ANNUAL REPORT

SOCIETY FOR INDOOR ENVIRONMENT

SIE

2023-2024

SOCIETY FOR INDOOR ENVIRONMENT

The Society for Indoor Environment (SIE) is a non-governmental organization registered under the Society Registration Act XXI of 1860 on 3rd February 2017. SIE represents a coalition of leading research, engineering, medical, and educational institutions in India, including prestigious entities such as IITs, NITs, CSIR-NEERI, EMC, IPCA, ICMR, and the University of Delhi.

Founded by a core group of experts, SIE is dedicated to addressing the critical issues of indoor environmental quality (IEQ). With people spending over 90% of their time indoors, the significance of indoor air quality cannot be overstated. According to the latest Global Burden of Disease report, indoor air pollution is India's second largest health risk. Poor indoor air quality impacts buildings and affects occupants' health, comfort, performance, and behavior, yet it has received insufficient attention in our country. Addressing this urgent need, SIE strives to find sustainable solutions to enhance indoor environments.

KEY OBJECTIVES

SIE aims to facilitate interdisciplinary communication and information exchange on indoor environmental quality through publications, seminars, meetings, and other events. The organization engages in research and development to provide sustainable solutions for societal welfare and promotes environmental education in indoor environmental science, technology, and policy across various educational institutions. SIE addresses environmental protection issues through effective and lawful measures and brings together diverse stakeholders to share knowledge and best practices. The organization develops guidelines to help architects, contractors, building owners, and operators achieve acceptable IEQ and works on implementing Indoor Air Quality (IAQ) standards and promoting IAQ-sensitive practices in building design, construction, commissioning, and operation. Additionally, SIE serves as a knowledge resource for green buildings and publishes various materials on IEQ-related issues.

OUR VISION

To remain a foremost source of technical knowledge on Indoor Environmental Quality (IEQ), mainstream IEQ in education

OUR MISSION

To promote individual, community, industry, and government's responsibility to create healthy indoor environments

OUR GOALS

To reduce people's exposure to indoor environmental contaminants and minimize the risk of building-related illnesses.

PATRONS OF SIE

TEAM AT SIE

DR RAKESH KUMAR

DR SRI HARSHA KOTA

DR PRIYANKA KULSHRESHTHA

DR SUMANTH CHINTHALA

DR NAMRATA JARIWALA

PROF SHUKLA DAS

PROF NEELIMA GUPTA

DR PRATIMA SINGH

DR RADHA GOYAL

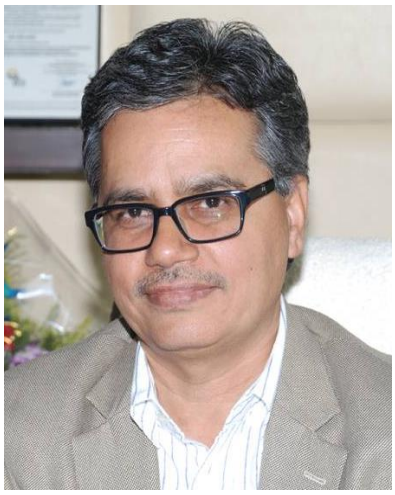
DR RAVINDRA KHAIWAL

DR SUNIL GULIA

CONTENTS

PRESIDENT'S MESSAGE

The Value of a Healthy Indoor Environment



A healthy indoor environment is not a luxury; it is a necessity. The air we breathe, the lighting that guides us, the temperature that keeps us comfortable, and the acoustics that shape our concentration all contribute to our physical and mental health. As we stand on the brink of a new era marked by rapid technological advancements and evolving lifestyles, the spaces where we live, work, and learn have never been more important. With the majority of our daily lives spent indoors—an estimated 90% of our time, according to the Environmental Protection Agency (EPA)—the quality of our indoor environments directly impacts our health, productivity, and well-being. It is time to recognize that the conditions within our homes, offices, schools, and public buildings are not just background elements—they are vital components of our lives that deserve attention and care. SIE members studies have shown the immense importance that this subject holds in India, as our disease burden due to air pollution is rapidly rising not in urban regions but also in rural areas.

World Health Organization (WHO) reports that 3.8 million deaths per year globally are attributed to indoor air pollution, with common pollutants such as particulate matter, carbon monoxide, and volatile organic compounds (VOCs) besides others contributing to respiratory problems, heart disease, and even premature death. Indoor air quality is a serious public health concern, particularly in spaces with poor ventilation, where pollutants can accumulate to levels up to five to eight times higher than outdoor air.

The building design codes have evolved; however, issue of implementation still remains a major issue. Beyond air quality, factors such as poor lighting and inadequate temperature control can also have profound effects on well-being. Inadequate lighting has been linked to increased rates of depression, especially houses which are poorly ventilated and densely built. Meanwhile, extreme temperatures, whether too hot or too cold, can exacerbate existing health conditions, including cardiovascular and respiratory issues. Inadequate regulation of indoor climate can lead to discomfort, decreased cognitive function, and a higher risk of illness, particularly among vulnerable populations such as the elderly and children.

In the face of these challenges, the need for sustainable and efficient indoor environments becomes even more pressing. We must strive for buildings that not only provide comfort and safety but also contribute to a healthier, more sustainable future. This means investing in energy-efficient heating, ventilation, and air conditioning (HVAC) systems that improve air quality while reducing energy consumption. It warrants critical and innovative thinking to design new spaces and retrofit old buildings that maximize natural light, regulate temperature effectively, and minimize the presence of harmful materials such as asbestos, lead, mold, and other bioaerosols.

As we move forward, though Society of Indoor Environment (SIE) has been trying its best to educate stakeholders and foster partnerships in this field, it would be desirable that architects, engineers, policymakers, and the public to prioritize the creation and maintenance of healthy indoor environments. SIE has been concentrating its efforts in sensitization and building capacity through organising events like IEQ 2024 where worldwide experts addressed a gathering of more than 100 academicians and researchers in India. SIE also played a pivotal role as knowledge partner in contributing to the 'Breathe In series' where various perspectives of indoor environment were discussed in last one year. SIE signed an MoU with EDS (Environment Design Solutions) and TSL (Techknowgreen Solutions Pvt Ltd) for giving impetus to IEQ research in India and work from grassroot level to policymaking in order to ensure that IAQ remains one of the important areas of future research.

