RESOLUTION

No. R-18-537

CITY HALL: December 20, 2018

BY: COUNCILMEMBERS WILLIAMS, MORENO, GIARRUSSO, BANKS AND NGUYEN

RESOLUTION AND ORDER ESTABLISHING AN INFORMATION GATHERING SCHEDULE IN CONNECTION WITH THE INQUIRY INTO REGULATORY AND RELATED MATTERS CONCERNING ELECTRIC VEHICLES AND ELECTRIC VEHICLE CHARGING FACILITIES

DOCKET NO. UD-18-01

WHEREAS, pursuant to the Constitution of the State of Louisiana and the Home Rule Charter of the City of New Orleans, the Council of the City of New Orleans ("Council") is the governmental body with the power of supervision, regulation, and control over public utilities providing service within the City of New Orleans; and

WHEREAS, pursuant to its powers of supervision, regulation, and control over public utilities, the Council is responsible for fixing and changing rates and charges of public utilities and making all necessary rules and regulations to govern applications for the fixing and changing of rates and charges of public utilities; and

WHEREAS, Entergy New Orleans, LLC ("ENO") is a public utility providing electric and natural gas service to all of New Orleans;[1] and

WHEREAS, the Council addressed certain limited matters related to the status of certain electric vehicle charging stations under the Code of the City of New Orleans in Resolution No. R-18-100; and

[1] On November 30, 2017, Entergy New Orleans, Inc. undertook a restructuring, which resulted in the transfer of substantially all of its assets and operations to Entergy New Orleans, LLC, which since that date provides retail electric and gas utility service to New Orleans.

WHEREAS, in that resolution the Council acknowledged that "there are other regulatory related matters concerning electric vehicles and electric vehicle charging stations that go beyond the limited issue addressed in the resolution;"[2] and

WHEREAS, the resolution also established Docket No. UD-18-02 for the consideration of matters related to electric vehicles and electric vehicle charging; and

WHEREAS, the resolution further directed the Council Utility Advisors to propose and implement a process for the gathering of additional information including public comment and development of additional proposed actions as are deemed necessary; and

WHEREAS, the Council directed the Advisors to file a report with the Council within ninety (90) days of the resolution, which report was timely filed; and

WHEREAS, it is recognized that electric vehicles cover a range of vehicle categories including, but not limited to the following:

- Plug-in hybrids and all-electric vehicles;
- Individually owned vehicles such as cars, light trucks and SUVs;
- Corporate fleets;
- Commercial vehicles;
- Government vehicles; and

WHEREAS, it is also recognized that electric vehicle charging mechanisms and purposes may refer to home and residential devices; publicly accessible charging stations; corporate fleet charging stations and government vehicle charging stations; and

WHEREAS, there are numerous topics that should be addressed in order to develop the most comprehensive policy toward electric vehicles and electric vehicle charging including, but not limited to, the following:

- Electric vehicle sales, ownership and estimates of penetrations both current and future by usage type;
- Electric vehicle charging stations installed and projected to be installed in the City of New Orleans;

[2] Resolution No. R-18-100 at 4.

- The impact of charging stations on ENO's electric distribution system reliability and regulated utility infrastructure;
- The impact of electric vehicle charging on ENO's capacity and generation needs;
- The use of electricity generation sources other than that provided by the regulated utility to supply power to charging stations, such as on-site photovoltaic solar capacity;
- Public safety issues and concerns;
- Regulated utility interconnection requirements including monitoring, control, communications requirements, and form of standard interconnection agreement;
- Rate design, time differentiated rate structures, and specialized rate tariffs for charging station service, including pilot service schedules;
- Utilization of electric vehicles as a regulated utility electric resource;
- Costs and benefits attributable to electric vehicle usage and electric vehicle charging;
- Development of an "electric vehicle highway" route;
- Matters related to autonomous vehicles and electric vehicles;
- Matters related to land use issues affecting electric vehicles and electric vehicle charging; and

WHEREAS, the Council has directed that the information gathering process must be comprehensive, transparent and inclusive; and

WHEREAS, the information gathering process should provide the Council with the maximum amount of information to make the broadest and most comprehensive evaluation of electric vehicles and electric vehicle charging matters to develop sound policy decisions within the framework and goals of the Smart City initiative; and

