



ComEd and the community of Bronzeville in Chicago have partnered to create a “smart community” using the smart grid, smart meters, sensors and other technologies.

SMART CITIES AND THE NEW URBAN ENERGY LANDSCAPE

By Eric Woods, Guidehouse Insights



Cities are essential to the development of a sustainable, global economy that can increase prosperity, address climate change, and ensure the well-being of all communities. Of the 50-largest U.S. cities, 46 either have a smart city strategy, significant projects, or a scoping project in place. Atlanta, Charlotte, Chicago, Boston, Kansas City, Los Angeles, New York, San Diego and

Washington, D.C., are examples of cities that have established extensive programs.

The ideas and principles behind the smart city movement evolve as cities and their partners better understand their requirements, new technology opportunities and how to address adoption challenges. This evolution is even more important as cities deal with the coronavirus outbreak and its consequences. City priorities will shift in the short and medium term as they look to restore their economies and revive normal operations. While there will be diversity in how individual cities manage this, there is an appetite to move forward in a spirit of renewal, regeneration and innovation.

Smart cities are sustainable cities

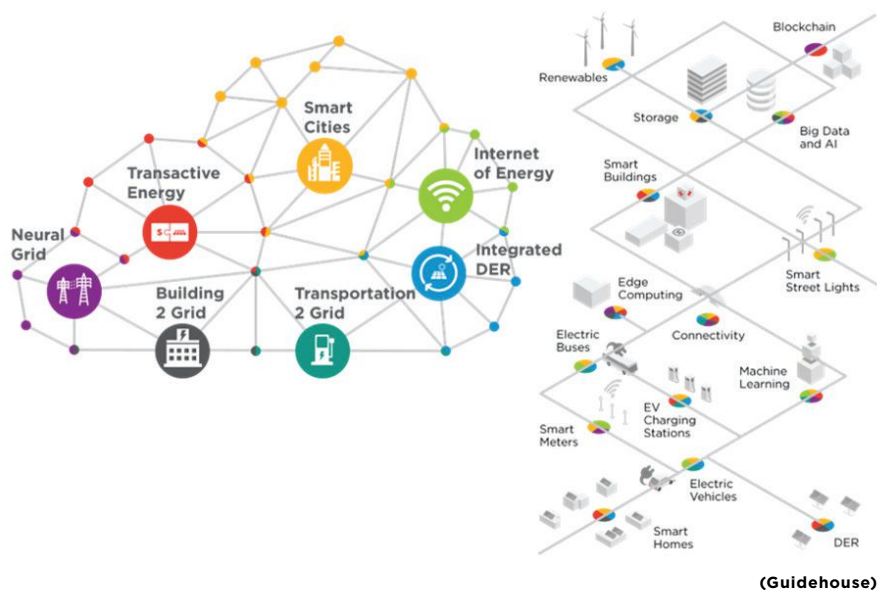
The importance of cities meeting global climate targets is undisputed. Since the Paris Agreement, city leaders have made commitments to deliver the necessary reduction in urban emissions to meet global climate goals, offering leadership that is often lacking at the national and international level. Many cities already have plans to be carbon-neutral or zero-carbon by 2050 or earlier. Impressive as these commitments may be, making that goal a reality requires:

- new approaches to urban infrastructure,
- services fueled by new energy systems,
- building and transportation technologies,
- digital tools, and
- new platforms to support collaboration between city departments, businesses and citizens.

At the same time, cities are being shaped by the next wave of disruptive technologies, including the widespread use of AI and machine learning, the deployment of 5G networks, the growth in automated vehicles and developments in robotics. In the next decade, smart cities will lead the way on climate

The Emerging Energy Ecosystem: Energy Cloud 4.0

- **Clean**
 - Energy storage
 - Alternative fuels
- **Intelligent**
 - Data-enabled solutions
 - Connectivity, big data, and AI
- **Mobile**
 - EVs
 - Commercial electrification
 - Autonomous and advanced controls
- **Distributed**
 - Distributed power
 - New prime mover



adaptation and mitigation, and they will serve as a test bed for the massive opportunities and challenges presented by the Fourth Industrial Revolution. The combination of ubiquitous communication, new energy solutions, innovations in transportation, and the digitization of almost all aspects of society will mark a massive change in urban economies and societies.

Cities and the energy cloud

Strategies for creating sustainable cities are well-aligned with changes in the energy sector as utilities and other players adapt to the requirements of a low-carbon economy. Guidehouse characterizes this transformation in the energy sector as the emergence of the Energy Cloud. The Energy Cloud represents the shift away from centralized energy generation and distribution toward a highly distributed, networked and dynamic grid in which technology-rich platforms such as Integrated Distributed Energy Resources, Building-to-Grid, Transportation-to-Grid, Neural Grid, Internet of Energy, Transactive Energy and Smart Cities are emerging. This transformation of the energy sector provides the bedrock for the creation of the zero-carbon cities of the future.

