Buildings 4 People
Quantifying the benefits of better performing schools, offices & hospitals

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Smart Cities Forum AGORIA - Brussels, 26 March 2019
90% OF OUR TIME IS SPENT INDOORS

97% OF EU BUILDINGS IS NOT FUTURE PROOF
4 key parameters influencing indoor environmental quality

- Indoor Air Quality
- Noise
- Thermal Comfort
- Lighting
Why quantify the benefits?

Research shows that poor IEQ can affect occupants’ health, attendance, concentration and working or learning performance.

Why are companies & public authorities not reaping the benefits by providing better buildings?

Because cost-benefit analysis does not allow (yet) quantification and integration to compare with other investment options.

**SCHOOLS**
- 90 million students spend their days in educational buildings.

**OFFICES**
- 80 million workers spend 8 hours each weekday in an office.

**HOSPITALS**
- 90 million patients spend on average 7.6 days per year in hospitals.
Wide-ranging literature review

> 400 relevant studies

- 73 studies quantified the impact of better indoor environment
- Selection criteria: measurement of an indoor environment parameter and the testing of performance or health
- Interviews and reviews by leading experts and stakeholders

Year of publication

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Methodological approach

**Approach**
- Identifying and linking beneficial impacts of Indoor Environmental Quality on people
- Quantifying health, educational and performance benefits
- Extrapolating quantified benefits to Europe
- Putting a monetary value on the benefits

**IEQ parameters**
- Temperature
- Air quality
- Light
- Noise

**Implications for Europe**
Intangible benefits put into numbers to include in cost-benefit analysis

**Impact categories**
- Well-being
- Performance
- Health

**Extrapolation for Europe**
- Offices
- Schools
- Hospitals
Better school buildings: boosting students’ academic performance

- Every 1°C reduction in overheating increases students’ learning performance by 2.3%.
- For every 1 l/s/p increase in the ventilation rate up to 15 l/s/p, academic performance increases by 1%.
- Every 100 ppm decrease in CO₂ concentration is associated with a 0.5% decrease in illness-related absence from schools.
- Every 100 lux in improved lighting in schools is associated with a 2.9% increase in educational performance.
- Better daylight is associated with a 9% to 18% increase in educational performance.
Better offices: enhancing productivity and wellbeing

Every 1°C reduction in overheating increases a worker’s performance by 3.6%

Every 1 l/s/p increase in ventilation increases a worker’s performance by 0.8%

For every 1 dB decrease in the excess noise, performance improves by 0.3%

Every 100 lux increase in lighting level increases a worker’s performance by 0.8%

Better daylight is associated on average with a 10% increase in performance
Better hospitals: facilitating better and faster healing

Patients’ length of stay can be reduced on average by 11%

Medication costs are reduced by up to 21%

Reducing noise levels has positive effects on heart-rate, pulse, respiration and sleep

Mortality rate can be reduced

Employee turnover is reduced by up to 20%
Skip class #strike4climate = better schools
Smart buildings are better buildings... for whom?

• Occupants save energy and money
• Healthier + more comfortable living and working environment

**OCCUPANTS** reap the benefits of smart technologies adapting to their needs and preferences

Smart buildings contribute to the stabilisation of the **ENERGY SYSTEMS** with storage capacity & demand response activities

• Larger uptake of renewable energy & electric vehicles
• Decreasing fossil fuel dependency
Key attention points

**Cease the silo thinking**
- Align health, energy & other policy agendas
- When appraising building renovation or new construction: include value of **health, well-being and performance benefits** alongside energy cost savings

**More R&D is needed to assess and grasp the full potential**
- Gather data and feedback from building users
- Develop business models & financing schemes
- Calculate broad impact for aggregated district renovation programmes
Thank you...

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