
amelio

Contents

Why Healthy Buildings?

We spend almost **90%** of our time **indoors** and **air within buildings** can be **more heavily polluted** than the **outdoor air**.

In the US, an estimated one quarter million annual deaths are associated with fine particulate matter, $PM_{2.5}$, exposure inside buildings (Bangalore's annual ambient $PM_{2.5}$ concentration is 7x higher)

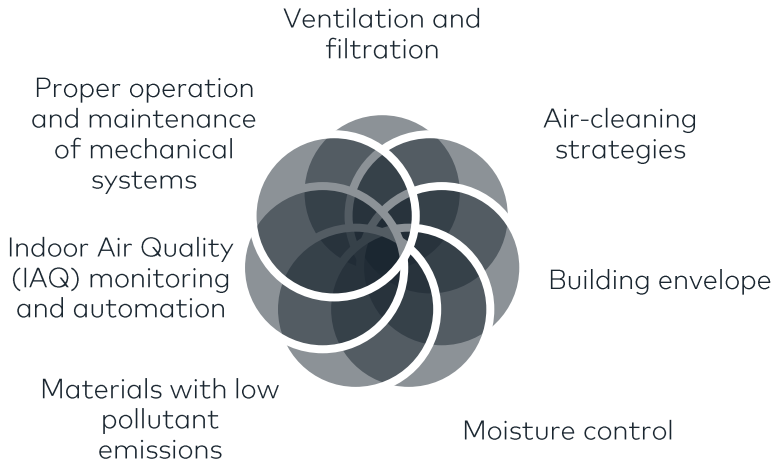
Impact

The ways in which **buildings** are designed, built, and maintained have a **profound impact** on occupants' physical and mental state and performance, **productivity**, sleep quality, and overall **health, wellbeing, and quality of life**.

Cardiovascular and respiratory diseases	Triggering and aggravation of asthma and allergy symptoms	Headaches, fatigue, nausea
Eye, nose, throat, and skin irritation	Cancer	Reduction in productivity
Developmental disorders in children	Adverse impact on psychological well-being	Airborne disease transmission

Solution

Amelio promotes **health and wellbeing** by employing an **evidence-based** approach to building design, construction, and management.



Outcome

Healthy building solutions **increase value** to occupants, tenants, employers, owners, and developers.

- ✓ Positive impact on occupant health, well-being, and quality of life **without compromising the conveniences** of a dense urban location (Residential)
- ✓ **Child development** benefits (Residential)
- ✓ Improved **energy** and quality of **sleep** (Residential)
- ✓ **ESG** (Environmental, Social, and Governance) alignment (Office)
- ✓ **Corporate identity** strengthening (Office)
- ✓ **Talent attraction and retention** (Office)
- ✓ **Employee satisfaction and engagement** (Office)
- ✓ Superior cognitive functioning and **work performance**
- ✓ **Reduction in absenteeism and presenteeism** (Office)
- ✓ **Improved** physical and mental **health**
- ✓ **Medical cost** savings
- ✓ **Reduced litigation** costs
- ✓ **Higher rent and resale** value
- ✓ **Faster leasing and sale** velocity
- ✓ **Higher occupancy and retention**
- ✓ **Competitive market advantage**

amelio can partner with you on all aspects of the building lifecycle: development, design, construction, and management

Testing/inspection, occupant and management surveys/logs, drawings/ specs/manual review	Lifecycle cost-benefit and ROI analysis	Healthy building design and construction administration	Instrumenting, monitoring, analysis, and automation	Operational, maintenance, and cleaning protocols and guidelines	Healthy building and IAQ certifications (WELL, Fitwel, RESET Air, etc.)	Marketing and communications support	Airborne disease (such as COVID-19) transmission risk mitigation

amelio's mission is to develop, design, build, and manage buildings with a measurably superior indoor environment to **improve health, well-being, and quality of life.**

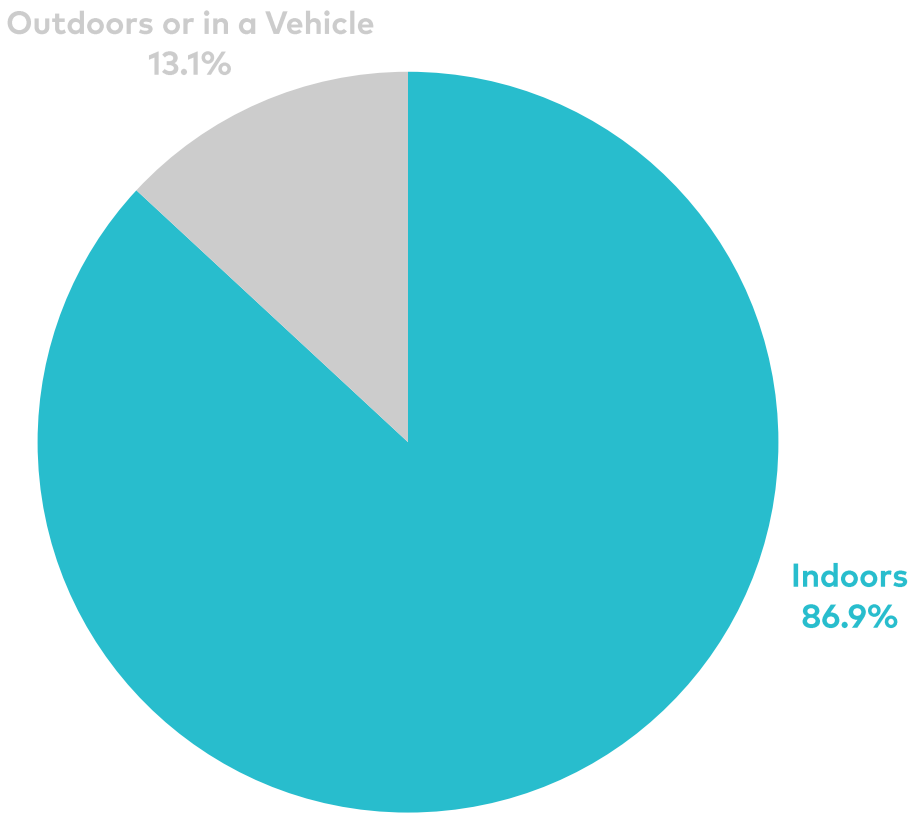
What do you think of when you hear "air pollution?"

Perhaps something like this comes to mind?

Photo by **Suraj Kardile** on **Unsplash**

But where are we exposed to air pollution?

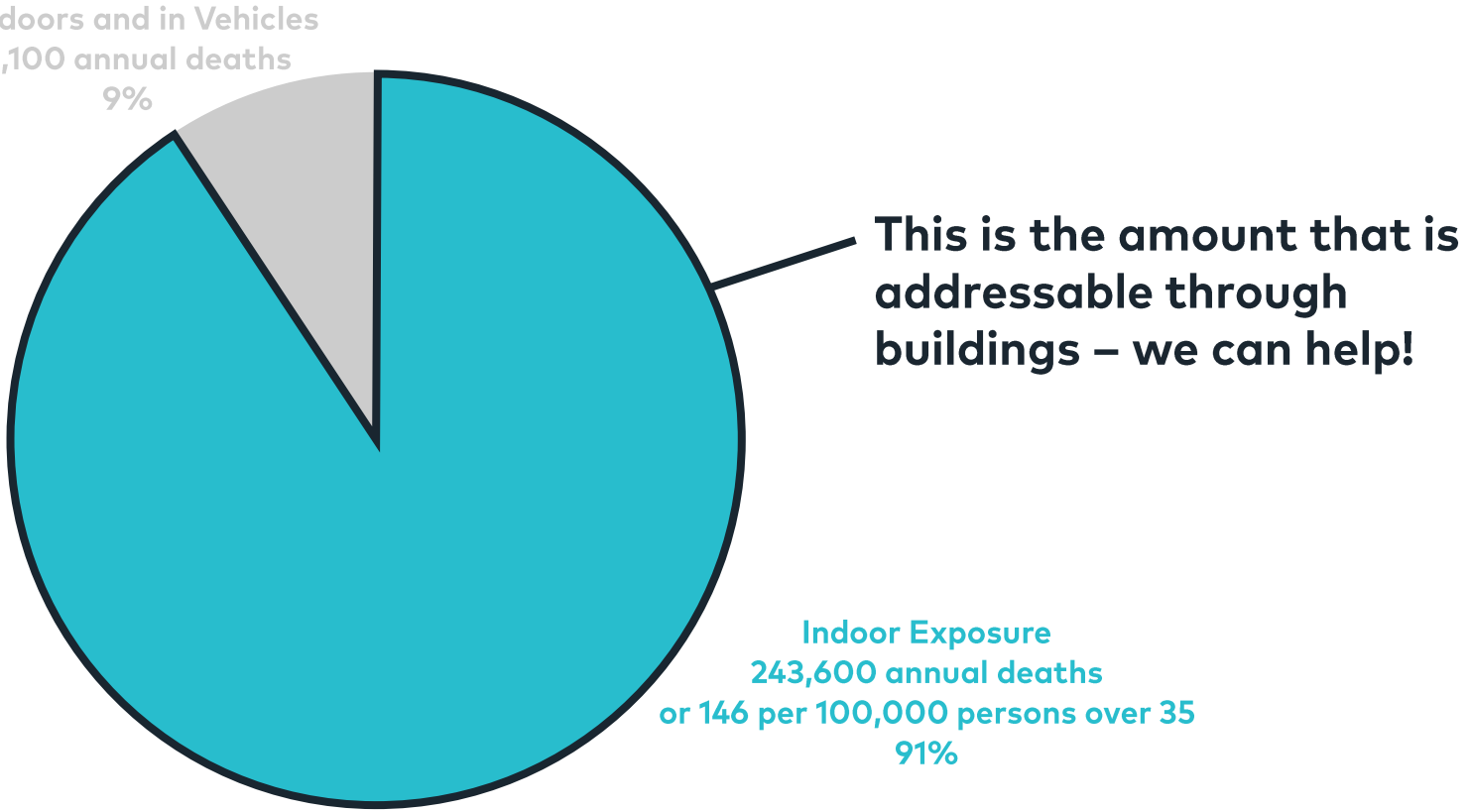
We spend almost 90% of our time indoors



Azimi P, Stephens B. 2020. A framework for estimating the US mortality burden of fine particulate matter exposure attributable to indoor and outdoor microenvironments. **J Expo Sci Environ Epidemiol** 30:271–284. https://doi.org/10.1038/s41370-018-0103-4
Klepeis N, Nelson W, Ott W et al. 2001. The National Human Activity Pattern Survey (NHAPS): a resource for assessing exposure to environmental pollutants. **J Expo Sci Environ Epidemiol** 11: 231–252. https://doi.org/10.1038/sj.jea.7500165

The vast majority of our exposure to fine particulate matter ($PM_{2.5}$) occurs indoors and it's making us sick!

