GRID MODERNIZATION LABORATORY CONSORTIUM
U.S. Department of Energy

Expanding the Scope of Commercial Opportunities for Investor-Owned Electric Utilities

February 2021

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Executive Summary

For roughly the first 75 years of the electricity industry, customers relied solely on utilities to generate, transmit, and distribute electricity. Starting about a quarter century ago, a new wave of technological innovation began to alter the market landscape. Customers of all scales increasingly could gain access to a suite of cost-effective technology options for generating, consuming, and storing electricity, which directly compete with or reduce the demand for the electric utility's traditional commercial opportunity – electricity service. More recently, entirely new technologies, especially automated and intelligent control and information systems, are creating new customer capabilities and expectations. Where customers once were relatively unengaged and passive consumers of electricity (i.e., ratepayers), some are now more active participants in the production and management of their electricity. In fact, many of these customers – as individuals, corporations, and governments – have committed to specific goals focused on increased electricity reliability, resilience, and clean energy at their homes and facilities.

In many instances, this is now motivating various entities and organizations in the electric industry to reconsider historical roles and responsibilities. Some utilities are seeking to expand their product and service offerings to customers beyond what has traditionally been provided (Satchwell and Cappers, 2018). At the same time, some state governments, including electric utility regulators, are independently examining how to leverage technological innovations in support of broader reform initiatives that promote electric utility innovation in new revenue-generating value-added products and services offerings (Myers, 2018).

A considerable body of literature has developed around electric utility commercial opportunities where customers (i.e., utility ratepayers, aggregators and intermediaries of electricity customers, and customers of utility services other than electricity) engage in a distinct and discernible transaction with the regulated utility that extends beyond traditional commodity service (hereafter referred to as alternative commercial opportunities) but creates an opportunity to generate profit for the utility that results in increased value for shareholders. Prior research has described technological changes from the customer perspective (Blansfield et al., 2017; Zarakas, 2017; Chevrette et al., 2018; Richter and Pollitt, 2018) and the utility perspective (Jamison, 2016; Blansfield et al., 2017; Zarakas, 2017). Other work has identified and organized major trends among new utility regulatory models (Satchwell and Cappers, 2018) with a few studies considering the impacts of those changes on utility finances (Kind, 2013; Satchwell et al., 2014; Waggoner et al., 2018). There also has been considerable research performed at a conceptual level on the evolution of the electric utility business model (e.g., Fox-Penner, 2010; Hanser and Van Horn, 2014; Satchwell et al., 2015). A number of journal articles (e.g., Zarakas, 2017; Richter and Pollitt, 2018), research reports (e.g., Chevrette et al., 2018; Waggoner et al., 2018), and white papers (e.g., Jamison, 2016) have discussed the ever-expanding set of commercial opportunities that regulated electric utilities could pursue in the future or, in some cases, are currently pursuing.

Our literature review yielded well over 100 current examples of specific electric utility product and service offerings, as well as approximately 80 generic product or service offerings that could potentially be pursued in the future.

Although this literature would appear to be quite robust, there are gaps that are apparent upon closer inspection. None of these manuscripts singularly and comprehensively captures the full suite of existing alternative commercial opportunities, nor the full suite of possible future alternative commercial opportunities. In addition, the literature lacks any organizing framework that seeks to categorize these commercial offerings in any meaningful way. With a more complete and organized sense of which opportunities a regulated electric utility could pursue, regulators and policy makers could make more informed short-term and long-term decisions that provide guidance on paths these utilities can take.

To that end, we developed a database of electric utility product and service offerings and organized the elements of that database into a comprehensive taxonomy (Figure ES-1). We propose three broad classes of alternative commercial opportunities: value-added services, energy products, and adjacent services. Within each class, commercial opportunities were further organized into portfolios, or sub-classes, of similar product offerings.

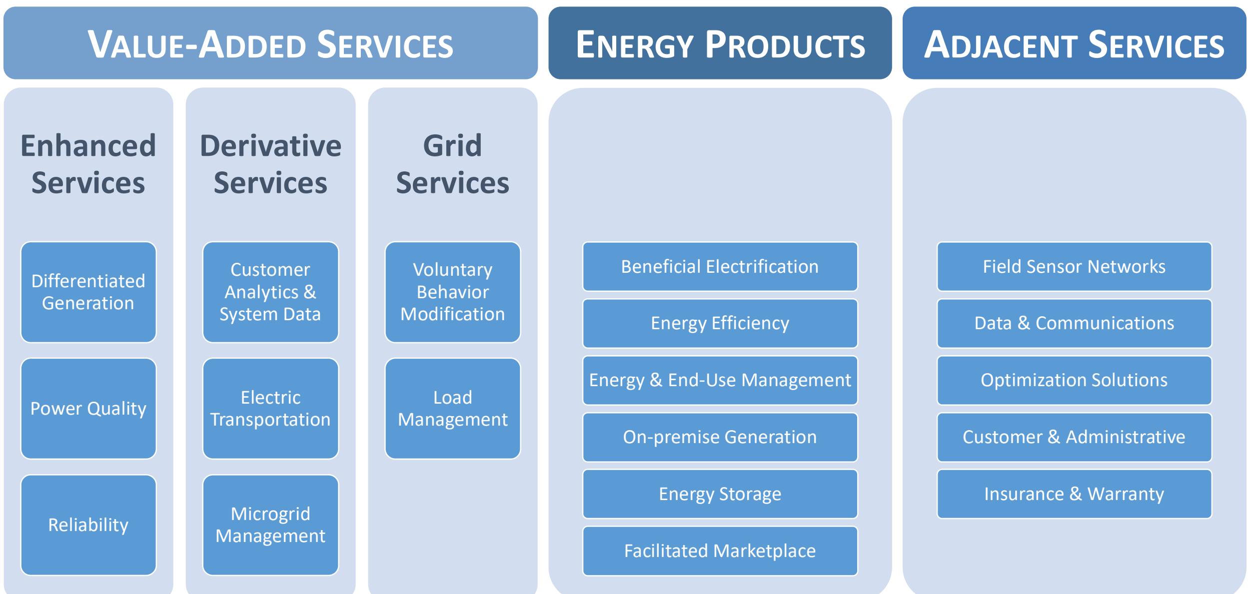

Figure ES-1. Taxonomy of alternative commercial opportunities

There also exists a literature gap providing a systematic approach to how regulators, who must adjudicate on utility proposals, might navigate these broader reform opportunities, as well as rationalize their response within the context of their state policy strategy and in comparison to their peers in other states. No single piece of literature has identified and discussed the full scope of issues, instead focusing narrowly on a single issue or subset of issues.

To fill this void, we developed a comprehensive list of six issues, based on the literature and the authors' direct industry experience in regulatory proceedings, that regulators may want or need to address when determining if and how investor-owned electric utilities pursue these alternative commercial opportunities (see Figure ES- 2). They represent issues which can be considered technical, in that they relate to objective or quantifiable metrics that could help guide the regulatory decision-making process, even if there is subjectivity in how the analysis is framed. In addition, the issues are representative of a strategic or policy preference that a state utility regulator has the prerogative to initiate, or has been directed to pursue by some other branch of state government.

Figure ES- 2. Technical and Policy Issues for Regulators

Technology advances and a more engaged customer population are pushing utilities and/or their regulators towards new strategies that promote growth and transformation. Common to many of these efforts is an interest in expanding the set of profit-generating commercial opportunities beyond just buying and selling electricity. By offering a taxonomy of these new product and service offerings and identifying the key issues that regulators, policy makers, and stakeholders may want to consider in decision-making , we hope this report serves as a resource to support more informed, robust strategic planning for and adjudicative processes concerning alternative commercial opportunities for electric utilities.

Acknowledgments

The work described in this study was supported by the U.S. Department of Energy's Grid Modernization Initiative through funding from both the Electricity Resilience Division in the Office of Electricity, and Solar Energy Technologies Office in the Office of Energy Efficiency and Renewable Energy under Lawrence Berkeley National Laboratory Contract No. DE-AC02-05CH11231.

The authors would like to thank Richard Caperton (Arcadia Power), Danny Waggoner and Ryan Katofsky (Advanced Energy Economy), Frank Lacey (Electric Advisors Consulting), Steve Hauser (GridWise Alliance), Lisa Schwartz and Sydney Forrester (Lawrence Berkeley National Laboratory), Kerry Worthington (National Association of Regulatory Utility Commissioners), Tom Stanton (National Regulatory Research Institute), Chris Villarreal (Plugged In Strategies), Mark LeBel and David Littell (Regulatory Assistance Project), Steve Kihm (Slipstream), Steven Rymsha and Audrey Lee (SunRun), Cheryl Roberto (Synapse Energy Economics) for reviewing and providing constructive comments on an earlier version of this manuscript. Lastly, we would like to thank Mark Wilson for technical editing support.

Acronyms and Abbreviations

ANSI	American National Standards Institute
DCPSC	District of Columbia Public Service Commission
DER	Distributed Energy Resources
DOE	U.S. Department of Energy
EV	Electric Vehicle
GHG	Greenhouse Gas
MWh	Megawatt-hour
RPS	Renewable Portfolio Standard

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Figures

1.0 Introduction

For roughly the first 75 years of the electricity industry, customers relied solely on utilities to generate, transmit, and distribute electricity. Starting about a quarter century ago, a new wave of technological innovation began to alter the market landscape. Customers of all scales increasingly could gain access to a suite of cost-effective technology options for generating, consuming, and storing electricity, which directly compete with or reduce the demand for the electric utility's traditional commercial opportunity – electricity service. More recently, entirely new technologies, especially automated and intelligent control and information systems, are creating new customer capabilities and expectations. Where utility customers once were relatively unengaged and passive consumers of electricity[1], some are now more active participants in the production and management of their electricity. In fact, many of these customers– as individuals, corporations, and governments – have committed to specific goals focused on increased electricity reliability, resilience, and clean energy at their homes and facilities.