WHEREAS, the Council by Resolution No. R-18-____ merged the Electric Vehicle Docket (Docket No. UD-18-02) with the instant Smart Cities Docket (Docket No. UD-18-01);

BE IT RESOLVED BY THE COUNCIL OF THE CITY OF NEW ORLEANS THAT:

1. Within ten (10) days of the adoption of this resolution by the Council public notice shall be given of the schedule adopted herein for participation of interested parties.
2. On or before January 31, 2019, all interested parties shall file with the Council notification of intent to participate and/or file public comments.
3. On or before February 28, 2019, each participant shall file with the Council a list of proposed relevant issues.
4. On or before March 7, 2019, the Advisors shall file with the Council and distribute to all participants a proposed list of issues to be addressed.
5. On or before March 28, 2019, the Advisors shall convene the first technical conference for participants to develop a consensus list of issues to be addressed.
6. On or before April 18, 2019, the Advisors shall file with the Council the consensus issues list.
7. On or before May 16, 2019, participants shall file comments with the Council.
8. On or before June 20, 2019, the Advisors shall file their comments with the Council.
9. On or before July 5, 2019, a second participant technical conference shall be held and a separate public meeting shall be held.

10. On or before August 15, 2019, the Advisors shall file their report and recommendations with the Council.

11. The Utility Advisors and ENO are designated as participants to these proceedings.

THE FOREGOING RESOLUTION WAS READ IN FULL, THE ROLL WAS CALLED ON THE ADOPTION THEREOF AND RESULTED AS FOLLOWS:

YEAS: **Banks, Brossett, Giarrusso, Gisleson Palmer, Moreno, Nguyen, Williams - 7**

NAYS: **0**

ABSENT: 0

AND THE RESOLUTION WAS ADOPTED.

THE FOREGOING IS CERTIFIED
TO BE A TRUE AND CORRECT COPY
Lora W. Johnson
CLERK OF COUNCIL

THE SMART CITY AUDIT AS A BUILDING BLOCK FOR DEVELOPING SMART CITIES

By Dr. Carl Pechman, Director, National Regulatory Research Institute

December 2018

1. Overview

There is a transformation happening in cities, as they increasingly rely on smart devices and networks to reduce the cost and improve the delivery of the many services that comprise urban life. Although this transformation is overseen by cities, they are not necessarily equipped to perform the analysis required for developing a comprehensive plan for the transformation to a "smart city."

The purpose of this paper is to introduce the concept of a smart city audit (or smart audit) for city government, planners, and citizens. A smart city audit is a process that leads to an understanding of the current state of the various systems that provide the platform for a smart city and provides a baseline for charting a path for its development. The sections that follow describe the unique role of electricity in the development and operation of smart cities; the various components of a smart city audit; and how the local electric utility is uniquely positioned to perform the smart city audit.[1]

2. What is a Smart City?

A smart city modernizes digital, physical, and social infrastructure and integrates essential services for the benefit of its citizens by harnessing advances in sustainable technology to make delivery of these services more efficient, useful, innovative, and equitable. The process begins by identifying the particular needs and goals of the city/community and how to address those needs through advanced data analytics and efficient, coordinated implementation of advanced telecommunications, sensor and camera technology, traffic control, LED street lighting, deployment of electric and autonomous vehicles, smart health care services, smart buildings, and so many other technologies and services.[2]

Smart cities are transformative and constantly evolving. These cities leverage technology to support infrastructure and to improve the quality of life for their citizens. As cities continue to grow, the ability to do more with less is increasingly important. Cities become smart through increased digital interconnection. Electricity, therefore, is a key pillar that supports the development and growth of smart cities.

3. The Role of Electricity in Smart Cities

Electric utilities have a unique role to play in charting the transformation into a smart city. All smart city activities require electricity. The nature of available electric service will affect the ability to pursue various options. For example, the electrification of transportation depends on the availability of distribution capacity sufficient to both deliver increased power demands and to absorb power injected back into the system by electric vehicles (EVs) acting as grid storage resources.

ATTACHMENT "A"

1 Every city's situation is unique, the implementation of the smart cities audit should be tailored to meet its specific regulatory and utility situations.

