Smart Buildings

Introduction

In September 2017, EY Middle East, a member of EmiratesGBC, delivered a Technical Workshop on the expectations of a smarter city, with a particular focus on smarter buildings. Gauthier Dupont, Executive Director of EY Climate Change and Sustainability Services MENA, led the workshop and shared industry and regional insights. Participants were invited to discuss the key components of a city, the definition of a smarter city and how buildings can influence the transition of a city of becoming smarter based on their experiences.

Defining Smart

In order to understand what makes a "smart city", it is important to first define what makes a city. While a complex subject, the key components of a city includes: Governance and Planning, Human Beings and Health, Infrastructure, Socio-Economic Structures, the Environment and Mobility. A city links all these different systems together into one cohesive area. A "smart city" is thus described as having all these aspects but goes further to include that a "smart city" is more efficient and is aware of all these systems, enabling it to interact and communicate with its residents.

As the global population is predicted to increase at unprecedented rates, so will the future energy demand and the rate of urbanization. This will place an increased pressure on any city's resources, infrastructure and energy consumption. Cities, as a result, are increasingly transitioning into becoming smarter. A major component of a city, and by extension "smart city", are buildings as people spend 90% of the time in them and also account for 30-40% of the world's energy consumption. Buildings will need to adapt and be smarter; smarter in information technology, smarter in occupant mobility as well as smarter in adapting to the diversified energy mix of the future.

Smart cities around the world

- IESE Cities in Motion Index 2017 was used as an example to highlight the "smartest cities" around the world.

Global top 10 ranking:	How does MENA compare?
1. New York, USA	64. Abu Dhabi, UAE
2. London, UK	66. Dubai, UAE
3. Paris, France	120. Jeddah, KSA
4. Boston, USA	128. Kuwait city, Kuwait
5. San Francisco, USA	132. Doha, Qatar
6. Washington, USA	140. Manama, Bahrain
7. Berlin, Germany	163. Cairo, Egypt
8. Amsterdam, Netherlands	175. Amman, Jordan

Figure 1: IESE Cities in Motion Index 2017 ranks cities across 10 different dimensions: Economy, technology, human capital, social cohesion, international outreach, environment, mobility and transportation, urban planning, public administration and governance.

- Based on three of the dimensions of the IESE Cities in Motion Index 2017, Environment, Technology and Mobility and Transportation, it was found that New York does not rank among the top ten.

- Similarly, other cities all rank differently, depending on the selected dimension, showing that globally, "smart cities" focus on different systems of a city.

Smart buildings

A building is smart when multi-layer systems communicate with each other and provide real-time data that predict and manage changes due to climate and occupants thereby: i) using cleaner natural resources more responsibly ii) improving efficiency iii) improving mobility and iv) providing a high quality of life.

- ICTs in buildings enable better services and quality of life to its occupants. For example, a smart HVAC system alone does not make the building intelligent; the presence of all smart systems does not either; it is how these systems communicate, how the data is aggregated, how the data is analyzed and presented to the end users and what systems are in place to respond to the data.
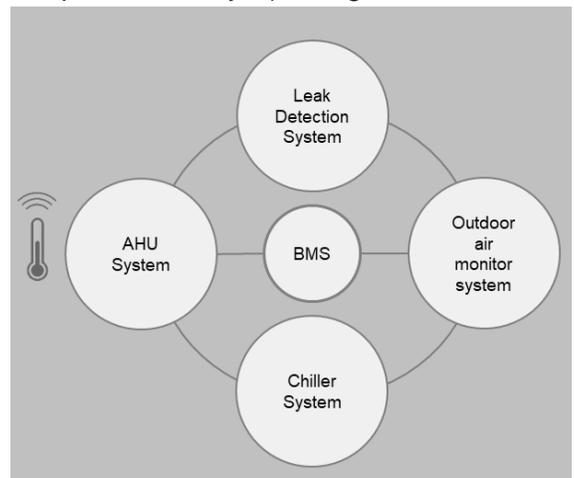

Figure 2. An example of a smart HVAC system

- Incorporating smart within transportation infrastructure and mobility frameworks reduces delays, cuts down on CO_2 emissions, reduces employer costs and greatly improves performance. Systems typically found in commercial buildings that may integrate smart technologies include: vertical transport systems, alternative transportation and parking infrastructure.
- By diversifying the energy mix, utilizing more efficient systems, prompting smart behavior and incorporating smarter demand side management technologies, buildings conserve natural resources and reduce CO_2 emissions.

