STATE OF ILLINOIS
ILLINOIS COMMERCE COMMISSION

Illinois Commerce Commission	)	
On Its Own Motion	)	
	)	16-NOI-01
Notice of Inquiry regarding the	)	
Regulatory Treatment of Cloud-	)	
Based Solutions retail	)	

AMEREN ILLINOIS COMPANY'S INITIAL COMMENTS
IN RESPONSE TO NOTICE OF INQUIRY

COMES NOW Ameren Illinois Company d/b/a Ameren Illinois (Ameren Illinois, AIC or the Company) and respectfully submits the following Initial Comments in response to the Illinois Commerce Commission (ICC or Commission) Notice of Inquiry 16-NOI-01 (NOI) regarding the regulatory treatment of cloud-based solutions.

The NOI solicits comments on the following questions from interested persons and entities:

I. INTRODUCTION

Ameren Illinois appreciates the opportunity to submit these Initial Comments in response to the questions posed by the Commission in it Notice of Inquiry regarding the regulatory treatment of cloud-based solutions. Ameren Illinois is not only a utility in Illinois but is a utility in the age of advancing technologies. As such, Ameren Illinois values the need for an investigation into the regulatory treatment of cloud-based solutions.

The Commission's NOI raises a range of issues related to the regulatory impact on the adoption of technology, and Ameren Illinois' comments contain the input from contributors across a broad spectrum of departments within the Company. These are some of the individuals who contributed to Ameren Illinois' comments: Craig Nelson, Senior Vice President, Regulatory

Affairs and Financial Services; Mary Heger, Senior Vice President and Chief Information Officer; Bruce Steinke, Senior Vice President and Chief Financial Officer; Tom Rice, Senior Director Cybersecurity & Planning; Grant Bourzikas, Director Cybersecurity; Robin Turner, Regulatory Consultant; Ryan Risse, Manager Plant Accounting; Leonard Jones, Senior Director Regulatory Policy & Rates; Jenny Russi, Director AIC Finance & Planning; Keith Martin, Director Energy Efficiency; Ryan Ellen, Director AMI Strategy & Implementation; Brian Cuffle, Key Account Executive; Jon Carls, Asset & Risk Management Manager. Ameren Illinois is pleased to participate in the Comment process that the Commission has initiated and looks forward to the exchange of ideas that will result. Ameren Illinois believes that cloud-based solutions offer viable options that can be used in conjunction with traditional on-premises resources to meet customer needs. Proper regulatory treatment can further align incentives to promote the advantageous use of cloud-based resources. In evaluating which type of resource is best, on-premises or cloud, the utility must evaluate the specifics of the system identified and its intended function to fully understand the impact that it will have on the service that the utility provides to its customers.

II. CLOUD vs. ON-PREMISES IT SOLUTIONS

1. Identify how costs differ between a traditional on-premises IT system and a cloud-based solution, including all relevant costs and timing of costs.

The difference in costs is two-fold. Both the traditional on-premises systems and cloud-based solutions have different cost structures, and there are also differences in the manner in which such costs are recognized and accounted for by a utility. Both the cost structure and the manner in which a utility recognizes costs in turn dictates how such costs are realized by utility customers when they pay utility rates. Generally speaking, on-site IT systems are likely to have more initial up-front costs *to the utility*, but as depreciation occurs, systems costs will likely

decline subject to periodic upgrade related costs. For customers, on-site systems costs are recognized in rates over multiple years because of the way capital costs are treated in the ratemaking process. With respect to the way the costs are recognized by a utility, on-site systems are typically capital investments, with associated expenses. Whereas cloud-based systems to date are typically expensed in total, and as such are recognized by customers in full in each annual period used to set rates. Further, there may be more of a risk of sunk costs with on-site systems, and cloud systems enable more of an ability to pay incrementally for services or discontinue services when no longer needed.

Utility companies have traditionally operated on-premises IT systems. In order to operate such systems the utility must purchase upfront the hardware, software, and support contracts to properly build and operate the system. Once the system has been designed and placed into service a utility will not only own but will also be responsible for operating these IT assets. Utilities must retain qualified and competent in-house and external expertise regarding the systems it owns and operates. Similarly, management expertise is also required when a utility leverages cloud-based services. Such resources necessary to manage IT systems have incumbent costs, albeit cloud-based services require less expertise in physical asset management. With traditionally owned and operated systems, additional costs could arise if the utility sees or has a need to build-out the IT system. Likewise, modifications or enhancements to cloud services also could result in additional costs.

