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# HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONAL - HBDP EXAM REFRESHER

ONLINE PROFESSIONAL COURSES LED BY THE  
WORLD'S TOP SPECIALISTS

ONLINE TRAINING BY KRISHNAJI PAWAR

LEED AP(BD+C), GSAS CGP, GCP, ISO 14001

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# BRIEF ABOUT ME

**Krishnaji PAWAR**

**CEO & FOUNDER**

Krishnaji Pawar is founder and CEO of Beyond Smart Cities. Before being named CEO in January 2020, Krishnaji held leadership roles at Beyond Smart Cities in both Sustainability ,Energy & Environmental Consultancy.

Specialized in developing sustainable design strategies for Green Building Certification Systems (LEED, GSAS, etc.), Energy & Water Conservation, Commissioning, Environmental Impact Assessment & Environmental Management Systems.

Currently responsible for 3,787 million square feet Green Building /Energy modeling Consulting since January 2008 in UAE, India and Qatar.





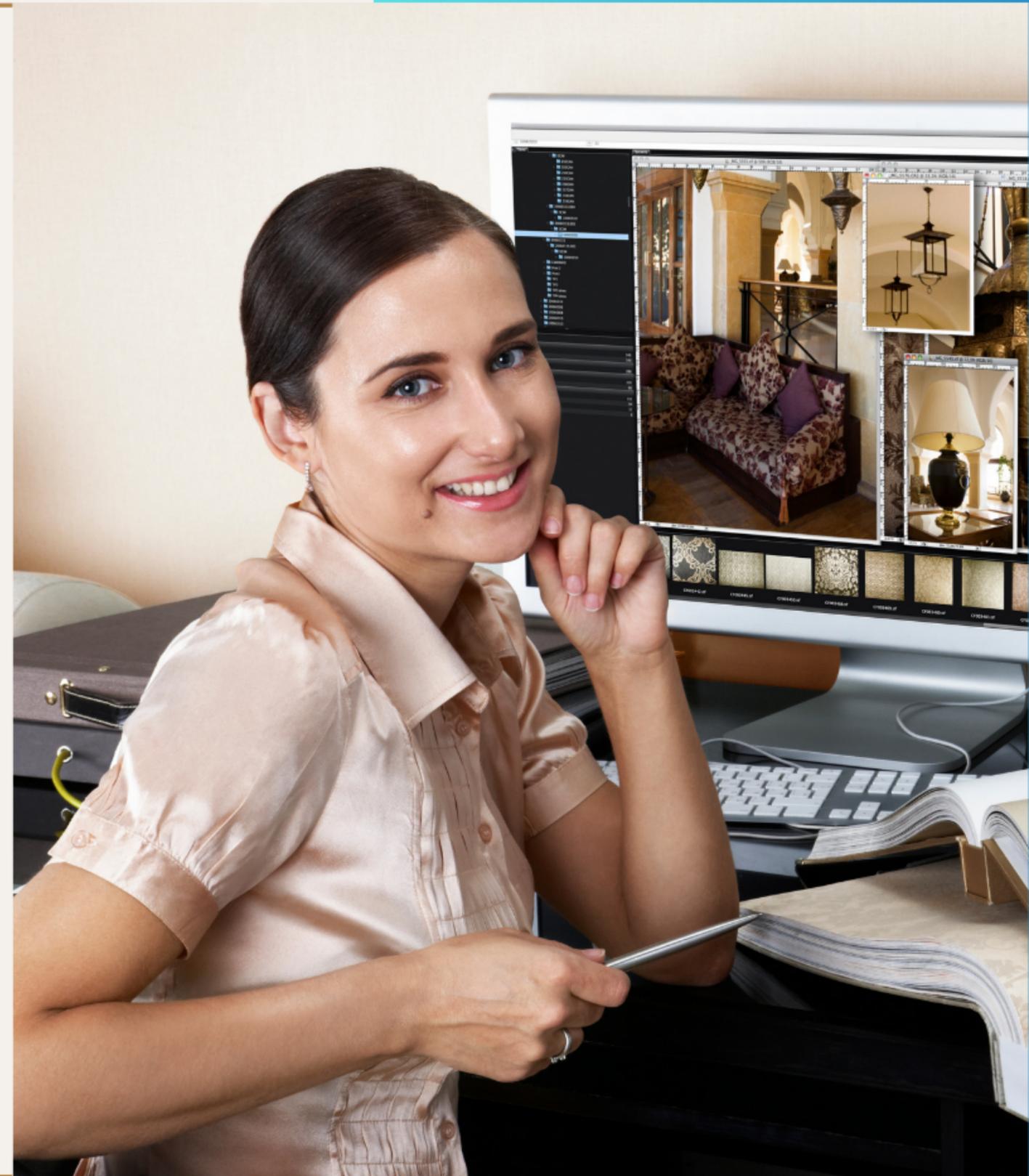
MODULE  
**1**

# Introduction and Course Outline

KRISHNAJI PAWAR - CEO & FOUNDER

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**HIGH-PERFORMANCE  
BUILDING DESIGN  
PROFESSIONAL - HBDP  
EXAM REFRESHER**