Estimated annual deaths in the US associated with $PM_{2.5}$ exposure



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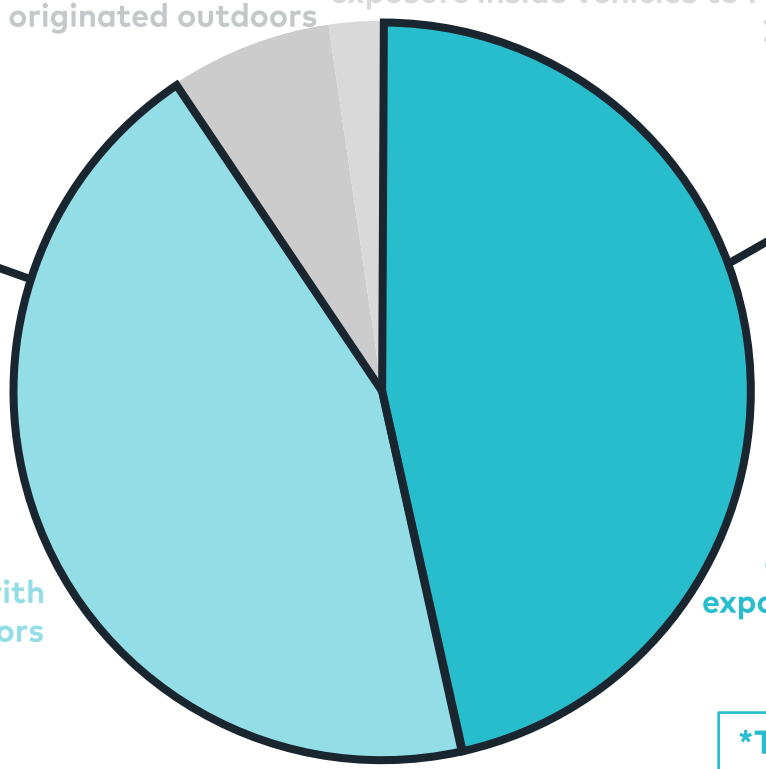
Outdoor air pollution makes its way indoors

Estimated annual deaths in the US associated with $PM_{2.5}$ exposure

18,900 annual deaths associated with outdoor exposure to $PM_{2.5}$ which originated outdoors
7%

6,200 annual deaths associated with exposure inside vehicles to $PM_{2.5}$ which originated outdoors
2%

This is addressable through indoor source and transport management, ventilation, and filtration



This is addressable through the building envelope, ventilation, and filtration

118,700 annual deaths
(75 per 100,000 persons over 35) associated with indoor exposure to $PM_{2.5}$ which originated indoors
44%

124,900 annual deaths
(75 per 100,000 persons over 35) associated with exposure to $PM_{2.5}$ which originated outdoors and made its way inside buildings*
47%

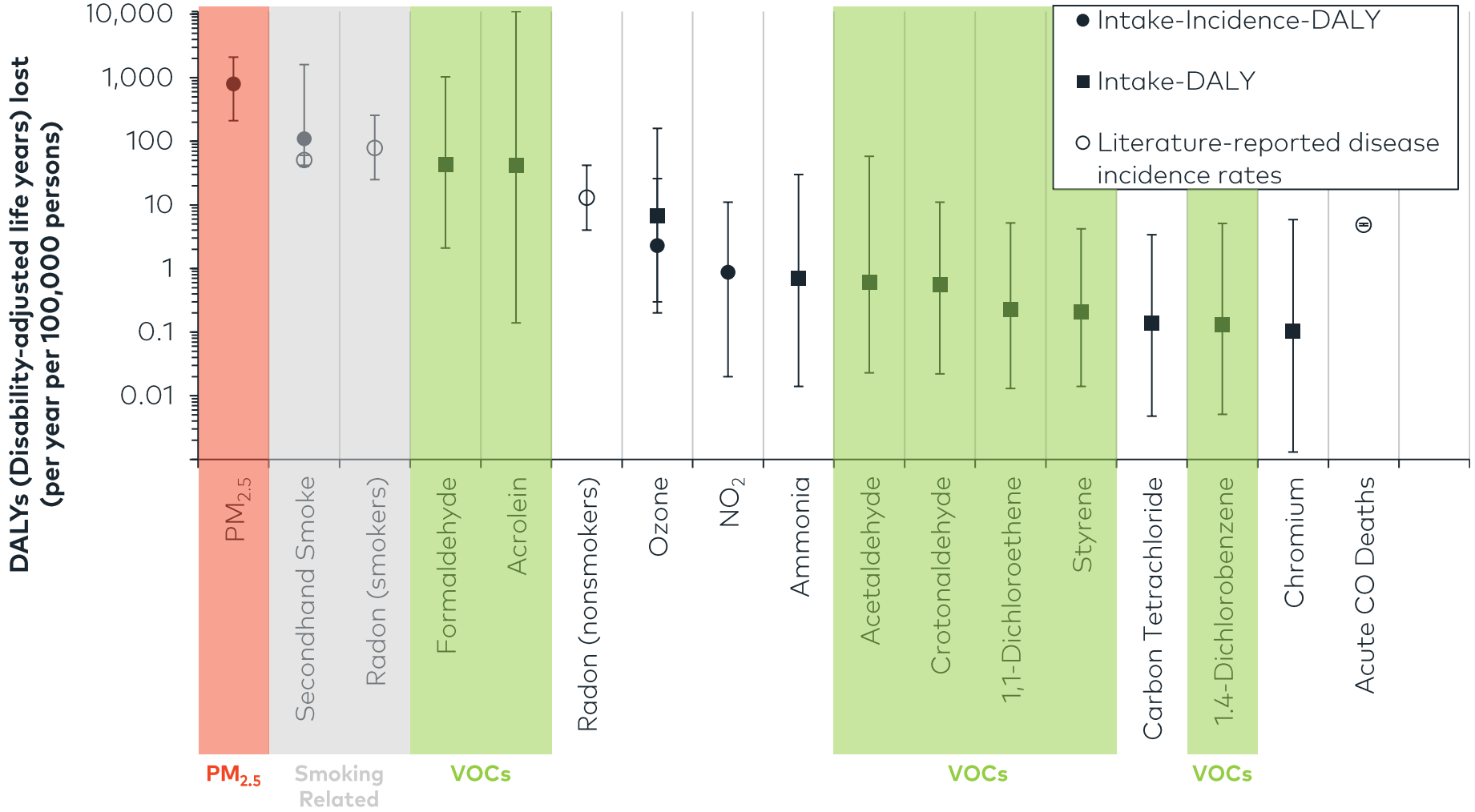
*The annual ambient US $PM_{2.5}$ concentration used in this study was 9.1 $\mu g/m^3$. By comparison, the annual ambient $PM_{2.5}$ concentration in Bangalore was 65 $\mu g/m^3$ in 2014

Azimi P, Stephens B. 2020. A framework for estimating the US mortality burden of fine particulate matter exposure attributable to indoor and outdoor microenvironments. **J Expo Sci Environ Epidemiol** 30:271–284. https://doi.org/10.1038/s41370-018-0103-4

Indoor Air Quality

$PM_{2.5}$ is estimated to be the most harmful of air pollutants inside homes, by an order of magnitude!

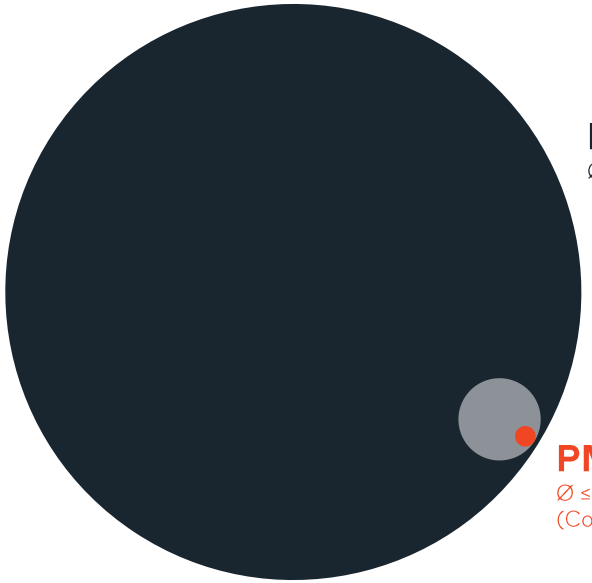
Formaldehyde and acrolein are the most harmful Volatile Organic Compounds (VOCs) inside homes



Air pollution inside homes results in ~5-14% of the noncommunicable, nonpsychiatric U.S. disease burden (not counting secondhand smoking and radon)

Logue JM, Price PN, Sherman MH, Singer BC. 2012. A method to estimate the chronic health impact of air pollutants in U.S. residences. **Environ Health Perspect** 120:216-222. https://doi.org/10.1289/ehp.1104035

Particulate Matter (PM)



Human hair
Ø 50-70 µm

PM_{10}
Ø ≤10 µm
(Dust, mold, etc.)

$PM_{2.5}$
Ø ≤2.5 µm
(Combustion particles, organic compounds, etc.)

Outdoor Sources

- Traffic emissions
- Industry byproducts
- Natural
- Atmospheric reactions

Indoor Sources

- Cleaning and cooking
- Combustion
- Appliances
- Chemical reactions
- Resuspension

Effects

- PM2.5 can travel deep into the lungs and into the bloodstream
- Cardiovascular and respiratory diseases
  - Acute Lower Respiratory Illness (ALRI), particularly in children
  - Cerebrovascular Disease (CEV)/Stroke
  - Ischaemic Heart Disease (IHD)
  - Chronic Obstructive Pulmonary Disease (COPD)
  - Lung Cancer (LC)
- Trigger and aggravate asthma symptoms

United States Environmental Protection Agency. 2021. Particulate Matter (PM) Basics. https://www.epa.gov/pm-pollution/particulate-matter-pm-basics
Lelieveld, J, Evans, J, Fnais, M. et al. 2015. The contribution of outdoor air pollution sources to premature mortality on a global scale. **Nature** 525:367–371. https://doi.org/10.1038/nature15371
United States Environmental Protection Agency. 2021. Integrated Science Assessment (ISA) for Particulate Matter. https://www.epa.gov/isa/integrated-science-assessment-isa-particulate-matter

Volatile Organic Compounds (VOCs)

Sources

- Building materials
  - Wood and composite wood
  - Gypsum wallboard
  - Concrete
  - Carpet/vinyl flooring/finishes
  - Glues
  - Paints/architectural coatings
- Furnishings
- Consumer products
  - Cleaners
  - Fragrances
  - Personal care products
- Combustion
- Electronics
  - Printers/copiers
  - Computers
- Outdoor sources

Effects

- Certain types of VOCs (e.g. formaldehyde) can affect health and productivity
  - Headaches
  - Fatigue
  - Nausea
  - Eye, nose, throat, and skin irritation
  - Cancer
  - Asthma attacks

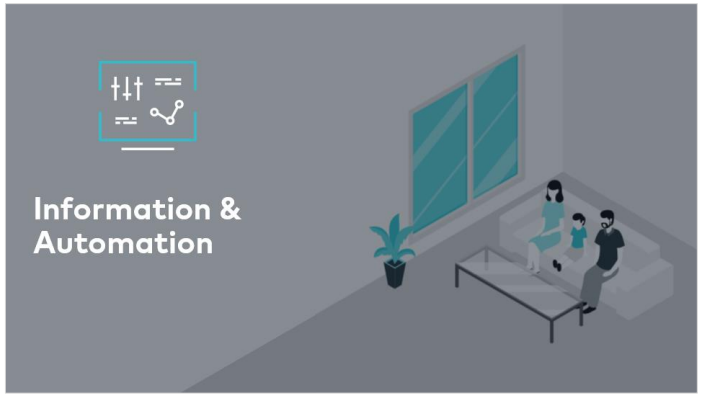
United States Environmental Protection Agency. 2021. Volatile Organic Compounds' Impact on Indoor Air Quality. https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality

Indoor Air Quality Solutions

- Ventilation PM VOC
- Filtration PM
- Air-cleaning
  - Activated carbon absorbents VOC
  - Ultraviolet (UV) lamp VOC
- Building envelope PM VOC
- Moisture control
- Material selection PM VOC
- Healthy cleaning practices PM VOC

You would not drink polluted water, why would you breathe polluted air?