With respect to traditionally owned and operated systems, a utility typically invests in such assets as capital projects. Recovery of capital projects occurs by placing the asset in the utility's rate base, and the recovery in rates occurs over the estimated useful life of the asset. Information technology assets have varying useful lives, typically three to five years, but can be

longer, such as 10 years, for certain large investments. The useful lifespan and the timing of costs incurred by on-premises assets typically follow a pattern similar to the example outlined in the table below.

	Phase	***Month***	***CAPEX***	***O&M***
1	*Initial System Build*	*12-24*	*5+M*	*Minimal*
2	*System In-use providing customer value*	*24-36*	*Minimal*	*Majority*
3	*System Functionality additions (in-house code)*	*36-48*	*1-2M*	*Minimal*
4	*Infrastructure refresh and/or additions due to organic growth and/or obsolescence*	*40-44*	*<1M*	*Over time O&M can be reduced through hardware and software synergies to make room for new projects. Also as systems mature and become more stable less O&M is required to support them.*
5	*Major System Upgrade due to new vendor software release*	*48-60*	*2-5M*	*Minimal*

- *Phases 2-5 occur during the life of the system which can be 20+ years*
- *Often times phases 4 and 5 will be coordinated to minimize cost and business/customer impacts*

As previously mentioned and as the table demonstrates costs incurred for on-premises solutions are typically recognized as capital expenditure investments, which are included in a utility's rate base, accompanied by ongoing O&M expense. Once capital is rate based, recovery occurs over an extended period, with the utility bearing the risk of the investment and earning a return on the invested capital. Customers benefit from the extended payback period, and earning a return on invested capital allows a utility to support dividends and capital appreciation to the benefit of investors. Further capital investments in rate base items are timed for recovery in the

period they are expected to become “used and useful” to customers and expense items are recognized in rates for the period in which they are expensed.

In contrast to traditional systems, Cloud-based solutions provide utilities with the opportunity to purchase a specific cloud model and pay for it incrementally based on the company’s usage and the terms of the contractual agreement. The contractual agreement typically will include additional fees for private cloud services, increased storage or security needs, and other business needs beyond the "standard" offering.

However, by adopting a cloud-based solution a company may potentially forgo O&M reduction opportunities that may be realized with on-premises solutions due to hardware and software synergies throughout the assets' lives. As detailed more thoroughly below in the discussion concerning regulatory barriers to cloud services, the use of cloud-based services is typically accounted for as an “expense” and expense as opposed to capital investment is not included in rate base. Operations and maintenance expense is typically recovered dollar for dollar subject to certain ratemaking adjustments. Thus, customers do not obtain the benefit of extended repayment over a period of time, and utilities are not afforded an opportunity to earn a return on invested capital.

As discussed below, the costs advantages of on-site vs. cloud resources depends on the application, and in turn the cost advantages to the utility and customer depend on accounting and ratemaking considerations. The bottom line is that it really depends on the system, its useful life, function, and associated accounting that drive which category of resource is best for a utility to adopt for a given application.

2. Describe the costs associated with migrating utility data systems to cloud services. What evidence have stakeholders seen of this shift and what are the results? How long would it take to migrate utility data from on-premises IT to a cloud solution? Provide examples of utility services that have migrated from utility-owned systems to cloud services.

As technology advances, companies will begin to examine the benefit of replacing existing systems and migrating from traditional on-premises to cloud-based solutions. The cost of migrating from an existing on-premises system to a cloud-based system could be significant. This cost could be impacted by the intricacy of the data being migrated and the detail of mapping, conversion, migration, and data quality assurance involved in the process. However, the effort involved when moving from one system to another can be extensive and represent a significant part of any system conversion whether cloud-based or not.