The HBDP Exam refresher covers building design, energy efficiency, sustainability, and green building standards. Passers demonstrate expertise in creating energy-efficient, sustainable, and environmentally friendly buildings, contributing to a sustainable future.

# Learning Objectives

- **Introduction to High Performance Buildings**
- **Sustainability Concepts**
- **What is sustainable development?**
- **Sustainable Development: Definitions and Applications**
- **Sustainable Buildings**
- **Sustainable Transportation**
- **Alternative Energy & Carbon Reduction**
- **Environmental Improvement Programs and Rating Systems**
- **HVAC Processes**



## INTRODUCTION

- HBDPs are experts in designing energy-efficient, sustainable, and environmentally friendly buildings.
- They use advanced modeling tools to optimize building design and systems, reducing energy consumption.
- HBDPs use passive design strategies and high-performance insulation, windows, and lighting systems to reduce energy use.
- Indoor air quality is a key principle, with HBDPs designing buildings with adequate ventilation, controlling humidity levels, and using low-emission materials.
- Sustainable building materials are a priority, with HBDPs specifying locally sourced, recycled, and low carbon footprint products.

## Learning Objectives +

- Energy Analysis: Envelope, Massing, and Orientation Optimization
- Energy Analysis: Initial Assessment
- Energy Analysis: Ventilation
- Energy compliance modeling
- Indoor and Site Environment: Thermal Comfort
- Indoor and site environments: air quality
- Indoor and Site Environment: Lighting
- Controls and monitoring: Control Hardware
- Controls and Monitoring: Control Strategies



## HBDDP EXAM REFRESHER TRAINING OVERVIEW

- Their expertise contributes to a more sustainable built environment, reducing operating costs and contributing to a healthier built environment.
- • Covers sustainability development, its applications, and impacts on sectors like high-performance buildings and manufacturing.
- Covers energy analysis, compliance modeling, energy efficiency technologies, renewable energy, thermal comfort, air quality, lighting, and water conservation.
- Validates competency to design and integrate sustainable HVAC&R systems into high-performing buildings.

## Learning Objectives +

- Benchmarking with Performance Metrics
- Water Conservation
- Commissioning in Sustainable Construction
- Energy and Materials Use and Management
- Summary and Resources
- HBDP Practice Test V.4.1\_Test Your Knowledge!



## HBDP EXAM REFRESHER TRAINING OVERVIEW +

- Validates competency in key domains: energy analysis, indoor and site environments, controls and monitoring, benchmarking with performance metrics, water conservation, commissioning in sustainable construction, energy and material use, and management.
- Employers support ASHRAE HBDP for recruitment, reputation, compliance, professional development, job satisfaction, and retention. Apply now, test, prepare, and recertify for eligibility.

# HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONAL (HBDP) ROLE

- Understands development practices, policies, technical requirements, program analysis, and financial assessments related to sustainable development.
- Works in commercial, institutional, industrial, or governmental sectors.
- Knowledge applicable to specific markets: green building construction, environmental mitigation, industrial facility operation, planning, alternative energies, carbon reduction, sustainable transportation.





# HIGH-PERFORMANCE BUILDING DESIGN EXAM REFRESHER TRAINING PROGRAM



- Supports the mission of ASHRAE, an international membership society committed to advancing the arts and sciences of heating, ventilation, air conditioning, and refrigeration.
- Equips participants with foundational understanding, principles, sustainability concepts, HVAC processes, environmental improvement programs, environmental rating systems, and resources needed to design high-performance buildings effectively.

# WHO ARE THE HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONALS?

- Energy professionals with knowledge of "green" construction technologies.
- Energy-efficiency consultants helping clients understand impact of sustainable practices.
- Involved in planning, developing, and implementing sustainability policies or programs.
- Involved in decision-making process.