The data is clear: the indoor environment has a direct impact on our health, and we can no longer afford to overlook it. Let us work together to develop solutions that ensure our indoor spaces are safe, comfortable, and sustainable for all. Whether through improved building codes, smarter technology, or greater awareness of the impact of indoor environments on health, we have the opportunity to create a better future—one room, one building at a time.

I would like to thank all the SIE members, experts and the team which is working hard to achieve the objective of the Society. Thank you for your commitment to this important cause. Together, we can ensure that our indoor environments enhance, rather than detract from, our well-being.

Sincerely,

Dr. Rakesh Kumar
President

OVERVIEW OF THE YEAR 2023-2024

The Society for Indoor Environment (SIE) has had a productive year with numerous impactful activities and projects. Key events included the "**Breathe In Dialogues**," which addressed critical issues related to indoor air quality (IAQ) in various settings such as healthcare and residential environments. These dialogues emphasized interdisciplinary collaboration and the importance of occupant awareness in achieving healthier indoor spaces.

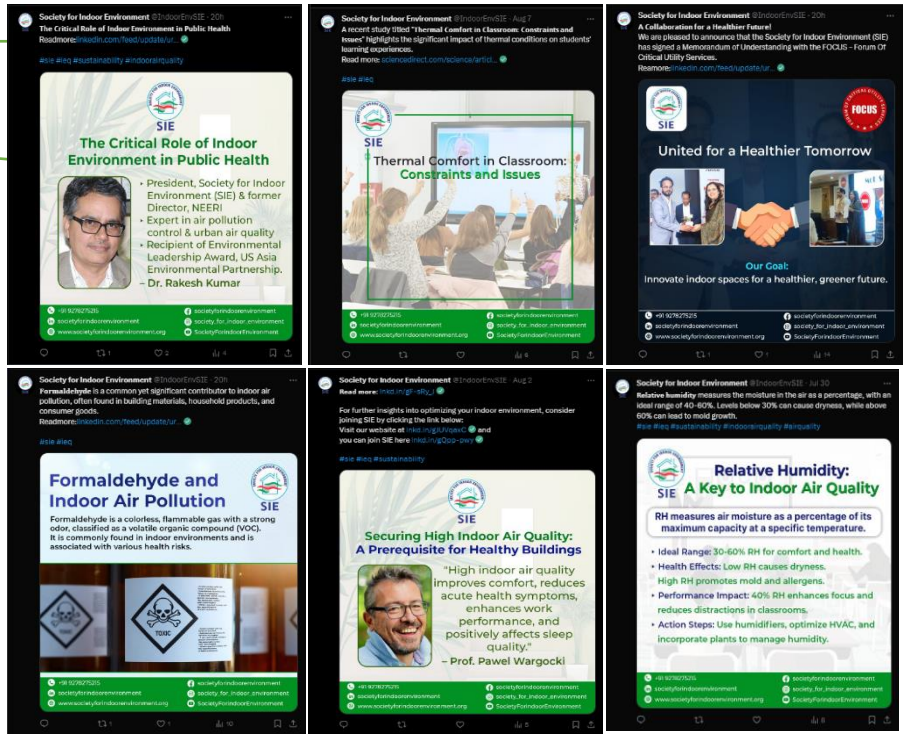
The 2nd **Asian Conference on Indoor Environmental Quality (ACIEQ 2023)** was a significant highlight, gathering over 350 participants from academia, industry, and research organizations. The conference featured distinguished speakers and provided a platform for discussing advancements in IAQ, highlighting the growing importance of indoor environmental quality in public health and productivity.

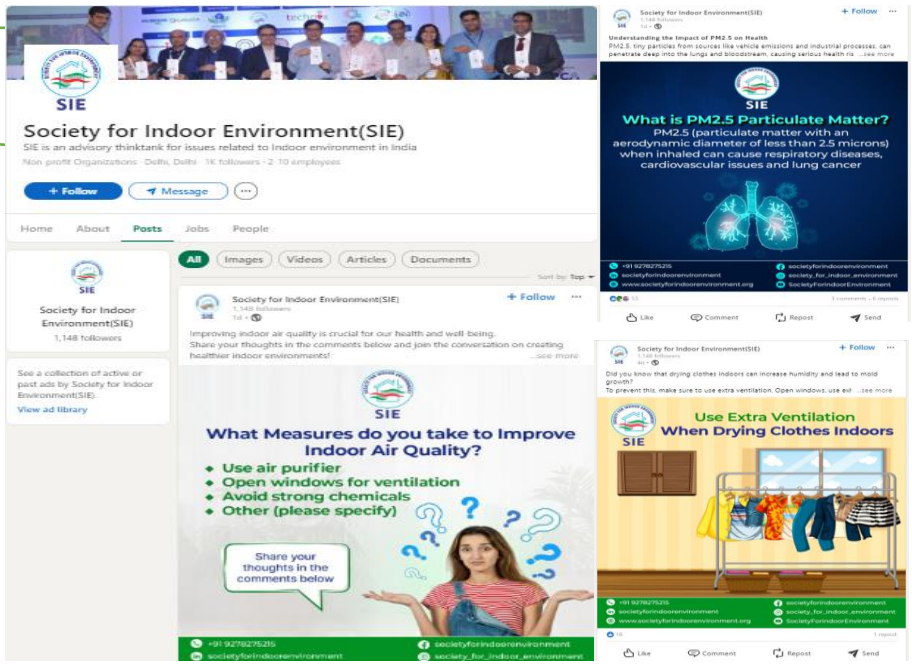
Additionally, the publication of selected proceedings from **ACIEQ 2023 by Springer** showcased cutting-edge research on various aspects of indoor environmental quality, further establishing SIE as a leading knowledge resource.

