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Shaping Building Performance: Adapting to Demographics, Lifestyles & Well-being

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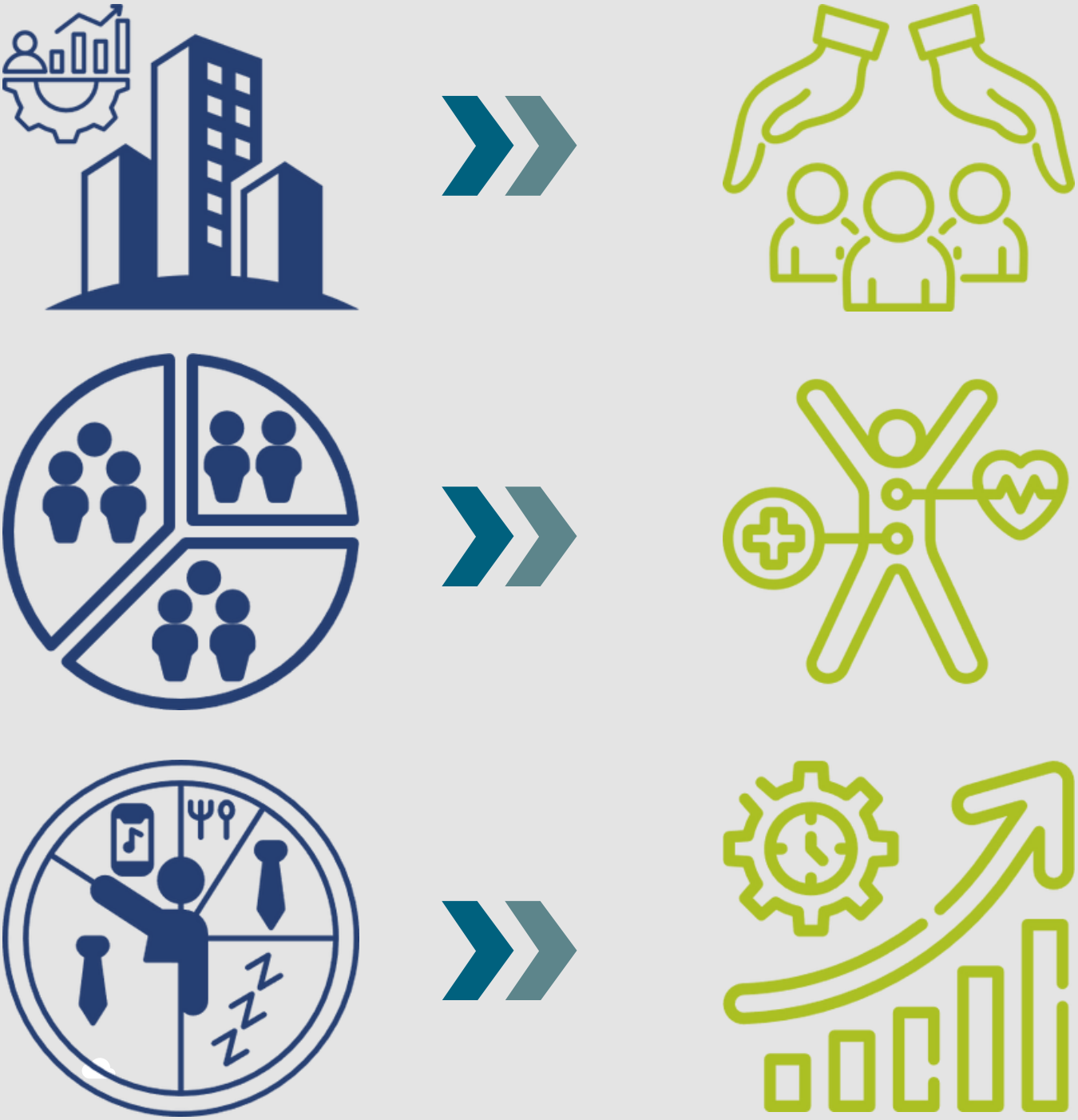
TOPIC

What do you consider the main implications for building performance of changing demographics, lifestyles, and the need to keep people safe, healthy, and productive?



