A sustainable future: Smart cities in the Middle East

Urban environments are in the middle of a revolution. The powers of technology and data are being harnessed to make cities safer, more efficient and more sustainable.

By Ibaad Hakim and Frederic Akiki

The implementation of digital and data-driven technologies has the power to enhance the socio-economic potential of these new "smart cities" and to improve the day-to-day lives of those who live there.

Countries in the Middle East have been remarkably proactive in developing smart cities, with a tendency to build them from the ground up rather than incorporating technology into existing environments.

Saudi Arabia stands out especially for its ambitious giga-projects. It is currently developing four significant smart cities—NEOM, Amaala, Qiddiya and the Red Sea Project—each involving multibillion-dollar construction contracts.

The largest of these projects is the planned US$500 billion mega-city, NEOM, which according to recently unveiled plans will incorporate a zero-carbon hyper-connected city called "the Line."

The aim is for the Line to be carbon positive, and for it to be powered by clean energy, artificial intelligence, machine learning and predictive analytics. The Line will harness an estimated 90 percent of available data to enhance infrastructure capabilities—a percentage significantly greater than that utilized in any existing smart city.

The first smart city development in the Middle East, the partly constructed Masdar City in Abu Dhabi, relies on renewable energy sources and utilizes sustainable building materials such as low-carbon cement and recycled aluminum. The development incorporates a number of smart solutions that reduce energy and water consumption, and offers an integrated smart network of electric or zero-carbon transportation options.

The city is also being used to run pilot projects to test new renewable energy innovations developed at the Masdar Institute of Science and Technology.

Meanwhile, the Zayed Smart City project, also in Abu Dhabi, utilizes information technology and the Internet of Things to upgrade the city's existing infrastructure.

The drive to sustainability in the region has also led to significant investment in renewable energy. Saudi Arabia has established the Renewable Energy Development Office, which is working on a substantial pipeline of solar and wind projects.

Abu Dhabi has already built the largest single-site solar park in the world at Sweihan, the 1.78 GW Noor Abu Dhabi. This will, however, be surpassed by the 2 GW Al Dhafra solar project, also in Abu Dhabi, which is currently under development.

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Financing was secured late last year and operations are scheduled to begin in 2022.

In addition to new smart city and renewable energy projects, Middle Eastern governments have also been looking to upgrade their cities' existing infrastructure.

One energy efficiency initiative that has become increasingly prevalent in the Middle East is the establishment of specialist energy service companies (ESCOs) for the implementation of energy efficiency measures. Typically, ESCOs either identify potential energy-saving measures by carrying out a detailed assessment of existing infrastructure, or implement energy-saving measures through the design, equipment procurement and operation and maintenance of a smart city project.

Government-backed super energy service companies (Super ESCOs) are being established by governments or through public-private partnerships to function as an intermediary between government entities and ESCOs. These Super ESCOs are acting as catalysts for the implementation of smart city and renewable projects in the Middle East.

A Super ESCO project structure typically involves the Super ESCO contracting with the government or public entity to set out the parameters for the energy efficiency measures to be implemented. The Super ESCO then separately contracts with the private ESCO to implement energy-saving or broader sustainability measures.

Super ESCOs are well placed to leverage their credibility as public institutions, and to overcome restrictions in public sector contracting and procurement rules. They are also able to assist in accessing project financing for energy efficiency projects.

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Given the significant investment in smart cities being made by various countries in the Middle East, there will continue to be a need for construction companies, governments, technology firms, and design and engineering firms to collaborate and adapt to ensure that the ambitious aims of smart cities can be fulfilled.

While the concept of smart cities remains an evolving target for many countries today, it is clear that smart cities will play a pivotal role in sustaining and managing the growing urban population while sparking social transformation, efficiency and sustainability. The more these smart cities innovate, the greater the need for the construction industry to adapt and remain responsive to the evolving needs and requirements of governments.

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