2 Dentons, "Developing Solutions for Sustainable and Prosperous 21st Century Cities and Communities," 2018.

The electric distribution system provides the foundation for the smart city. At the same time, the electric system will itself be transformed by new digital technologies. The processes of production, distribution, and use of electricity will evolve as customers are increasingly transformed into "prosumers"[3] participating not only in the consumption, but also the production and distribution of power. Inherent in the design of smart cities is the increased penetration of distributed electric resources. Through investments in distributed energy systems, customers are becoming transformed into producers of power instead of passive consumers. Automation systems in buildings will increase consumers' ability to use electricity more efficiently. Likewise, dynamic pricing will provide price signals to help guide customers' production and consumption decisions. Customer expectations for reliable service will be managed through distribution automation systems that enable more efficient operations while also reducing outage time.

4. Navigating to the Future: The Role of the Smart City Audit

Charting the path to a smart city is a complicated task that will be different for each city depending on the city's starting point and identified needs. A smart city audit produces an inventory of existing assets and needs that allows a city to understand its starting point and begin identifying the steps for transforming into a smart city. It provides a description of the physical and institutional nature of the current states of all the elements of the smart city, from the different points of connectivity to control and communications. The smart city audit supports the development of a coherent vision for the future that articulates policy goals and enables the development of a trajectory for change. It has a number of components including:

1. Articulating possible end states
2. Developing architectural design and renderings
3. Evaluating systems inventory and status
4. Considering electric planning
5. Identifying governance mechanisms
6. Determining the need for new institutional roles and structures to support new functions
7. Evaluating the role of the utility

Each of these components will be essential inputs into the development of a master plan. The master plan will take the audit information and apply it to the many policy decisions that need to be made to chart the path to the smart city.

Articulating Possible End States

It is vitally important when charting a path to the smart city to have a shared vision of the ideal end state(s) among stakeholders. What will need to change? What are the general objectives (e.g., increased resilience, decarbonization, etc.)? What new services will be provided? Does the smart city involve the electrification of transportation? What is the role of distributed generation and microgrids? How does the smart city enhance digital communications and network access for all citizens? Will the infrastructure provide a network for monitoring threats to the public welfare—such as gunshot detection systems and biohazard sensors? The desired end state will change with new priorities and changing technology, but articulating an end state or states at the beginning of the process provides a target for designing the path for transformation. An audit can assist city officials in their consideration of the desired end state by identifying various possibilities of what an end state might look like.

Grid Architecture and Systems Architecture as Tools for Developing the Smart City

The evolution of the smart city has many moving parts. Thinking about all of those moving parts is complicated. Architectural renderings of those parts and their relationships provide a useful tool for facilitating understanding the interaction of the many relationships that will change in the development of the smart city. There are two types of architectural renderings required to perform the smart city audit. The first is "systems architecture," which provides a conceptual view of the various components of complex systems and their relationships. The second is "grid architecture," which provides detailed information on the relationships among systems that enable the design and operation of the electric grid.

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3 The word "prosumer" was introduced by Alvin Toffler in his book, *The Third Wave* (1981), to describe the merging of the roles of consumers and producers in the information age—the third wave (agriculture was the first wave and industrialization was the second wave).