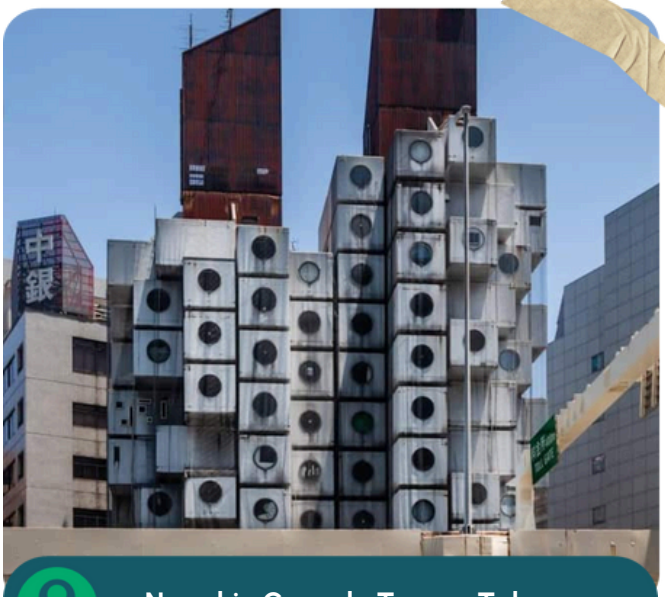
Lessons from Building Failures: Adapting to Change

The Nakagin Capsule Tower in Tokyo and the Rana Plaza factory in Dhaka are two stark reminders of what happens when buildings fail to adapt to the needs of their occupants and changing environments.

Starting with the Nakagin Capsule Tower, this iconic structure was designed in the 1970s to be adaptable, with its replaceable capsule units aimed at accommodating the fast-paced lives of Tokyo businessmen. However, over the decades, as lifestyles changed and Tokyo's population grew more diverse, the building's tiny, cramped capsules couldn't meet the evolving demands for space, comfort, or modern amenities. To make matters worse, replacing these capsules turned out to be prohibitively expensive, leading to decades of neglect, poor air quality, and unsustainable living conditions. Ultimately, the building, once hailed as a symbol of flexibility, was demolished in 2022 because it failed to adapt in a truly sustainable way.

Now, contrast this with the Rana Plaza factory collapse in 2013, where over 1,100 garment workers tragically lost their lives. This eight-story building was originally designed for commercial purposes but was illegally altered to house heavy industrial equipment, far exceeding its structural capacity. The workers, many of whom were women from low-income backgrounds, were forced to work in dangerous conditions, and the building's collapse demonstrated a blatant disregard for safety and the well-being of its occupants.

What these examples teach us is that adaptability and safety are not optional—they are essential. Buildings must be designed to evolve with changing demographics, lifestyles, and safety needs. Otherwise, we risk repeating these mistakes, leading to wasted resources, unsafe environments, and tragic outcomes.



Nagakin Capsule Tower, Tokyo

OUTDATED ADAPTABILITY

- Designed for flexibility with replaceable capsules, but couldn't adapt to modern living needs.
- Deteriorated due to lack of maintenance, becoming uninhabitable and unsustainable.
- Demolished after 50 years, despite its original vision of adaptability.

Rana Plaza Factory, Dhaka

NEGLECTING SAFETY

- Building designed for commercial use, not heavy industrial machinery. Incorrect usage led to catastrophic failure.
- Over 1,100 deaths due to structural collapse from unauthorized alterations.
- Tragic example of disregarding safety, especially for its vulnerable workers demographic.

THE CONSEQUENCES OF IGNORING CHANGING DEMOGRAPHICS AND SAFETY NEEDS”

YOU CAN HAVE A 1000 PROBLEMS IN LIFE, UNTIL YOU HAVE A HEALTH PROBLEM...