At this point in time, Ameren Illinois has not migrated data from an on-premises solution to a cloud solution. And, due it its lack of experience in migrating data, Ameren Illinois is concerned that cloud-based solutions by their very nature allow for less customization than on-premises solutions which may result in some data from legacy systems having to continue to be maintained on premises to meet regulatory requirements and would eliminate any benefits that were to be realized from migrating to a cloud-based system. However, Ameren Illinois has utilized cloud-based solutions specifically for new system functionality. The time to launch the new cloud-based systems took between 90 days and less than 18 months. This allowed Ameren Illinois to begin to utilize the cloud-based system sooner and avoid spending limited time and resources designing and building an on-premises system.

3. Identify costs associated with training employees to use cloud-based solutions and whether those costs differ substantially from costs to train employees to use utility-owned, on-premises systems.

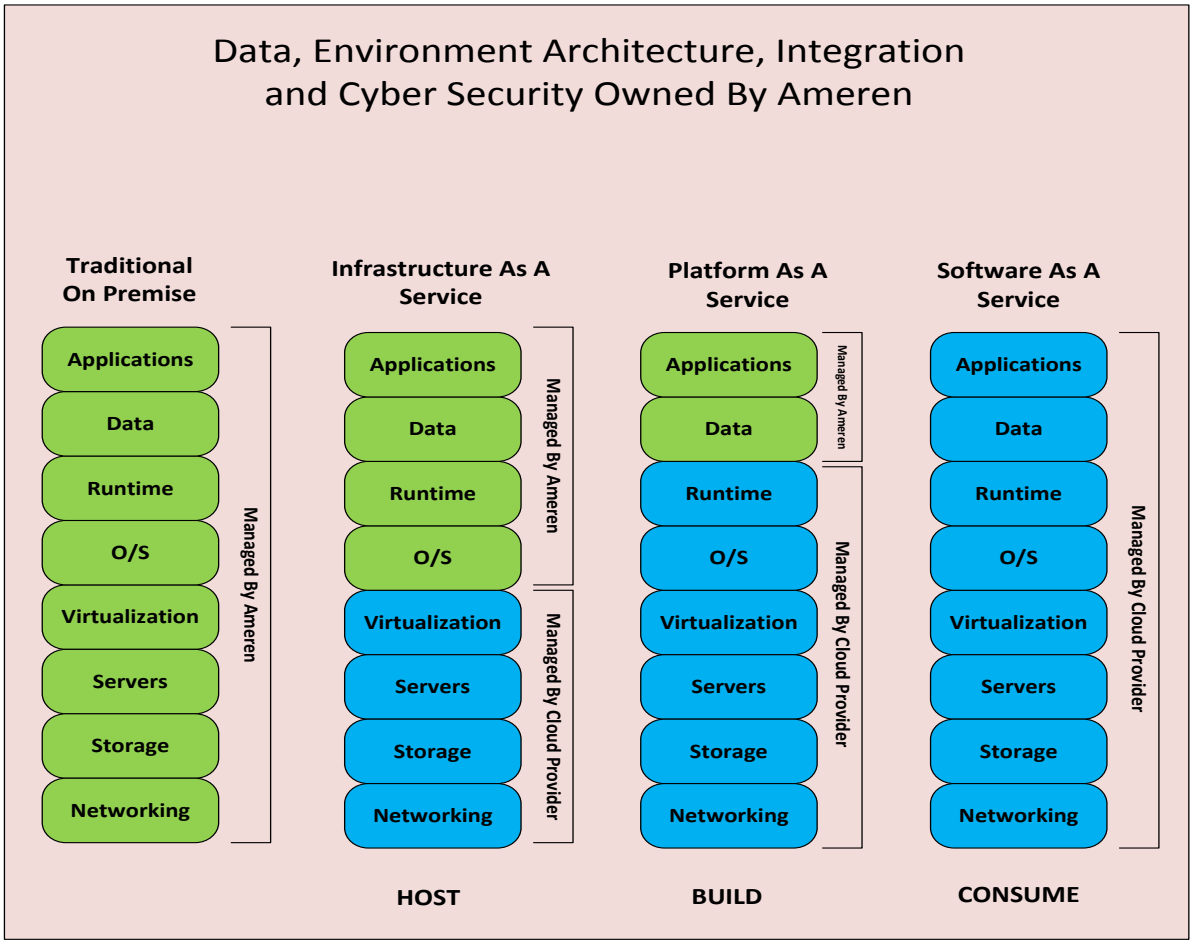
In Ameren Illinois' experience there has not been a substantial difference in the cost to train employees to utilize cloud-based versus utility-owned, on-premises solutions. Rather, what Ameren Illinois has observed is the learning curve for the IT support staff may actually be less with cloud-based solutions than with on-premises solutions. This is due to most cloud-based solutions being a configuration-based system vs. requiring traditional coding.