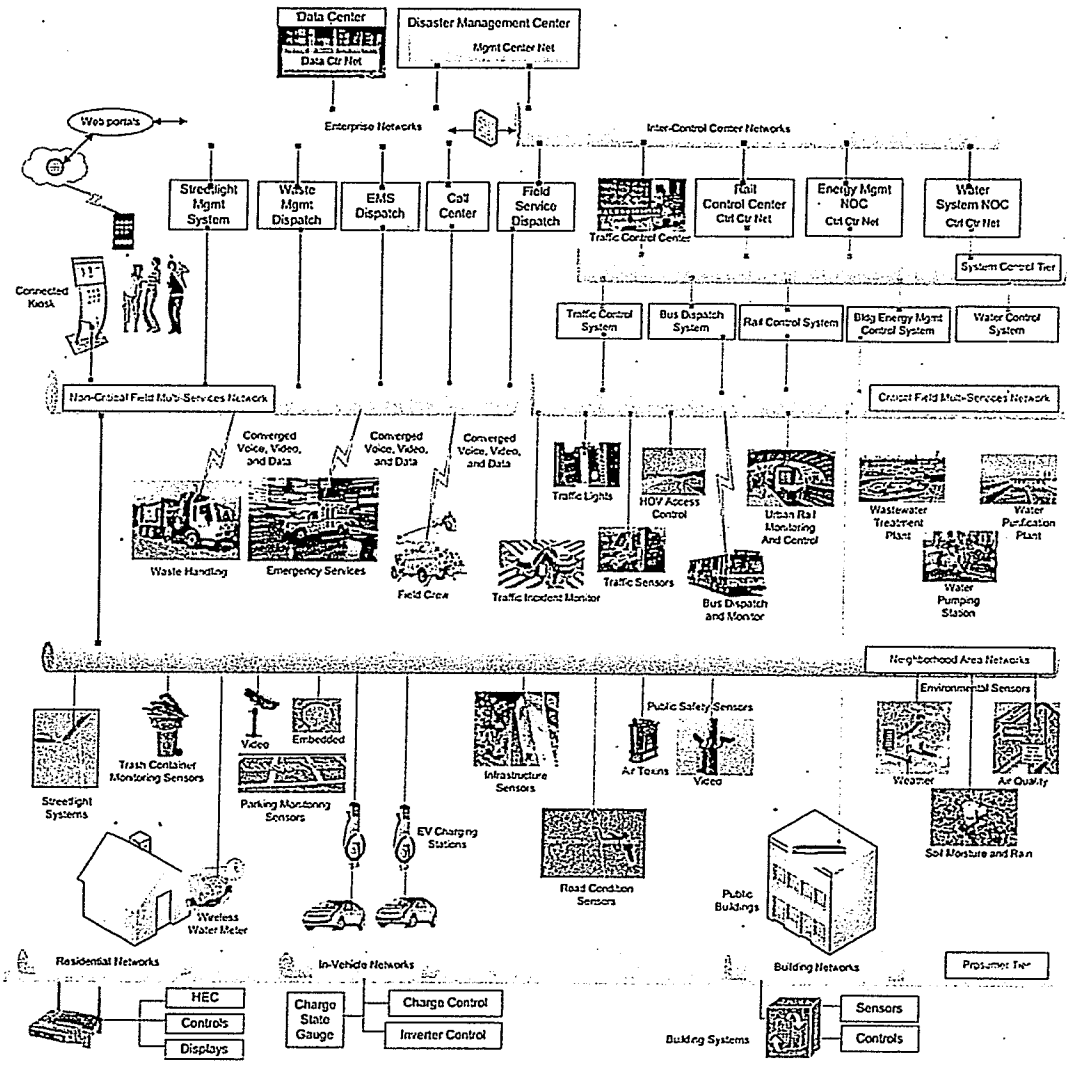

Figure 1. A systems architecture view of the smart city.[4]

Figure 1 provides an example of a systems architecture view of the smart city. Systems architecture depicts the intersection of the electric system with the other city infrastructures (including dependencies and weaknesses) and the gaps that must be overcome to electrify transportation, improve grid/city resilience, etc.

Grid architecture provides a description of the physical and institutional nature of the current and future states of the electric system. It is a visualization tool that can help navigate the path to the future. It is being used to inform grid modernization efforts in California, Minnesota, Hawaii, New York, and Ohio—jurisdictions that are evaluating the future structure of the distribution utility. **Figure 2** provides an industry structure model. The grid architecture process is laminar, with many layers, each of which describes a different attribute of the grid (e.g., governance, communications, security, etc.).