THEN YOU ONLY HAVE ONE PROBLEM"

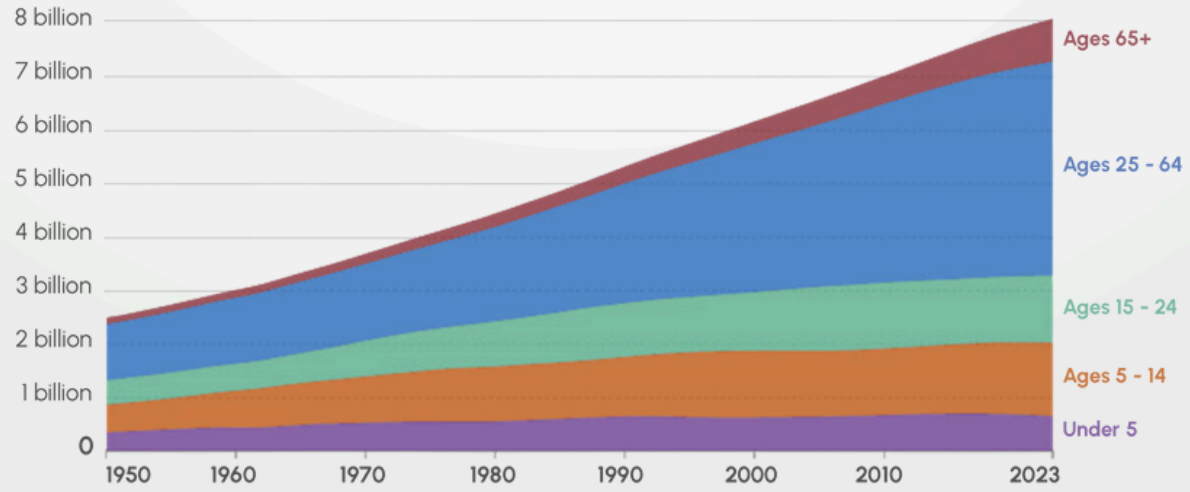
No matter what challenges we face in life, the loss of human lives is always the greatest impact. When we think about building design, it's not just about creating efficient or visually appealing spaces—it's about protecting the lives of those who inhabit them. This reminds me of a profound quote I deeply value: **"You can have a thousand problems in life, until you have a health problem... then you only have one problem."**

Health isn't limited to the physical dimension; it encompasses how people interact, behave, and respond to their environment on a daily basis. Are they breathing clean air? Are they comfortable, focused, and productive? The environments we design directly influence the health, well-being, and productivity of every individual who enters these spaces.

This is why building performance must always prioritize the human experience above all else.

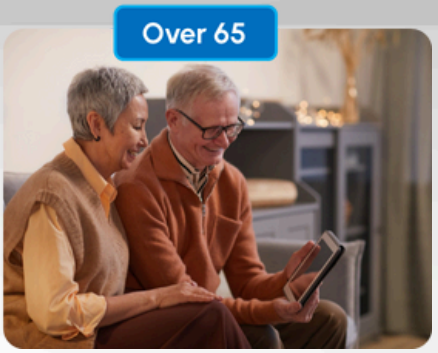
Evolving Demographics, Lifestyles & Building Performance

Source: UN, World Population Prospects (2024)
OurWorldData.org/population-growth | CC BY



As building services professionals, we stand at a critical juncture where our work can shape how society adapts to rapid demographic and lifestyle changes. Buildings account for 40% of global energy consumption, and with urban populations expected to grow by 2.5 billion by 2050, the pressure on building performance is immense. Additionally, the pandemic-driven surge in remote work—up by 91% in recent years—has fundamentally altered how we design and utilize our spaces.

These trends challenge us to create environments that are not only energy-efficient but also responsive to the evolving needs of their occupants. The key question is: How can we leverage these shifts to enhance the safety, health, and productivity of building users? In this presentation, I'll explore how advanced building service strategies can help achieve these goals, using critical data and sustainable practices to guide our path forward.



Designing for Diverse, Multigenerational Occupants

Adaptive designs must accommodate **diverse needs,** offering **flexibility** for **families, young professionals,** and **seniors.**

As demographic shifts intensify, our buildings must adapt to accommodate a more diverse range of needs than ever before. By 2050, one in five urban residents will be aged 65 or older, underscoring the necessity for senior-friendly features such as anti-slip flooring, stair-free access, and easy-to-reach controls. However, it's not just about aging populations. Millennials and Gen Z—who are set to comprise the majority of the workforce—are demanding tech-integrated, flexible spaces that align with their digital lifestyles. In fact, 88% of Millennials are looking for smart-home technologies in their living environments.