4. Describe whether and how operations and maintenance costs differ between utility-owned, on premises systems and cloud services.

The differences in costs between on-premises solutions and cloud-based solutions can vary based upon a multitude of factors. For example, a utility would be responsible for its on-premises system and would need to employ IT Staff specifically to maintain, repair, and update it as it ages. On the other hand, a utility would not be responsible for the maintenance of a cloud-based system because the utility would pay a subscription fee which would provide for the maintenance of the cloud by the provider.

In order to better understand the differences in costs it is imperative to understand that options available for utilities for cloud-based solutions. Today there are three basic types of cloud computing services and the primary difference among them is what portions of the infrastructure and applications that make up the solution are managed by the provider and what portions are managed by the utility.

The greater the portion of the solution provided by the cloud provider the larger the on-going subscription fee and, conversely, on-premises operations and maintenance cost may be reduced. The graphic below illustrates how operations and maintenance costs migrate to subscription fees based on the cloud offering being consumed.



Due to the significant cost synergies that are currently being realized by Ameren Illinois due to data center consolidations, application rationalization, and virtualization, realized reductions in O&M cost savings will occur slowly over time.

The three cloud offerings considered by Ameren Illinois and depicted in the graphic above are discussed below.

Infrastructure as a Service (IaaS)

IaaS is a type of cloud service where all compute infrastructure resources, including network, server, storage, and the virtualization technologies used, are managed by the cloud provider for Ameren Illinois. Ameren Illinois is limited to the compute options offered by

the provider. Ameren Illinois must still manage operating systems, runtime environments, data, and deployed applications.

Examples: Virtual servers and storage absent of Operating Systems and Applications

Appeals to: Infrastructure Teams

Platform as a Service (PaaS)

PaaS is a type of cloud service where all compute infrastructure resources, including network, server, storage, virtualization, operating systems, programming languages, and runtime environments, are managed by the cloud provider for Ameren Illinois. Ameren Illinois is constrained to the compute and platform options offered by the provider.

Examples: Azure App Service, Azure Machine Learning, Amazon Elastic Beanstalk

Appeals to: Developers, Rapid Innovators, and Tech Savvy Business Users

Software as a Service (SaaS)

SaaS is a type of cloud service where all compute infrastructure resources, including network, server, storage, virtualization, operating systems, runtime environment, data, and applications, are managed by the provider for Ameren Illinois.

Examples: Office 365, Saftey1Source, ServiceNow, Ultimate

Appeals to: Based on software offered, ranges from all levels of IT and business.

III. RELIABILITY

1. Describe whether and how cloud-based solutions improve safety and reliability at a utility.

In Ameren Illinois' opinion cloud-based solutions don't improve safety or grid reliability at a utility beyond that of on-premises solutions. It is imperative that no matter what solution is chosen by a utility that solution must be capable of providing reliable service because utilities, such as Ameren Illinois, have a mandate to serve their customers, operate a reliable energy grid, and protect their employees. However, Ameren Illinois recognizes that emerging cloud-based solutions are another alternative to be considered when developing solutions that meet the needs of all of their stakeholders in fulfilling this mandate.

2. Proven Cloud Technologies in Regulated Utilities

i. Identify the cloud services that have proven most successful for public utilities. Identify the differences between a public versus a private cloud, and determine whether one is more appropriate for the utility industry.

Ameren Illinois cannot speak for other utilities, but in its opinion cloud computing solutions have proven to be effective tools by improving collaboration, providing innovative and better client experiences, increasing IT efficiency, and improving the implementation speed of new processes and technologies. Cloud computing provides a highly automated, dynamic, and cost-effective alternative for the acquisition and delivery of IT services. Cloud-based solutions present opportunities to accelerate business value and free resources for utilities to focus on the core utility business. These opportunities have the potential to be so transformational that they should not be overlooked.

According to IBM as stated in *Cloud Computing for Energy and Utilities*

> Energy and utility companies face challenges from aging infrastructures, disruptive technologies, environmental concerns and new regulations. The companies must implement a decarbonization strategy, including renewable energy, and build a more intelligent, secure and reliable grid.

