SMART BUILDINGS & GOOD INDOOR AIR QUALITY
Providing a Smart Place to Work & Live in that Enhances Human Experience by Enhancing Wellness

A Presentation by
Kamal Meattle,
CEO – Paharpur Business Centre
GB FEATURES

• Energy Efficient
• Water Efficient
• Waste Management
• Sustainable Materials & Vendor Management
• Aware Occupants
• Indoor Environment Quality (Human Experience)

Green Buildings - a high school degree,
Next step is Smart Cities, And,
Smart Cities can’t flourish without

Assuring WELLNESS

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Moving A Step Further From just Green Buildings to Smart Buildings with Wellness
WELL BUILDINGS

- **Delos WELL Building Certification** is first protocol of its kind that addresses critical parameters of Human Health and Well-being within the built environment.

- Prescribes a series of technology enhancements and performance-based measures that are systemized across seven categories relevant to occupant health in the built environment.

**Paharpur Business Centre (PBC)** is registered as a Pilot Project in India for WELL Building certification.
WELL PYRAMID

- Mind
- Comfort
- Fitness
- Light
- Nourishment
- Water
- Air
WE CHOSE AIR FIRST

Why?

Daily Intake

23000 breaths
~ 13000 liters

2 – 3 liters

3 – 6 meals

Survival

Air

Few Minutes?

Water

Few days?

Food

Few weeks?
AIR: BASE OF WELL BUILDING CERT

Following are some of the criteria to be addressed for maintaining good air quality as per WELL Building Standard.

• A demand controlled ventilation system integrated with HVAC to regulate the ventilation rate of outdoor air to keep CO₂ levels in the space below 800 ppm.

• The standard also demands maintenance and monitoring of the levels of any one parameters from, Ozone or CO₂ clubbed with either PM 2.5 or PM 10 in the regularly occupied areas on an hourly basis.

• Adherence to ASHRAE 62.1 2013 is required.
Specifications to be achieved as per adherence to ASHRAE:

a) Formaldehyde levels less than 27 ppb
b) Total volatile organic compounds less than 500μg/m³
c) Carbon monoxide less than 9 ppm
d) PM$_{2.5}$ less than 15 μg/m³
e) PM$_{10}$ less than 50 μg/m³
f) Ozone less than 51 ppb
Indoor Air Pollution

- The Slow, Silent & Invisible Killer

- Indoor Air Pollution is up to 10 times worse than the ambient air

- Indoor air pollution is the 2nd highest killer in India after Blood Pressure  
  - Global Burden of Diseases Report

- 1.3 million people in India die due to indoor air pollution every year  
  - WHO Study

- Annual premature deaths caused by particulate air pollution have increased six times since the year 2000  
  - Global Burden of Diseases Report

- 27.5% under-five infant mortality is because of indoor air pollution  
  - TERI study
Breathing poison: Delhi's air was deadlier than Beijing this winter

Delhi world's most polluted city

WHO's health shocker: The air we breathe causes cancer

Latest China smog emerges as 11 million people

Indian lungs 30% weaker than Europeans'

Delhiites worst hit by air pollution: Study

As city sizzled, ozone reached alarming level

The Pollution Cocktail Isn't

High benzene levels raise alarm

Capital Breaths Uneasy

EMIs set to rise

Pollution capital of India

Delhi's air quality has been on the downgrade due to the rising number of vehicles

Dangerous Pollution levels rose since mid-November as the chill slowed down the dispersal of pollutants

Chandan Chauhan

The study was conducted

Health, vegetation and ecosystem affected

Toxic ozone levels set to

y scientist

DURGESH Nandan Jha TNN

emission, doctors warned.

slightly better than South in

smaller towns, doctors warn

be studied by testing

of a person. A

JAYASHREE NANDI TNN
Brain Function

The brain utilizes approximately 20% of the body's oxygen supply. Compared with other types of cells, brain cells are especially sensitive to oxygen availability, and they quickly begin to die when they are deprived of oxygen.
A STUDY BY EHP JOURNAL

Summary: Poor Indoor Environmental Quality Linked to Workers' Low Cognitive Function

CAMBRIDGE, Mass.—People working in well-ventilated buildings with below-average indoor air pollution and low carbon dioxide, levels showed better cognitive functioning than workers in "non-green" offices with typical pollutant and CO$_2$ levels, according to a recent study published in Environmental Health Perspectives.

"These results suggest that even modest improvements to indoor environmental quality may have a profound impact on the decision-making performance of workers," wrote lead author Joseph Allen, director of the Healthy Buildings Program at the Harvard Center for Health and the Global Environment.

The study of 24 people exposed to different indoor environmental quality conditions over six full work days found that participants' cognitive scores were on average 61% higher on days working in buildings with low pollution levels than on days working in a conventional building.

When lowered CO$_2$ levels were coupled with lower pollutants in buildings, cognitive scores were 101% higher than in conventional buildings.
WHO ARE WE?