In many instances, this is now motivating utilities to innovate and modernize. Some are seeking to expand their product and service offerings to customers beyond what has traditionally been provided, creating new revenue streams to further expand their markets while also trying to mitigate the erosion of their traditional revenues (Satchwell and Cappers, 2018). At the same time, many electric utilities are making investments to update and modernize grid infrastructure and information technology (Elliot and Aaronson, 2019). These investments are enabling some utilities to better respond to new customer expectations for increased access to information, greater engagement in their electricity sourcing and consumption, and enhancements in energy independence, reliability, and resiliency by further expanding their product and service offerings (Blansfield et al., 2017).

Some state governments, including electric utility regulators, are independently examining how to leverage technological innovations in support of broader reform initiatives that promote electric utility innovation in the pursuit of broader public policy goals that have included lower cost of service, increased reliability and/or resiliency of the grid, as well as climate change initiatives. One area of innovation has centered on the pursuit of additional commercial opportunities beyond traditional electricity service into new revenue-generating value-added product and service offerings (Myers, 2018) –. To that end, some are establishing direct requirements concerning electricity sourcing, technology adoption, and new priorities regarding resilience for the electricity system as a whole (Barbose, 2019; NARUC, 2019). These policies create new demands for customer and broader public participation in utility planning, procurement, and operations that were once delegated to the utility alone (Cross-Call et al., 2018).

A considerable body of literature has developed around electric utility commercial opportunities where traditional customers (i.e., utility ratepayers), aggregators and intermediaries of electricity customers (e.g., demand response providers), and customers of utility services other than electricity (e.g., internet service) engage in a distinct and discernible transaction with the regulated utility that extends beyond traditional commodity service (hereafter referred to as alternative commercial opportunities) but creates an opportunity to generate profit for the utility

[1] Throughout the manuscript, we use the term ***customer*** to refer to those enter into a commercial transaction with the utility (i.e., pay the bill for whatever product or service the utility is providing). In contrast, we use the term ***consumer*** to refer to those who use the electricity delivered by the utility.

that results in increased value for shareholders. Prior research has described technological changes from the customer perspective (Zarakas, 2017; Chevrette et al., 2018; Richter and Pollitt, 2018) and the utility perspective (Jamison, 2016; Blansfield et al., 2017; Zarakas, 2017). Other work has identified and organized major trends among new utility regulatory models (Satchwell and Cappers, 2018) with a few studies considering the impacts of those changes on utility finances (Kind, 2013; Satchwell et al., 2014; Waggoner et al., 2018). There also has been considerable research performed at a conceptual level on the evolution of the electric utility business model (e.g., Fox-Penner, 2010; Hanser and Van Horn, 2014; Satchwell et al., 2015). A number of journal articles (e.g., Zarakas, 2017; Richter and Pollitt, 2018), research reports (e.g., Chevrette et al., 2018; Waggoner et al., 2018), and white papers (e.g., Jamison, 2016) have discussed the ever expanding set of commercial opportunities that regulated electric utilities could pursue in the future or, in some cases, are currently pursuing. Our literature review yielded well over 100 current examples of specific electric utility product and service offerings, as well as approximately 80 generic product or service offerings that could potentially be pursued in the future.

None of these manuscripts singularly and comprehensively captures the full suite of existing or possible future alternative commercial opportunities. In addition, the literature lacks any organizing framework that seeks to categorize these alternative commercial opportunities in any meaningful way. With a more complete and organized sense of what opportunities a regulated electric utility could pursue, regulators and policy makers could make more informed short-term and long-term decisions that provide guidance on paths these utilities can take.

There is also a literature gap providing a systematic approach to how regulators, who must adjudicate on at least investor-owned utility proposals, might unpack these transformative opportunities, as well as rationalize their response within the context of their state policy strategy and in comparison to their peers in other states. No single piece of literature has identified and discussed the full scope of issues, rather they focus narrowly on a single or subset of issues with some going deep into the particulars.

This report extends this ongoing research into the evolving investor-owned utility business model and seeks to fill this void. Specifically, this report:

1. Develops a comprehensive catalog of utility product and service offerings (including current, proposed, and reasonably anticipated offerings).

2. Provides a categorization scheme (or taxonomy) to help organize the various offerings.

3. Identifies the central topics regulators and decision-makers may need to explore as they consider new commercial opportunities within this new category of utility offerings.

Importantly, this report does not attempt to take a position on the viability or even the appropriateness of the pursuit of these alternative commercial opportunities by electric utilities. In addition, it does not attempt to make any determinations, recommendations, or other conclusions about the myriad issues associated with their pursuit. Each utility commission operates under specific authorities with specific objectives, which makes each jurisdiction unique. It is the core responsibility of the regulator to consider proposals from the investor-owned utilities in their own jurisdiction or commence proceedings on their own initiative, to assess if or how to proceed.

This report is intended to serve as a resource for policy makers, regulators, investor-owned electric utilities, and utility industry stakeholders to support informed discussion and, when appropriate, consideration of proposed commercial opportunities. In addition, the research summarized in this report may help regulators to better: (1) identify and implement staged strategies that seek to expand the commercial offerings of electric utilities; (2) understand the scope of potential enabling technology investments and capabilities necessary to successfully execute these staged strategies; and (3) recognize the issues regulators will likely need to consider concerning whether and how they might review and/or promote new utility offerings within the context of both long-standing regulatory principles and new objectives to advance a more strategic transformation of the electric industry.[2]

The remainder of the report is organized as follows. Chapter 2 presents the criteria used to determine what electric utility commercial opportunities could be included in this assessment, describes the organizing framework for these commercial opportunities, and depicts the full catalog of commercial opportunities within that taxonomy. Chapter 3 identifies and discusses issues regulators may want to consider in determining if and how utilities can pursue these alternative commercial opportunities. Finally, Chapter 4 provides some concluding thoughts on the implications of our findings for state decision-makers and electric utilities.

[2] Several manuals supplement this report by providing a more detailed exploration of the quantification of program costs and benefits (see, e.g., Woolf et al., 2017), rate design (see, e.g., NARUC, 2016), and valuation (see, e.g., NARUC, 2019; SEE Action Network, 2020).

2.0 A Taxonomy of Commercial Opportunities

One objective of this research is to develop an organizational framework that can support informed regulatory, policy, and stakeholder discussions. Our literature review served as the basis for establishing and applying a research methodology to develop a taxonomy for the full range of potential commercial products and services that electric utilities could offer. That comprehensive categorization scheme includes four broad classes of offerings. Within each class, commercial opportunities are further organized into groupings, or sub-classes, of similar product offerings. To make the taxonomy more tangible and applicable, we offer several representative examples of the commercial opportunities offered in the market today or that have been identified and can be reasonably anticipated to be pursued in the future.

2.1 Methodology

2.1.1 Defining "Commercial Opportunity"

Based on our research, investor-owned utilities in the United States have two broad portfolios of profit-generating[3] commercial opportunities available to them: electricity delivery and everything else hereafter referred to as alternative commercial opportunities (see Figure 1).[4]

Electricity delivery is traditionally understood to represent the generation, transmission, and distribution of electricity from the utility to the customer, although more recent restructuring arrangements have modified the utility's role in generating electricity. Utilities provide this service such that it meets certain minimum service level requirements, including overall capacity, power quality, and reliability. Regulators typically monitor these performance standards and implement reporting requirements to ensure that regulated utilities deliver electricity that meets the customer's capacity requirements, within certain standardized power quality constraints, and with an acceptable level of reliability.

Although there may be a wide range of potential rate structures based on customer class, the underlying basic electricity service "product" does not vary from customer to customer, and costs are generally recovered from the entire customer base. The increasing amount of distributed energy resources (DER) is prompting the regulatory community to examine different rate structures that may capture the value of these resources more appropriately (NARUC, 2016). However, as noted earlier, while these new rate structures will certainly affect the earnings opportunities and profit achievement for utilities, the variety of rate structures do not represent distinct or unique transactions with customers, and so are not the subject of this research.

[3] Technically, utility managers and executives are focused on creating value for their shareholders, not just in promoting higher earned returns. This is a subtle, but important distinction that is discussed in more detail in Kihm et al. (2017). For purposes of this paper, we use the term "profit-generating commercial opportunities" as ones that, on net, have the opportunity to create value for shareholders, which is the motivation for utilities to pursue them.
[4] Some utilities also have the ability to increase earnings through the achievement of certain goals contained in performance incentive mechanisms. In some cases, those goals (e.g., annual energy savings) are associated with alternative commercial opportunities (e.g., energy efficiency programs), whereas in other instances they focus on utility operations (e.g., improvements in reliability or customer satisfaction). We exclude mention of the latter here so as to simplify the framework, but fully acknowledge that is another source of earnings that some utilities have access to.