> They must meet their customers' growing demands for a better experience and comply with changing and strict regulations. Utilities must meet these challenges amidst a surge in structured and unstructured data, new technologies such as electric vehicles and energy storage, and their customers' reliance on social media.
>
> The transformation of the industry means energy and utility companies must invest in new technologies and optimize their existing processes, standardization and collaboration. Cloud technology has proven to be an effective tool in this transformation by improving collaboration, providing innovative and better client experiences, increasing IT efficiency, and improving the implementation speed of new processes and technologies.

In a public cloud, the services provided are offered to multiple clients who all share the same infrastructure. One of the main benefits that come with using public cloud services is near unlimited scalability. The resources are pretty much offered 'on demand' so any changes in activity level can be handled without negatively affecting the function of the cloud or another entity's use of the cloud. This level of scalability in public cloud options increases its cost effectiveness. Finally, the vast network of servers involved in public cloud services means that it can benefit from greater reliability. Even if one data center were to fail entirely, the network simply redistributes the load among the remaining centers making it highly unlikely that the public cloud would ever fail. In summary, the benefits of the public cloud are easy scalability, cost effectiveness, increased solution reliability and increased velocity of innovative change.

The main difference with public and private cloud services is that a private cloud service is a secure service offering accessible only by one client. It works on the same principles of a public cloud, but with only your organization having access. The main benefit of choosing a private cloud is the greater level of information/cybersecurity and control offered. Private cloud services also offer some other benefits for business users including more control over the infrastructure and timing of upgrades allowing it to be tailored to your specific business needs and requirements. While this can remove some of the scalability options and slow the pace of

innovative functionality additions, it is a viable alternative in many cases. In summary, the main benefits of the private cloud are improved security, greater control over the infrastructure and software changes and greater change stability and less associated organizational impact.

Due to sensitivity of information stored by utility companies security is of the upmost importance. Private and public cloud computing are at opposite ends of the "isolation" spectrum. Private cloud can be on-premises, managed by a third party, or hosted by a third party. Organizations building a private cloud service are emulating public cloud computing providers to acquire similar benefits − mainly agility in provisioning and managing infrastructure. Whichever system a utility chooses to deploy, it must choose the solution that is most appropriate for its specific needs without compromising safe and reliable service to the customer.

Utilities need to let the service and business requirements, rather than technologies, lead their cloud computing decisions. A cloud-based solution needs to provide the flexibility and cost efficiency that would be expected, as compared to a CAPEX (traditional on-premises) solution, in the short term, but more importantly in the longer term. But simply because cloud is defined as flexible, scalable, and pay-per-use should not be the reason for moving to cloud. There has to be a compelling business advantage that outweighs the on-premises alternative.

ii. Identify public utilities that have adopted cloud-based solutions and what effect cloud services have had on the utility's safety and reliability.

Ameren Illinois has conferred with its IT experts, who are employed by Ameren Services Company. Ameren Illinois is unable to speak for other utilities, but has gathered non-proprietary information concerning its own operations and those of its utility affiliates. Ameren companies are currently using a variety of cloud-based solutions. A list of the services being provided is identified in the table below.

Safety management system − Safety1Source
Employee Compensation
Wealth Benefits – NetBenefits
Healthcare & Life benefits, Annual Enrollment processes for employees and retirees; calculate pension benefits – BenefitsWeb
Talent Pooling & Candidate referral
Customer energy management portal
Crew callout and scheduling to find, assemble, and track repair crews to improve service restoration and emergency response
IT Service & Incident Management
Ticket Management system for customer underground locate requests
Real Estate Records Information Management System
Lake of Ozarks Shoreline Management GIS
Fleet telematics and GPS tracking for on-and off-road fleet assets
HR/Benefits Systems – Workforce Systems Alignment Initiative

From a safety perspective the deployment of Saftey1Source, a cloud-based service, has provided significant benefit to Ameren companies.

Prior to Safety1Source, Ameren companies lacked a central, enterprise-wide repository for safety data. In addition, the use of disparate tools and systems resulted in inconsistent and inadequate data that required hours of manual intervention to process and share. Ameren companies now have the ability to track and trend safety indicators and access near real-time data which allows for proactive training and informed decision-making.