Please click on the links for the other aspects of the indoor environment



Why Invest in Healthy Buildings?

Residential Building Value Proposition

Healthy building strategies have a small cost premium relative to comparable high-quality buildings and certain strategies and early planning may even provide a cost saving.

Healthy home solutions **increase value** to occupants, tenants, home/building owners, and developers.

- ✓ Positive impact on occupant health, well-being, and quality of life **without compromising the conveniences** of a dense urban location
- ✓ **Child development** benefits
- ✓ Improved **energy** and quality of **sleep**
- ✓ Increased working from home **comfort and productivity**
- ✓ **Medical cost** savings
- ✓ **Higher rent and sale** value
- ✓ **Faster leasing and sale** velocity
- ✓ **Higher occupancy and retention**
- ✓ **Competitive market advantage**

Indoor Air Quality and Asthma

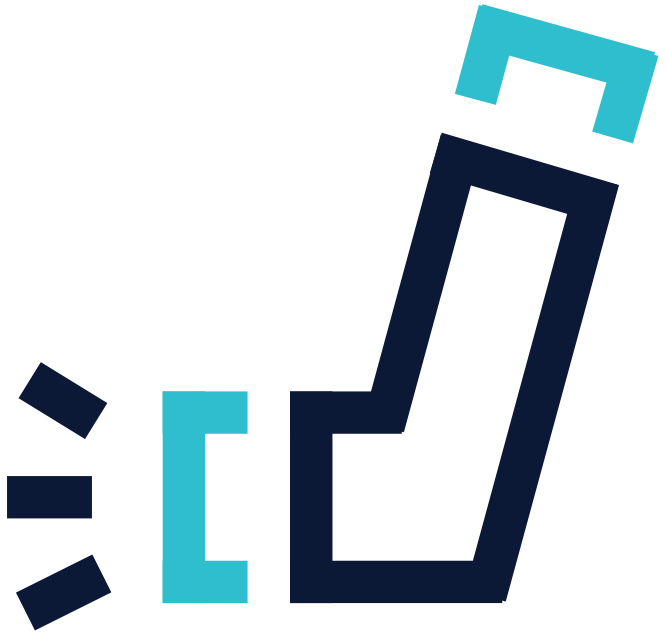
In the US, 21% or approximately 4.6 million asthma cases are attributable to dampness and mold exposure in the home

Common asthma attack triggers

- Allergens
  - Mold/fungi
  - Dust mites
  - cockroach/insects
  - pet dander
  - rodent allergens
  - pollen
- Nitrogen Dioxide (NO_2 - gas cooking stoves)
- Particulate Matter
- Environmental Tobacco Smoke
- Cleaning products, especially spray-form
- Pesticides
- Volatile Organic Compounds (VOCs)
- Ozone
- Infectious airborne diseases

Solutions

- Ventilation
- Filtration
- Air-cleaning
- Dehumidification
- Avoiding gas stoves or properly sized range hood
- Healthy cleaning practices
- Material selection
- Smoking policy



Parham Azimi and Zahra Keshavarz's Selected Work

- Mold and asthma
  - National Science Foundation (NSF) Rapid Response Research (RAPID) Grant Award: Understanding the Interrelationships Among Floods, Building Characteristics, Mold Growth and Occupants' Asthma Symptoms in the Aftermath of Hurricane Ida (Parham Azimi, Co-Principal Investigator; Zahra Keshavarz, Research Assistant)
    - Harvard Health Publishing Article: Respiratory health harms often follow flooding: Taking these steps can help (Parham Azimi, Author)
- Ventilation and asthma
  - **Indoor air quality** impacts of residential **mechanical ventilation** system retrofits in existing homes in Chicago, IL (2022 – Parham Azimi, Author)

Mudarri D, Fisk WJ. 2007. Public health and economic impact of dampness and mold **Indoor Air** 17:226–235. https://doi.org/10.1111/j.1600-0668.2007.00474.x

Office Building Value Proposition

The financial benefits of healthy building features that improve employee health and productivity far exceed their costs.

Healthy building solutions **increase value** to occupants, tenants, employers, building and portfolio owners, and developers.

- ✓ **ESG** (Environmental, Social, and Governance) alignment
- ✓ **Corporate identity** strengthening
- ✓ **Talent attraction and retention**
- ✓ **Employee satisfaction and engagement**
- ✓ Superior cognitive functioning and **work performance**
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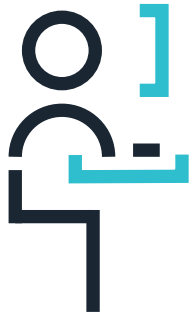
Benefits of Enhanced Ventilation in Office Buildings

Small investments in Indoor Air Quality solutions can yield outsized returns



Ventilation × 2 @ $40/person/year → **+8% Increase in Productivity @ $6,500/person/year** → **ROI = $6,500/$40 = 16,250%**

Doubling the ventilation rate from ASHRAE minimum costs less than **$40/person/year**

Improved worker performance by **8%** is equivalent to a **$6,500** increase in productivity per year

An ROI of **16,250%** can be achieved for improved worker performance alone without considering added benefits of reduced absenteeism, reduced turnover, and improved health

MacNaughton P, Pegues J, Satish U, Santanam S, Spengler J, Allen J. 2015. Economic, Environmental and Health Implications of Enhanced Ventilation in Office Buildings. **International Journal of Environmental Research and Public Health** 12(11):14709-14722. https://doi.org/10.3390/ijerph121114709

WELL Certification & ESG Alignment

(https://resources.wellcertified.com/tools/well-esg-guide/)

80% of WELL features are aligned with at least one of the UN Sustainable Development Goals (SDG)s.

Features in WELL align with 38.5% of indicators within the 2022 GRESB Real Estate Assessment.

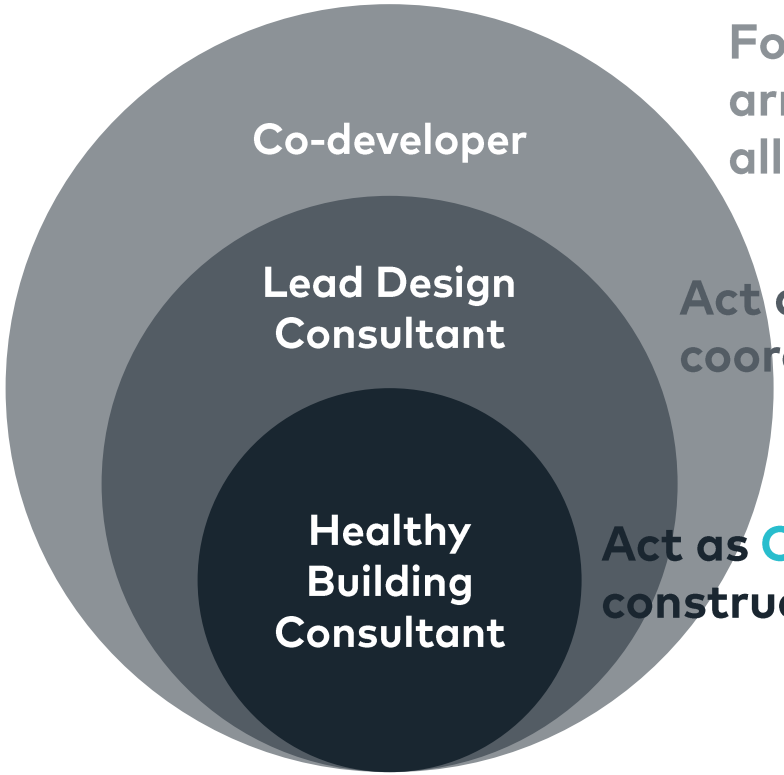
Features in WELL can impact the results of approximately one-sixth of the metrics in the IRIS+ 5.1 Catalog, including almost half of the metrics in the Operational Impact category (OI-series).

Features in WELL can impact the results of approximately one-fifth of the disclosures in the GRI Sustainability Reporting Standards, including approximately half of the topic-specific Standards in the social category (400-series).

Features in WELL can impact the results of approximately a quarter of the S&P CSA banking sector questions, including approximately half in the Social Dimension.

How Can We Help?

Flexibility in How We Can Work Together

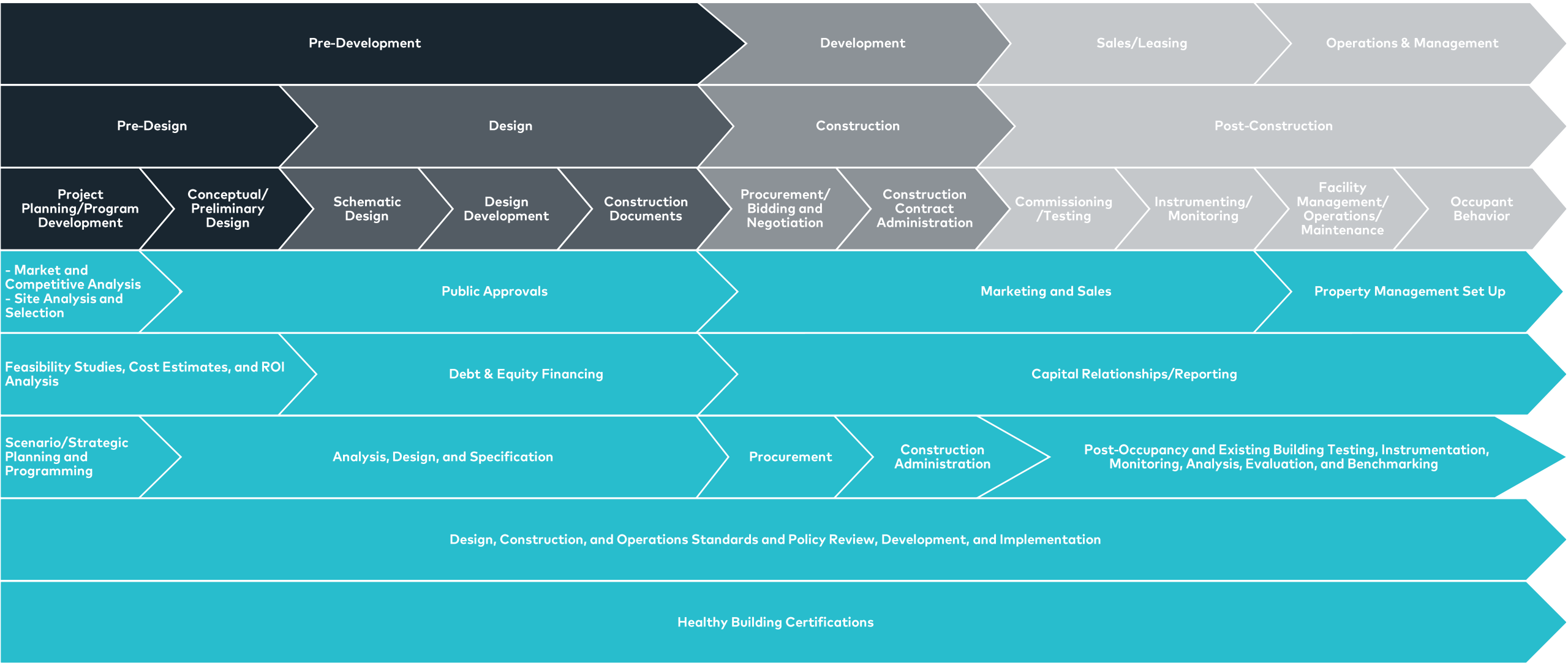


Form a **Joint Venture** or other business arrangement to collaborate on some or all aspects of real estate development

