

## The City of Tomorrow: Smart, Electric



Across the globe, electric utilities are rapidly becoming “digital utilities.” They are deploying advanced communications networks along with millions of smart meters at homes and businesses and sensors at power plants, transmission, and distribution grids. Supported by advanced data analytics techniques, these investments are enabling sophisticated monitoring and control of energy networks and distributed energy resources, improving service for customers.

The New York Power Authority (NYPA) is rethinking the use of data in the energy industry, deploying sensors, software, and data analytics to monitor and optimize real-time performance of its *entire* network of power plants and grids. Similar efforts are underway at other utilities.

Digital utilities are uniquely positioned to support smart city initiatives, which rely on digital technologies to optimize urban services such as gas, water, electricity, transportation, lighting, and heating. Cities and communities can leverage electric utility investments in meters and secure communications networks to operate these other services. Rather than reinvent the wheel for each service, the infrastructure can be set up once and used by many, with significant potential cost savings.

I’ll return to NYPA as an example. At thousands of buildings in New York, the utility has deployed its “New York Energy Manager,” a digital dashboard that collects energy data from various metered systems, analyzes it, and shows building managers how to reduce consumption. This infrastructure also examines the buildings’ water and natural gas systems.

We are headed for a global urban population of 10 billion at the end of this century. According to the United Nations, 66% of the world’s population will be urban by 2050—up from 30% in 1950. Our cities must get unimaginably efficient, even as they grow unimaginably large. Integration of urban systems can only be realized



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with growing engagement and coordination among utilities, cities, regulators, and other stakeholders. We need vigorous discussion of the big picture.

Earlier in 2017 EPRI introduced the [Integrated Energy Network](#) concept to direct thinking about integrating today's fragmented electric, natural gas, and water systems and their diverse business models, markets, and regulations. The Integrated Energy Network provides a pathway to the unprecedented reliability, efficiency, and service urban populations will need. If we are to survive and thrive, humanity will have to make every aspect of energy use sustainable.

Electricity is key to this vision. Closely linked to the Integrated Energy Network, EPRI's new Efficient Electrification initiative includes a national electrification assessment for the United States, followed by regional assessments, accelerated R&D and other R&D projects.

We already know the environmental advantages of converting natural gas to electrons in power plants, then delivering the electric "fuel" to vehicles. Relative to internal combustion engines, this approach can be more than twice as energy efficient, save 70% in fuel costs, and reduce CO<sub>2</sub> emissions by 75%. Advanced heat pumps can *move* heat more efficiently than traditional electric and fossil heating technologies can *produce* it. And here's a twist on the city of tomorrow: It may well include farms. EPRI is evaluating "indoor agriculture" that harnesses electric power to produce fresh food locally, significantly reducing pesticide application and water consumption.

We see similar thinking elsewhere. Europe's newly formed [Electrification Alliance](#) is calling for electricity to be recognized as the key energy carrier for an efficient and decarbonized Europe. It issued a [declaration](#) calling for policies to remove barriers to electrification, to roll-out the much needed widespread electric vehicle charging infrastructure, and to enable the deployment of smart and efficient heating and cooling technologies.

A final thought on smart cities: Much innovation and attention are directed to smart technologies—everything from servers, sensors, and apps to global communication networks and appliances. I can tell you firsthand that this is certainly true also for electricity sector R&D. Advances in information and communication technologies are not only unleashing huge gains in performance and reliability for the sector. They are also establishing a foundation of infrastructure for smart cities to evolve more quickly, safely, and effectively. Smart cities and smart utilities go hand-in-hand.

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