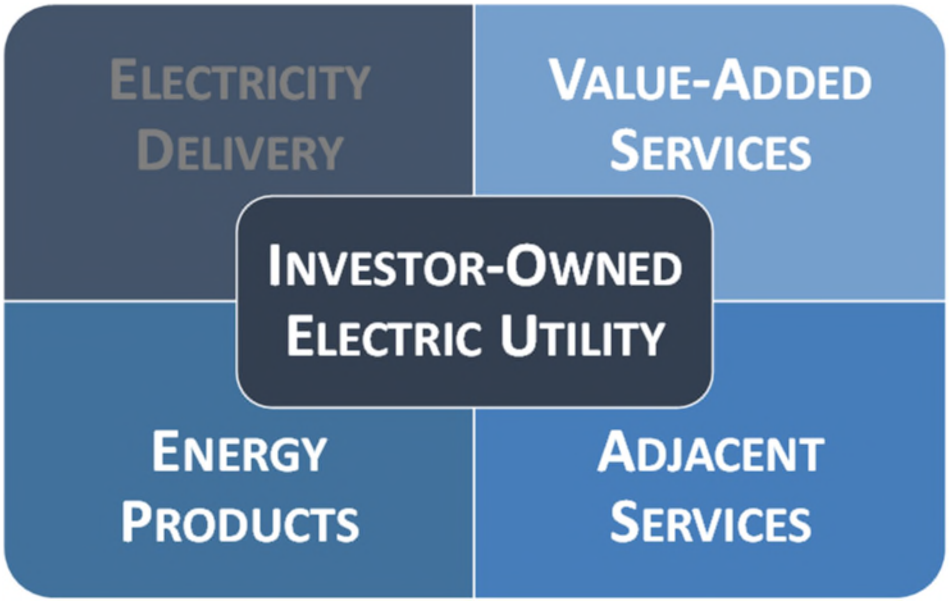

Figure 1. Profit-generating commercial opportunities for investor-owned electric utilities

In contrast, three other broad types of commercial opportunities, what we collectively call *alternative commercial opportunities*, represent instances where customers (i.e., electricity consumers, aggregators and intermediaries of electricity consumers, and consumers of services other than electricity) engage in a distinct and discernible transaction with the regulated utility that extends beyond traditional energy delivery service. Each must create an opportunity for the utility to generate profit, even if the exact business model varies. In addition, any utility investments in support of these alternative commercial opportunities are generally recovered from the customers engaging in the transaction, and thus are not considered for inclusion in rate base, which is recovered from all of the utility's electricity consumers.

Value-Added Services - A wide variety of commercial opportunities provide a value-added component or attribute beyond the utility's traditional service offering. For example, value-added services have historically focused on offerings that target the source of the electricity (e.g., renewable energy products) or the power quality of the delivered electricity (e.g., smaller variations in the voltage). In other cases, the additional value may come from the provision of standby generators and other forms of enhanced reliability services. These opportunities also include demand-side management and other regulated programs in which the customer may participate, creating opportunities for the utility to satisfy a regulatory requirement and/or receive incentives based on performance. Overall, the commercial opportunities in this class are fundamentally connected to or embedded within the delivery of electricity.

Energy Products - Beyond either electricity delivery or value-added services, there are commercial opportunities based on devices, products, and equipment that specifically use or manage electricity usage. These include devices that help customers optimize electricity consumption, enhance the overall consumer experience, or provide other benefits. For commercial opportunities in this class, the value for customers is not embedded within the electricity delivery itself, but is associated with how customers manage their energy use, which in many cases will enable the customer to either receive services they otherwise were not able to receive, or provide services back to the grid or regulated utility.

Adjacent Services - Finally, there is a class of commercial opportunities that have no direct or indirect relationship with the delivery, use, or production of electricity, but that leverage regulated utility assets or capabilities in order to provide other services.

2.2 Utility Assets and Regulatory Framework

The second major criterion established that each of the products and services included in this catalog utilizes the regulated assets, capabilities, and/or systems of the regulated utility. While some examples are drawn from public power, competitive suppliers, or unregulated utility affiliates, they had to build on or somehow leverage the foundational capabilities and assets of the investor-owned electric utility in order to be included in our catalog and framework.

2.3 Catalog of Alternative Commercial Opportunities

Our review revealed 19 distinct portfolios of alternative commercial opportunities that could create new or expanded earnings opportunities for utilities and financial benefits for participating customers (Figure 2). Distinct commercial opportunities for all three classes (i.e., Value-Added Services, Energy Products, and Adjacent Services) of our taxonomy are described in the following sections, along with representative examples of utility activity. This review is by no means a complete inventory of all utility product and service offerings at present, although we have sought to capture as comprehensive a listing as was possible and practical. This catalog of alternative commercial opportunities provides a framework that states and stakeholders can use to better understand ongoing utility and industry activity that may be underrepresented in the existing literature and stakeholder discussions.

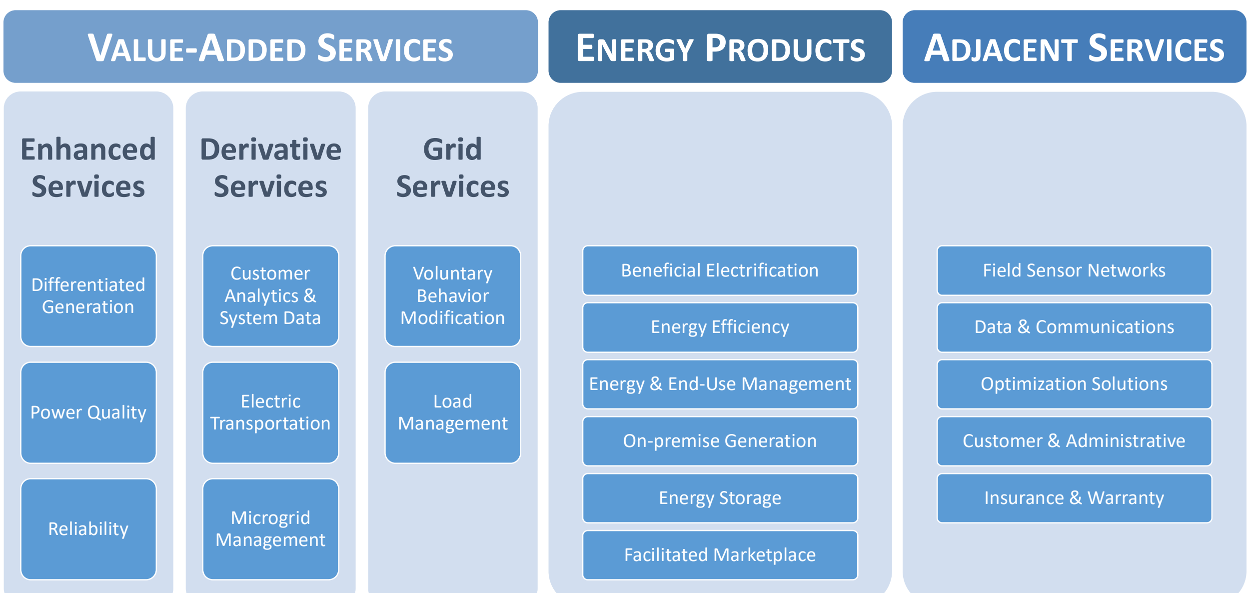

Figure 2. Taxonomy of alternative commercial opportunities

2.3.1 Value-Added Services

There are eight new or expanded alternative commercial opportunities included in the class of our taxonomy related to Value-Added Services. As depicted in Figure 2, they can be further organized into:

1. **Enhanced services** that are tailored to specific customer needs or preferences related specifically to their electricity consumption.

2. **Derivative services** that influence electricity consumption or provide other values.

3. **Grid services,** where the product enables the customer to receive or provide other services.

Each of the eight commercial opportunities is discussed below.

2.3.1.1 Differentiated Generation

Within the context of traditional electricity service, there has historically been no distinction between the type of electricity delivered to the consumer. However, beginning at least as early as the 1990s consumers and regulators began to implement programs that provided some differentiation of electricity based on specific attributes (O'Shaughnessy, 2015). While the most common differentiations relate to the source of the electricity (typically wind, solar, or other renewable energy sources), differentiation can also include locally produced power.

Voluntary markets for renewable energy grew from individual and corporate consumers who wanted to use clean energy sources and support their development. Voluntary markets grew alongside mandated requirements — Renewable Portfolio Standards (RPS) — and relied on trackable certificates as a means to verify the attributes of the delivered energy (Jones, 2017). By 2017, over 5 million retail electricity customers purchased over 100 million megawatt-hours (MWh) of green power, representing more than 25 percent of all U.S. renewable energy sales, or about 3 percent of all U.S. retail electricity sales (O'Shaughnessy, 2018).

According to the Green-e Program, the largest certification program for renewable energy in the United States, certified renewable electricity options in 2017 were available in 38 states and Washington, D.C., with more than 60 utility green pricing, competitive electricity supplier and community choice aggregation programs available (Center for Resource Solutions, 2018).

Utilities have the opportunity to further expand the range of differentiated generation offerings to customers.

2.3.1.2 Power Quality

In nearly all cases, traditional energy delivery services provide electricity within certain specified parameters of service quality, such as voltage within the range specific by American National Standards Institute (ANSI) standards. However, some customers and certain applications may require higher quality and power conditioning. In those cases, the utility can provide additional equipment at the customer premise that will provide the enhanced power quality required, such as surge protection, voltage management, or other attributes that may be required by sophisticated or sensitive equipment.

This review did not reveal examples of regulated utilities providing these services, but there are several instances of unregulated affiliates currently providing power quality services. Duke, for example, has surge protection offerings for customers (Duke Energy, 2019a).

2.3.1.3 Reliability

Similar to power quality, some customers may find value in establishing backup power that can improve reliability, especially where the value of continued operations is high or critical functions are involved. Such backup power systems can provide critical support during grid disruptions.