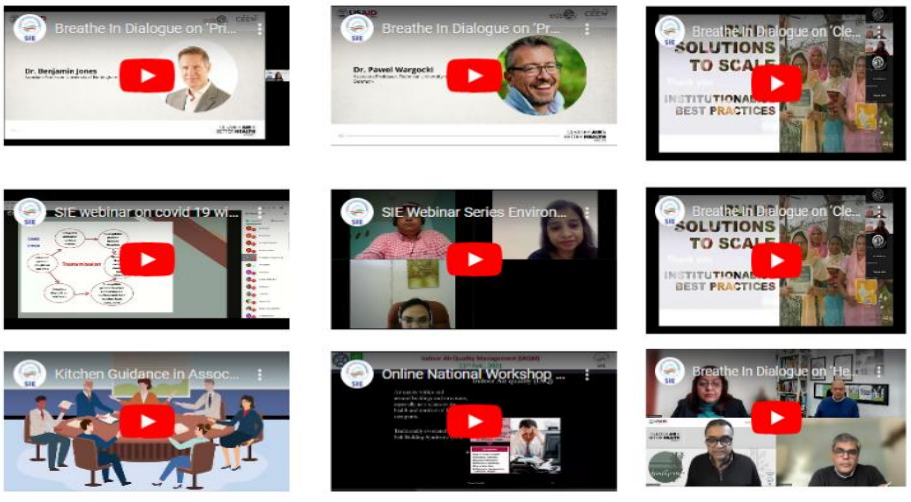
SIE's outreach efforts, including collaborative projects with organizations like **EDS**, have focused on mitigating indoor air pollution and enhancing IAQ standards. These initiatives underscore the urgent need for comprehensive strategies to improve indoor environments, particularly in densely populated and poorly ventilated areas.

Looking ahead, SIE remains committed to advancing research, promoting education, and advocating for policies that prioritize indoor environmental quality. The organization's ongoing efforts aim to create healthier indoor environments for all, ensuring that the quality of indoor air receives the attention it deserves in building design, operation, and maintenance.

OUTREACH ACTIVITIES @ SIE


The Critical Role of Indoor Environment in Public Health
Thermal Comfort in Classroom: Constraints and Issues
United for a Healthier Tomorrow
Formaldehyde and Indoor Air Pollution
Securing High Indoor Air Quality: A Prerequisite for Healthy Buildings
Relative Humidity: A Key to Indoor Air Quality


Society for Indoor Environment(SIE)
What is PM2.5 Particulate Matter?
What Measures do you take to Improve Indoor Air Quality?
Use Extra Ventilation When Drying Clothes Indoors


Breathe In Dialogue on 'Pri...
Breathe In Dialogue on 'Pr...
Breathe In Dialogue on 'Cle...
SIE webinar on covid 19 wi...
SIE Webinar Series Environ...
Kitchen Guidance in Assoc...
Online National Workshop
Breathe In Dialogue on 'He...

BREATHE IN DIALOGUES (SIE as knowledge partner)

BREATHE IN DIALOGUE 01: CLEAN AIR IN HEALTHCARE

DATE: SEPTEMBER 15, 2023

The "**Dialogue on Cleaner Air in Healthcare**" event, held on September 15, 2023, from 16:00 to 17:30 IST, was a part of the Cleaner Air and Better Health (CABH) project. This initiative was a collaborative effort supported by USAID, EDS, SIE, and CEEW. The event aimed to address critical issues related to air quality in healthcare settings and its impact on public health.

The agenda included a welcome and introduction by Ms.Nidhi Gupta, Associate Director at EDS, followed by an overview of the CABH Project by Mr. Om Prakash Singh, Chief of Party at CEEW. Mr. Soumitri Das, Project Management Specialist at USAID, shared insights on air pollution mitigation in India. **Prof. Dr. Shukla Das, SIE GB Member** discussed IAQ Challenges to reduce biological and chemical impact.

Ms. Deepanjali Wadkar, Senior Policy Analyst at EDS, discussed the intersection of public health, pollution, and built environments. Dr. Brendon Burley, Healthcare Practice Leader at BKM & Associates, and Mr. Vinay Sethi from ISHRAE addressed IAQ challenges and the reduction of biological and chemical impacts. Finally, Mr. Ravideep Singh, Associate Director at Creative Designer Architects, presented best practices for indoor environment design in healthcare, followed by an open discussion session.

The event provided valuable insights and strategies for improving air quality in healthcare facilities, highlighting the importance of interdisciplinary collaboration in tackling air pollution and its health impacts.

FOR MORE INFORMATION: https://www.youtube.com/watch?v=md4C2F0iPtw&t=1s

BREATHE IN DIALOGUE 02: PRO INDOOR AIR QUALITY ACTIONS

DATE: OCTOBER 11, 2023

The **"Breathe In Dialogue on 'Pro Indoor Air Quality Actions'"** featured multiple speakers discussing strategies to enhance indoor air quality (IAQ). The session opened with an overview of the Cleaner Air and Better Health (CABH) Project, which aims to reduce air pollution and exposure. Goals include a 60% reduction in emissions from MSME units, a 40% reduction in PM levels at pilot construction sites, and 80% of households using clean cooking fuel. The project also aims to strengthen the capacities of 10 State Pollution Control Boards and encourage 200 sources to adopt IAQ monitoring technologies.

Dr Pawel Wargocki from Denmark highlighted how the pandemic accelerated focus on IAQ, leading to health certifications and new guidelines. He discussed challenges in IAQ measurement and certification, emphasizing the need for comprehensive metrics that include infection and health risk assessments using parameters like CO2, PM2.5, and TVOCs.

Dr Vishal Kapur from India shared insights from pilot studies at IIT Madras and MNIT Jaipur, which stressed the importance of building design, system controls, and maintenance. He highlighted the economic and health benefits of good IAQ, noting long-term gains from IAQ improvements.

During the Q&A session, moderated by Ms. Nidhi, speakers addressed IAQ practices and standards. Dr. Kapur emphasized the need for collaboration to standardize IAQ measurements and create a central data repository. He suggested developing different IAQ standard classes for various environments such as health, learning, and work.

The session concluded with an invitation to the next dialogue, featuring experts like Dr. Benjamin Jones from the University of Nottingham and Dr. Sunil Ghia, to continue discussions on improving IAQ for better health and sustainability.

FOR MORE INFORMATION: https://www.youtube.com/watch?v=SC1rB0EVsD0

BREATHE IN DIALOGUE 03: PRIORITISATION OF INDOOR AIR POLLUTANTS

DATE: NOVEMBER 02, 2023

The dialogue on "**Prioritisation of Indoor Air Contaminants**," part of the Cleaner Air and Better Health Project (CABH), focused on indoor air quality (IAQ) issues, including regulatory convergence, design and technology, monitoring and management, and occupant awareness. The CABH project, supported by USAID, aims to mitigate air pollution and reduce exposure in selected regions of India.

Dr Benjamin discussed the complexity of IAQ, highlighting the need to prioritize contaminants and the harm they cause. He emphasized the importance of understanding the emission sources, exposure, and the resultant harm, measured in disability-adjusted life years (DALYs). He presented data showing that particulate matter (PM2.5) is significantly more harmful than other indoor contaminants. The challenge lies in setting and enforcing threshold limit values for various pollutants.