Are all Green Buildings Smart Buildings?

A comparison of LEEDv4 credits to selected dimensions, Environment, Technology and Mobility and Transportation, it was seen that:

- Location & Transportation category presents opportunities for smart to reduce traffic and save time.
- Water Efficiency category includes possibilities to use smart to regulate water and use less energy.
- Energy & Atmosphere category offers various paths in integrating smart systems and technologies.
- Environmental Quality category has great potential to utilize connectivity and automation technologies to improve quality of life and reduce energy use.

A [report](#) by Honeywell and EY, evaluated more than 600 buildings from different industry sectors across seven cities, in four countries (UAE, Saudi Arabia, Qatar and Kuwait). The Honeywell Smart Building Score was used to assess fifteen smart assets in each building and accordingly rated on their Green, Safe, and Productive characteristics. Key results from the report show:

- There is no correlation between the smartness of a building and how new it is.
- Doha and Dubai lead the region in terms of their smart building capabilities across all three categories of Green, Safe and Productive. This is largely attributed to the presence of stronger building regulations in both cities, both past and present.

- LEED and other green building certificates score almost 50% higher on the Honeywell Smart Building Score.
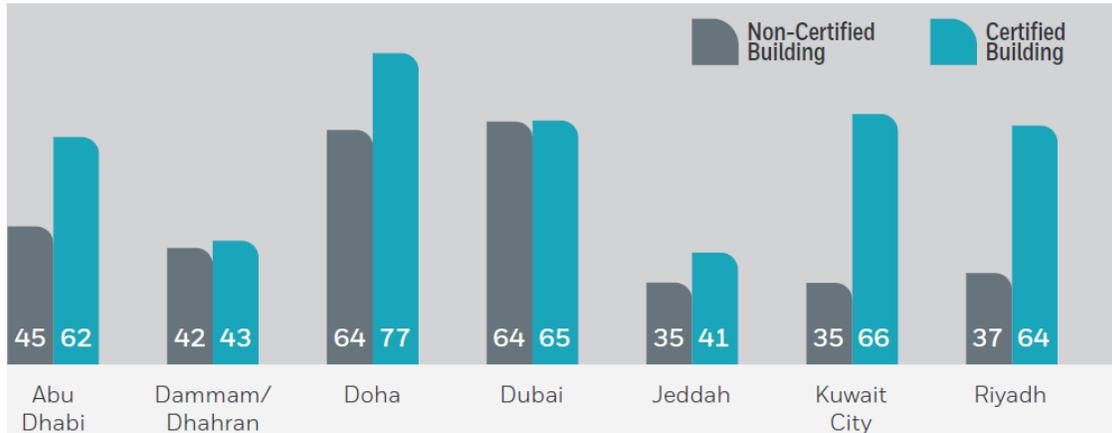

Figure 3 Honeywell Smart Building Score by building certification.

Conclusion

Buildings of the future must address the complex issues faced by growing urban population and climate change. Smart Buildings, which form an integral part of smart cities, are paramount to managing these issues and will become more prevalent as governments promote innovation and smart policies. In Dubai, the foundations of a smart city were laid down with the introduction of the smart government initiatives, vast improvement of infrastructure, stringent building regulations and the strategies addressing a diversified energy mix. As discussed previously, a city is formed of an interconnected number of systems; Dubai is therefore on track on not only becoming a smarter city but, also a happier city.