In 2019, the Florida Public Service Commission issued an order approving a three-year pilot program for "supplemental power services" in which Florida Power & Light would "be responsible for the monitoring, maintenance, and repair of the equipment located on a customer's premises" (FPSC, 2019). The order describes a program that operates through a tariff, under which participating customers pay a monthly fee that accounts for the cost of the equipment.

In California, Pacific Gas & Electric led the development of a microgrid project in Humboldt County, a geographically remote region of the state susceptible to wildfires. In a pilot project, the utility integrated renewable energy, battery storage, and controllable loads that supports an evacuation center and a six-building campus. In 2017, a nearby fire caused a grid outage, but the microgrid successfully islanded and kept the facilities from experiencing a blackout (Carter et al., 2019).

2.3.1.4 Customer Analytics and System Data

Particularly, but not exclusively, the deployment of advanced meters allows utilities to deliver sophisticated analyses of energy use patterns and load profiles of both individual customers and aggregated information about groups of customers. This information can be used to enhance a particular customer's asset management, operations, cost management, or other attributes primarily related to energy consumption. These information services also can be offered directly to other market participants and companies, with the customer's consent. External companies may utilize customer segmentation and system-level data to inform project development or market strategy of their own offerings. Types of useful data to these companies include operational information, network constraints, system infrastructure, and usage metrics.

At present, we could not find any examples of utilities profiting from activities related to customer analytics and system data.

2.3.1.5 Electric Transportation

With the growth of electric vehicles (EVs) in both individual and fleet settings, demand is rising for a range of services related to charging equipment, charging management, and fleet charging services. An estimated 20 million EVs are expected to be on the road in the United States by 2030, positioning electric transportation as the most significant new electric load since the rise of air conditioning in the 1950s (Myers et al., 2018). This anticipated increase in charging activity suggests that some form of managed charging strategies will be required to maximize benefits and reduce risks. While strategic rate design may address some of the need for charging management by providing strong financial incentives, direct charging management services are also beginning to emerge.

While a recent survey of utilities found that the vast majority (more than 75 percent) are still in an "early" stage of EV deployment (Myers et al., 2018), a subsequent review of managed charging programs from regulated and public-sector utilities revealed that well over 20 programs provide incentives, equipment, and direct services for vehicle and fleet charging (Myers, 2019).

Though the scope of this report is focused on direct charging equipment and services sold to specific customers, it is worth observing that the proliferation of electric vehicle activity has a corollary effect that may increase utility investment in electric vehicle infrastructure through traditional rate base strategies. Such activities could result in the utility directly participating in the EV charging market, by owning and/or operating their own charging stations. For example, in 2019, the Colorado legislature passed a law enabling cost recovery and performance incentives for utility investment in EV infrastructure and providing charging services (Colorado Legislature, 2019). However, not all commissions are supportive of monopoly utilities directly competing in the nascent EV charging market, and have restricted utility companies' ability to provide charging services directly (Satchwell and Cappers, 2018).[5]

2.3.1.6 Microgrid Management

Microgrids are generally considered local electricity systems that combine retail load with DER in a manner that is connected to the centralized network (the "macrogrid") but that is typically capable of disconnecting and operating independently for either physical or economic reasons at a specific point in the system (e.g., Point of Common Coupling (PCC)). The interface between the microgrid and the macrogrid means that the microgrid can act as a single controllable entity in relation to the larger utility or grid network behind the PCC.

Management of the microgrid can be optimized to enhance reliability, costs, or other services from customer-owned assets. Microgrid management also can provide important ancillary services for the operation of the macrogrid. While there are several examples of utility-owned microgrid assets (primarily in the context of pilot or demonstration projects), our review did not find specific examples of utilities operating customer-owned microgrids assets as a distinct commercial opportunity.

However, in 2019 a commission-sponsored stakeholder process in Washington, D.C., led to a recommendation to define a new entity: the microgrid operator. The operator would be responsible for maintenance, operation, dispatch, and coordination of non-utility owned DER and the microgrid distribution system (DCPSC, 2019a). The commission established that this operator would be regulated. The role of microgrid operator could be fulfilled by an independent third party, or the utility and regulatory commissions may determine that it is a commercial opportunity for the regulated utility to provide.

A managed microgrid also could provide other services identified in this research, such as demand and load management. A tariff incorporating fixed, time-based, and volumetric charges

[5] Even when the utility is precluded from directly providing charging services, many commissions are supportive of utility "make ready" investments for public and private EV charging enterprises (Satchwell and Cappers, 2018). For example, the Public Service Commission for the District of Columbia approved a Transportation Electrification Program in which they denied Pepco's proposal to provide direct charging services, but noted, "The Commission recognizes that Pepco plays a critical role in make-ready infrastructure from the electric distribution system to electric vehicle charging stations and supports 'make-ready' investments to facilitate transportation electrification" (DCPSC, 2019b). For more information on the range of activities that utilities can undertake with respect to electric vehicles, see Jones et al. (2018).

could be developed to govern the macro-to-micro grid interactions and establish the value of improved grid resilience (see Section 2.3.1.8 for more details).

2.3.1.7 Voluntary Behavior Modification

Many utilities offer programs that encourage customers to change their electricity consumption behavior without direct financial incentives, in order to achieve reductions in total electricity consumption or otherwise improve grid operations without regard to specific time periods. This approach stands in contrast to load management programs that are dispatchable and are accompanied by some form of financial compensation for altering electricity consumption (see Section 2.3.1.8). These voluntary behavior modification programs often employ home energy reports or simple, actionable messages to encourage small behavioral changes from consumers to produce overall reductions in energy consumption or reductions during peak demand moments. Typically, these programs claim energy consumption reductions of 1.0 to 2.5 percent (Marquis, 2016).

These programs have become widespread with utilities in recent years, with a majority of the largest utilities in the country deploying them in more than 35 states (Marquis, 2016). Some utilities are just beginning to pursue behavioral demand response programs as a way to produce peak demand reductions in the absence of direct financial compensation.

2.3.1.8 Load Management

Load management typically is incorporated through voluntary consumer participation in demand-side management programs that ultimately deliver some form of grid service to the utility. Utilities offer direct device control, indirect load management, or other specific load modifications with the goal of enhancing grid reliability and flexibility. Consumers benefit from lower electricity bills provided by the utility, usually through direct payments for either commitments to perform (i.e., up-front payments) and/or actual performance during load management events (i.e., performance payments). Load management programs may include rebates or other financial incentives for customer investment in enabling products, as discussed in the next section. These are often part of an energy efficiency program (see Section 2.3.2.2) which likewise seek to reduce the cost and remove other barriers to customer investment. In our taxonomy, we differentiate between utility efforts to reduce the costs of investment in various products (as described in 2.3.2.2) and the value-added services that those products could possibly provide (as described in this Section 2.3.1.8).

2.3.2 Energy Products

2.3.2.1 Beneficial Electrification

Beneficial electrification refers to the broad category of applications that replace direct fossil fuel consumption with electricity, which results in lower carbon emissions and energy costs. Some of the most common applications include electric transportation (see Section 2.3.1.5 for discussion of how utility services could seek to improve the management of EV charging activities), electric water and space heating systems, and ground- or air-source heat pumps. In this context, the utility is either directly selling these products or promoting their adoption through programmatic opportunities to connect buyers and sellers.

For example, in 2018, the Massachusetts legislature passed a law that expanded the scope of energy efficiency to include programs that: "(1) provide energy and demand savings through strategic electrification that result in cost-effective reductions in GHG emissions and minimize ratepayer costs, and (2) result in customers switching to renewable energy sources or other clean energy technologies" (MADPU, 2019). As a result of this legislation, the state's regulators approved a nearly $3 billion package of energy efficiency programs, including several incentives for "strategic electrification." In approving these new programs, the Massachusetts Department of Public Utilities noted that with the expanded energy optimization approach, "the goal going into a home is to provide customer education on every available option, including heat pumps and renewables, rather than pursuing only more efficient versions of what the customer currently has."

Beneficial electrification overlaps with and, in many cases, is coupled with efforts to promote load management (see Section 2.3.1.8) and energy efficiency (see Section 2.3.2.2).

2.3.2.2 Energy Efficiency

Energy efficiency programs and services have been a core part of utility operations for several decades. In 2017, electric utilities in the United States spent over $6.9 billion on energy efficiency programs. Previous studies have revealed energy efficiency to be one of the most cost-effective resources for utilities. A comprehensive study of 8,790 electricity efficiency programs at 116 investor-owned utilities and other program administrators in 41 states found the average program administrator cost to be 2.5 cents per kilowatt-hour, with a total cost of saved energy of roughly 5.0 cents per kilowatt-hour (Hoffman et al., 2018).

As a result of the widespread implementation of energy efficiency, the commercial opportunities include a wide range of products, services, and earnings models. These include direct sales of energy efficiency products, retrofits of existing buildings, and rebates and other incentives provided through demand-side management or regulated programs.

2.3.2.3 Energy and End-Use Management

Many utilities now offer control devices, sensor equipment, and software tools that facilitate overall energy and end-use management in homes, buildings, and other facilities. Building energy management control systems and more narrowly focused lighting control systems are examples of technologies covered by this product offering. Often these types of offerings are combined with rebates or other incentives that may be provided through load management (see Section 2.3.1.8) and/or energy efficiency programs (see Section 2.3.2.2). Similarly, many of these offerings are available through an online marketplace hosted or facilitated by the utility (see Section 2.3.2.6).