SIE GB Member Dr. Sunil Gulia shared findings from studies conducted by his team, which focused on different indoor environments in Delhi. The studies revealed that PM2.5 levels often exceed World Health Organization (WHO) standards, influenced by factors such as building design, ventilation, and surrounding environment. He stressed the importance of continuous monitoring and the need for accurate data to develop effective IAQ standards, including considerations for ultrafine particles.

The session concluded with a call for more research, especially in South Asia, to establish relevant IAQ standards and strategies for implementation. The experts highlighted the need for simple, enforceable guidelines to improve indoor air quality, ultimately making homes and workplaces safer.

FOR MORE INFORMATION: https://www.youtube.com/watch?v=CbTOPv1keSU

BREATHE IN DIALOGUE 04: OCCUPANT AWARENESS AND COMMUNICATION

DATE: JANUARY 23, 2024

On January 23, 2024, the "Breathe-In Dialogue on **Occupant Awareness & Communication"** was held as part of the Cleaner Air and Better Health (CABH) Project, supported by USAID and organized by EDS and CEEW. The session, titled "Healthy Indoors: An Exchange of Stories, Facts, and Experiences," featured esteemed speakers including Barun Aggarwal, CEO of Breathe Easy Consultants Pvt Ltd; **SIE GB member Dr. Neelima Gupta**, Director Professor & Head (ENT) at UCMS and GTB Hospital, Delhi; Mr. Chetan Bhattacharji, Contributing Editor and Consultant on Climate Comms Strategies; Mr. Sachin Panwar, Founder of YOGa Clean Air; and Mr. Soumitri Das, Project Management Specialist (Environment) at USAID. Moderated by Mr. Tanmay Tathagat, Director of EDS, along with Ms. Nidhi Gupta, Associate Director of EDS, and Ms. Deepanjali Wadkar, Senior Policy Analyst at EDS, the dialogue provided a platform for sharing insights and experiences on improving indoor air quality (IAQ). The event emphasized the importance of occupant awareness and communication in achieving healthier indoor environments. It also highlighted the role of knowledge partners like the **Society for Indoor Environment (SIE)** in advancing these critical discussions. The session underscored the significance of collaborative efforts in promoting better IAQ standards and practices for the well-being of all.

FOR MORE INFORMATION: https://www.youtube.com/watch?v=7tK9pyxTB8k

ACIEQ 2023

As urbanization and population growth continue to rise, people are increasingly spending their lives within airtight buildings, leading to significant health impacts. With over 90% of our time spent indoors, the quality of the indoor environment is crucial for maintaining health, well-being, and productivity. Despite its importance, the indoor environment has not been adequately addressed in building design and usage, nor has it received the attention it deserves.

Building on the success of the 1st Edition of the Asian Conference on Indoor Environmental Quality (ACIEQ) in February 2019, the Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE), in collaboration with the Society for Indoor Environment (SIE) and the Indoor Air Quality Association-India Chapter (IAQA), proudly announced the 2nd Edition of ACIEQ. This event was scheduled to take place on the 24th and 25th of February 2023 at the Indian Aviation Academy in Vasant Kunj, New Delhi.

The ACIEQ 2023 aimed to bring together experts, researchers, and practitioners from various fields to discuss the latest advancements, challenges, and solutions in indoor environmental quality. This conference served as a platform for interdisciplinary communication, knowledge exchange, and collaborative efforts to improve the indoor environments where we live and work.

ACIEQ 2023 HIGHLIGHTS

The 2nd Edition of the Asian Conference on Indoor Environmental Quality (ACIEQ) 2023 was inaugurated by Chief Guest Mr. Prashant Gargava, with the participation of SIE President Prof. Arun Sharma and ISHRAE President Mr. N.S. Chandrashekhar. The event featured outstanding research presentations by eminent keynote speakers, including Prof. Lidia Morawska from Australia, Prof. Pawel Wargocki from Denmark, Prof. Prashant Kumar from the United Kingdom, and Prof. Arsen Melikov from Denmark.

Eminent personalities at ACIEQ 2023

Prof. Pawel Wargocki and Prof. Lidia Morawska along with other notable members of SIE

Renowned experts from across India also contributed significantly to the conference. Notable speakers included Dr. Rakesh Kumar from CSIR, Prof. Arun Sharma from ICMR-NIIRNCD, Prof. Shiva Nagendra from IITM, Prof. Ravindra Khaiwal from PGI Chandigarh, Prof. Ajay Taneja, Prof. Susan Varghese from Dr. B.R.A University, Agra, Prof. Shukla Das, and Prof. Neelima Gupta from UCMS, Delhi.

With a record-breaking attendance of 500+ speakers and delegates from academia, research organizations, and industry, ACIEQ 2023 marked the largest-ever event on Indoor Environmental Quality in India. This conference underscored the growing importance of indoor environmental quality in ensuring the health, well-being, and productivity of individuals in the built environment.

ASIAN CONFERENCE ON INDOOR ENVIRONMENTAL QUALITY

Day – 1 (24th February 2023)