There are five key areas where the energy transformation is influencing future cities and where cities are becoming more influential in shaping this transformation:



Accelerating the shift to renewable energy

Cities are increasingly proactive in setting targets for their power utilities to shift from fossil fuels to renewable energy in generating electricity to help meet carbon emissions targets. As of April 2020, 150 U.S. cities have committed to 100% clean energy goals, many of which aim to achieve this before 2030 or earlier. More than 440 U.S. mayors have committed to the Paris climate goals. Cities are working with their utilities to expand renewable energy generation and are encouraging residential and commercial adoption through a range of community energy schemes.



Driving the adoption of smart grid technologies

Support for renewable generation by city authorities increases the pressure on utilities to deliver an infrastructure that can integrate clean energy resources in a manageable way. Cities have been the focus of extensive

smart grid pilots that demonstrate the increased control, flexibility and integration enabled by a digital infrastructure for grid monitoring and management. ComEd's initiative to build a Community of the Future demonstration in Bronzeville, Chicago, is a good example of such integrated programs. It is working with the local community to build a "connected, green and resilient" smart community using smart grid and other technologies, including a local microgrid.



Increasing energy efficiency

Collaboration between city departments and local energy utilities to improve energy efficiency is one of the simplest and most-effective measures for reducing a city's energy footprint. Coordinating programs for energy efficiency improvements is an obvious step and enables cities and utilities to target the most appropriate residents, businesses, and communities for retrofit and rebate programs.

Street lighting is another area where utilities can play a key role in city energy efficiency. Smart Street Lighting NY, for example, is a statewide program that has a goal to convert 500,000 streetlights throughout the state with energy-saving

LED technology by 2025. The initiative is led by the New York Power Authority, which has created a full turnkey service to manage and implement a customer's transition to LED streetlight technology.

4 Increasing resilience
Resilience is becoming a much more central part of the discussion about smart cities. Resilience requires an assessment of each city's complex, interconnected infrastructure and institutional systems that span the physical, economic, institutional and sociopolitical environment. Energy networks are at the heart of this web of infrastructure interdependencies. After the experience of Hurricane Sandy, for example, New York made a significant commitment to the use of distributed generation alongside other grid and market innovations to provide an energy infrastructure better able to cope with future events of that scale.

5 Innovation and development
City leaders recognize that the future prosperity of their communities depends on their ability to develop an infrastructure fit for the 21st century. This acknowledgement is driving investment in smart infrastructure for communications, transportation, energy, water and data sharing. Clean energy innovation is one of the most important sectors for many cities and utilities have an important role in supporting these initiatives. CPS Energy, for example, is partnering with the City of San Antonio and other stakeholders on three innovation zones across the city. The innovation zones will explore how new technologies and processes can be used to address the most pressing local issues.

The role of utilities in smart cities

Smart city development presents opportunities for utilities at many levels, including collaboration on the development of new energy services and emerging commercial opportunities. Utilities looking to develop or expand

their smart city activities should focus on the following steps:

- Engaging with local smart city stakeholder groups and leadership teams, and actively participating in the development of low-carbon city strategies. Energy companies can help chart viable programs to turn ambitious city energy and emissions targets into reality.
- Delivering benefits for all communities. Utilities have a unique connection to all city residents, which provides a strong basis for furthering community goals around social equity, and helping improve and redefine customer relationships.
- Creating platforms for the delivery of new energy services that can also be a launchpad for innovative urban service offerings. Thinking holistically enables existing assets and services to become a base for expansion into other areas.
- Developing partnerships with technology providers. Utilities are important conduits to the market for many players, and the combination of sector and service knowledge with technology leadership is a strong proposition.
- Playing a role in the creation of new urban data systems. Energy data is a valuable element in any city data platform, and energy players should be proactive in shaping new data exchanges and markets. Big data will be core to building new products and solutions, and in building closer ties with customers.
- Becoming key orchestrators of new urban energy platforms and the ecosystems they support. Playing a central role in these new networks is essential to the development of new services and business lines.

Looking beyond the coronavirus outbreak

The U.S., like many countries, is in the middle of a national emergency that has seen the greatest mobilization of national and local resources since World War II. There is much speculation as to how the country will emerge from

the situation and what measures are needed to restore the economy — while managing a health emergency that could continue well into 2021. Cities have been at the forefront of the battle against the virus and have seen immense changes to the way people live, work and socialize. Many questions are being raised about which of these changes will be short-lived and which will have a more lasting impact. Utilities too have seen a massive shift in demand patterns and new challenges in terms of workforce availability and the need to support critical services. Utilities have risen to the immediate task of maintaining power supplies through the emergency, but are also looking at the longer-term consequences.

The shifts discussed in this article toward more sustainable and resilient cities may be delayed or accelerated as cities and states begin their post-pandemic recovery. This depends on the types of stimulus applied to the economy and local decisions on the management of that process. Many cities are already looking at how they can shape the recovery to support their emissions and environmental targets, and hasten the shift to a zero-carbon economy. The energy sector has a responsibility and an opportunity to work more closely with local governments to ensure that a renewed focus emerges on building more resilient, more sustainable and more equitable cities. Beyond the current crisis, we will continue to see a profound transformation in how cities are designed, built, managed and experienced. This is not technology hype. It is a result of the categorical imperative for cities to take a leading role in climate change and climate adaptation programs.

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