Family dynamics are also evolving. Multi-generational households have surged by 64% over the last decade, requiring buildings to be more adaptable than ever. This calls for designs that transition effortlessly between different uses. Imagine a space that serves as a quiet, productivity-driven zone for remote work during the day, yet transforms into a communal family area in the evening. We need buildings that can 'breathe'—featuring movable walls, adjustable lighting, and responsive HVAC systems capable of adapting to the distinct needs of seniors, professionals, and families under one roof. These demographic shifts are not just statistics; they compel us to rethink building design, ensuring spaces are truly adaptable, inclusive, and future-ready.

SENIOR POPULATION

1 in 5

URBAN RESIDENTS BY 2050

-UN

TECH - SAVVY PROFESSIONALS

88%

MILLENIALS DESIRE SMART-HOME TECH IN THEIR LIVING SPACES

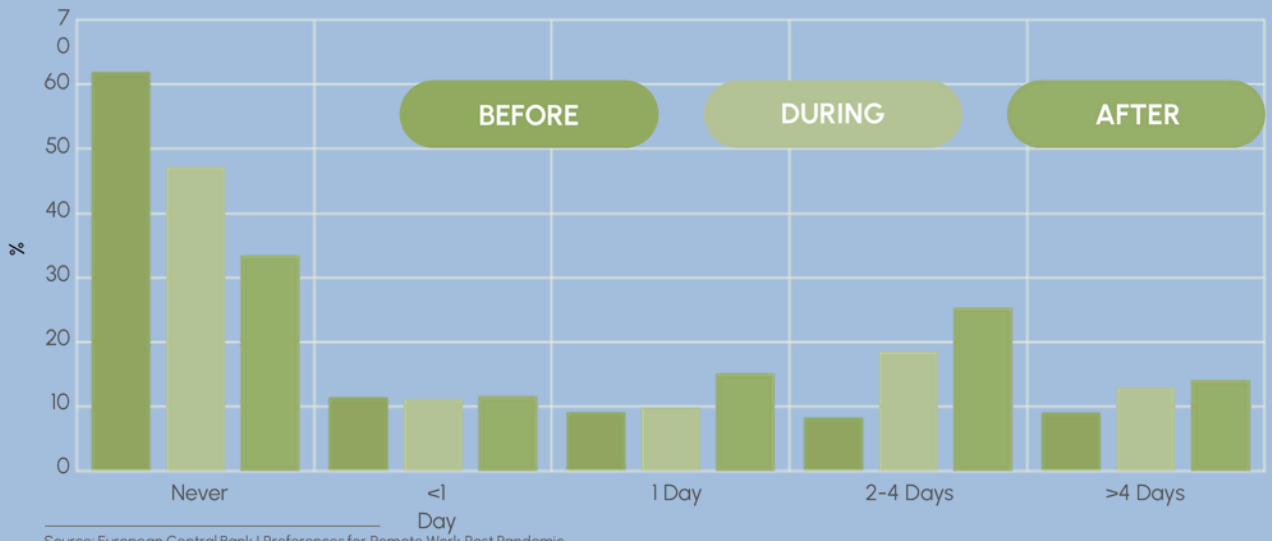
-FORBES

YOUTHFUL WORKFORCE

75%

OF THE WORKFORCE BY 2050 WILL BE MADE UP BY **MILLENIALS AND GEN Z**, DEMANDING SMART, TECH INTEGRATED LIVING SPACES.

Preferences for Remote Work after the Pandemic



Source: European Central Bank | Preferences for Remote Work Post Pandemic
ECB Economic Bulletin, Issue 1/2023

87%

REMOTE WORK

OF ORGANIZATIONS PLAN TO MAINTAIN FLEXIBLE WORK ARRANGEMENTS

-PWC

68%

MENTAL HEALTH & WORK-LIFE BALANCE

OF WORKERS SAY THAT FLEXIBLE WORK ARRANGEMENTS IMPROVE THEIR MENTAL HEALTH AND WORK-LIFE BALANCE

-MCKINSEY

35%

DYNAMIC HVAC SYSTEMS

ENERGY SAVINGS HAS BEEN ACHIEVED IN BUILDINGS WITH DEMAND CONTROL HVAC SYSTEMS, RESPONDING TO FLUCTUATING OCCUPANCY LEVELS

-ASHRAE

+ 200%

IMPORTANCE OF AIR QUALITY

SURGE IN USE OF UV AIR PURIFICATION SYSTEMS IN COMMERCIAL SPACES DURING PEAK PANDEMIC TIMES.