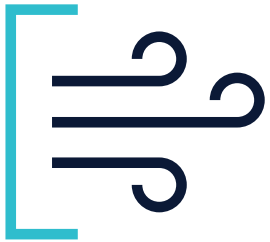
Act as **Architect** and work on or coordinate all building design aspects

Act as **Consultant** to the design, construction, and development teams

Services



Indoor Air Quality Services



Ventilation, Filtration, Air-Cleaning, and Infiltration Reduction

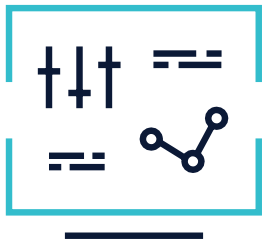
- HVAC design strategies for ventilation and filtration to achieve superior indoor air quality
- Air-cleaning strategies, including those involving activated carbon absorbents and ultraviolet germicidal irradiation
- Building envelope and partition design strategies to reduce infiltration of air pollutants

Material Selection and Interior Layout

- Healthy material, product, finish, furniture, fixtures, and equipment selection for material emission control, ease of maintenance, and reduction in pollutant sinks
- Space planning for optimal placement of and ability to address potential pollutant sources

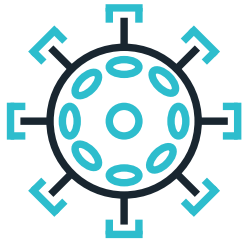
Moisture and Water Management

- Moisture control strategies
- Water filtration to reduce pollutant volatilization (stripping of chemicals from water to indoor air)



Operation

- Indoor air quality instrumenting, monitoring, analysis, and automation
- Operational, maintenance, and cleaning protocols and guidelines development



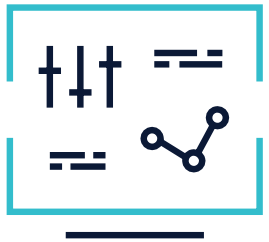
Disease Transmission Mitigation

- Airborne disease (such as COVID-19) transmission risk mitigation, including assessment, simulations, and design strategies

Indoor Environmental Quality (IEQ) Testing & Monitoring Services

Indoor Space Assessment

- On-site IEQ testing
- Interior space and HVAC system inspection (e.g., Filters, Dampers, supply air rate)
- Evaluation of existing and new building drawings and specifications, operations and maintenance manuals and logs
- Building occupant and management team surveys development and administration



IEQ Monitor Installation

- IEQ monitor product selection
- Location selection for optimal sampling
- On-site IEQ monitor installation and dashboard setup

Analysis

- Monitoring, analysis, and reporting of IEQ issues
- Lifecycle cost-benefit and ROI analyses and validation after deployment
  - Absenteeism
  - Cognitive function and work performance
  - Deployment and operating costs
- Airborne disease (such as COVID-19) transmission risk assessment

Operation

- Building system adjustments for IEQ improvement
- Iteration of previous steps for better understanding of IEQ issues, of possible solutions, and of how to optimize them
- Maintenance manual for the management team to maintain indoor environmental quality performance

Team

Amelio Team

Alex Brandt Montalbini, RESET AP, LEED AP

Founder & CEO

Healthy Buildings

- Structural engineering on large-scale developments based in Chicago, Hong Kong, and Abu Dhabi
- Structural/Civil and Environmental Engineering MS from Stanford University

SOM | P&T GROUP 巴馬丹拿集團
wsp | HALVORSON AND PARTNERS STRUCTURAL ENGINEERS
Thornton Tomasetti
Stanford ENGINEERING | Civil & Environmental Engineering

Parham Azimi, PhD, RESET AP

Chief Scientific Officer

Indoor Air Quality

- Research Associate researching indoor air quality and airborne disease transmission at the Healthy Buildings Research Group at the Harvard T.H. Chan School of Public Health
- Environmental Engineering Ph.D. from Illinois Institute of Technology, M.Sc. and B.Sc. from Sharif University of Technology

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ILLINOIS TECH
SHARIF UNIVERSITY OF TECHNOLOGY
ASHRAE Epidemic Task F
UL Standards Technical Panel

Zahra Keshavarz, PE, RESET AP

Lead IEQ Analyst

Indoor Environmental Quality

- Research Assistant researching applications of sensors for indoor environmental quality assessment at the Healthy Buildings Research Group at the Harvard T.H. Chan School of Public Health
- Licensed Professional Engineer in Iran
- Structural Engineering M.Sc. from Islamic Azad University

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Islamic Azad University
IndoorScience

Hung Kit Yuen, AIA

Principal

Building Design/Construction

- Licensed Architect based in New York, also practiced in Barcelona, Vienna and Hong Kong
- Architecture MArch from University of Pennsylvania and BA from University of Hong Kong, MBA from University of Chicago Booth School of Business

PERKINS EASTMAN | Leigh & Orange
COOPHIMMELB(L)AU | EMBT
CHICAGO BOOTH | Weitzman SCHOOL OF DESIGN
THE UNIVERSITY OF HONG KONG 香港大學 faculty of architecture 建築學院

Rossitza Dreis, WELL AP, LEED GA

Associate Principal

Healthy Building Design, Construction and Certification

- Acquisition, development, design, construction, and management at architecture and real estate firms
- Bachelor of Architecture with a minor in Psychology from Syracuse University

EXPANSIVE workspace | SEN+RAL
CALLISONRTKL | SHEEHAN NAGLE HARTRAY ARCHITECTS
SYRACUSE ARCHITECTURE

Amit Anafi, WELL AP, Fitwel Ambassador, LEED AP (BD+C), BREEAM Associate, WiredScore AP, SmartScore AP

Architect

Healthy Building Design, Construction and Certification

- Design, construction, R&D, and healthy building certification at architecture firms, a research institute and a general contractor
- Master degree in Architecture and Urban Design and Master degree in Sustainable Architecture from the Politecnico di Milano

il prisma | DESIGN HUMAN LIFE | R2M SOLUTION
STUDIO ATTILIO TERRAGNI
POLITECNICO MILANO 1863

Why Us?

The Amelio Difference

Evidence-Based Approach

- We have deep Indoor Air Quality expertise grounded in robust scientific research and underlying principles.
- We don't simply follow standards and guidelines; we help create and shape them. Dr. Azimi is on ASHRAE and UL Standards technical committees and panels.

Mission-Driven & Outcome-Oriented

- We are entirely devoted to healthy buildings. They are not one of many potentially competing priorities in a generic green building approach.
- We prioritize features and performance levels based on specific conditions and goals, not arbitrary standards. One size does not fit all.

System-Level & Interdisciplinary

- We employ a comprehensive approach taking into consideration the complexities and interdependencies of building elements. We go beyond certifications, checking boxes and disparate features.
- We can deliver residences fully furnished for a greater impact.

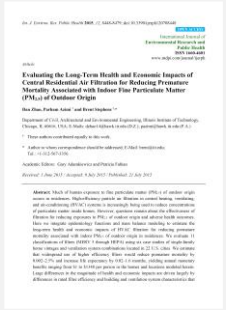
Full Building Lifecycle

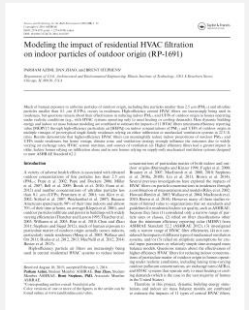
- We can be involved in all the stages of the building lifecycle to maximize indoor environmental quality outcomes and ongoing performance:
  - Early decisions tend to have the greatest impact.
  - Instrumentation, monitoring, and automation are critical to ensuring the ongoing high performance of healthy buildings.

Ventilation and Filtration Expertise

Parham Azimi's Selected Work

- Research papers
  - Estimates of **HVAC filtration** efficiency for **fine and ultrafine particles** of outdoor origin (2014)
  - Evaluating the **Long-Term Health** and Economic Impacts of **Central Residential Air Filtration** for Reducing **Premature Mortality Associated** with **Indoor Fine Particulate Matter (PM2.5)** of Outdoor Origin (2015)
  - Modeling the impact of residential **HVAC filtration** on **indoor particles** of outdoor origin (RP-1691) (2016)
  - **Indoor air quality** impacts of residential **mechanical ventilation** system retrofits in existing homes in Chicago, IL (2022)
- Extensive field experience
  - Building inspection
  - Indoor air quality and airflow instrumentation and testing
  - Data collection and analysis





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Mold Expertise

Parham Azimi and Zahra Keshavarz's Selected Work

- National Science Foundation (NSF) Rapid Response Research (RAPID) Grant Award: Understanding the Interrelationships Among Floods, Building Characteristics, Mold Growth and Occupants' Asthma Symptoms in the Aftermath of Hurricane Ida (Parham Azimi, Co-Principal Investigator; Zahra Keshavarz, Research Assistant)
  - Harvard Health Publishing Article: Respiratory health harms often follow flooding: Taking these steps can help (Parham Azimi, Author)

- Extensive field experience
  - Building inspection
  - Indoor air quality and airflow instrumentation and testing
  - Data collection and analysis

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SCHOOL OF PUBLIC HEALTH

National Science Foundation
WHERE DISCOVERIES BEGIN

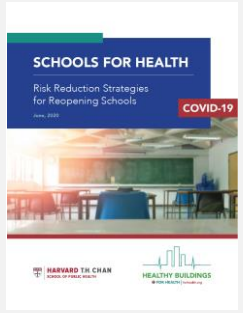

National Science Foundation
WHERE DISCOVERIES BEGIN

COVID-19/Airborne Disease Expertise

Parham Azimi and Zahra Keshavarz's Selected Work

- The Lancet COVID-19 Commission's **Proposed Non-infectious Air Delivery Rates (NADR) for Reducing Exposure to Airborne Respiratory Infectious Diseases**
- Harvard's report on **COVID-19 Risk Reduction Strategies for Reopening Schools**
- Harvard's **COVID-19 Transmission Risk in Buildings Calculator**
- Research papers
  - **Mechanistic Transmission Modeling of COVID-19** on the *Diamond Princess* Cruise Ship Demonstrates the **Importance of Aerosol Transmission** (2021 - reported in the New York Times in 2020 while it was in pre-print)
  - **HVAC filtration for controlling infectious airborne disease transmission** in indoor environments: Predicting risk reductions and operational costs (2013)
  - Estimating the nationwide **transmission risk of measles in US schools** and impacts of vaccination and **supplemental infection control strategies** (2020)
  - Quantifying the size-resolved dynamics of **indoor bioaerosol transport and control** (2017)
- Extensive field experience
  - Building inspection
  - Indoor air quality and airflow instrumentation and testing
  - Data collection and analysis

Please click here for a sample proposal from a past project



HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH

ILLINOIS TECH

Indoor Environmental Quality (IEQ) Monitoring Expertise

Parham Azimi and Zahra Keshavarz's Selected Work

IEQ monitoring of 30+ classrooms at Harvard University

- Monitoring carbon dioxide (CO_2) concentration as an estimate of fresh air ventilation
- Assessment of exposure to indoor air pollutants (e.g., fine particulate matter $PM_{2.5}$, volatile organic compounds VOC, and radon)
- Thermal comfort evaluation (e.g., temperature, relative humidity, and air speed)
- Risk assessment of airborne infectious disease transmission