4 Courtesy of Dr. Jeffrey Taft, Pacific Northwest National Lab.

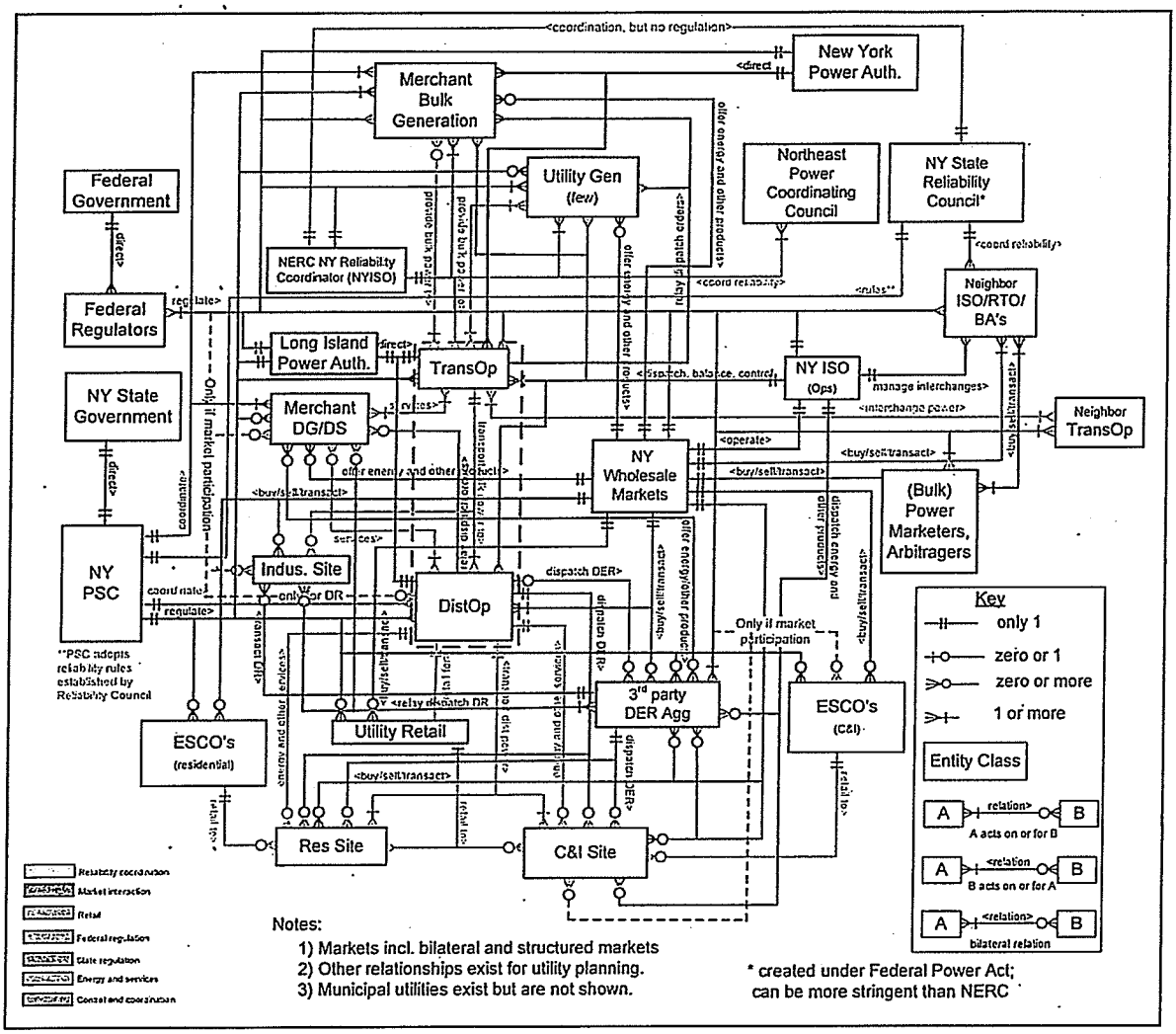

Figure 2. Grid architecture representation of electric industry structure.[5]

The value of grid architecture is that it facilitates understanding and defining the many complex interactions that exist in present and future electric grids. It provides a representation that defines system structure, behavior, and the essential limits of growth that facilitate thinking about the overall shape of the system, its attributes, and how the parts interact. Grid architecture maps relationships and functions, both for the entire system and for the distribution system itself by considering the grid as a network of related and intersecting structures, including: electric circuit structure, control, communications, and coordination systems; industry structure; and even regulatory structure. It provides a method for determining points of intersection with other components of the smart city. It also provides a framework for determining the consequences of changes across the set of structures and functions from the distribution utility to the grid and other components of the smart city. Grid architecture supports the evaluation of structural limitations and identifies the changes needed to enable new capabilities. It clarifies value flows, system interfaces, and market/control integration structure, as well as illuminating regulatory jurisdiction and market rule design issues. By identifying multiple dimensions of relationships among different entities and technologies, the grid architecture framework enables identifying and understanding economies of scale and scope.