For example, in 2019 Georgia Power announced a new partnership with Vivint, a smart home service provider, in which customers who sign up for home security services will also receive a smart thermostat. Conceivably, that smart thermostat could then be used by the customer to participate in some future demand response program offered by the utility. Georgia Power also offers a variety of smart home products including filters, locks, switches, vents, smoke alarms, and doorbells through the "Georgia Power Marketplace" online portal to help customers better manage and control their electricity consumption (Georgia Power, 2019).

2.3.2.4 On-Premise Generation

Similar to energy efficiency programs, incentives for and deployment of distributed energy generation sources, such as solar and combined heat and power solutions, are widespread among U.S. utilities. In recent years, several utilities have advanced programs designed to support direct provision of distributed energy at customer locations; some targeted at specific populations, such as low-income communities (Satchwell and Cappers, 2018). Utilities can promote the adoption of on-premise generation resources through direct sales, rebates, and other incentives connected to load management (see Section 2.3.1.8) or other regulated programs, but have also begun to pursue more innovative approaches.

In Arizona, for example, Arizona Public Service has implemented an offering where the utility installs solar photovoltaics on a customer's roof. The utility owns the system and provides an ongoing incentive to the homeowner. In 2018, this program expanded to include low- and moderate-income single-family households. The utility works with local installers to provide the systems. Similar programs have been implemented in Los Angeles, South Carolina, and New York (Walton, 2018).

2.3.2.5 Energy Storage

Energy storage technology offers a multidimensional set of services that can be used by consumers to store and dispatch energy onsite for a wide range of applications, including increased reliability, optimizing intermittent energy production, or managing exposure to variable rates and demand charges. In addition, customer-owned storage devices can be used to provide grid services via load management programs (see Section 2.3.1.8). Utilities can promote the adoption of energy storage devices through direct sales, rebates, and other incentives connected to load management or regulated programs.

A notable example of a utility storage program is Arizona Public Service's "Storage Rewards" program, which is designed to enable customers to manage peak usage in order to reduce demand charges and optimize their overall energy use. Residential customers receive a one-time incentive of $500 and then have access to available backup power. A portion of the power is reserved for energy grid support that can be called on by the utility for system needs (EEI, 2018).

2.3.2.6 Facilitated Marketplace

In recent years, many utilities have implemented a digital marketplace website where customers can find energy-related products from multiple vendors. These facilitated marketplaces can provide a wide range of products and services and often have ancillary energy efficiency (see Section 2.3.2.2) benefits or control capabilities for load management purposes (see Section 2.3.1.8). The products and services offered on utility-sponsored marketplaces provide customers with enhanced convenience, control, and efficacy.

At the end of 2018, more than 60 million customers had access to utility marketplaces from over 50 utilities in the United States. For example, the New York Public Service Commission in 2015 accepted proposals from utilities to implement digital marketplaces to increase customer engagement and energy efficiency as part of the state's *Reforming the Energy Vision* initiative. Similarly, the California Public Utilities Commission requires investor-owned utilities to develop and administer marketplaces. Some of these marketplaces are notable because of their ability to apply utility-supported rebates and discounts at the point of sale and facilitate or automate enrollment in load management programs (see Section 2.3.1.8).

2.3.3 Adjacent Services

2.3.3.1 Field Sensor Networks

Utilities may be positioned to apply their expertise and networking capabilities to support operations that involve a combination of field sensors, utility communications, and physical networks. Applications can include law enforcement (e.g., gunshot detection), environmental monitoring (e.g., radiation detection, gas leaks), weather monitoring, disaster management (e.g., seismic detection), and municipal services (e.g., parking management). In each of these applications, the utility can support the connection to sensor devices in the field.

For example, in a recent Rhode Island National Grid rate case, regulators mentioned the potential to provide a “shared infrastructure solution” using the robust telecommunications system that is a foundational component of advanced metering systems. National Grid identified “an opportunity in exploring partnerships with other parties that could share in the cost and benefit from the access to a statewide communications system,” including partnerships with water utilities, emergency agencies, municipalities pursuing intelligent lighting, warning systems, traffic monitors, and environmental sensors (RIPUC, 2017). The utility has not yet begun to pursue such an offering, though.

2.3.3.2 Data and Communications Solutions

Utility data and communication networks can be made available by utilities for a wide variety of applications, including supporting other municipal or utility functions. Utilities are expected to invest more than $100 billion in networking and communications equipment and services over the next decade, fueling speculation that there will be growing opportunities to create multipurpose, holistic networks across their territories that can be made available through leases and other commercial arrangements (Elberg, 2019). Some utilities are leveraging these networks to provide additional services for their own customers. Burbank Water and Power is one such example; it uses the existing wireless metering network to provide customers with free WiFi (Burbank Water & Power, 2019). As another example, the Electric Power Board (EPB) of Chattanooga invested in a fiber optic network as the backbone for a number of their smart grid investments, which they then leveraged to provide high speed internet, TV, and phone service to their customers on a subscription basis (COS, 2019).

2.3.3.3 Optimization Solutions

Utilities may be able to use computing and systems analysis capabilities to support optimization, particularly of other municipal utility, waste, and water management systems. This review did not reveal specific instances of utility offerings.

2.3.3.4 Customer and Administrative Services

Utilities may be able to leverage their workforce and customer relations facilities (e.g., call centers) to provide efficient management of administrative services (e.g., customer service). Municipal, governmental, or other utility systems could especially benefit from these services.

For example, many utilities are investing in leading technologies, such as voice technology, within their call centers. These capabilities and the systems that enable them could be made available to other regional utilities and government agencies for the provision of customer service offerings (Wang and Holden, 2018).

2.3.3.5 Insurance & Warranty

Utilities have access to capital resources that can be applied to insurance, financial indemnity, and service contracts. These services can increase customer adoption of preferred technologies (see Section 2.3.2).

This review did not reveal examples of regulated utilities providing these services, but there are several instances of unregulated affiliates providing insurance or warranty services. CenterPoint Energy offers a range of warranty and service plans for customers in Minnesota (CenterPoint Energy, 2019). Similarly, Duke Energy Carolinas offers “Home Protection Plans” through an unregulated affiliate (Duke Energy, 2019b).

3.0 Technical & Policy Issues Associated with Alternative Commercial Opportunities

The alternative commercial opportunities identified and discussed in Chapter 2 are raising important technical and policy issues for regulators and decision-makers. Their assessments and decisions are predicated on the particular regulatory environment, while recognizing that the regulatory environment itself has evolved over the past century by adapting to prior industry and market changes. We first briefly discuss prior adaptation of electric industry regulation in order to help better frame the issues regulators may need to address in the current environment of increased interest in the pursuit of alternative commercial opportunities. We then identify and define seven technical and policy considerations for regulators and decision-makers.

3.1 Adaptations of Utility Regulation Over Time

The emergence of regulation for the electric industry in the early part of the 20th century was based on the economic theory of the “natural monopoly” characterized by fixed costs and powerful economies of scale such that a single firm could offer service at a lower cost than a potential competitor (Pierce and Gellhorn, 1999). Economic regulation of electric utilities arose from the perception that competition would not benefit consumers under natural monopoly conditions and states should oversee the price and service of electricity to ensure electric utilities did not exploit their monopoly position. Beginning with New York and Wisconsin in 1907, regulation by state commission spread rapidly across the country (Boyd, 2014). By 1930, nearly every state had enacted legislation that charged some type of administrative entity with responsibility for regulating public utilities, built on principles of management and regulation by experts (Boyd, 2014). In the following decades, state regulators oversaw the growth of the natural monopoly electric industry, fueled by continued economies of scale that favored development of ever-larger, centralized electricity generating plants. However, by the 1960s, these economies of scale for large power plants had been exhausted.

The first significant adaptation of electricity regulation was The 1978 Public Utility Regulatory Policies Act (PURPA) adapted electricity regulation in response to the emergence of non-utility generators who could increasingly economically build and operate generation. Among other things, PURPA required utilities, for the first time, to consider non-utility generation assets when procuring electricity for the utility’s customers. Specifically, utilities had to provide certain non-utility generation assets with an opportunity to participate, and thus compete, in electricity markets. This implied that the regulated utility’s natural monopoly status was significantly altered and PURPA stimulated the development of a non-utility power sector selling electricity to local utilities under long-term contracts (Joskow, 1989).

During the late 1980s and into the 1990s, advances in combined-cycle natural gas technology allowed newer, non-utility generators to more effectively compete with traditional, large-scale power plants. Through passage of the Energy Policy Act of 1992, the U.S. Congress sought to further strengthen competition in the electricity industry by enabling the broader restructuring of the electric industry in much of the country (Lazar et al., 2020). The legislation removed structural barriers to the broader development of unregulated non-utility generating facilities and expanded the Federal Energy Regulatory Commission (FERC)’s authority to order utilities to provide these facilities with transmission system access in order to support wholesale power transactions. In response, beginning in 1995 and continuing into the early 2000’s, a wave of state regulatory reforms fundamentally transformed the electric industry through the introduction of competition into various utility functions. Known broadly as “electricity restructuring”, states adopted a range of different retail market structures for utility generation and transmission resulting, in many cases, in further contracting the utilities’ natural monopoly position.