9:00 am - 9:45 am	Registration		
9:45am - 10:45am	Auditorium Inaugural Session Invitees Dr. Prashant Gargava, Member Secretary, CPCB (Chief Guest) National President, ISHRAE; President, SIE; Chapter Director, IAQA India Chapter		
10:45am - 11:30am	Key Note 1, Lidia Morawska, Distinguished Professor at Queensland University of Technology, Australia		
11:30am - 11:50am	Presentation by Conference Partner – KNAUF CEILING SOLUTIONS		
11:50am - 12:15pm	High Tea Break		
12:15pm - 1:15pm	Hall 1	Hall 2	Hall 3
	Session 1 (IAQ – Monitoring & Assessment) Moderator – Dr. Rakesh Kumar, OSD, CSIR, HQ, Delhi	**Session 2** (Productivity and Health) Moderator – Dr. Arun Kumar Sharma, Director, ICMR– NIIRNCD, Jodhpur	**Session 3** (Ventilation and Thermal Comfort) Moderator – Dr. Jyotirmaya Mathur, Professor, MNIT, Jaipur
	Session Mentor: Yogesh Takkar (Founder,Yogi Engineers)	**Session Mentor: N S Chandrashekhar (Director, Genex Consultants)**	**Session Mentor: Aneesh Kadyan (Sr. ED, CBRE Property Management)**
	Chemical fingerprinting of Volatile Organic Compounds – A forensic tool to apportion pollution sources in industrial microenvironments – **Abinaya Sekar, George K Varghese**	Microbiological profile and air quality indoor effects in the operation theatres of a tertiary care hospital: An impapct on disease burden – **Kirti Nirmal, Shukla Das**	Determination of air exchange rate, ventilation rate and indoor air quality index for a community kitchen – **Naragam Bhanu Sree, Aditya Kumar Patra**
	Session Partner presentation – CALEEDO	**Session Partner presentation – Intelligreen Technologies**	**Session Partner presentation – ALP Aeroflex**
	Invited Speaker – Dr. Suresh Jain, IIT Delhi Indoor air quality in different urban microenvironments – case studies	**Invited Speaker** – Dr. Madhulika Bhati, CSIR–NEERI Indoor pollution and possible Science and technology intervention through the lens of scientometric study	**Invited Speaker** – M.P. Maiya, Professor, IIT Chennai Thermal Comfort: Evaluation and Energy Conservation
	Particulate Matter and Black Carbon in different Indoor Microenvironments of Schools in Agra, India – **Rini John, Ajay Taneja**	Respiratory Viral Infections During COVID-19 Pandemic : A Study From A Tertiary Care Hospital India – **Jothisri Lakshmanan, Shukla Das**	Quantification of dynamic ventilation rates and assessment of occupant thermal comfort inside a naturally ventilated hostel room during wintertime in north India – **Supreme Jain, Asmita Addye**
1:15pm - 2:15pm	Networking Lunch Break		
2:15pm - 2:45pm	POSTER PRESENTATION Microplastic in indoor environment sources : A preliminary assessment : Sruthy Robert Relationship between measured and perceived indoor environmental quality status in Indian offices : Shashank Mishra Assessment of indoor air exposure due to man-made rituals: Inhalation dose and lobar deposition : Sneha M Periodic identification of microbial indoor air contaminants and health hazard taxation in different microenvironments : Anam Taushiba		
2:45pm - 3:00pm	AUDITORIUM SKIT BY ALCHEMY THEATRE SOCIETY		
3:00pm - 3:45pm	Key Note 2, Prof. Pawel Wargocki, University of Denmak (Ventilation & Thermal Comfort)		
3:45pm - 3:55pm	Theme Partner Presentation– Ultrapure		
3:55pm - 4:05pm	Theme Partner presentation– Bry – Air, DRI		
4:05pm - 4:20pm	Networking Tea Break		
4:20pm - 5:30pm	Hall 1	Hall 2	Hall 3
	Session 4 (IAQ – Exposure & Health) Moderator– **Dr. S.K. Goyal, CSIR– NEERI**	**Session 5** (Lighting and Visual Comfort) **Dr. Jyotirmaya Mathur, Professor, MNIT, Jaipur**	**Session 6** (IAQ– Monitoring & Control Technologies) **Moderator – Dr. Dipankar Saha, Former Addl. Director, CPCB, Advisor, BPCB**
	Age–specific deposition of indoor particulate matter in the human respiratory tract – **Akshay Somnath Kale, Ritwika Roy**	Policy to Implementation : Lighting, Thermal Comfort & Indoor Air Quality – **Nidhi Gupta, EDS Global**	Antimicrobial air filters to purify air and deactivate captured microorganisms using environment–friendly and non–toxic bio–polymer coating – **Ravi Kaushik**
	Session Partner presentation – EPSCO	**Session Partner presentation – Camfil**	**Session Partner presentation – Durkeesox**
	Invited Speaker– Dr. Naresh Gupta, MAMC, Delhi Insights into health effects of indoor air quality	**Invited Speaker**– Dr. Reena M Choudhary, ICARE Hospital, Noida Effects of blue light exposure fron screens on the eye health	**Invited Speaker**– Dr. Manoranjan Sahu, IIT Bombay Development of Indoor Pollution Control Technology for Particulate Matter: A special focus on Bioaerosols
	Exposure to aerosol–associated trace metals during active cooking in rural spheres of northeastern India: Insights from size–segregated profiles and respiratory deposition analysis – **Bijay Sharma**	Investigating student's perception of visual comfort in architectural studios and its impact on their work output –**Tanishka Ajinath Kharat,Prof. Namrata Dhamankar**	Prediction of Cleaning and Life cycle analysis of HVAC Filter – **Kapil Kapoor, Arun Nanda**

ASIAN CONFERENCE ON INDOOR ENVIRONMENTAL QUALITY

Day – 2 (25th February 2023)