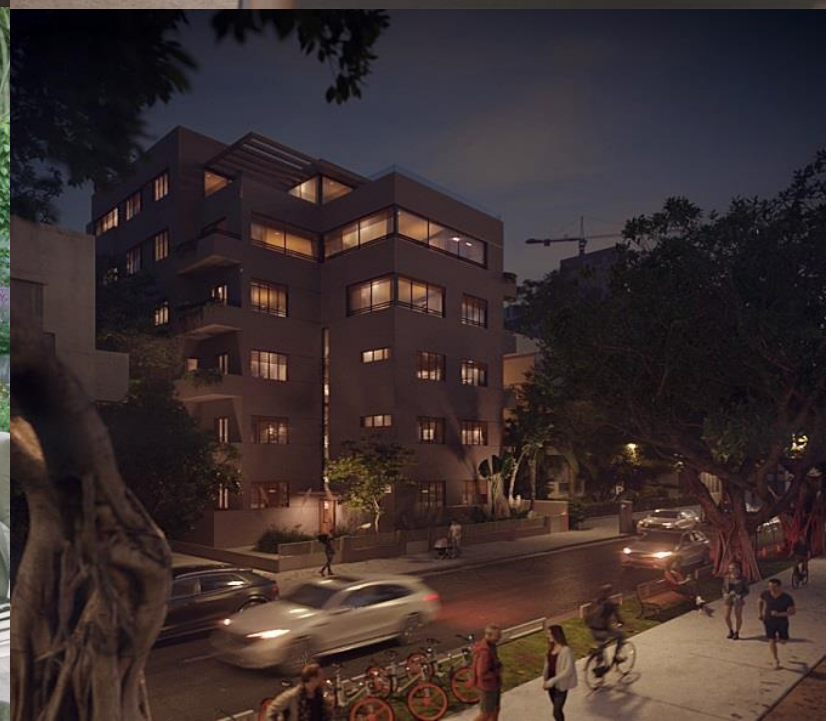
IEQ monitors employed:

AWAIR

Airthings

HARVARD T.H. CHAN
SCHOOL OF PUBLIC HEALTH

Selected Projects: Amelio



Rothschild 101

Tel Aviv, Israel

Type: Residential
Area: 20,000 SF

Ongoing healthy building consulting for a 20-unit condominium building development

- Identify indoor air quality and other indoor environmental quality problems and implement solutions to address them.
- Pursue 3rd party validation through building certifications like RESET® Air residential pilot for indoor air quality and WELL v2™ for healthy buildings.
- Develop a methodology to scale the solutions to future projects.

Healthy Building Consultant: Amelio
Developer: SANI

Learning Bridge

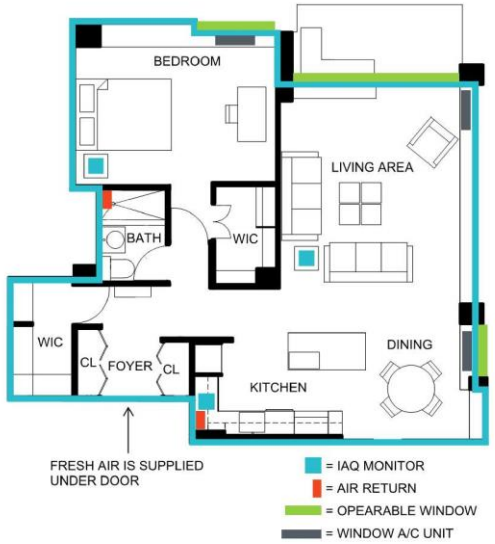
Evanston, Illinois

Type: Education

Area: 10,000 SF

COVID-19 Transmission Mitigation Consulting for an Early Childhood Education Center. Solutions included portable air cleaners throughout to deliver a target 6 ACH (Air Changes/Hour) and upgraded HVAC filtration and bathroom exhaust fans.

COVID-19 Transmission Mitigation Consultant: Amelio
Client: Learning Bridge



RESET Air/Materials Residential Pilot

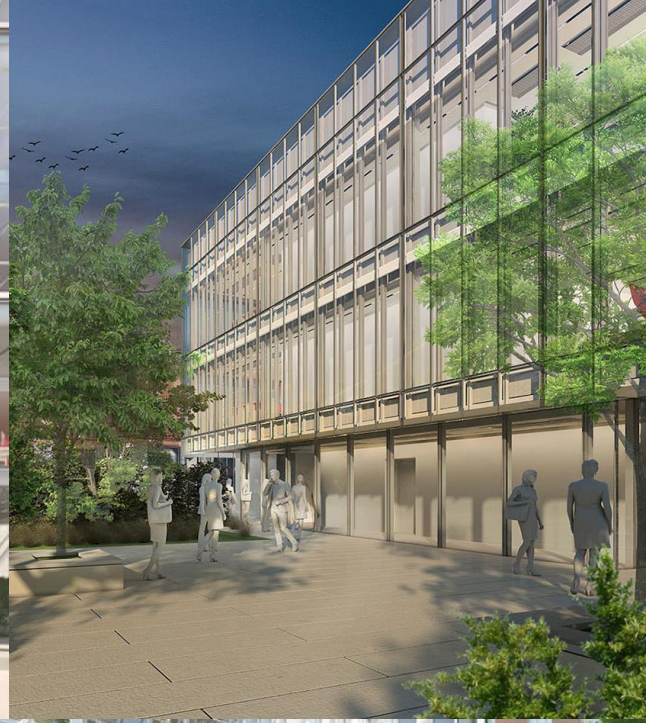
Chicago, Illinois

Type: Residential
Area: 900 SF

- 1st RESET Air/Materials Residential pilot project in the US
  - RESET Air – Continuous indoor air monitoring
  - RESET Materials – Material transparency and emissions
  - Single high-rise condo unit renovation
    - Material selection
    - Instrumenting and monitoring the indoor air

Healthy Building Consultant: Amelio

Selected Projects: Previous Employers



VP22
Via Vittor Pisani 22
Milan, Italy

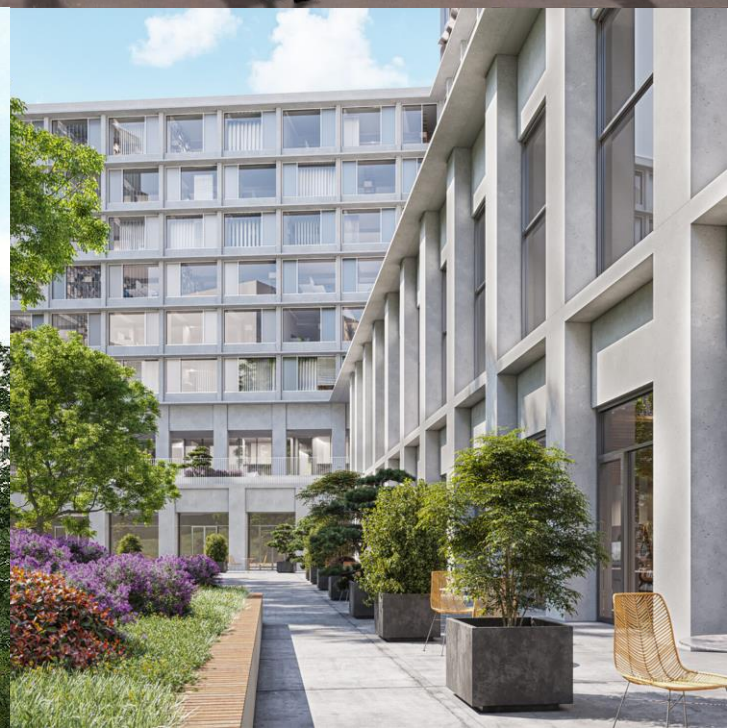
Type: Office

Area: 150,000 SF

An 11-story office building near the Central Station of Milan.

Amit Anafi with R2M Solution
WELL and LEED Certification Consulting and Coordination

Architect: Tectoo
Developer: Antonello Manuli Holdings S.p.A.



ED.G.E. - Edifici Garibaldi Executive

Milan, Italy

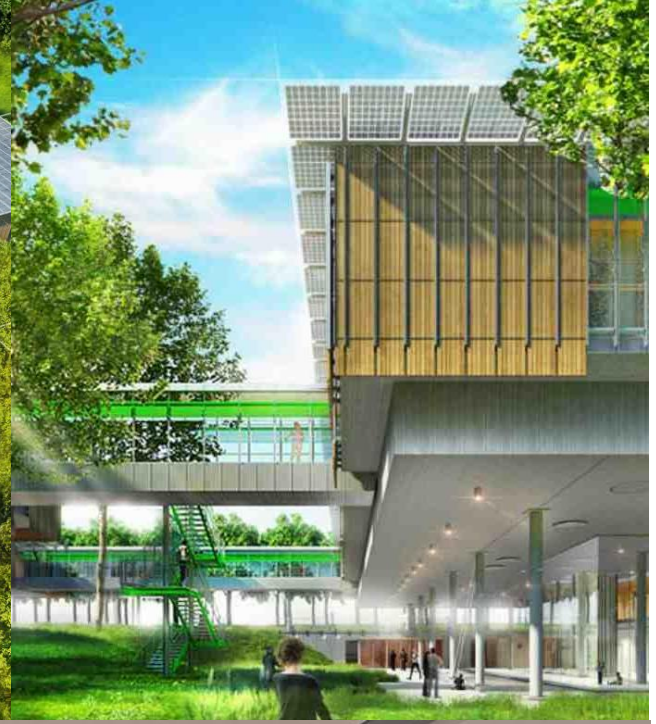
Type: Office

Area: 240,000 SF

A 10-story office building with parking garages for 123 vehicles.

Amit Anafi with R2M Solution
LEED Certification Consulting and Coordination

Architect: Onsitestudio
Developer: Colliers Global Investors Italy SGR S.p.A.



Children's Hospice

Bologna, Italy

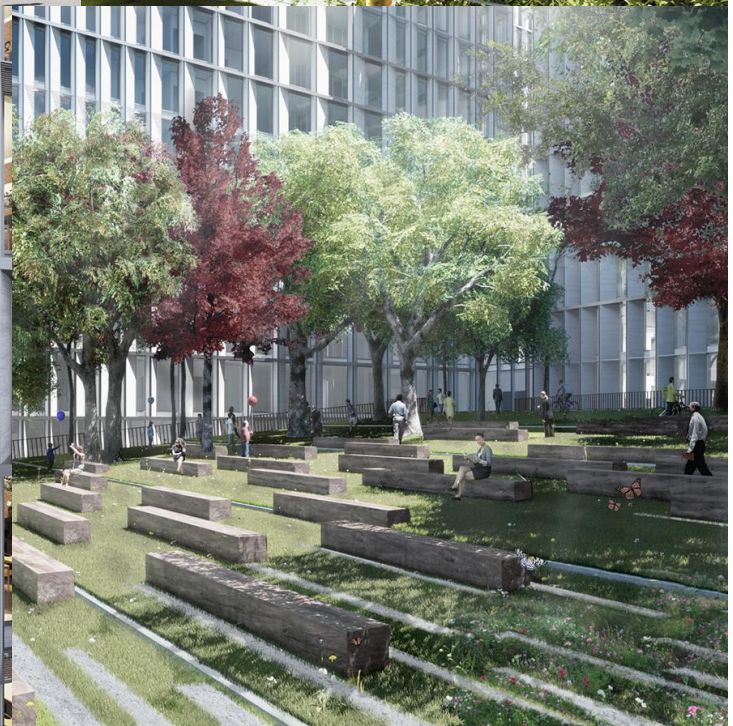
Type: Pediatric Hospice Care

Area: 90,000 SF

Three treehouse-like pavilions connected to a main block in the middle with a courtyard garden.