-WHO

The Pandemic's Lasting Impact on Building Performance

Flexibility and **health-centric** building services are now essential for **productivity** and **safety.**

The pandemic fundamentally changed how we view workspaces, shifting the paradigm toward flexibility, health, & productivity. An impressive 87% of organizations have recognized this shift, indicating plans to maintain flexible work arrangements moving forward. This isn't just a fleeting trend—it marks a fundamental transformation in how we use our buildings. Workers themselves have highlighted the benefits, with 68% reporting that flexible work arrangements significantly improve their mental health & work-life balance. This underscores the critical role building services play in supporting productivity, well-being, & overall quality of life.

However, flexibility isn't just about allowing people to work from different locations; it's about how our buildings adapt in real time to changing occupancy levels. Consider demand-controlled HVAC systems, which respond dynamically to occupancy, achieving up to 35% energy savings while maintaining optimal indoor air quality. During the peak of the pandemic, the use of UV air purification systems in commercial spaces surged by over 200%, demonstrating that air quality and health are now central to building design considerations.

Imagine an office that adjusts to the number of people present, with lighting & HVAC systems that respond instantly to occupancy changes, creating a comfortable, safe, & energy-efficient environment. As building service professionals, our challenge is to seamlessly integrate these systems, ensuring we deliver adaptable spaces that keep occupants safe, healthy, & productive-whether they're in the office five days a week or just one.

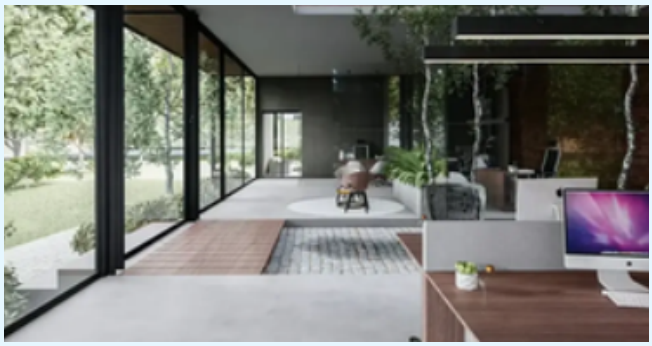
Optimizing Indoor Quality for Diverse and Changing Demographics

DEMAND CONTROL VENTILATION

The DCV implementation at the DEC Campus Legacy Expansion in Dubai optimized ventilation based on real-time occupancy, catering to younger workers' **air quality preferences** and older adults' **sensitivities**, achieving up to **35% energy savings** while ensuring optimal indoor air quality.

BIOPHILIC DESIGN ELEMENTS

The integration of natural elements at Cape Jumeirah in Dubai reduced **stress levels** among **younger professionals by 15%** and improved **well-being** for **older workers by 25%**, resulting in enhanced mental health and productivity across all occupants.



As we face evolving demographics, the need to adapt our indoor environmental strategies has never been more pressing. What makes these strategies truly effective is that they aren't just theoretical concepts—I've seen their impact firsthand across multiple projects throughout my career.

At the DEC Campus Legacy Expansion in Dubai, implementing demand-controlled ventilation resulted in a 35% reduction in energy use while maintaining top-tier indoor air quality. Similarly, at Cape Jumeirah, the incorporation of biophilic design elements reduced stress by 15% and enhanced overall well-being by 25%, proving that nature-inspired solutions can have a profound effect on occupants. When we think of smart lighting, it's not just about energy savings—it's about creating an adaptable, human-centric environment. For example, at Project Q (Sweid & Sweid HQ) in Dubai, I imple-