# WHAT DOES A HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONAL DO?



- Understanding development practices, policies, technical requirements, program analysis, and financial assessments.
- Identifying various approaches for sustainability programs.
- Working in commercial, institutional, industrial, or governmental sectors.
- Knowledge applicable to specific markets like green building construction, environmental mitigation, industrial facility operation, planning, alternative energies, carbon reduction, sustainable transportation, and water conservation.

# SUSTAINABILITY CONCEPTS

- Balancing economic, environmental, and social considerations to create a resilient society.
- Emphasizes the triple bottom line: economic prosperity, environmental stewardship, and social equity.
- Lifecycle thinking considers the environmental and social impacts of a product or service throughout its lifecycle.
- Both concepts aim to promote responsible and efficient use of resources for a more sustainable future.



# ENERGY EFFICIENCY AND SUSTAINABILITY CONCEPTS

## Energy Efficiency in Sustainability

- Involves optimizing energy use to minimize waste and environmental impact.
- Achieves desired outputs with minimal energy input through energy-efficient technologies, practices, and behaviors.
- Energy conservation involves reducing energy consumption by using less energy to achieve the same output.
- Energy management involves monitoring and optimizing energy use to improve efficiency.
- Energy efficiency reduces greenhouse gas emissions, mitigates climate change, and conserves natural resources.



# ENVIRONMENTAL IMPACT OVERVIEW

- Environmental impact refers to the effects of human activities on the environment, including ecosystems, natural resources, and ecological balance.
- Key factors include emissions, solid and fluid waste disposal, deforestation, habitat destruction, and pollution.
- Emissions, including carbon dioxide, nitrogen oxides, sulfur dioxide, and particulate matter, contribute to climate change by trapping heat in the atmosphere.
- Solid and fluid waste disposal, including plastics, paper, food scraps, and other materials, can lead to pollution and harm to wildlife.
- Fluid waste, such as wastewater from industrial processes or sewage treatment plants, can contain harmful substances that can contaminate water sources and harm ecosystems.
- Factory production, for example, emits pollutants into the air, generates solid waste, and discharges wastewater containing chemicals, affecting aquatic life.
- Understanding these factors can help implement sustainable practices and reduce ecological footprint, ensuring a healthy and thriving planet for future generations.