Amit Anafi with R2M Solutions
LEED Certification Consulting and Coordination

Architect: Renzo Piano Building Workshop
Developer: Fondazione Hospice Seragnoli



TIM New Headquarters

Rome, Italy

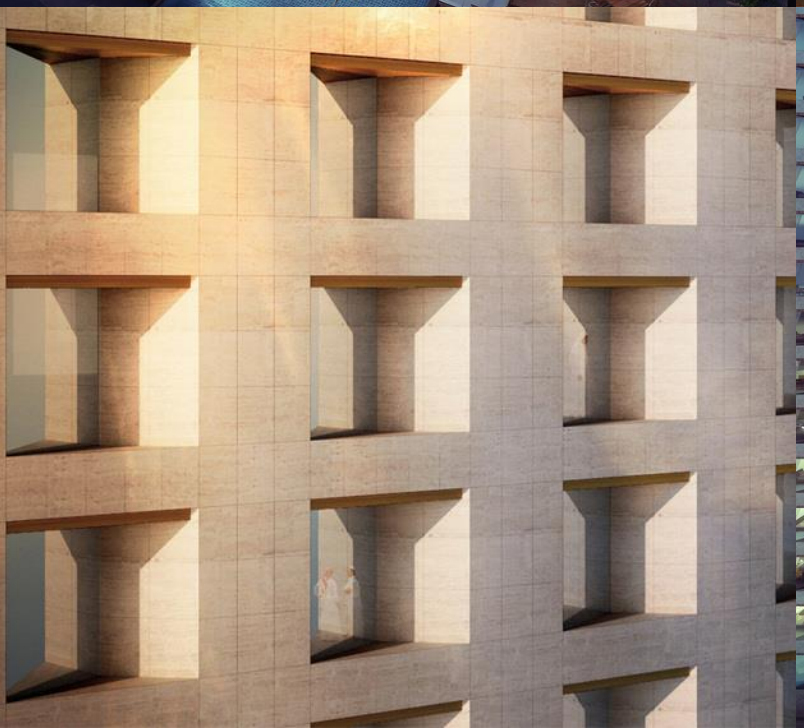
Type: Office and Retail

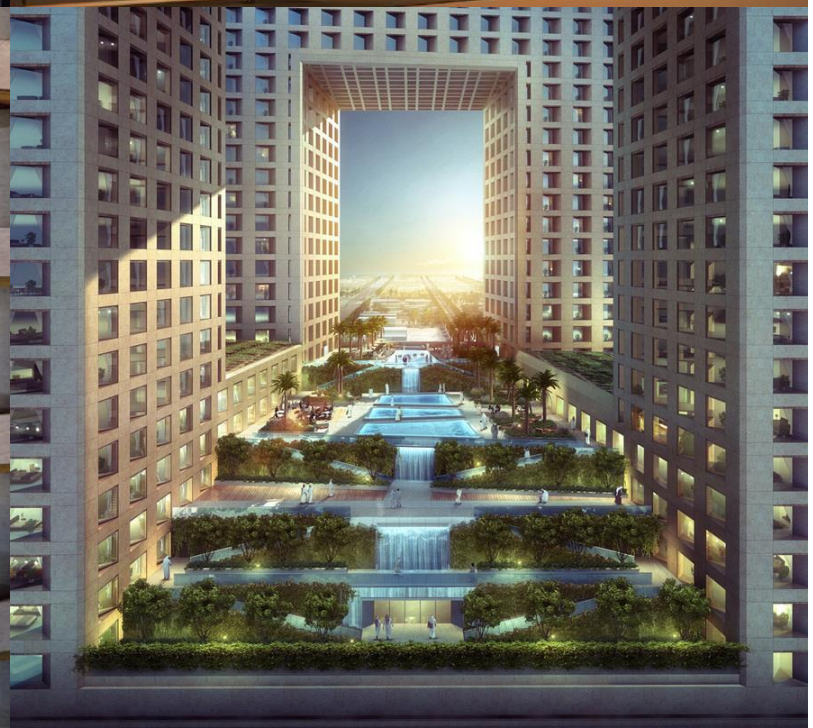
Area: 650,000 SF

Three 17-story office towers with 3 levels of retail and parking below grade.

Amit Anafi with Goldmann & Partners
LEED Certification Consulting and Coordination
and BIM Services

Architect: UNO-A Architetti Associati + Calzoni Architetti +
Bruno Egger Mazzoleni Architetti Associati
Developer: Alfiere S.p.A.





Four Seasons Hotel

Jeddah, Saudi Arabia

Type: Mixed-Use (Hotel, Residential, Retail)

Area: 2,000,000 SF

A mixed-use development comprised of 4 35-story towers with 275 hotel rooms, 25 serviced apartments, 50 branded apartments, an amenity and retail podium and parking garage.

Alex Montalbini with Skidmore, Owings & Merrill (SOM)
Structural Design Services | Design Development | Chicago

Architect: Skidmore, Owings & Merrill (SOM)
Developer: MIDAD Real Estate Development & Investment Co.

Guiyang Cultural Plaza Tower

Guiyang, China

Type: Office & Hotel

A 1,700 ft tall office and hotel tower with an observation deck.

Alex Montalbini with Skidmore, Owings & Merrill (SOM)
Structural Design Services | Design Development | Chicago

Architect: Skidmore, Owings & Merrill (SOM)
Developer: Zhongtian Urban Development Group Co., Ltd

Al Ahmadi Cultural Center

Mahboula, Kuwait

Type: Cultural

Area: 450,000 SF

A cultural center consisting of two 800-seat theaters, a 400-seat concert hall, a lecture hall/cinema, a conference center, a children's center, and fine arts and artifact galleries.

Alex Montalbini with Skidmore, Owings & Merrill (SOM)
Structural Design Services | Design Development | Chicago

Architect: Skidmore, Owings & Merrill (SOM)

World Trade Center

Abu Dhabi, UAE

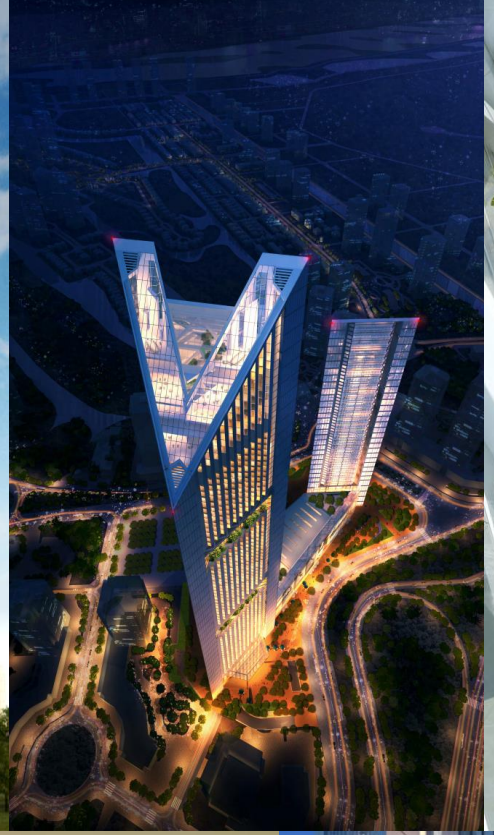
Type: Mixed-Use (Office, Hotel, Residential & Retail)

Area: 6,000,000 SF

A mixed-use development with a 58-story office tower and an 88-story residential tower surrounded by 4.4 million ft² of retail space with 5 levels of below-grade parking and an 11-story business hotel.

Alex Montalbini with Halvorson & Partners (now WSP)
Structural Design Services | Design Development, Construction Documents and Construction Administration | Chicago and on site in Abu Dhabi

Architect: Foster + Partners
Developer: ALDAR Properties



VietinBank Business Center

Hanoi, Vietnam

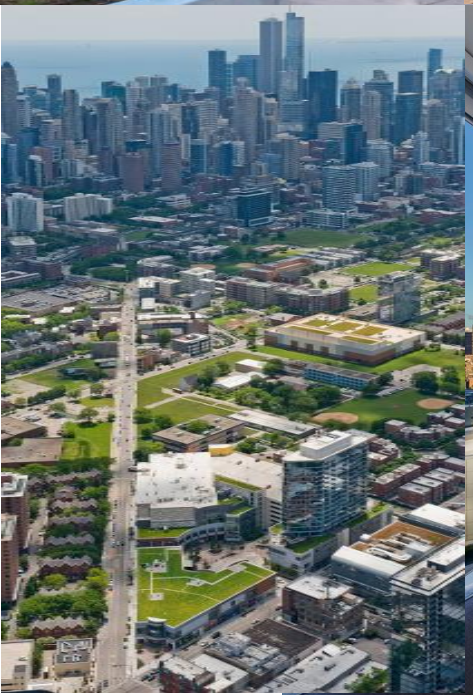
Type: Mixed-Use (Office, Hotel, Residential & Retail)

Area: 3,000,000 SF

Mixed-use development with a 68-story office tower and a 48-story hotel and serviced apartments tower connected by a seven-story retail podium building.

Alex Montalbini with Halvorson & Partners (now WSP)
Structural Design Services | Design Development | Chicago

Architect: Foster + Partners
Developer: VietinBank



New City

Chicago, Illinois

Type: Mixed-Use (Residential, Retail)
Area: 500,000 SF

A 20-story residential tower and retail and parking podium buildings.

Alex Montalbini with Halvorson & Partners (now WSP)
Structural Design Services | Design Development to Construction Administration | Chicago

Architect: OKW Architects
Developer: Bucksbaum Retail Properties, LLC

Burj Rafal Kempinski

Riyadh, Saudi Arabia

Type: Mixed-Use (Hotel, Residential, Office, Retail)

Area: 1,000,000 SF

Mixed-use development consisting of a 70-story tower with hotel rooms, serviced apartments, apartments, and offices on top of an amenity and retail podium.

Alex Montalbini with P&T Architects & Engineers
Structural Design Services | Design Development | Hong Kong

Architect: P&T Architects & Engineers
Developer: RAFAL Real Estate Development Co. Ltd

Marine Bay, Omega & Sigma Towers City of Lights

Abu Dhabi, UAE

Type: Mixed-Use (Residential, Office, Retail)

Area: 2,250,000 SF

Mixed-use development on two separate plots: one consisting of 2 28-story residential towers and a 34-story office tower on top of an 8-story retail and parking podium and the other of two towers of 25 and 29 stories on top of a 5-story parking podium.

Alex Montalbini with P&T Architects & Engineers
Structural Design Services | Design Development, Construction Documents, and Construction Administration | Hong Kong and in the UAE

Architect: P&T Architects & Engineers
Developer: Tamouh Investments LLC

Rutgers Honors Living-Learning Community

Newark, New Jersey

Type: Student Housing

Area: 300,000 SF

The HLLC building is located in the historic district of downtown Newark, serving the mission of the new Rutgers HLLC program to provide free education to talented and non-traditional students.

The building provides 400 beds for student housing, supporting academic spaces, street retails and a parking garage.

Kit Yuen with Perkins Eastman
Architectural Services | Conceptual Design to Construction Administration | New York City

Owner/ Developer: Rutgers University; RBH Group

52 North Broadway

White Plains, New York

Type: Master Plan & Residential

Area: 765,000 SF

Residential master plan with 700,000 SF of multi-family and assisted-living housing, and 28 single-family townhouses.