SMART LIGHTING SYSTEMS

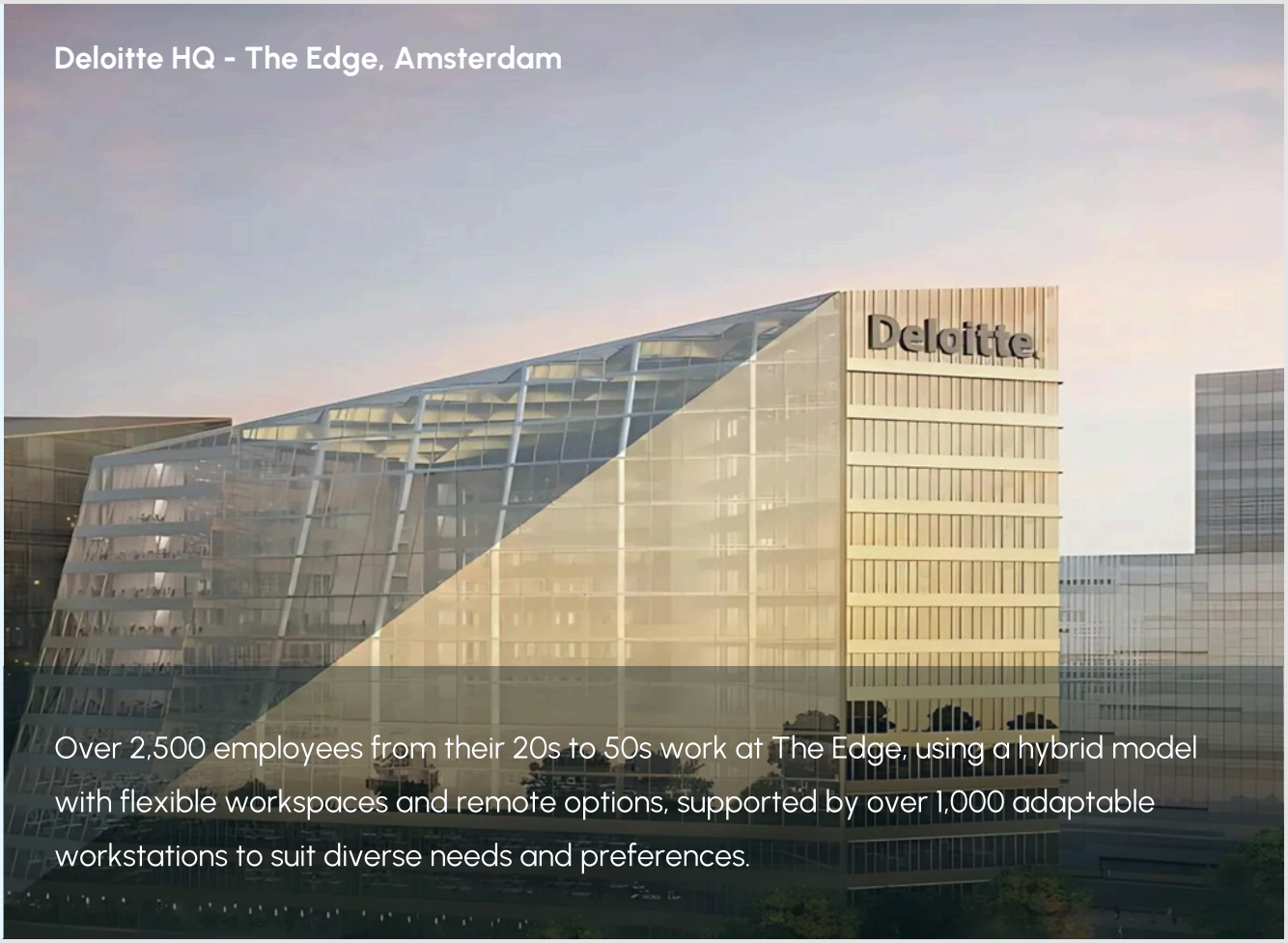
The smart lighting system at Project Q (Sweid and Sweid HQ), which adjusts color temperatures and brightness to align with circadian rhythms, **achieved a 60% reduction** in **energy consumption**, benefitting younger professionals with dynamic lighting and supporting older workers by reducing eye strain, enhancing **comfort and productivity**.

ADVANCED AIR FILTRATION

The installation of MERV-15 filters (Class F8) and UV-C air purifiers at the Misk Heritage Institute in KSA **removed up to 95% of airborne pathogens**, significantly enhancing air quality. This solution proved especially beneficial for older adults and young children with **respiratory issues**, improving health outcomes for all building users.