3.2 List of Technical and Policy Issues

The emergence of alternative commercial service opportunities for electric utilities, as well as the market factors and policies driving them, present several considerations for regulators and decision-makers. The issues that regulators may need to address when determining if and how investor-owned electric utilities pursue alternative commercial opportunities are shown in Figure 3. Collectively, two important and inter-related components will likely inform decision making concerning each of the identified issues. Technical considerations relate to objective or quantifiable metrics that could help guide the regulatory decision-making process, even if there is subjectivity in how the analysis is framed. Policy considerations are representative of a strategic or policy preference that a regulator has the prerogative to initiate, or has been directed to pursue by some other branch of state government. Each issue in Figure 3 is described in more detail below.

Figure 3. Technical and Policy Issues for Regulators

The remainder of the chapter defines the issue, describes how utility regulation has historically approached the issue, and provides examples of how utility regulation may need to consider the issue for alternative commercial service opportunities. In order to more clearly explain each issue, we examine a commercial opportunity associated with utility ownership and operation of electric vehicle supply equipment and infrastructure (EVSEI). Clearly each state’s regulatory authority will make its own assessments on how to address the issues we raise as they relate to EVSEI; but we provide this as a heuristic to illustrate the ways each issue can be considered for a currently viable alternative commercial opportunity.

In addressing the complicated technical and policy issues, it is important to recognize – and hopefully dispel – any perception of implicit bias toward traditional regulatory approaches and utility investment models. Predominantly, the issues identified here are based on activities and regulatory discussions in the electricity sector in recent years. In particular, many industry observers have identified barriers to innovation embedded in the regulatory process and opportunities for regulators to take more aggressive actions, especially with regard to the relationship between utility companies and competitive market models (see, for example, Roberts (2015); MIT (2016); Blansfield et al. (2017); Waggoner et al. (2018)). The authors recognize that these complicated subjects raise a myriad of questions worthy of detailed examination, most of which are beyond the scope of this report.

3.2.1 Market Structure

Market structure defines the activities, transactions, and customers of the utility. This includes the utility and customer relationship at several levels, including the wholesale market relationship between the utility and entities connected to the bulk power system, the retail market relationship between the utility and entities connected to the distribution system (excluding end-use customers), and the retail market relationship between the utility and the end-use customer. In this sense, market structure bounds the footprint of the regulated entity by defining both where the utility has a protected market and from which what activities it is restricted from engaging in.

The definition of the market structure boundary is critical, in that it sets the structural boundaries of the market(s) and whether they exist or not in many cases. The market structure is particularly important now because as technology has changed and advanced, the perspective of regulators and legislatures concerning what should be protected or restricted business pursuits of the regulated utility has likewise changed (e.g., introduction of retail electricity competition in some states). If new technologies suggest that economies of scale exist such that the greatest public benefit is achieved by limiting the market to a single company – the core principle of natural monopoly theory – then a regulator may determine that expansion of the boundary of the monopoly franchise is warranted (e.g., installing rooftop photovoltaics, selling internet bandwidth from its backhaul network, providing access to its sensor network for gunshot detection). Conversely, a regulator might determine that, in fact, technology changes have eroded the natural monopoly conditions and, as a result, a contraction of the natural monopoly footprint is warranted (e.g., third-party administration of energy efficiency programs, working with demand response aggregators, requirements to support in-home devices through AMI systems).

Because the new commercial opportunities are defined as specific transactions with distinct customers (as opposed to general services provided to the entire customer class), questions of equity and fairness may also be relevant for regulators in determining the boundary of the market. A regulator may want to determine whether changes to the market structure associated with new products and services would have an adverse or beneficial impact on customer choice and equity concerns (e.g., utility-owned and -operated community solar arrays can bring renewable energy to lower income communities who may not receive financially-viable offers from third-party service providers). In addition, the regulator may also consider whether pursuing the new commercial opportunity would leverage other utility capital in a way that is advantageous to the overall customer base (e.g., utility owned community solar arrays with smart inverters can provide essential grid services such as voltage or reactive power management on the distribution grid).

> *Regulators are considering market structure in the context of utility Electric Vehicle Supply and Equipment Infrastructure (EVSEI) largely by defining whether or not to include some or all EVSEI investments within the electric utility's market boundary. In some cases, regulators will need to determine if the utility must restrict its EVSEI investment to the grid side of the service drop via make-ready infrastructure or is able to own and operate the charging equipment itself (NYDPS, 2020). If no other entity has been willing to enter the charging market to date in a particular locale, then this may leave the utility as the only entity viably able to do so (Jones et al., 2018). However, in some cases, it may be premature to deem that a market failure exists that a utility is uniquely positioned to address (CDG Stakeholders, 2017) .*

3.2.2 Role of Competition

Whereas market structure defines the macro-level footprint of the utility within the specified market, the role of competition defines the micro-level forms of engagement between the utility and the other market participants. This includes how utilities procure necessary grid resources and services and what access to the regulated system is afforded to non-utility actors. If market structure identifies the boundaries of the playing field, the role of competition determines how the players on the field interact with each other.

In a regulatory context, competition has often been defined by exclusion. Since its earliest days, a defining characteristic of utility regulation has been to prevent competitive players from participating in the marketplace, granting a monopoly franchise to a single firm by erecting legal barriers to entry for other firms (Kiesling, 2015). Notwithstanding "exogenous" competition (where the entire regulatory regime may be eroded by external forces), regulators define who can participate in the market and where utilities must use competitive measures (e.g., requirements to work with demand response aggregation providers rather than develop utility-managed programs or establishing requirements to procure resources and services through competitive solicitations). Deliberations concerning tariffs and rules to encourage new competitive players (e.g., publicly available hosting capacity maps that allow DER developers to have a better understanding of interconnection potential) or competitive procurement mechanisms (e.g., non-wires alternative load management programs that seek to allow distributed energy resources to provide grid services that compete with utility assets) may include considerations of whether regulators believe these measures will lead to the least-cost outcome and benefit ratepayers.

Changes in competition may also introduce new players who are unregulated by public utility commissions. New market participants will likely not be subject to the same oversight as incumbent electric utilities (e.g., electric supply service providers) (Blansfield et al., 2017). Allowing non-regulated entities to compete with the regulated utility may introduce risks for customers that are absent or mitigated by having a single regulated entity offer the product or service because regulators provide ways for customers to appeal and have substantial enforcement authority over utilities. Thus, regulators may want to consider the implications of expanding a market to include enterprises whose behavior could harm customers without proper safeguards (e.g., customers being moved to non-utility electric supply suppliers without their consent) or put them at risk through higher prices (e.g., substantial and unannounced price increases after initial electric supply contract periods are over), or increased exposure of vulnerable customers to potential harm (e.g., aggressive or misleading sales techniques from non-utility electric supply providers).[6] Should the utility be allowed to compete with a non-utility entity to sell electricity for EV charging services, for example, regulators will also need to determine the legal authority that allows another entity to operate within the service territory of a pre-existing monopoly (NYPSC, 2013).

Regulators may also view competition as an opportunity to promote, or hinder, market innovation. By allowing third-party entities to directly compete with regulated utilities for particular products or services, regulators can push utilities to be more innovative (e.g., developing clean energy supply offerings, like "green" tariffs).). Under the appropriate conditions, utilities in their protected role can also help move the electric industry as a whole

[6] For example, the regulator may want to ensure that appropriate codes of conduct and consumer protections are instituted and enforced by Attorneys General office or other governmental organizations for these non-utility entities it can no longer provide oversight of.

forward (e.g., data analytics that connect customers with third-party opportunities to promote increased customer engagement), or create temporary opportunities to incubate an under-developed or nascent product or service industry that would not prosper as quickly, or at all, without the protections afforded to monopoly providers (e.g., leasing battery storage systems). This may not be the case in perpetuity, as there may come a time when innovation would be best served by allowing competition for that product or service. Regulators may need to identify the conditions under which the electric utility would no longer continue to be granted this protected role. Alternatively, regulators could determine that having utilities enter the market at all would have too great a chilling effect on competition, which if allowed would hinder market development and innovation. Such an assessment would suggest that regulators should restrict utilities from providing the commercial opportunity, leaving it to the competitive market to develop.

> *Depending on how regulators determine the boundaries of the utility's monopoly, utility ownership and operation of EVSEI may or may not result in direct competition with non-utility entities. If the utility is afforded a monopoly franchise right to provide charging services, then regulators may allow it to fill a gap until an environment exists that promotes competition (CPUC, 2014; NYPSC, 2015; CDG Stakeholders, 2017). As the EVSEI market expands, though, regulators will need to determine if there comes a time when a contraction in the utility's EVSEI offerings are warranted due to market maturity. However, concerns have been raised that the utility has a business interest to limit competition and reinforce its market dominance. If competition is authorized, the utility may select the best and most financially advantageous locations, leaving lower margin opportunities for competing firms to fight over, thereby limiting market growth (CPUC, 2016).*

3.2.3 Market Risk Strategy

Electric utilities face myriad physical, financial, and security risks. Regulators, acting as a substitute for markets, need to be cognizant of how changes in the utility's market structure (e.g., increased penetration of distributed energy resources) or operating environment (e.g., global spike in oil markets, extended drought that increases the threat of wildfires) can dramatically alter the kinds and/or increase the scale of risks which must be managed (Kihm and Beecher, 2016). Although economic regulation strives to reduce risks for investors as a core component of efficiently and affordably attracting capital to support utilities, regulators must also be cautious that reducing risks for utility investors does not inadvertently or excessively shift the burden of risk to utility customers (Binz et al., 2012).