9:00 am - 9:45am	Registration		
9:45am - 10:45am	Auditorium **Key Note 3, Dr. Prashant Kumar, Professor, University of Surrey, UK**		
10:45am - 11:45am	Panel Discussion – IEQ: Regulations, Innovation and Management for better health Moderator – Dr. Rakesh Kumar, OSD, CSIR Panelists: Dr. V.M. Motghare, MPCB; Dr. Rameshwar, Deputy Director, NPCCHH, MOHFWA; Dr. Sumit Sharma, Program Head, UNEP; Ashish Rakheja, AEON Consultants; Varun Jain, Senalac Consultants; Naresh Duble, Knauf Ceiling Solutions		
11:45am - 12:10am	Networking Tea Break		
12:10pm - 1:20pm	Hall 1	Hall 2	Hall 3
	Session 7 (IAQ– Monitoring & Assessment) Moderator – Dr. P.B. Rastogi, Former Advisor, MOEFCC	**Session 8** (IAQ– Exposure & Health) Moderator – Dr. Anubha Goel, IIT Kanpur	**Session 9** Productivity & Health – Bioaerosols) Moderator – Dr. Shukla Das, UCMS, Delhi
	Session Mentor: Manoj Chakravorti (Consultant, ACME Consultants)	**Session Mentor: Rishi Raj (COO, Max Estates Ltd.)**	**Session Mentor: Samta Bajaj (Principal, Envirocon Engineering Services)**
	IAQ Exposure Calculator and its Management– Sachin Panwar	School Children's Exposure to Fine Particulate Matter: Personal Air Quality Monitoring in the City of Ghaziabad – David Massy & Mahima Habil	Using Viable and low–cost interventions that reduce particle levels can enhance the operating efficiency of occupants – Subham Rathi, Anubha Goel
	Invited Speaker – Dr.S.M.Shiva Nagendra, IIT Chennai Indoor air pollution, associated health risks and technological interventions	**Invited Speaker** – Dr. Ravindra Khaiwal, PGI Chandigarh Indoor Air Pollution Exposure – Emerging Issues & Way forward	**Invited Speaker** – Dr. Neelima Gupta, UCMS Role of Environmental factors on Health
	Effect of Standard Effective Temperature on Thermal Comfort, Mental State, Human Performance and Mental Load – Virendra Sharma, A. Dave Tanmay	**Invited Speaker** – Dr. Susan Verghese, St. Johns College, Agra Impact of Cigarette Smoking on Indoor Air Environment and on Covid 19	Socio–economic perspective on the size distribution coupled morphometry of fine particles in indoor microenvironments of Northern India – Himanshi Rohra, P.G. Satsangi
	Assessment of Indoor Air Quality in the Dyeing and Printing Processing House, Using Multivariate Factor Analysis – Dr. Dharmendra Vasantlal Jariwala, Dr. R.A.Christian	Occupational exposure assessment for highway toll station workers exposed to fine, ultrafine and black carbon in India : Nazneen and Aditya Kumar Patra	Investigation of Indoor Air Quality and Passengers' Exposure in Underground Rapid Transit System– Amit Passi, Shiva Nagendra
1:20pm - 2:20pm	Networking Lunch Break		
2:20pm - 3:05pm	Auditorium **Key Note 4: Prof. Arsen K. Melikov, Technical University of Denmark**		
3:05pm - 4:00pm	Hall 1	Hall 2	Hall 3
	Session 10 (IAQ– Monitoring & Assessment) Moderator – Dr. Sumantha Chinthala, Professor, NIT, Warangal	**Session 11** P Productivity and Health Moderator – Dr. Yash Shukla CEPT Univ.	**Session 12** IAQ – Monitoring, Assessment & Characterization Moderator – Dr. Harsha Kota, IIT Delhi
	Session Mentor: G S Balaji, ED (Rentco), DLF	**Session Mentor: Pankaj Dharkar (President, Pankaj Dharkar Associates)**	**Session Mentor: Sunil Nayyar (Founder, Sunil Nayyar Consultants)**
	Quantification and assessment of Indoor PM2.5 in North Indian precinct – Farheen Zehra, Alfred. J. Lawrence	Post vaccination Covid infection: An observational study at a tertiary care hospital in East Delhi – Charu Jain, N.P. Singh	Indoor Particulate Matter Pollution on Oxidative Stress Pathways: Role of Chemical and Biological Constituents – Milind Kumar Bhatkar, Shreya Roy
	Invited Speaker – Dr. Sunil Gulia, CSIR NEERI Indoor Environmental Quality Assessment in a recently renovated Office Building in Delhi City	**Invited Speaker** – Dr. Jolly Rohtagi, Computer Vision Syndrome	**Invited Speaker** – Prof. Ajay Taneja, B.R. Ambedkar Univ. Agra Indoor Air Pollution, health issues and solution
	Fine Particulate Matter and Elemental concentration in different schools of Agra (India) – Stuti Dubey, Ajay Taneja	Fungal infection during second wave of COVID –19 pandemic in a tertiary care hospital: Impact of aerial spore density during lockdown – Neha Rani, Kriti Nirmal	Physico–chemical characterisation and metal analysis of indoor airborne particles– Veerendra Sahu, Bhola Ram Gurjar
4:00pm - 4:20pm	Tea Break		
4:20pm - 4:40pm	SKIT BY STUDENTS OF UNIVERSITY OF DELHI		
4:40pm - 4:50pm	Automation Partner presentation		
4:50pm - 5:15pm	Springer Awards Distribution & Closing Ceremony		
5:15pm - 6:15pm	High Tea		

ASIAN CONFERENCE ON INDOOR ENVIRONMENTAL QUALITY

Organising Committee :

Chair – Barun Aggarwal
Co – chair – Dr. Priyanka Kulshreshtha
Convener – Anoop Ballaney
Co – convener – Dr. Harsha Kota
Sr. Conference Coordinator – Ms. Rakhi Ghosh
Conference Coordinator – Ms. Aakriti Tanwar

Scientific Committee :

Chairman – Dr. Arun Sharma
Joint Chairman – Dr. Rakesh Kumar
Convener – Dr. Radha Goyal
Co-convenor – Dr. Pratima Singh
Members – Dr. Shukla Das
Members – Dr. Neelima Gupta
Members – Dr. Sunil Gulia
Members – Dr. Ravindra Khaiwal
Members – Dr. Anubha Goel
Members – Dr. Sumanth Chinthala

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Dr. Rastogi
Dr. R.A. Christian
Dr. Dipankar Saha
Dr. Ajay Taneja
Prof. Shiva Nagendra
Dr.V.N. Motghare (Assistant MS of MPCB)
Dr. Prashant Gargava (MS, CPCB)
Dr. S.K. Goyal (NEERI Delhi)

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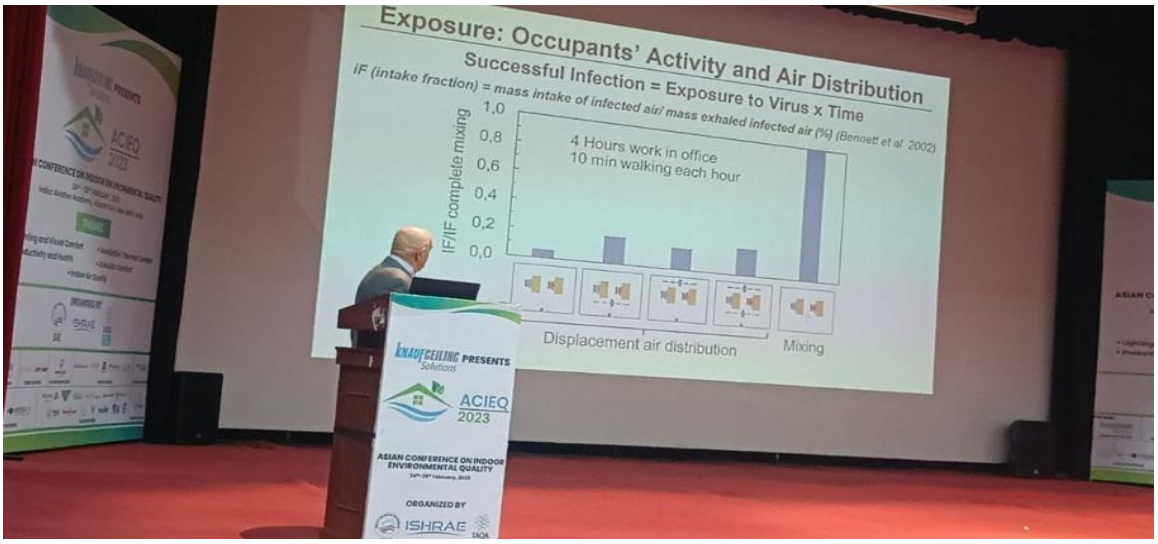
Brochure of ACIEQ 2023 Providing an Insight into The List of Eminent Personalities at the Event