-mented lighting systems that adjust based on circadian rhythms, leading to an 18% boost in productivity and reduced eye strain. This approach effectively supports the needs of both tech-savvy Millennials and older workers.

Air filtration has become even more critical in our post-pandemic world. With the rise in respiratory illnesses, especially conditions like asthma and allergies, air quality can no longer be an afterthought. At the Misk Heritage Institute in Saudi Arabia, we installed advanced filtration systems such as MERV-15 filters (class F8) and UV-C air purifiers, which captured up to 95% of airborne pathogens. This significantly improved indoor air quality, offering protection to older adults and children, who are particularly vulnerable to respiratory issues. By incorporating these systems, we not only improved health outcomes but also reduced absenteeism, which directly impacts productivity.



Deloitte HQ - The Edge, Amsterdam

Over 2,500 employees from their 20s to 50s work at The Edge, using a hybrid model with flexible workspaces and remote options, supported by over 1,000 adaptable workstations to suit diverse needs and preferences.

World's highest **BREEAM** rating of **98.36%**

Net Positive: Generates **102%** of its own energy

30% Energy Savings with DCV HVAC Systems

80% Reduction in Lighting Costs with Smart LED Lighting

15% Increase in Occupant Productivity

The Edge in Amsterdam is more than just an architectural marvel—it's a living, breathing example of how building services can seamlessly adapt to evolving demographics, lifestyles, and the demand for healthier, safer, and more productive environments. Achieving the highest BREEAM score ever recorded at 98.36%, The Edge stands as a beacon of sustainability and adaptability, demonstrating what's possible when we design with intention and foresight.

This building doesn't just check the boxes for energy efficiency—it actively responds to its occupants' needs. Through its advanced Demand-Controlled Ventilation system, The Edge adjusts airflow based on real-time occupancy, ensuring optimal air quality for a diverse range of users, from younger tech-savvy professionals to older individuals who are more sensitive to indoor pollutants. This adaptability has resulted in a 30% reduction in HVAC energy use, proving that comfort and sustainability can coexist harmoniously.
The Edge's lighting system, equipped with over 6,000 smart LED fixtures, exemplifies how technology can enhance well-being while reducing costs, achieving an 80% reduction in lighting expenses. These fixtures don't merely illuminate—they adapt to natural light levels, circadian rhythms, and even individual preferences, creating a workspace that's both human-centric and highly efficient. This has contributed to a 15% increase in productivity, underscoring how thoughtful building services can significantly impact how people feel, work, and perform.

Furthermore, The Edge generates 102% of its energy needs through renewable sources such as solar panels and geothermal energy, making it not only self-sufficient but also a net-positive contributor to the grid. This level of resilience and adaptability is exactly what's required as we navigate a future where demographics, work habits, and health priorities continue to evolve.

The Edge challenges us to rethink what's achievable when building performance aligns with the needs of a dynamic, diverse population.

The Future of Building Performance

It embodies the very essence of our topic today—demonstrating that when we prioritize flexibility, health, and sustainability, we create spaces that not only serve but also enhance the lives of everyone who occupies them. This is the future of building performance: responsive, adaptive, and always prioritizing people first.

IMAGINE. CREATE. ACHIEVE.
a sustainable future

Egis is an international player active in architecture, consulting, construction engineering and mobility services. We create and operate intelligent infrastructure and buildings that respond to the climate emergency and contribute to more balanced, sustainable and resilient territorial development.

Operating in 100 countries, Egis puts the expertise of its 19,500 employees at the service of our clients and develops cutting-edge innovations accessible to all projects. Through our wide range of activities, Egis is a key player in the collective organisation of society and the living environment of citizens all over the world.

Our operations in the Middle East are underpinned by key strategic acquisitions and a deep understanding of local market conditions. Egis' long and distinguished history, providing a comprehensive suite of engineering, consulting, and project management services makes us a trusted partner for the region's governments, investors, and developers alike.

With 3,500 employees, across 8 countries in the Middle East, Egis has successfully delivered over 700 complex development projects in the region, stimulating economic growth and enhancing quality of life. We are firmly committed to sustainable development, positioning us as one of the top five firms, according to the Engineering News Record (ENR) rankings.

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