5 U.S. Department of Energy, *Modern Distribution Grid, Decision Guide*, vol. 3, http://doe-dspx.org/wp-content/uploads/2017/02/Modern-Distribution-Grid-Volume-III.pdf, p. 71.

Systems Inventory and Status Evaluation

Another key component of the smart city audit is a systems inventory and status evaluation. This component differs from grid architecture in the level of information that it provides. Grid architecture provides a conceptual view of the way that the components of the system fit together. The system status inventory, however, focuses on the actual components of the system, including physical infrastructure, control systems, communication, and rates. Importantly, the status inventory also provides a baseline for waste, transportation, and other city services that can be enhanced through a smart city initiative.

Of particular importance is the inventory of existing systems. This inventory builds on the utility's asset management programs and will identify the system components that are at or near the end of their useful life. Understanding the need for near term replacement or upgrade decisions will reduce the probability of redundant investment by building on the utility's existing asset management programs.

Electrical structure should be audited for resilience as part of this effort. Different feeder structures can provide different levels of resilience.[6] The smart city audit can evaluate the relative resilience of various circuits necessary to support the objectives of the smart city.

The smart city audit will also perform carrying capacity analysis. Of particular concern is the ability of different feeders to support distributed energy resources (DER) and EV charging stations. For example, because of low capacity utilization, school busses offer a potentially valuable grid resource. Unfortunately, bus depots are not generally designed with sufficient feeder capacity to support a fleet of electric busses interconnected to the distribution system, so upgrades might have to be made. Analysis of carrying capacity will help identify current options and future requirements to develop different elements of the smart city.

The smart city audit should also evaluate the state of the utility's communications infrastructure. Electric utilities must be able to communicate to their customers during large scale outages. Doing so can play a significant role in reducing outage costs, by ensuring that trouble is located and reported on a timely basis. If the larger communications system fails when the power goes out, customers will not be able to receive (or make) calls and the electric utility will be unable to assist its customers in mitigating the impacts of the outage. It is important to evaluate communications structures—not only the communication path between different physical components of the electric system itself, but also the mechanisms and facilities used for communicating with customers in the event of any serious failures or threats. Ultimately, it is important to decide whether a backup communication network is appropriate. One such network could be a kiosk-based system, such as those deployed by Intersection in New York City.

Rates can be considered a principal form of communication between the utility and its customers. Rates provide information that guides customer consumption and investment. As the nature of the electric system evolves to support smart cities, it is vitally important that rates are adequate to support new activities and to improve existing activities. One critical component of rates is whether cost studies support new and innovative rate designs (e.g., the availability of a marginal cost of service study).

Electric Planning as an Integral Role in Developing the Smart City Audit

A grid modernization strategy is a key component to enable the development of smart cities. Entergy has identified three pillars of grid modernization. As demonstrated in **Figure 3**, these include:

- **Grid Infrastructure:** Infrastructure upgrades to enable the grid to support new options, such as two-way power flows.
- **Grid technology:** Includes specialized sensors, and software systems that enhance real-time automation and control.
- **Advanced planning:** New methods of thinking about the future of the electric system and its evolution.

6 The two-feeder structure has four increasing levels of resilience:
1. Two feeders connected to same transformer bank in a single substation.
2. Two feeders connected to separate transformer banks in a single substation.
3. Two feeders connected to separate substations on a single transmission system.
4. Two feeders connected to separate substation each of which is connected to a separate transmission system.

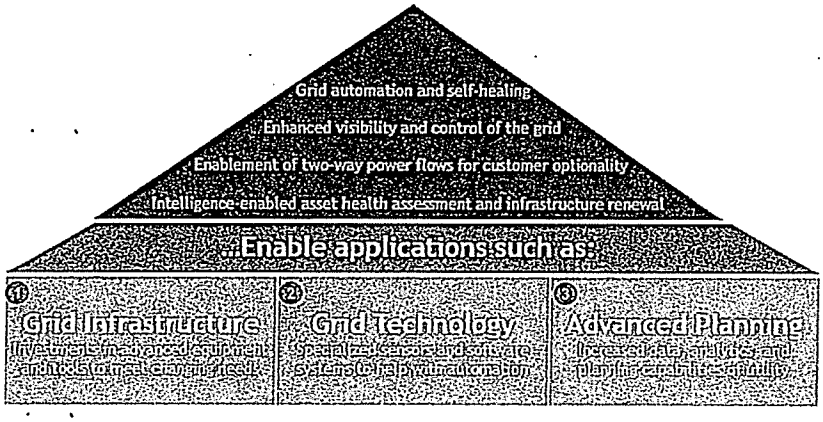

Figure 3. Three electric pillars that enable the development of smart cities.[7]