Dr. Priyanka Kulshrestha addressing the gathering at ACIEQ 2023



Informative Presentation at ACIEQ 2023

ACIEQ 2023 featured distinguished speakers from academia, industry, and research. Notable keynote speakers included **Prof. Prashant Kumar** from the University of Surrey, UK, **Prof. Pawel Wargocki** from the Technical University of Denmark, and **Prof. Lidia Morawska** from the Queensland University of Technology, Australia. They shared valuable insights on indoor air quality.

The event saw an attendance of over **350 participants**.

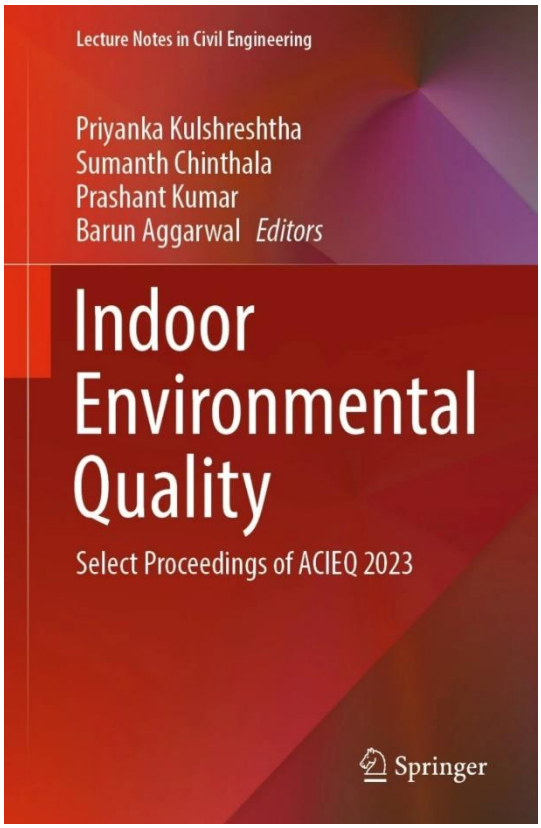
Interactive Session at ACIEQ 2023

Members of SIE (**Dr. Rakesh Kumar**, CSIR-NEERI; **Dr. Dipankar Saha**, Ex-CPCB; **Mr. Sachin Pawar**, Your Own Green Area; **Prof. Ravindra Khaiwal**, PGI, Chandigarh; **Dr. Sunil Gulia**, NEERI Zonal office-Delhi; **Dr. P.B. Rastogi**, Former MoEFCC; **Dr. Sumanth Chinthala**, NIT Warangal; **Dr. Priyanka Kulshreshta**, University of Delhi; **Dr. Radha Goyal**, IPCA; **Dr. Pratima Singh,** University of Delhi**, Dr. Anubha Goel**)

Interaction of speakers, members and participants

SPRINGER PUBLICATION 2023

SELECTED PROCEEDINGS OF ACIEQ 2023



This book presents select proceedings from the 2nd Asian Conference on Indoor Environmental Quality (ACIEQ-2023) and delves into the latest research on indoor environmental quality. It covers various topics including indoor air quality, adaptive thermal comfort, productivity and health, indoor lighting, and acoustics. Key themes involve assessing exposure in various microenvironments—commercial, residential, and institutional—and examining their impact on human health and performance. The book also explores strategies to enhance thermal and visual comfort, alongside advanced filtration technologies aimed at improving indoor air quality in urban environments. Additionally, it emphasizes the profiling of indoor air pollutants such as bioaerosols, volatile organic compounds, and particulate matter in diverse settings like schools, offices, the dyeing/printing industry, and modes of commute. This comprehensive volume serves as an invaluable reference for researchers and professionals in engineering, architecture, lighting, and acoustics, focusing on the critical aspects of indoor environmental quality.

Editors: Priyanka Kulshreshtha, Sumanth Chinthala, Prashant Kumar, Barun Aggarwal

FOR MORE INFORMATION: https://link.springer.com/book/10.1007/978-981-99-4681-5

IEQ 2024

COMPENDIUM 2024

The Indoor Environmental Quality (IEQ) 2024 National Conclave was held at IIT Delhi, focusing on the theme "Transitioning from Outdoors to Indoors." The event addressed several critical topics, including the growing concern about microplastics indoors, the monitoring and modeling of priority indoor air pollutants, the alignment with UN Sustainable Development Goals 2030 regarding Indoor Environmental Quality, and collaborative mitigation strategies for improving indoor environmental conditions. This conference aimed to gather experts and stakeholders to discuss and develop comprehensive approaches to enhance indoor environmental quality for indoor health, comfort, well-being, and productivity.

Release of COMPENDIUM at IEQ 2024

Prof. Pawel Wargocki explained that Securing High Indoor Air Quality is a Prerequisite for Healthy Buildings in IEQ 2024

High indoor air quality (IAQ) significantly enhances comfort, reduces health symptoms, boosts work and learning performance, and improves sleep quality. Achieving high IAQ involves avoiding toxic pollutants and ensuring air is free from infectious pathogens. While ventilation rates and CO2 levels are commonly used to regulate IAQ, this approach is insufficient due to the variety of indoor pollutants and their complex chemical transformations.

Dr. Prasad Modak threw light on how to address indoor air quality at city level.

Effective air quality action plans should integrate both outdoor and indoor air quality, recognizing the significant impact of indoor air on public health. Despite efforts to improve ambient air quality, indoor air quality is often neglected. To address this, a comprehensive strategy should include setting baseline data and standards for indoor air quality, which currently do not exist. Key strategies for improving indoor air quality include ensuring buildings are designed to minimize indoor emissions, regulating emissions from building materials and furnishings, establishing certification schemes for indoor air quality in public

spaces with regular inspections, and engaging relevant professionals in developing indoor air quality standards.

