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ENERGY MANAGEMENT SPECIALIST CURRICULUM

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SMART CITIES
IOT & BIG DATA - TRANSFORMING GREEN
BUILDINGS INTO SMART ONES
FOR ENERGY MANAGEMENT SPECIALIST
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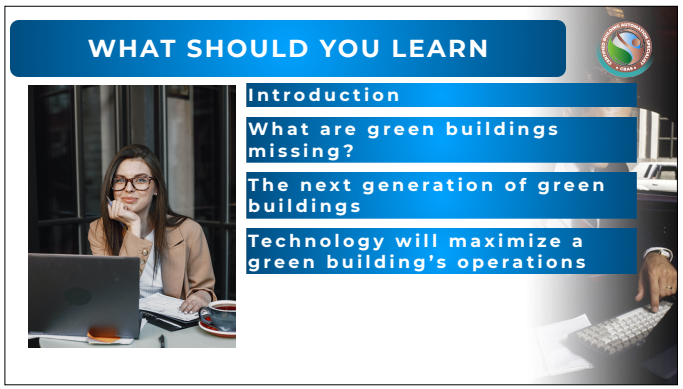

WHAT SHOULD YOU LEARN
Introduction
What are green buildings missing?
The next generation of green buildings
Technology will maximize a green building's operations

INTRODUCTION

According to the Environmental Protection Agency (EPA), “Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building’s life- cycle from siting to design, construction, operation, maintenance, renovation and deconstruction.”1 Sustainable building design has always been an inherent part of architecture.

Throughout history, people incorporated passive design principles to build habitable places in harmony with local conditions. While many buildings now house these sustainable architectural features, many do not and are considered to be a form of postmodern architecture in comparison to their sustainable counterparts.

WHAT ARE GREEN BUILDINGS MISSING?

Now the question is, with so many standards, best practices, and compliance/norms implemented over the last two to three decades, have green building practices been successful? This is a complicated question and the answer cannot be a direct yes or no.

Over the years, green building initiatives have been successful in many areas: creating awareness, promoting adoption, and influencing the energy efficient materials market and design practices. In general, green building remains fixated on standards and compliance. The focus is still on design and material. These remain passive design principles in a world that is becoming more and more agile thanks to technology.

GREEN BUILDING REMAINS FOCUSED ON STANDARDS AND COMPLIANCE.

Green building design and systems rarely address building operations. Today, green buildings need to provide a dynamic response to such things as occupant needs, operating policies, and space management changes. Most buildings (including green ones) have not yet integrated intelligent building equipment and systems. They are not able to benefit from smart building outcomes or accomplish things such as:

THE NEXT GENERATION OF GREEN BUILDINGS

Step 1: Leverage Technology

- To transform today's green buildings into smart ones, two major shifts must occur. The rapid pace of technology development has created a multitude of new opportunities to address green building challenges.
- According to the European Commission, smart buildings are empowered by, "Ubiquitous Computing and the Internet of Things (IoT): the generalization in instrumenting buildings with sensors, actuators, micro-chips, micro- and nano-embedded systems will allow to collect, filter and produce more and more information locally, to be further consolidated and managed globally according to business functions and services." Advancements in IT technology and data convergence will find increased relevance in the way green buildings operate — transforming them to smart buildings.

THE NEXT GENERATION OF GREEN BUILDINGS +

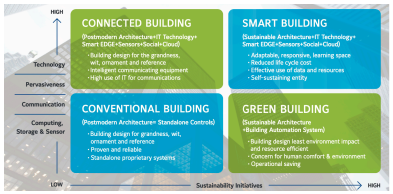
- Advancements in IT technology and data convergence will find increased relevance in the way green buildings operate — transforming them to connected buildings.
- Smart buildings generate vast amounts of data from multiple systems such as energy, IT, security, operations, etc. But conventional methods of manual analysis don't produce desired results due to the variety, velocity, and sheer volume of data. This is often referred to as a Big Data problem. Big Data is all about seeing and understanding the relationships, patterns within and among pieces of data generated from multiple sources.

Step 2: Let Data Drive Decisions

- The convergence of IoT and ubiquitous computing generates enormous data and information about the building into actionable resources. Technology now makes it possible for a green building to forecast, predict, and optimize its operations and needs. A connected green building's ability to be self-aware, self-regulated and optimized transforms it into a smart building.

TECHNOLOGY WILL MAXIMIZE A GREEN BUILDING'S OPERATIONS

The following graphic shows the relationship between green concepts and pervasiveness of IoT technologies and Big Data analysis. It highlights ways to transform a conventional building to a smart building.



Currently, the convergence of IoT and Big Data with green buildings is in its nascent stage, but is already creating renewed interest in several areas.

TECHNOLOGY WILL MAXIMIZE A GREEN BUILDING'S OPERATIONS +

The evolution and acceptance of wireless networking technologies: Smart buildings will accelerate demand of wireless devices leading to better Quality of Service, more secure devices, and resolution of low power challenges. Currently, IoT devices require a lot of electricity which is cost prohibitive and challenging given our aging electric grid.

The growing number of connected devices: Smart building equipment will have IT connectivity and supporting technology over open protocols allowing for more plug and play devices. We expect this to impact the smart lighting market first, followed by heating, ventilation, and air conditioning (HVAC) products (package units, chillers, RTUs, etc.).

TECHNOLOGY WILL MAXIMIZE A GREEN BUILDING'S OPERATIONS +

The ability to bring transparency and visibility: Smart buildings offer greater insight into operations and building performance.

- A market for new tools will emerge, such as the building intelligence quotient program from the Continental Automated Buildings Association. Organizations are likely to increase self-declaration to facilitate benchmarking against peers and create crowd sourcing for a sustainable environment.
- Community portals will highlight operations and building performance, likely creating a new group of advocates who will promote awareness of the need for better indoor environments and reduced negative environmental impacts.

Data gathered from buildings will impact sustainability: Data will drive design standards that are more empirical in nature. This will cause a shift towards an economic value framework that focuses on financial, operational and maintenance metrics that will track and predict optimal design and operational principles.

PEOPLE CAN USE BIG DATA TO DRIVE OPERATIONAL EFFICIENCIES, REDUCE ENERGY CONSUMPTION, IMPROVE OCCUPANT EXPERIENCES, AND INCREASE FINANCIAL PERFORMANCE.

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