For example, the New Orleans City Council's approval of advanced metering infrastructure (AMI) expenditures and the development of the outage and distribution management systems are important steps for developing the electric system as the platform of the smart city.

Identification of Governance Mechanisms

The audit is not merely a snapshot. It is a vehicle for guiding the transformation to a smart city. For this reason, an important aspect of the audit is an overview of the governance structure of the various components of the smart city. In evaluating the governance structure that will ultimately guide the transformation to the smart city, it is necessary to ask the following questions:

- Which components of the smart city are regulated?
- Who regulates the various components of the smart city?
- What is the decision process for determining the acquisition and deployment of smart city assets?
- What information is required to support decisions on buildout and acquisition for the smart city?

Identifying and understanding current governance structures that will affect the development of a smart city and how they interact can be of great assistance to city officials in charting a path forward to a smart city.

Determine the Need for New Institutional Roles and Structures to Support New Functions

To succeed, the smart city will need to support the customer acting as a prosumer. As a prosumer, the customer will not only be a traditional consumer of electricity, but will also increasingly take on the role of a resource provider, either through distributed generation, responsive demand, or both, for the operation of the electric system. Maximizing the contribution of prosumers can require new information networks. One such network, called the distribution system operator (DSO) coordinates the consumption and production at the distribution level and aggregates load and generation for participation in wholesale electric markets. The audit should consider whether a DSO that coordinates the role of the customer as prosumer is required.

7 Entergy, *Entergy New Orleans, LLC's Grid Modernization and Smart Cities Report*, April 10, 2018, p. 5.

Evaluating the Role of the Utility

The utility will play a key role in the smart city. The smart city audit provides a vehicle for evaluating that role. There are certain functions, like ownership and operation of the distribution system, that can be considered essential utility services. Other functions, like emergency communications, may have economies of scope with other essential services that might warrant an expansion of the role of the electric utility. The audit can serve to provide the detailed analysis of the whether the utility or some other entity might be best to provide particular services.

Figure 4 provides a decision tree for determining the role that the utility might play in the smart city. It is important to evaluate whether there are economies of scope in providing different smart city functions. For example, if the utility creates a backup communications network (such as the smart kiosk-based system) to communicate to customers in the event of catastrophic outages, who should own and fund it? While outside the normal bounds of electric service, such a network would serve customers and might have also have other uses, such as gunshot detection. So, a key issue is the ownership and maintenance responsibility for the communication facilities and the terms of service.

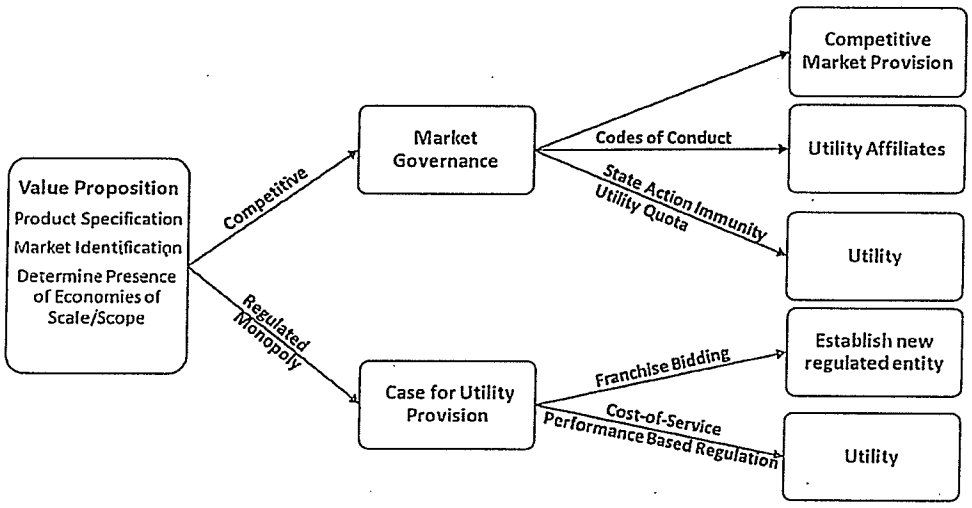

Figure 4. Decision tree for determining the scope of the utility.[8]