Kit Yuen with Perkins Eastman
Architectural Services | Schematic Design | New York City

Owner: George Comfort & Sons

Wasmiya Beach Resort

Bahrain

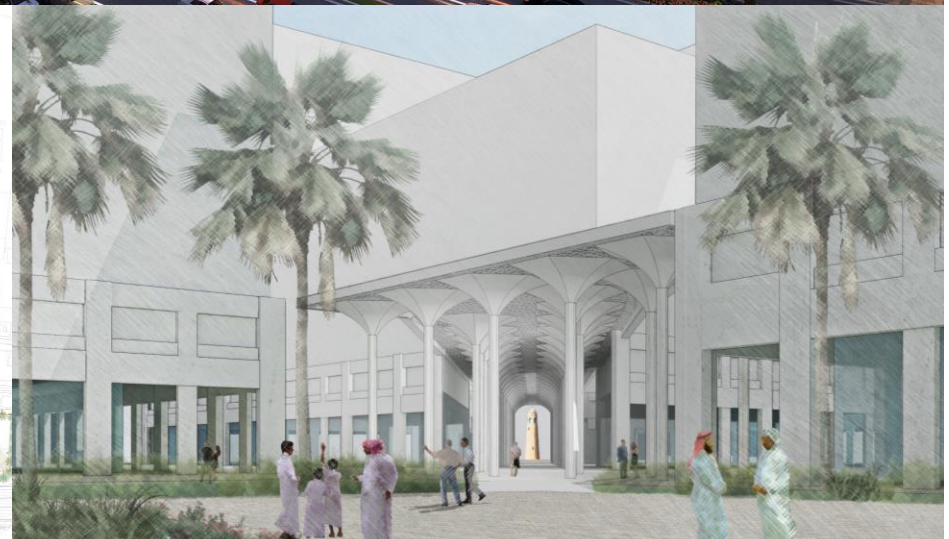
Type: Master Plan & Hospitality

Area: 336,000 SF

Master planning and architectural design for a hospitality development with 24 villas, 180-key hotel and guest amenities.

Kit Yuen with Perkins Eastman
Master Planning and Architectural Services | Schematic Design | New York City

Owner: Shumokh Real Estate



Umm Ghuwailina

Doha, Qatar

Type: Master Planning & Architecture

Area: 9,340,000 SF

Transit-oriented development adjacent to a new metro station. Master planning and architectural service for all 21 buildings including residential, commercial, hotel, shopping mall and school.

Kit Yuen with Perkins Eastman
Architectural Services | Schematic Design to Design Development | New York City and Doha

Owner: Qatar Rail

Katy Square

Dallas, Texas

Type: Master Planning & Architecture

Area: 441,500 SF

Master planning, streetscape experience and architectural design of a development comprising 2 residential towers and 1 office building.

Kit Yuen with Perkins Eastman
Architectural Services | Competition Phase | New York City

Owner: Confidential

New York Wheel

Staten Island, New York

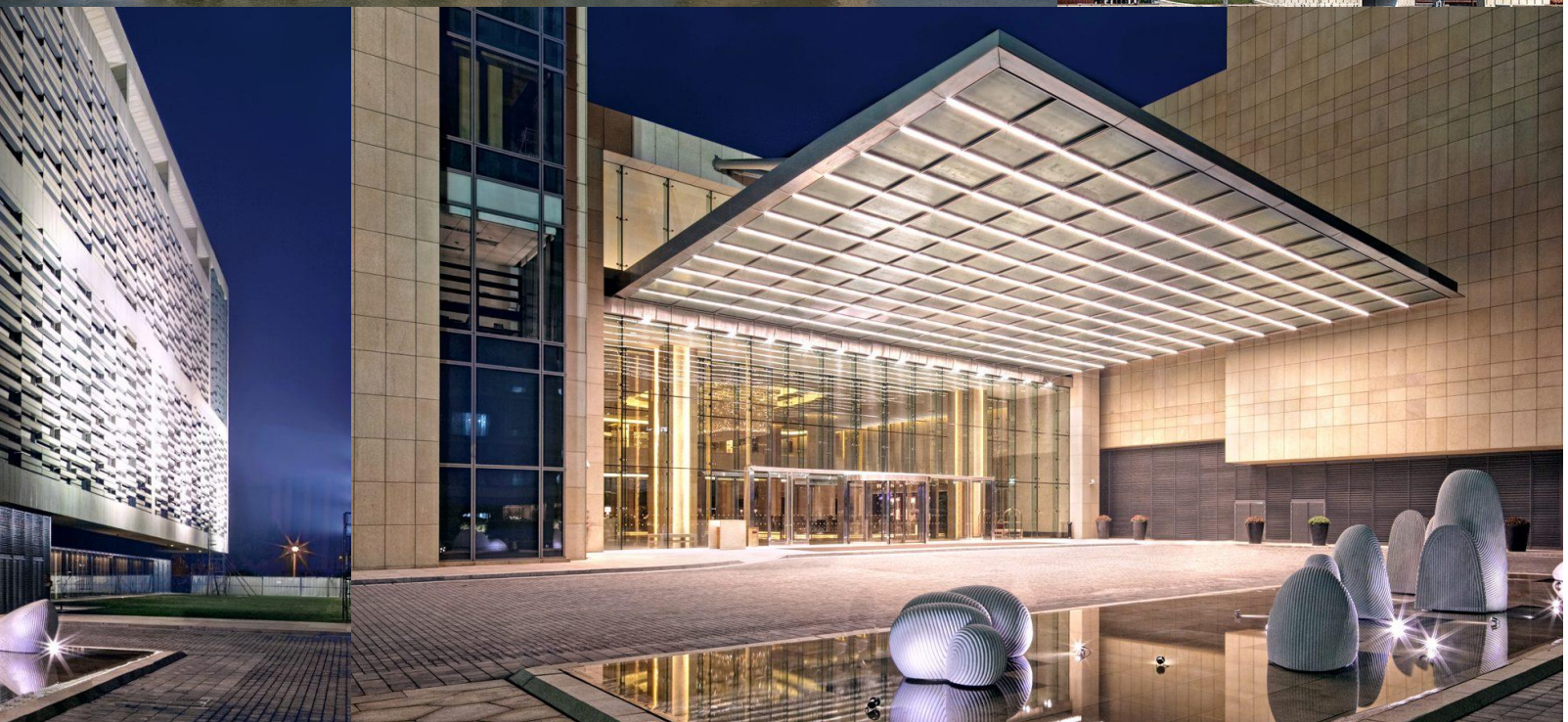
Type: Cultural

Area: 400,000 SF

Visitor's terminal, 950 space parking garage, bus storage facility, and a 2.5-acre public green roof accompanying the 630 ft tall observation wheel.

Kit Yuen with Perkins Eastman
Architectural Services | Conceptual Design to Construction Administration | New York City

Developer: New York Wheel LLC



Tianjin Kerry Centre

Tianjin, China

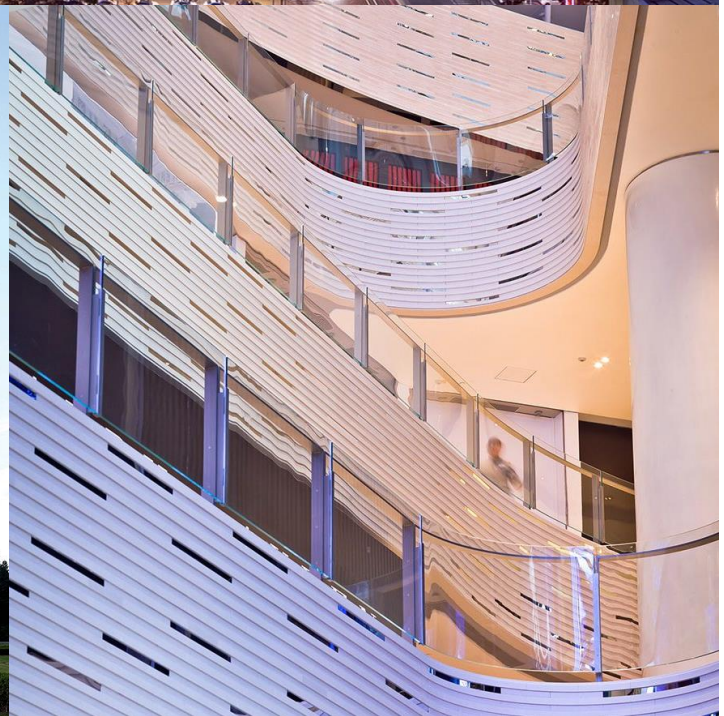
Type: Residential

Area: 3,700,000 SF

Residential design of a mixed-use development comprising 3,650 ft total height of residential towers, a 1,000+ ft office tower, a 470 ft hotel tower, 4-story podium and 3 levels of basement retail and parking.

Kit Yuen with Leigh & Orange
Architectural Services | Design Development | Hong Kong

Master Planning Architect: Skidmore, Owings & Merrill (SOM)
Developer: Tianjin Kerry Real Estate Development Co. Ltd



L'Avenue

Shanghai, China

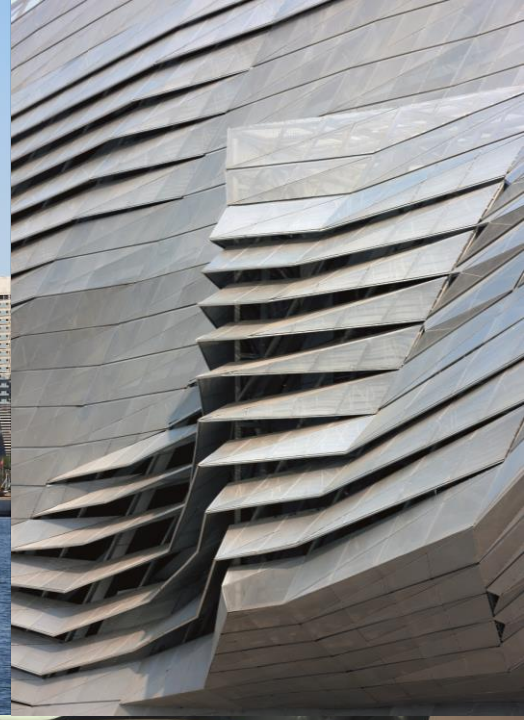
Type: Mixed-Use (Office, Retail)

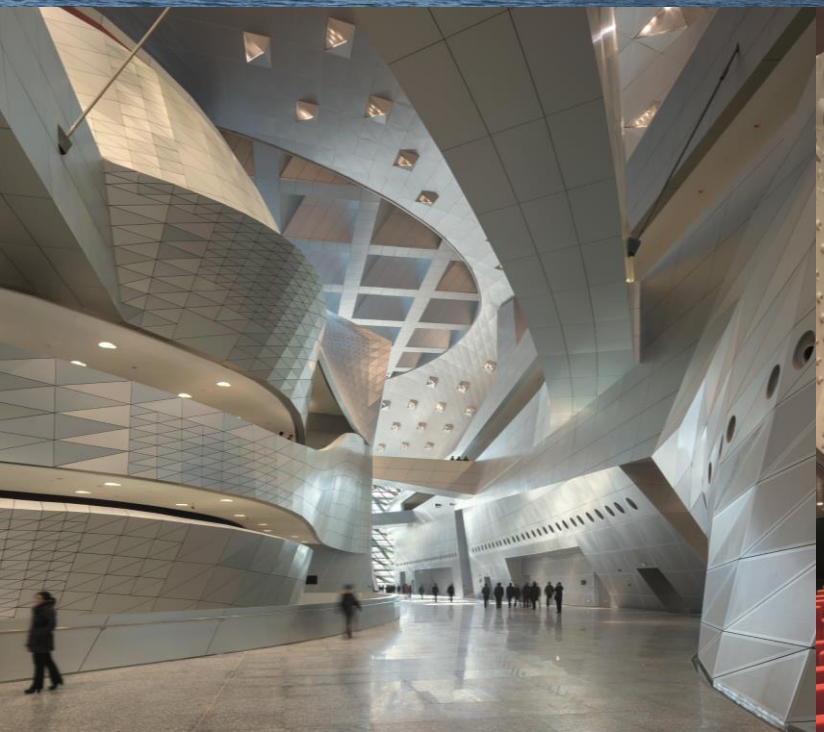
Area: 700,000 SF

Mixed-use building comprising of a 24-story office tower, a 4-story retail podium, and a 4-story basement.