Safety1Source has increased efficiency of core safety processes, namely on-the-job safety behavior observation and incident data tracking. The future implementation of mobile technology to support coworker-to-coworker (c2c) interactions, job briefings, and near miss reporting will increase efficiency, reduce administrative load, and offer near real-time access to safety information. Safety1Source allows migration of our Safety Data Sheet (SDS) information from an unsupported and non-compliant system (as of June 2016) to a centralized, efficient source.

iii. Identify circumstances where the utility and its customers are better served by a combination of utility-owned, on-premises IT systems and cloud services, a "hybrid" model. What approach best maximizes reliability, safety and security for a utility and its customers?

Ameren Illinois considers cloud computing a viable IT service delivery model that can provide part or all of nearly any service that can be delivered with traditional on-premises IT solutions. Cloud-based solutions also offer services that are not available via the traditional on-premises model. Accordingly, understanding the business and technical requirements, opportunities, risks, and costs are foundational in deciding whether a cloud-based IT solution makes business-sense. The table below provides a framework that Ameren Illinois has developed to help business and IT leaders evaluate cloud opportunities.

Solution Questions and Characteristics	More Suited for Cloud Computing	←	→	Less Suited for Cloud Computing
Commoditized software with no or little potential for a differentiator or heavy customization	X			
Ultra High Availability Required				X
Ameren wants to innovate in this area or we expect lots of frequent fluctuating compute needs	X			
We want to follow on after the leaders or early adopters		X	X	
Solution is only required to operate part of day or year and can be turned off when not used	X			
Heavily integrated with legacy real-time Ameren-hosted software				X
Frequent large data movements between Ameren on-premises and Cloud Computing			X	

Here are some example use-cases that Ameren feels have a potential to be well suited for Cloud Computing:

- Agile and dynamic creation of innovation sandboxes to prototype and test new business capabilities

- Pay-as-you use alternatives to Ameren's delivery and management of Business-recognized IT services
- IT services may be delivered directly to users via Internet and mobile channels
- Leveraging of pre-engineered disaster recovery solutions
- Commoditized solutions which represent standardized business practices within and across industries such as customer management, asset management, and human resource management

Likewise, here are a few examples of solutions that are likely not well-suited for Cloud Computing today:

- Grid Operations and highly critical systems
- Wholesale moving legacy systems from on-premises to cloud-computing solutions
- Large and frequent data movements between Ameren on-premises and Cloud Computing solutions

Conversely, there are some cases where cloud computing may be the only practical solution to a problem:

- Grid Analytics and other similar services that require extremely large and rapidly changing computing needs
- Cloud-based solutions can be used to rapidly bring on-line hundreds or thousands of virtual machines to perform a load test or solve a complicated problem requiring large amounts of compute or storage. When the load test or problem analysis is complete the compute and storage can be released. The elasticity afforded by cloud-based solutions allows a utility to pay for only what they need when they need it.

3. Identify successful cloud services adopted by non-utility, but highly regulated, companies or industries. Explain any lessons from their experience that can help maximize reliability, safety, and security for a utility and its customers.

Ameren Illinois does not have any relevant information to submit for this inquiry.

IV. CYBERSECURITY

1. Cloud Security

i. Describe whether and how utilities will benefit from the cybersecurity practices provided by cloud-based solutions providers versus those associated with on-premises solutions.

Cloud-based solution providers must deliver strong cybersecurity protections to their customers in order to compete for and maintain a viable business model. Ameren Illinois is unable to speak for other utilities, but it considers the cybersecurity practices of its providers when evaluating and selecting a cloud-based provider. Since cloud-based providers supply their product to many customers, they must protect each customer's data and provide assurances as to their cybersecurity policies and practices. For this reason, most utilities should expect cloud-based solution providers to maintain a level of cybersecurity which is at least equal to or even better than their on-premises policies and practices.

ii. Identify any cybersecurity benefits of using a cloud-based solution versus an on-premises IT system.

Due to the type of business model that cloud providers operate under, Cybersecurity is one of their best marketing assets. Therefore, utilities can take advantage of a wide range of cybersecurity controls available from the cloud-based providers that can be tailored to align with specific business requirements. Many cloud-based providers must operate under strict audit regulations and requirements which would afford utilities the assurance that cybersecurity controls are operating effectively. This is a significant benefit for smaller utilities that may be resource constrained and are not able to hire the appropriately trained IT staff or cannot build their own on-premises system to their specifications.