5. Rationale for the Electric Utility Performing a Smart City Audit

Because of the unique role electric utilities play in developing the smart city, they are the natural entities to lead the smart city audit. Most importantly, electric utilities provide the foundation for the smart city—electric power and the electrical grid—without which there would not be a smart city. Electric utilities have an obligation to serve. From a smart cities perspective, this implies providing a platform for future service. They own the distribution system. They have a wealth of data – both customer data (consumption and infrastructure) and engineering data.

This is not to say that the electric utilities alone should be involved in the smart city audit or drive smart city planning. The electric utility should lead the audit process, but the smart city audit should be an inclusive process. All city services touched by a smart city initiative should be included. There are many groups and economic entities that have equities in the outcome of the process. These stakeholders (ranging from community groups to solid waste officials) have unique perspectives that are important to charting the needs and promises of the smart city. It is important that the scope of the smart city audit addresses the range of equities so that it provides the analytical framework for developing and implementing the master plan strategy.

8 Pechman, C. "Determining the Scope of the Electric Distribution Utility of the Future." *Prepared for the SEPA 51st State Initiative*, November 2017, https://sepapower.org/resource/51st-state-ideas-determining-scope-electric-distribution-utility-future/.

Public utility commissions are in a unique role to pique the utilities' enthusiasm to pursue a smart city audit through financial incentives. One way is to capitalize the cost of providing information and technical support to the commission and stakeholders and then depreciate that investment in the future over a five-year period. To the extent that the utility performs and creates an open and fair process, it should receive an incentive rate of return. If the utility is not cooperative, then the utility should be penalized, and depending on how it performs, receive no return at all.

6. The Smart City Audit as the Start of the Transformation to a Smart City

The transformation of cities into smart cities is a significant undertaking that involves many diverse interests and stakeholders. The smart city audit can act as a tool for helping to ground and focus that process.

Clearly, a city government has a unique role to play in the smart city audit. In some rare instances (such as with New Orleans), the boundaries of the city coincide with the boundaries of the utility and are also within the jurisdiction of the public utility commission, which aids in coordination and oversight. In the event that regulatory boundaries do not align with those of the city, it is important that the PUC form a compact with the city to oversee the development of a record that will ultimately guide the evaluation of the prudence of utility expenditures.

The smart city audit is a process in which the analytical burden falls initially upon the local distribution utility. Provisions that allow stakeholders (or their representatives) access to models and data are needed. Confidentiality and critical infrastructure need to be protected.

Although the process of developing the smart city audit is performed by the local electric distribution utility, it must be directed by the city in conjunction with key stakeholders and providers of smart grid networks, such as communications and coordination of city services. The city will need analytical support to do so.

Making a city smart requires keeping its citizenry informed and engaged. It is important for the citizens to understand the rationale and benefits of the changes being made. This involves an active outreach and public education program involving all neighborhoods and economic sectors in the city. The development of a smart city audit that helps all participants understand the baseline to begin a city's efforts to become a smart city is a crucial step for city officials, the utility, stakeholders, and citizens to begin a conversation regarding the city's needs, priorities, desired end state, and the path to reach that state.

The result of the smart city audit will serve as the foundation for developing a smart city. The smart city audit will ultimately include many evaluations, documents, and potential plans to achieve the smart city's goals. To serve the city through its evolution, the resulting strategy needs to be both interactive and updated continuously so that it will keep pace with the changes, identify new capabilities, and recognize challenges and solutions.

Dr. Carl Pechman is the director of the National Regulatory Research Institute. He is an economist, with extensive experience in electric utility regulation, having served as both a federal and state regulator. The opinions expressed in this NRRI publication are the author's and do not necessarily reflect those of NRRI or NARUC.