Kit Yuen with Leigh & Orange
Architectural Services | Conceptual Design & Design Development | Hong Kong

Associate Design Architect: Jun Aoki & Associates
Developer: Shanghai Luxchina





Dalian International Conference Center

Dalian, China

Type: Cultural

Area: 1,200,000 SF

Conference center comprising a 2,500-visitor conference hall and an 1,800-seat opera house.

Kit Yuen with Coop Himmelb(l)au
Architectural Services | Schematic Design | Vienna

Owner: Dalian Municipal People's Government

Vassar Brothers Medical Center

Poughkeepsie, New York

Type: Healthcare

Area: 696,000 SF

A 7-level inpatient pavilion with 264 private medical/surgical patient rooms and 30 critical care rooms.

Rossitza Dreis with CallisonRTKL
Architectural Services | Design Development to Construction Administration | Chicago

Owner: Health Quest

DC12

Ashburn, Virginia

Type: Data Center

Area: 182,000 SF

A data center consisting of a 2-story administration space, data halls, mechanical and electrical rooms accommodating 2,880 data cabinets.

Rossitza Dreis with Sheehan Nagle Hartray Architects Architectural Services | Schematic Design to Construction Documents | Chicago

Owner: Equinix

Thank you!

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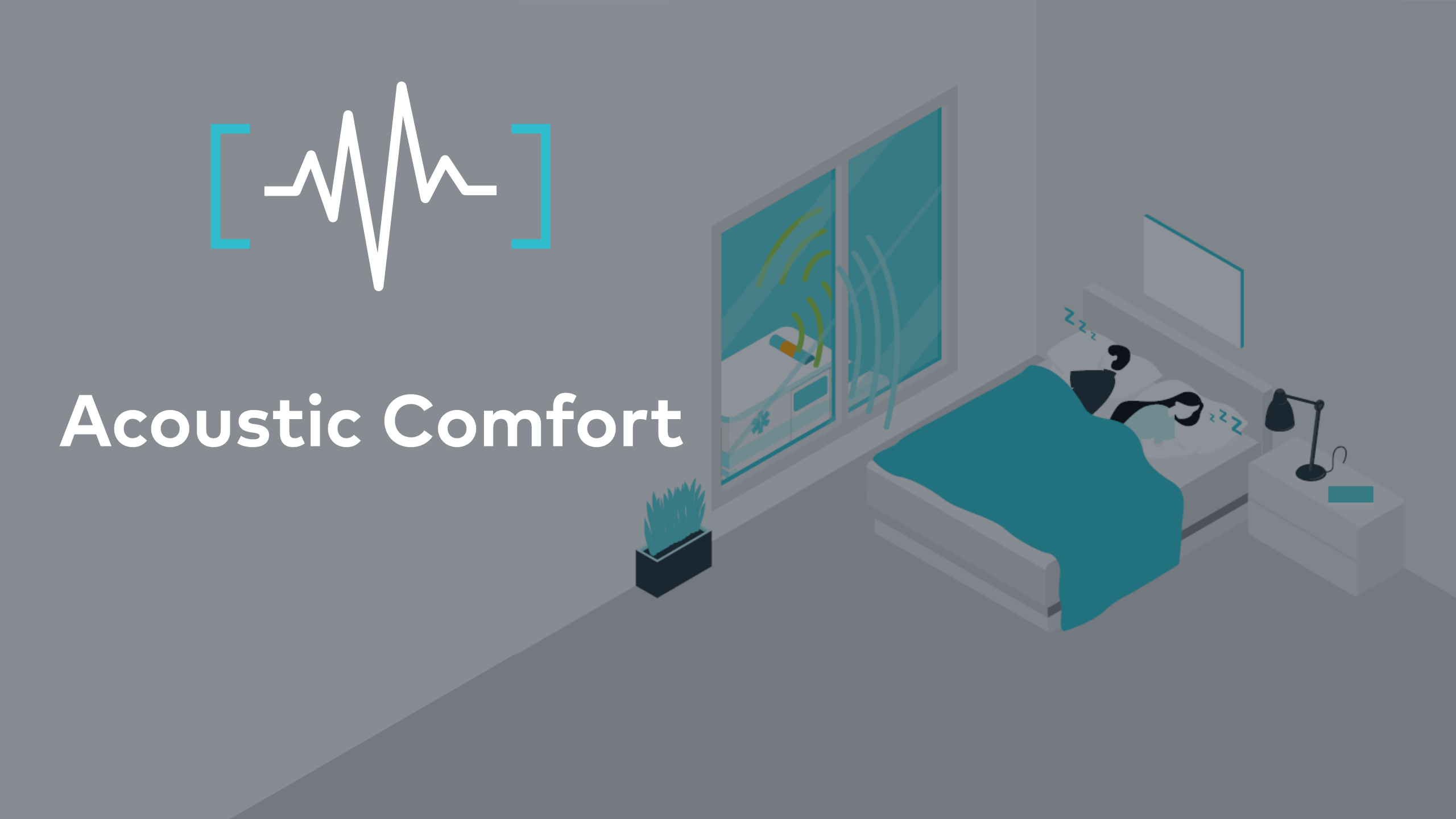
Appendix

Acoustic Comfort



Acoustic Comfort

Noise Sources

- City noise
- Neighbors
- Adjacent rooms
- Equipment

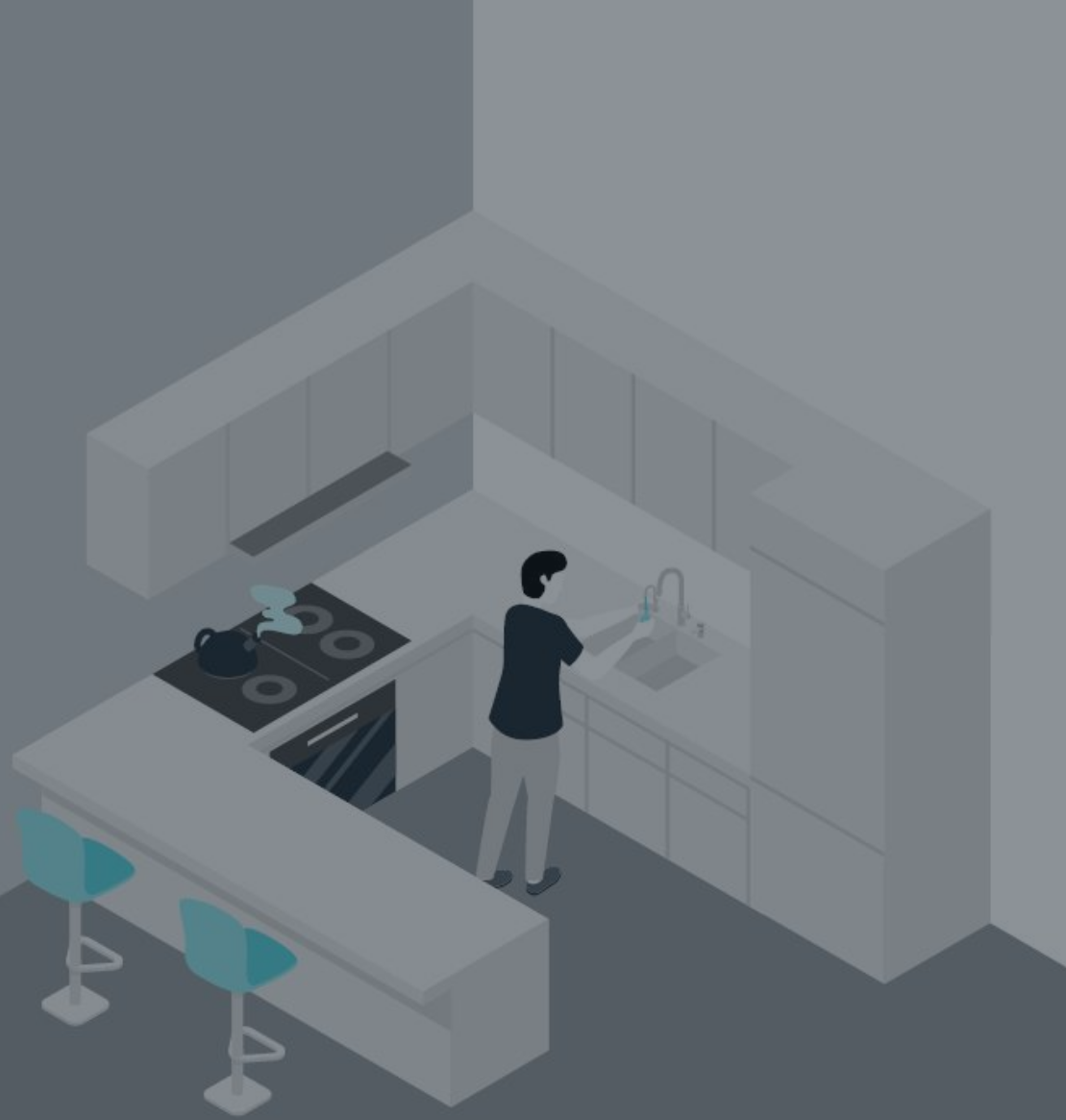
Effects

- Sleep disruption
- Adverse impact on psychological well-being
- Reduced productivity

Solution

- Sound insulation
- Sound absorption through finishes
- Vibration control of equipment and ducts
- Strategic location and limitation of equipment noise

Water Quality



Water Quality

Pollutants

- Lead, mercury, and other metals
- Chlorine and chloramines
- Organic and inorganic pollutants/contaminants
- Vary greatly by locality (treatment, sourcing, and transportation)

Effects

- Gastrointestinal infections
- Developmental disorders in children
- Cancers

Solution

- Use-specific filtration and treatment

Light Quality

Light Quality

Issues

- Light intrusion into sleeping spaces
- Glare
- Inadequate task lighting

Effects

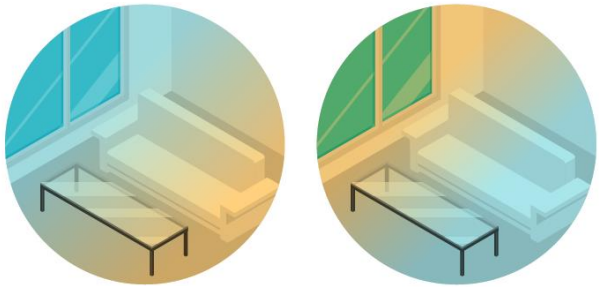
- Sleep disruption
- Circadian rhythm disruption
- Eye strain
- Mood, alertness and productivity effects

Solution

- Black out shading with tracks
- Blue-light control/dynamic lighting
- Glare control through shading, light shielding, and material selection
- Task specific lighting
- Daylighting

Thermal Comfort

Thermal Comfort



Issues

- Non-uniform temperature
- Humidity and air speed

Effects

- Discomfort
- Effects on productivity and mood

Solution

- Thermal insulation
- Automation

Information & Automation

Information & Automation

Issues

- Low/lack of occupant awareness of their indoor environment
- Having to frequently intervene to manually adjust IEQ

Solution

- Instrument and monitor Indoor Environmental Quality (IEQ)
- Automation