Implementing these strategies requires coordination between local governments, pollution control boards, academic institutions, and organizations specializing in indoor environmental quality. Public awareness and education are crucial, particularly in densely populated and poorly ventilated areas. Financial resources and technical guidance from national bodies can support these efforts. Pilot projects in selected cities can demonstrate effective integration of outdoor and indoor air quality management, helping refine strategies for broader implementation and better protecting public health.

A brief on bioaerosol and its effect was given by Dr. Shukla Das, Dr. Neelima Gupta, and Dr. Chhavi Gupta

Bioaerosols, airborne particles from biological sources like animals, plants, fungi, bacteria, and viruses, can cause various health issues including allergies, respiratory diseases, and infections. Major pathogens include SARS-CoV-2, influenza, and TB. Monitoring bioaerosols involves culture-based and non-culture-based methods, but no single method is perfect. Healthcare facilities, laboratories, biotechnology facilities, and food processing plants are among the buildings that require bioaerosol monitoring. Controlling bioaerosols indoors involves aspects, like ventilation, airflow management, filtration systems, room design, and surface materials.

Felicitation of Dr. J.S. Sharma and Dr. B. Sengupta

Sonam Sandal, Susan Verghese P., David Daneesh Massey, and Mahima Habil's study on environmental tobacco smoke and its effect on pregnancy

Environmental tobacco smoke (ETS), or second-hand smoke, poses significant risks during pregnancy. Nicotine, found in tobacco products, is highly addictive and harmful. Smoking during pregnancy can lead to complications such as miscarriage, ectopic pregnancies, preterm births, low birth weight, and Sudden Infant Death Syndrome (SIDS). Second-hand smoke, which includes harmful chemicals like arsenic, formaldehyde, and carbon monoxide, similarly affects foetal development, causing low birth weight and respiratory issues. The foetus is exposed to the same dangers as if the mother were smoking, including restricted oxygen supply, which hampers growth and increases the risk of stillbirth and other complications.

Smoking also affects fertility, making it harder for women to become pregnant. During pregnancy, nicotine can constrict blood vessels, including those in the umbilical cord, worsening complications. Despite smoking reducing the risk of preeclampsia, the overall dangers far outweigh this benefit. To protect both mother and child, pregnant women must quit smoking and avoid exposure to second hand smoke.

Team SIE at IEQ 2024

Performance of students from University of Delhi at IEQ 2024

On going session at IEQ 2024

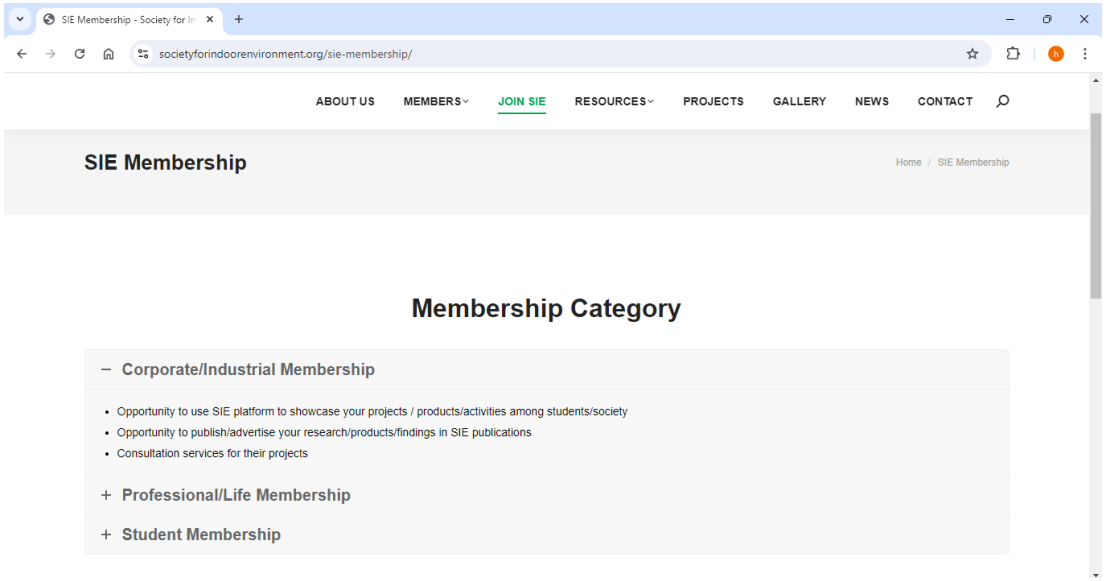
GET INVOLVED

AS A CITIZEN

Have you ever considered the impact of poor indoor air quality on our health and well-being? Many of us spend the majority of our time indoors, unaware that the air we breathe in our homes, schools, and workplaces may be harmful. Poor indoor air quality can lead to various health issues, including allergies, asthma, and other respiratory problems. It is particularly concerning for children, the elderly, and those with preexisting health conditions.

As citizens, we can take several steps to improve indoor air quality and protect our health. One of the most effective actions is to educate ourselves and others about the sources and dangers of indoor air pollution. Simple measures, such as ensuring proper ventilation, using air purifiers, and avoiding the use of harmful chemicals indoors, can make a significant difference.

Furthermore, connecting with organizations dedicated to improving indoor air quality, like the Society for Indoor Environment (SIE), can amplify our efforts. SIE works tirelessly to raise awareness, conduct research, and advocate for better indoor air standards. By supporting their initiatives or volunteering, we can contribute to creating healthier indoor environments for everyone.



CONNECT SIE AT: https://societyforindoorenvironment.org

If you want to be part of a coordinated effort to combat indoor air pollution, consider volunteering with the Society for Indoor Environment. Together, we can make a significant impact on the quality of air we breathe and the overall health of our communities.

AS AN NGO OR INDIVIDUAL

The Society for Indoor Environment (SIE) is always open to collaborating with individuals and organizations committed to improving indoor air quality. We gladly share our resources, publications, policies, and other materials to benefit the broader community.

AS A PROFESSIONAL WORKER

As a Professional Social Worker, if you are seeking an opportunity to make a meaningful impact on indoor air quality and public health, then the Society for Indoor Environment (SIE) can be the place for you.

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