Paharpur Business Centre (PBC),

a Unique Experience Centre

which offers

Flexible Office & Conference Space

in Mountain Fresh Ambience
PBC – A UNIQUE BUILDING

- Rated as the healthiest ready-to-move-in office building in Delhi by CPCB, MoEF, GOI and CNCI
- USGBC Certified LEED Platinum building – With LEED Dynamic Plaque for Real time monitor of building performance
- Rated as BEE 5-Star building with AAhEPI of 28 Wh/hr/sqm
- Certified with international accreditations - ISO 9001, 14001, 22000, 50001, SA 8000, OHSAS 18001 & FSSAI
- NABERS Certified Building (for Indoor Environment Quality)
- CETEC 5 Palm Rating (for Healthy & Sustainable Operating Building)
- Signatory to the UNGC & WEP
WE GROW FRESH AIR

With the help of Three Common Plants

<table>
<thead>
<tr>
<th>The Living Room Plant</th>
<th>The Bedroom Plant</th>
<th>The Specialist Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Areca Palm</strong>&lt;br&gt;<em>(Chrysalidocarpus lutescens)</em></td>
<td><strong>Mother-in-law's Tongue</strong>&lt;br&gt;<em>(Sansevieria trifasciata)</em></td>
<td><strong>Money Plant</strong>&lt;br&gt;<em>(Epipremnum aureum)</em></td>
</tr>
<tr>
<td>Removes Chemical Toxins</td>
<td>Remove Chemical Toxins&lt;br&gt;Produces $O_2$ at Night</td>
<td>Removes Chemical Toxins &amp; Produces $O_2$ During the Day</td>
</tr>
</tbody>
</table>

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## WE GROW FRESH AIR

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>AVG. of other Buildings</th>
<th>PBC</th>
<th>% REDUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂, ppm</td>
<td>1068</td>
<td>441</td>
<td>59</td>
</tr>
<tr>
<td>PM₁₀, µg/m³</td>
<td>689</td>
<td>9</td>
<td>99</td>
</tr>
<tr>
<td>PM₂.₅, µg/m³</td>
<td>492</td>
<td>5</td>
<td>99</td>
</tr>
<tr>
<td>VOC - Benzene, ppb</td>
<td>150</td>
<td>BDL</td>
<td>99.99</td>
</tr>
<tr>
<td>VOC - Acetaldehyde, ppb</td>
<td>3125</td>
<td>BDL</td>
<td>99.99</td>
</tr>
<tr>
<td>VOC - Acetone, ppb</td>
<td>800</td>
<td>BDL</td>
<td>99.99</td>
</tr>
<tr>
<td>VOC - Toluene, ppb</td>
<td>275</td>
<td>BDL</td>
<td>99.99</td>
</tr>
<tr>
<td>Aerobic Plate Count, cfu</td>
<td>153</td>
<td>7</td>
<td>95</td>
</tr>
<tr>
<td>Fungal Count, cfu</td>
<td>48</td>
<td>&lt;5</td>
<td>90</td>
</tr>
</tbody>
</table>

- **BDL** – Below Detectable level
- **PPB** – Parts per Billion
- **µg/m³** – Micrograms per cubic meter
- **CFU** – Colony Forming Units
- **ppb** – Parts per billion
IMPACT OF GOOD IAQ

A study by CPCB, MoEF, GoI & Chittaranjan National Cancer Institute, Kolkata

- 52% Eye Irritation
- 34% Respiratory symptoms
- 24% Headaches
- 12% Lung impairment & Asthma

42% Probability of BOL increase by 1%
20% Productivity
10% Energy Costs
Low Absenteeism

Deduced Results

‘Indoor Air Quality’ (IAQ) at PBC conforms to ASHRAE & WHO standards

www.pbcnet.com
CO₂ COUNT

A SNAPSHOT OF CO₂ LEVEL AT CAFÉ EINSTEIN, PBC
– IT IS LOWER THAN AMBIENT

9:06 AM  429 ppm  Café Einstein CO₂
9:06 AM  460 ppm  Ambient CO₂

Normally Indoors CO₂ levels should be lower than 700 ppm. At PBC we are way below that.
HOW DID WE MAKE IT?

• Indoor Air Quality System
• Displaying Outdoor and Indoor Air Quality Index
• Measuring saturated Blood Oxygen Level
• Promoting use of Hand - Sanitizers
• TB Tests & Blood Pressure Monitoring
• Maintaining proper Acoustic levels
• Providing Optimal Water Quality
• Healthy Food & Beverage services
• Maintaining proper Lux Levels for different areas
• Health Check-up camps
• Yoga, Gym & Massage Chair

• Creating Awareness through training sessions
• Sharing information on TFTs & emails
IAQ CAN BE REPLICATED

The same technology can be replicated in other buildings, both in homes and commercial buildings

BreatheEasy (BE), IAQ division of PBC renders Air Quality Solutions to homes (so far completed 2,500 homes in Delhi/ NCR) and commercial buildings

www.pbcnet.com
TO BREATH FRESH

Visit us @

Paharpur Business Centre
and experience ‘Davos’ or ‘Gulmarg’ in Delhi’
The Best Time to Act Towards Enhancing Wellness & Making Buildings Smart is NOW

Thank You