQ Master Class Professional Training Webinar Series across more networks and platforms. Please contact us at iaqschools@epa.gov if your organization would like to use your existing training platforms and vehicles to host or link to EPA’s IAQ Master Class Professional Training Webinar Series.

Improved Household Energy

ISO Standards

In the fall of 2018, the International Organization for Standardization (ISO) published the first international standard for laboratory testing of cookstoves. The new standard includes protocols to test and report the emissions, efficiency, safety and durability of cookstoves in a lab setting. The laboratory test standard replaces an ISO International Workshop Agreement from 2012, which was led and organized by EPA through the Partnership for Clean Indoor Air. It will serve as the basis for national policies and programs on cookstoves, while also incentivizing manufacturers and developers to improve stove quality and performance. An accompanying ISO technical report that benchmarks performance to voluntary performance targets, or tiers, and provides guidance on how to understand and interpret laboratory test results was also approved by member countries of the ISO Committee and published. Development of the standard was led by EPA staff, with strong engagement of DOE staff. This summer (2019) a second ISO household energy standard was finalized, “Guidance on Field Testing Methods for Cookstoves.” These voluntary documents provide a framework for organizations, countries and regions to adapt and implement the protocols, metrics and targets based on their priorities over the coming months and years. EPA is working with the World Health Organization, the Clean Cooking Alliance, and ISO to organize and facilitate regional workshops to promote the adoption or the adaptation of the ISO harmonized laboratory standards for clean cookstoves and clean cooking practices by countries. The first workshop was held in Nepal for Asian countries in December 2018. The second workshop was held in Uganda for English-speaking African countries in July 2019. At both workshops, the partners also organized a concurrent workshop for staff of household energy laboratories to provide technical assistance and guidance on laboratory testing methods contained in the new ISO standard. A third regional workshop is scheduled to be held in West Africa in the spring of 2020 for Francophone African countries, and later in 2020, a fourth workshop will be held in Latin America. ISO standards are reviewed and updated regularly, so these standards can be updated based on future research and on the progress in the cookstove and fuel market.

EPA staff are preparing to participate in the 9th Biennial Cookstove/Household Energy Forum, which will be held in Nairobi, Kenya, on November 4–6, 2019. The Forum convenes more than 500 participants representing 50+ countries. Attendees represent public and private sector health, energy and environmental professionals, stove designers and manufacturers, researchers, NGOs and others who share the common mission of reducing the health, environmental and economic burden from biomass fuels and rudimentary stoves. Sessions focus on technical training, tailoring stove standards, health and environmental research findings and creating collaboration opportunities. In conjunction with the Forum, there will be an ISO Technical Committee 285 (TC285) Plenary Meeting (November 7–8).

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