Regulators use different mechanisms to manage risks. For example, rate setting, in particular pro-forma adjustments to revenue requirements, can be made to shift risk from ratepayers to shareholders. Conversely, rate riders can be used to insulate utilities (and their shareholders) from the risk of unforeseeable market price fluctuations. Alternatively, hearings and investigations can be used to provide oversight concerning activities intended to mitigate physical risks are being properly and sufficiently undertaken, with financial fines being the ultimate manifestation of a determination that risk has not been appropriately managed or mitigated.

Utility pursuit of alternative commercial opportunities will create new risks, some of which regulators and utilities can anticipate and have sufficient experience with managing and allocating. In particular, many utilities will need to make new capital investments in order to pursue these alternative commercial opportunities. Typically, ratepayers fund these investments to the extent that all or a sufficient number of them benefit from the asset. However, in the context of alternative commercial opportunities, the capital invested may go towards infrastructure that is solely used by customers transacting in the particular utility product or service. Under such situations, regulators may need to determine if it is appropriate to ratebase the asset, allocating the risk of recovery across all customers, or assigning its recovery to only those customers who are partaking in the new product or service opportunity. The former situation may create risks for the utility if it is increasingly looking like traditional methods may be insufficient to fully recover the investment costs; whereas the latter may likewise be risky for the utility if it is unsuccessful in effectively promoting the commercial opportunity. This would put the risk of non-recovery firmly on the utility. There may also be risks associated with the useful lifetime of the asset, relative to the period of recovery, especially in product or service markets that are rapidly evolving, which could result in stranded assets. Lastly, regulators should be wary of promised benefits of such investments without commensurate commitments or legally/financially binding obligations to pursue them down the road, as has been the case with consumer benefits inuring from many utilities' AMI investments (Gold et al., 2020).

Many of the capital investments in enabling technologies under consideration have traditionally been made by the utility. But in some instances, it may be the case that regulators want to consider non-utilities entities who could make such investments instead (e.g., non-utility entities investing in AMI that provide utilities with the opportunity to leverage customer consumption data collected on a more granular level for a range of alternative commercial opportunities). Such approaches, although attractive along some dimensions, may create new challenges. Regulators may be unable to exert as much control or authority over non-utility market participants as they can their regulated utility counterparts. The degree of oversight that is capable and can be executed may be a decisive factor in the determination of whether a utility should be allowed to pursue their proposed commercial opportunities and make the necessary investments.

Regulators may also need to ascertain if new risks will be indirectly introduced by the pursuit of these alternative commercial opportunities. Existing utility investments may be leveraged and thus exposed to new or unexpected risks (e.g., increased use of online platforms may introduce new cybersecurity risks for existing backoffice systems). Regulatory deliberations may want to focus on whether or not these risks can be appropriately managed, whether the cost to manage them is worth the benefit associated with the new commercial opportunity, and if so, what the appropriate allocation of those risks should be.

> *Regulatory approval for the utility to own EVSEI may create numerous risks. An initial determination by regulators whether or not EVSEI meets the legal standard for what qualifies as "electric plant" will determine, in part, if ratepayers or shareholders will bear the risk of poor financial performance (MOPSC, 2017). Depending on the degree of regulatory oversight and approval for particular EVSEI sites, utilities may pursue locations where the financial benefits are more speculative (CPUC, 2016), leading to increased risk of an investment that is not cost effective. From a technology standpoint, it is unclear how quickly today's state-of-the-art charging systems (e.g., direct current fast chargers) will be replaced with faster and more innovative approaches, which creates a risk for stranded assets (CPUC, 2016).*

3.2.4 Customer Value Case

The customer value case determines whether the proposed use of regulated assets or regulated capital will yield compelling benefits for the traditional electricity delivery customer as well as those who take advantage of the alternative commercial opportunity. Often, these considerations are suitable for quantifiable or analytic methodologies (such as cost-benefit assessments, payback and adoption analysis) and relate directly to the capabilities and resources of the utility. More generally, regulators must assess whether the utility's capabilities are well-suited to the opportunity, whether there is sufficient benefit for the utility's electricity consumers associated with the implementation plans presented by the utility, and whether the financial implications of expanding the monopoly footprint warrant approval of its commercial opportunity proposal.

Regulators in most states are accustomed to integrating the traditional electricity delivery customer value case into their deliberations concerning utility proposals for alternative commercial opportunities. At one level, regulators have historically focused on the cost-effectiveness of particular product or service offerings. For example, many utilities are obligated to file cost-effectiveness screening test (e.g., the Program Administrator Cost Test) results for their energy efficiency program portfolios in order to receive regulatory approval (Woolf et al., 2017). Regulators have also historically been interested in promoting utility-administered commercial opportunities that more fundamentally change the customer value case for the entire market. Although market transformation programs may not be cost effective in the short-run, their pursuit and successful achievement can create cost savings for all in the long-run (e.g., programs that promote increased adoption of rooftop solar have been shown to dramatically reduce soft costs in the long run, see O'Shaughnessy et al. (2019)). Financing or product costs may also be driven down as regulated electric utilities have ready access to less expensive capital which often times put them at a competitive advantage over other firms (Blansfield et al., 2017). Certainly, some regulators have emphasized the potential to achieve stronger or unique benefits through regulated utility efforts than what they believe would be realized through a competitive market. Regulators are able to more readily dictate the terms and conditions that the electric utility must operate within as a way to better protect customers and promote higher achievement of benefits (e.g., utility demand response programs must pass along 90% of the wholesale market payment to participating customers).

Part of the customer value case may include the addition, or in some cases the removal, of property rights to specific assets associated with the alternative commercial opportunity. Regulators may need to take into consideration when ownership of the asset may start out with one party, but over time resort to another (e.g., leased solar PV systems with an option for buy-out at some future point). Alternatively, the alternative commercial opportunity may itself generate an asset that the utility could subsequently monetize by reselling to a third-party (e.g., battery storage utilization data from customer leased systems), provided the utility was deemed to own the rights initially or was able to get them assigned by the customer as part of the terms and conditions for the product or service being transacted. Not all of the alternative commercial opportunities described in Chapter 2 will create property rights issues, but regulators will need to adequately resolve those that do so that the value associated with the asset in question is appropriately quantified and assigned.

Although regulators recognize that new utility product or service offerings may create a customer value case where none existed before (e.g., no other entity was able or willing to install rooftop solar systems in low-income communities) (Blansfield et al., 2017), the opportunity to create an entirely new market for ancillary products or services may require regulators to take a much deeper and potentially more speculative assessment of the customer value case. The costs to develop the necessary infrastructure may be challenging to fully quantify at present (e.g., insurance or warranty services for end-use technology sold via online marketplaces). An assessment of benefits to the utility's electricity consumers may likewise be difficult to estimate, especially if they are not the direct customer of the utility commercial opportunity (e.g., availability of and access to interval meter data as a service to third parties interested in producing more customized energy solutions for the utility's customers).

> *Utility proposals for EVSEI often times focus on an improved customer value case as a strong reason for justifying their approval. Where private companies have failed to invest in EVSEI, monopoly electric utilities are uniquely willing or able to do so (NYPSC, 2015). Some contend that public charging stations need to be precisely targeted to specific locations, such as workplaces, to promote EV adoption (NYSERDA, 2015; Jones et al., 2018). Regulators are uniquely positioned to direct such investment but only from monopoly electric utilities. The electric utility's ability to procure less expensive capital may allow them to charge lower prices for the same EV charging service (Blansfield et al., 2017). However, having such access to less expensive capital may discourage potential investment and direct or indirect competition from other providers (NYPSC 2015). Regulators will need to ensure that the utility does not charge higher prices in the long run than could have otherwise occurred through competition (MOPSC, 2017).*

3.2.5 Regulatory Business Model

Each utility's business model, in the traditional sense, is the result of a complex set of interactions between the utility, customers, regulator, and legislature. Regulators establish incentives to motivate utility behavior, which has traditionally been through the opportunity to earn a return on approved capital investments and recovered from customers via retail electricity rates. Electricity consumers respond to the prices established through rate design, some of whom make investments of their own to manage their electricity consumption and/or reduce their reliance on the grid by producing their own electricity. Policy priorities and mandates set by regulators and other governmental bodies affect utility resource decisions and investment plans. In addition, the design of rates and, in particular, cost allocation to various customer classes has a dramatic impact on the incentives of the regulated utility and the opportunity for utilities to shift costs to regulated operations and away from competitive operations. This, in turn, may have an impact on the opportunities available to competitive new market entrants (Lazar et al., 2020). The combination of these admittedly complicated and interrelated factors result in the utility's achieved earnings, which for an investor-owned utility will substantially drive firm decision-making.

Regulators can consider four broad elements when determining the most appropriate utility business model that financially compensates an investor-owned electric utility for pursuing regulated alternative commercial opportunities:[7]

[7] Technically, an investor-owned utility can increase its earnings between rate cases by ensuring costs grow slower than sales. However, this is not a sustainable long-term business model, per se, in the context of these alternative commercial opportunities as the additional earnings gets zeroed out at the next rate case filing when the revenue requirement, reflective of the cost savings, is set.

1. *Rate of return on capital invested:* The earnings opportunity is tied to the price set for the alternative commercial opportunity, which is inclusive of a rate of return on the capital invested to enable the transaction. This price could be paid exclusively by customers engaging in these transactions or across all ratepayers, depending on the extent of benefits (see Customer Value Case discussion in 3.2.4).

2. *Performance incentives:* Costs associated with the alternative commercial opportunity are recovered separately from the earnings opportunity. The latter is tied to the achievement of certain goals or outcomes associated with the alternative commercial opportunity. Both are usually paid by either all or a subset of the utility's electricity consumers, regardless of whether they engage in these transactions or not (e.g., energy efficiency savings performance incentives).