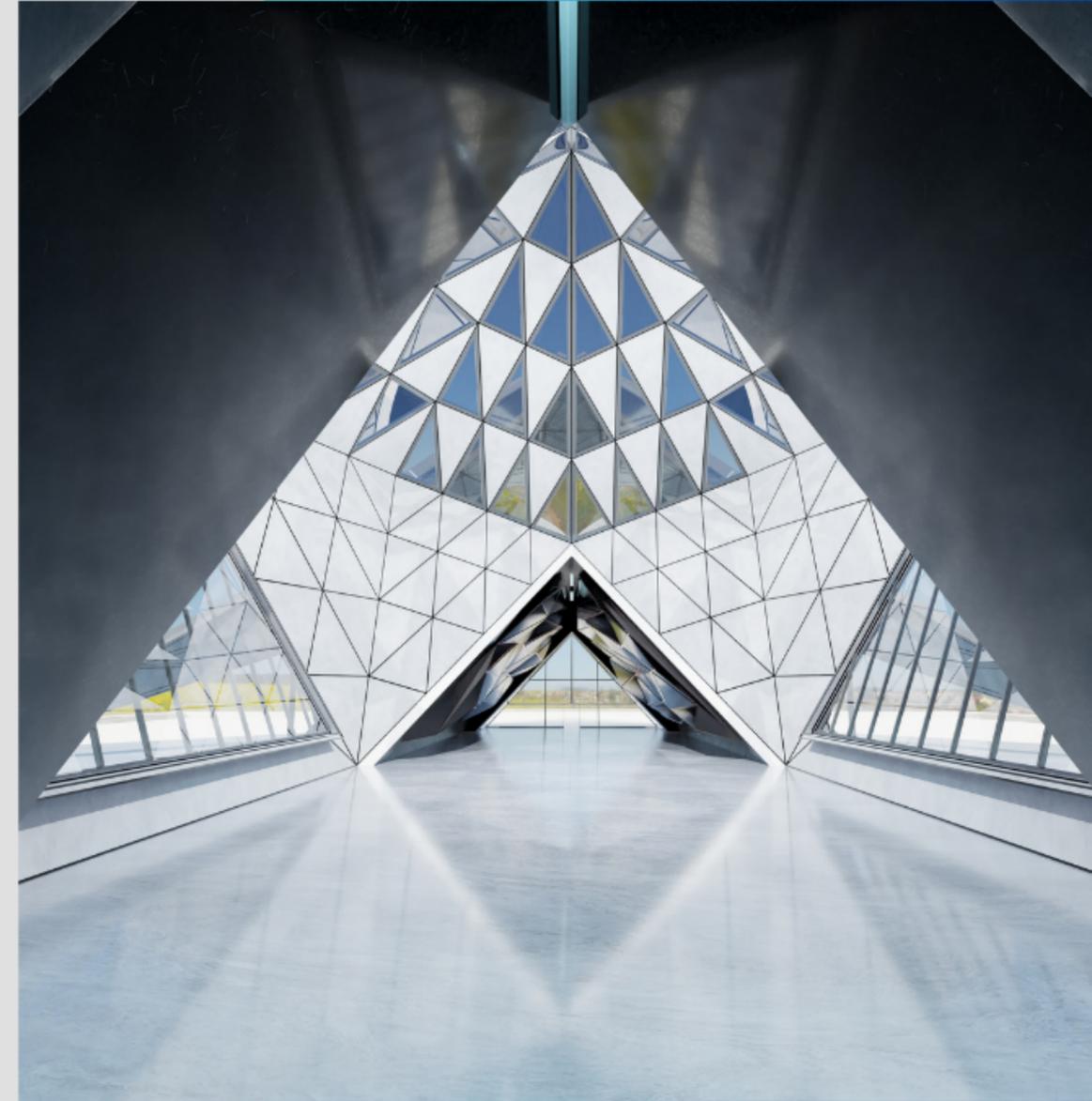


# HIGH PERFORMANCE BUILDING DESIGN

High performance building design is a process of integrated approach using various parameters surrounding building design for optimised design excellence. The entire process is a holistic approach to designing high-performing buildings that are -

- Sustainable environmentally and economically
- Energy efficient
- Prioritising occupant's well-being through design

These three points essentially summarise all the attributes a high performance building should have. And naturally, it falls onto the architect to ensure all aspects are fulfilled.



# COMMISSIONING PROCESS IN BUILDING CONSTRUCTION

- Commissioning ensures all systems and components are designed, installed, tested, operated, and maintained according to owner's-project requirements (OPR) and design intent.
- The OPR document serves as a roadmap for the design and construction team, guiding them in meeting the owner's expectations.
- The commissioning process begins during the design phase and continues through construction, occupancy, and beyond.



# DESIGN PROCESS OVERVIEW

- Involves defining project scope, goals, and objectives, understanding end user needs and constraints.
- Team formation involves diverse skill sets and backgrounds for a holistic problem-solving approach.
- Team dynamics are crucial for effective communication and collaboration, fostering a culture of open communication, trust, and respect.
- Documentation requirements capture and communicate design decisions, rationale, and outcomes.
- Documentation includes design briefs, sketches, prototypes, specifications, and other documents.

The design process is systematic and collaborative, leading to the development of high-quality, user-centered solutions.





# WATER USAGE EFFICIENCY IN SUSTAINABLE BUILDINGS

- Sustainable buildings aim to minimize environmental impact by maximizing resource efficiency, including water usage.
- Water-saving fixtures and appliances, such as low-flow toilets, faucets, and showerheads, can significantly reduce water consumption.
- Water recycling and reuse systems, such as greywater recycling systems, can reduce reliance on freshwater sources and minimize water waste.
- Rainwater harvesting systems can capture and store rainwater for non-potable applications, reducing demand for municipal water supplies and decreasing stormwater runoff.
- Promoting water conservation behaviors among occupants through education and awareness campaigns can further reduce water consumption and contribute to long-term sustainability.



# HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONAL SKILLS

- Analyze renewable energy sources.
- Evaluate envelope decisions on building pressurization.
- Apply air quality strategies.
- Perform energy compliance modeling.
- Develop strategies to reduce potable water consumption.
- Establish O&M procedures and operator training.
- Evaluate alternative HVAC systems.
- Implement maintenance plan and commissioning procedures.
- Integrate controls with equipment and systems.
- Model energy consumption.
- Normalize performance data and trends.





# EARNING CRITERIA FOR HBDP



- Complete application and pass the HBDP Certification Exam.
- Eligibility requirements: meet one of four possible education requirements.
- Completion of one of four combinations of high-performance building design work experiences.
- Adherence to a Code of Ethics: uphold reasonable industry standard of care, prioritize public health and safety, and work in compliance with laws and regulations.
- Pass a proctored, closed book/closed notes, 2.5-hour, 100-question, multiple-choice exam with a pass rate of 63%.

# HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONALS' ROLE IN ARCHITECTURE AND CONSTRUCTION

- High-performance building design professionals optimize the design, construction, and operation of buildings to maximize energy efficiency, indoor air quality, and overall performance.
- They can reduce energy consumption by incorporating energy-efficient strategies like proper insulation, efficient heating and cooling systems, and use of renewable energy sources.
- Daylighting strategies, such as careful positioning of windows, skylights, and light shelves, can maximize natural light levels and reduce energy consumption.
- They can improve indoor air quality by utilizing proper ventilation systems, low-emission materials, and moisture control strategies.



# HBDP'S ROLE IN ARCHITECTURE AND CONSTRUCTION

- Low-VOC paints and finishes can minimize indoor air pollution and create a healthier indoor environment.
- They also focus on optimizing water usage, waste management, and overall building performance.
- They can suggest the installation of low-flow toilets, faucets, and showerheads to minimize water usage and implement a greywater recycling system.
- Working with high-performance building design professionals is essential for achieving sustainable and high-performing buildings in the construction industry.



# DEFINITION AND BENEFITS OF HIGH-PERFORMANCE BUILDING DESIGN

- Focuses on creating energy-efficient, environmentally friendly, and sustainable structures.
- Considers factors like building materials, insulation, ventilation, lighting, and layout to optimize performance and minimize environmental impact.
- Energy efficiency is achieved through the use of energy-efficient materials like double-pane windows, LED lighting, and high-efficiency HVAC systems.
- Indoor air quality is improved through proper ventilation systems and use of low-VOC materials.
- Sustainable building materials like recycled steel, bamboo flooring, and low-impact paints contribute to a more sustainable building industry.
- The goal is to create buildings that reduce environmental impact and provide a healthier, more comfortable space for occupants.





**Baseline model : the set of arithmetic factors, equations, or data used to describe the relationship between energy use or demand and other baseline data. A model may also be a simulation process involving a specified simulation engine and set of input data**

**Boundary conditions :physical conditions (values of physical quantities, conditions of energy interchange, etc.) imposed upon a system at the start or end of a process (temporal boundary conditions) and/or at the boundaries separating the system from its surroundings (local boundary conditions)**

**Building envelope : (1) outer elements of a building, including walls, windows, doors, roofs, and floors, including those in contact with earth. (2) the exterior plus the semi-exterior portions of a building. For the purposes of determining building envelope requirements, the classifications are defined as follows. Building envelope, exterior: the elements of a building that separate conditioned spaces from the exterior. Building envelope, semi-exterior: the elements of a building that separate conditioned space from unconditioned space or that enclose semiheated spaces through which thermal energy may be transferred to or from the exterior, to or from unconditioned spaces, or to or from conditioned spaces**



**Urban energy system : a formal system that represents the combined processes of acquiring and using energy to satisfy the energy service demands of a given urban area.**

**“composition of all components related to the use and provision of energy services associated with a functional urban system, irrespective where the associated energy use and conversion are located in space “**

**Urban building energy modeling : UBEM involves developing energy models of buildings using their geometric and non-geometric features and simulating them in a simulation engine, just like BEM.**

**The modeling process is more complicated and fraught with uncertainty.**

# HIGH PERFORMANCE BUILDING DESIGN BENEFITS



- Environmental Benefits: High-performance green building design reduces energy consumption and CO2 emissions. It uses passive design strategy, reducing electricity consumption and indirect water consumption. Smart and advanced construction materials also reduce CO2 emissions.
- Economic Benefits: High-performance buildings are an investment with long-term economic benefits, including lower operating and maintenance costs and increased market value.
- Occupant Wellbeing: High-performance design improves indoor environmental quality, contributes to higher employee productivity, and reduces sick leave. It also improves air quality and overall wellbeing.



# WELCOME TO BEYOND SMART CITIES

Beyond Smart Cities is the world's 1st Green Technology Marketplace, connecting millions of Sustainability Specialists, Green Building Specialists, Energy Specialists, Commissioning Specialists, Environment Specialists, Health & Safety Specialists, Fire Safety Specialists, Climate Change Specialists & Green Products/Technology Manufacturers with independent talent around the globe.

Our mission is to build and support a global community of experts with the highest professional standards in sustainability, green building, energy, commissioning, environment, health & safety, fire safety, climate change, GHG accounting, carbon auditing, and GHG emissions management.



**“SUSTAINABLE”... TAKE A FEW QUIET MOMENTS. THINK ABOUT WHAT THIS TERM MEANS TO YOU—THEN CONSIDER TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT!**

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# THANK YOU