3. *Cost margins:* The earnings opportunity is tied to the cost of delivering the alternative commercial opportunity, with some markup inherently included in the price of each transaction. Payment to the utility is made exclusively by customers engaging in these transactions.

4. *Transaction or Performance Fees:* The earnings opportunity is tied to a fee that is added to the cost of the transactions that the utility facilitates between two external parties. Payment to the utility is made exclusively by customers engaging in these transactions.

A key distinction between different business models is the degree to which they motivate innovation, increase utility asset utilization, and promote consideration of alternatives to direct utility investment. Tying the return on the alternative commercial opportunity to the capital invested to enable or achieve it largely maintains the existing set of utility motivations (Averch and Johnson, 1962). Alternatively, performance incentives can be designed to make an explicit connection to how utilities operate the assets within their systems, mitigating the financial pressure to drive earnings through continued utility investments (Whited et al., 2015). Earnings tied to the margin between an offering's market price and its cost structure can be expected to motivate efficiencies and encourage new investment in partnerships with non-utility entities (Newcomb et al., 2013). Finally, business models focused on transaction or performance fees can be expected to motivate a market that involves substantial non-utility investments in equipment and operational systems, creating capabilities to expand market activity (Newcomb et al., 2013).

The regulatory business model also allocates certain risks to various stakeholders. Therefore, regulators may want to ensure that the established business model appropriately allocates various financial and operational risks between electricity consumers, customers of the commercial opportunity, and shareholders but also provides the appropriate balance of incentives for the assigned level of utility/shareholder risk (see Market Risk Strategy in Section 3.2.3). Regulators may also want to consider whether revenues associated with a commercial opportunity are likely to change over time and what impact that might have on the utility's ability to fully recover its costs as well as earn a profit from the endeavor (e.g., if the utility is first into a locale with EV charging stations, competition is likely to increase over time which will likely reduce its future earnings potential for that activity). Such considerations may necessitate alterations to the business model that take into account the expected window of time where this commercial opportunity may be viable. If it has a relatively short window but large up-front investment costs, a regulator may want to determine if its pursuit is worth the potential for stranded assets and what would happen to that stranded asset (i.e., would ratepayers or shareholders be at risk for the lack of adequate cost recovery).

Regulatory determinations concerning the most appropriate business model for electric utilities' pursuit of ownership and operation of EVSEI will first and foremost be dictated by whether or not it qualifies as electric plant. In some jurisdictions, a decision that EVSEI is not electric plant may be interpreted to mean that the Commission lacks statutory authority to regulate their operation at all (MOPSC, 2017)[8], thereby precluding the utility from entering this market. In other cases, it may mean alternatives to the traditional return of and on a capital investment must be pursued, like a cost margin by way of a surcharge as a profit provision. Regulators who accept that EVSEI is electric plant must then determine if it is appropriate for all ratepayers to cover the authorized return on equity of the investment (Duke Energy Carolina, 2019), or instead the recovery should be sought from only those who partake in the charging service. Currently, regulatory decisions regarding EVSEI are somewhat clustered in those states that have addressed these issues directly, but it is clear that there is a wide range of regulatory approaches to the utility business model that have a strong impact on the business opportunity and the correlated benefit to consumers (Myers et al., 2018).

3.2.6 Transition Strategies

For many regulators, a major motivating factor when considering these alternative commercial opportunities is the opportunity to support long-term electric utility sector transformation and grid modernization strategies. Within the larger context of a more engaged consumer base, alternative commercial opportunities can serve as a catalyst to these larger dynamics in the industry. So regulators have an opportunity to not simply respond to or encourage proposals from utilities, but to forge new business models for the electric industry where the consumer interactions are as much a part of the "fuel" mix as the traditional energy sources. Without a doubt, many regulators and policy makers have expressed interest in supporting the transformation of the electric utility industry in response to deployment of advanced technologies, customer preferences and policy objectives.

Regulators have a wide range of tools available to integrate alternative commercial opportunities into their larger transition strategies for the industries they oversee. But they are also not the sole arbiters of how the marketplace evolves since it is a combination of the specific people, companies and policy priorities. Still, regulators have unique tools that they can deploy to foster alternative commercial opportunities and ensure that they serve to support transition goals. In this way, regulators can engage utilities in new product and service offerings consistent with the energy policies and regulatory principles in their state, as well as the long-term vision of electricity market transformation. Of course, these long-term strategic questions will inevitably be answered differently by regulators as they seek to balance their wide-ranging objectives within their unique historical state experience.

For example, one tool that regulators can deploy that combines alternative commercial opportunities with long-term strategies is to encourage devices that increase customer engagement or support third-party service aggregators. By encouraging deployment of consumer devices, regulators may support interactions with distributed resources that result in an entirely new utility landscape and delivery of grid services. As noted, the alternative

[8] Although this decision was subsequently overturned by the Missouri Court of Appeals (MICOA, 2018)

commercial opportunities identified and discussed in this research arise largely because of technology advances and changing customer preferences.

Another tool available to regulators is the use of pilots that allow utilities to test out these new utility product and service offerings on a smaller scale. Pilots create an opportunity to better understand customer issues (e.g., adoption, retention, and performance), utility systems issues (e.g., integration, operations, and planning), as well as financial issues (e.g., costs, benefits, and earnings potential). For example, Green Mountain Power's multi-year regulation plan includes a $5M annual spending cap on innovative product and service pilots that must support Vermont's energy transformation requirements and greenhouse gas reduction goals (VTPUC, 2017). Some pilots have either been proposed or approved to move to full scale implementation (e.g., leasing of energy storage systems, bring-your-own-storage-device demand response program), while others have been not been pursued further (e.g., marketplace for cold climate heat pumps) or were abandoned (e.g., sale of rapid solar integration technology) due to sufficient market development over the course of the pilot or poor performance of the product in the pilot. Several states (e.g., New York, Maryland, and Michigan) are promoting pilots as a way to support utility service and product innovation in a safe but limited environment. All have carved out an important role for stakeholders to, at the very least provide feedback on the pilot's design, or more comprehensively include them in the design process.

Regulators can also use their ongoing proceedings and commission deliberations to align outcomes and objectives across multiple utility dockets with long-term transformation objectives. By articulating a long-term vision and then commencing activities on a number of different fronts concurrently, regulators can enable a more integrated and successful transition. The Reforming the Energy Vision (REV) initiative in New York (starting in 2014), Rhode Island's Power Sector Transformation initiative (starting in 2017), and Transforming Maryland's Electric Grid initiative (starting in 2016), among others, have all utilized multiple concurrent activities, including stakeholder working groups, pilots, and docketed proceedings, to flesh out the details associated with the initial vision and subsequently identify utility and non-utility commercial opportunities that will support the achievement of the initiatives.

Finally, regulators can use lessons learned from their early experiences with alternative commercial opportunities to improve future offerings. In this respect, it is possible for regulators to encourage the feedback effect that may occur as utilities successfully undertake these alternative commercial opportunities in support of broader transformational and transitional activities. Utility ratemaking, program offerings, planning, and operations will all be affected, to some degree or another. Establishing formalized stakeholder processes to identify these experiences would allow utilities to focus their efforts up front on these ancillary impacts and how they will be addressed, managed, or mitigated. These lessons will be critical for the success of both the individual product or service offering undertaken by the utility, as well as the broader reform initiatives that may have instigated it. As with other issues associated with transition strategies, stakeholders' perspectives on the implications of these feedback effects will be important for regulators to integrate into their decision making processes.

Many state regulators and policymakers recognize that electric vehicles are coming, either due to increased customer adoption and/or legislative goals. Developing a sound plan for how electric utilities can support the transition of the transportation sector may help achieve myriad public policy goals in a more timely fashion. For example, New York regulators, as part of the REV initiative, approved a performance incentive mechanism associated with the adoption of electric vehicles to ensure utilities were supportive of the desired transition towards the electrification of the transportation sector (Niagara Mohawk Power Corporation et al., 2018). Subsequently, the Governor recommended that the New York Public Service Commission (NYPSC) direct the State's regulated electric utilities to build, and thus receive a return of and on, the grid (i.e., make ready) infrastructure needed to enable a robust network of publicly-accessible charging stations (New York State Governor's Press Office, 2020). The NYPSC then requested comment in an existing proceeding on the Governor's recommendations to determine how to best move forward on that recommendation (NYPSC, 2020). Clearly states will take very different approaches to the role utilities will play in the transition of the transportation sector. This is but one approach to illustrate the evolution of the regulator's decisions in regards to the utility's role in this specific alternative commercial opportunity.

4.0 Conclusions

The electric industry has advanced significantly since its inception over a century ago. Throughout that time, the industry has co-evolved with a regulatory model that, while varying from state to state, shares core principles of natural monopoly and consumer protection. As technology advanced, regulation has adapted to new economies of scale, examined legal and practical barriers developed under a century of regulation, and what market structures are best suited to deliver customer, grid and social benefits as well as support technology, product and customer innovation.

Today, technology advances and a more engaged customer population are pushing some utilities and regulators towards new strategies that promote growth and transformation. Common to many of these efforts is an interest in expanding the set of profit-generating commercial opportunities beyond just buying and selling electricity. By offering a taxonomy of these new product and service offerings and identifying the key issues that regulators may want to explore in considering their approval, this report serves as a resource for policy makers, regulators, and stakeholders to support more informed and robust strategic planning and adjudicative processes concerning alternative commercial opportunities for investor-owned utilities.

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