2. New Risks

i. Describe the extent of new risks introduced (if any) when a utility migrates to a cloud-based solution from an existing on-premises system.

Ameren Illinois is unable to speak for other utilities, but Ameren Illinois is of the opinion that with proper vendor assessment and contract negotiation and enforcement moving to the cloud does not increase or create significant new risks. However, Ameren Illinois is aware that

any migration from an on-premises system to a cloud-based solution does not reduce the threat of security risks and that no matter what platform is utilized by a utility it will need to be vigilant in protecting its data − assessing constantly to address vulnerable gaps in cybersecurity.

3. Incident Response

i. Describe how cloud-based solution providers can respond to cybersecurity threats in contrast to utilities utilizing on-premises systems.

Cloud-based solution providers are exposed to a much broader cybersecurity threat landscape than any single utility is typically required to manage. This broad scope allows cloud-based providers to better anticipate and prepare defense programs to protect against the ever-increasing threat landscape compared to any single utility.

The experience gained by managing this larger threat landscape has motivated cloud service providers to maintain a level of cybersecurity skill sets that would be difficult for a single utility to achieve. These skills can be leveraged, to not only protect and defend against malicious cyber activities, but can prove valuable in aiding in the rapid recovery of systems if a compromise were to occur.

4. Threat Detection

i. Describe whether and how a cloud-based solution can assist a utility in protecting, detecting, and responding to cybersecurity threats and operational vulnerabilities.

Ameren Illinois believes that due to cloud-based solution providers' expertise in cybersecurity they are the in the best position to assist a utility in protecting, detecting, and responding to cybersecurity threats and operational vulnerabilities. Cloud-based solution providers can assist utilities in responding to cyber threats in the following ways:

- Utilize shared threat intelligence across utilities and across industry to be able to identify potential threats and inform utilities that an attack is imminent

- Utilize services to be able to analyze data and identify potential utility breaches that will improve the overall cybersecurity situational awareness
- Utilize managed services to be able to assist utilities in managing the daily cybersecurity operations and incident handling process
- Utilize shared cloud-based platforms that enable utilities a mechanism to implement solutions quicker for the protection against, detection of, and response to attacks. As the threat landscape changes, it is essential to be able to stay current with the latest technologies and platforms that will protect the utility from attackers.

5. Security Framework for Utilities

i. Identify the key elements and value of a security best-practices framework for utilities to address cybersecurity threats.

The key elements and value of cybersecurity best practices allow utilities to customize a cybersecurity controls approach based on the threats and risks to the organization. A viable cybersecurity program must contain at least the following three elements:

- A consistent methodology to manage risk and measure capability maturity
- A long-term strategy to meet the customer and business needs of the future and to continually mature and improve the program
- A strong controls framework to ensure that the program implemented is working as designed and is sustainable over the course of time

Frameworks are critical to program effectiveness and sustainability. They help identify and standardize known key controls that can be tailored for specific systems. These best practices aid in the development of a strong cybersecurity controls framework. However, cybersecurity and the systems it protects are bombarded with ever-changing and evolving threats and therefore these best practices must be reviewed and updated regularly to ensure that they are in front of any potential attacks or threats.

ii. Identify the security best-practices framework you would recommend for Commission adoption and explain why.

On January 8, 2015, the Energy Department released guidance to help the energy sector establish or align existing cybersecurity risk management programs to meet the objectives of the Cybersecurity Framework released by the National Institute of Standards and Technology (NIST) in February 2014. The voluntary Cybersecurity Framework consists of standards, guidelines, and practices to promote the protection of critical infrastructure and was developed in response to Executive Order 13636, "Improving Critical Infrastructure Cybersecurity," through collaboration between industry and government. In developing this guidance, the Energy Department collaborated with private sector stakeholders through the Electricity Subsector Coordinating Council and the Oil & Natural Gas Subsector Coordinating Council. The Department also coordinated with other Sector-specific agency representatives and interested governmental stakeholders.

The Electricity Subsector Cybersecurity Capability Maturity Model (ES-C2M2) was developed in support of a White House initiative led by the Department of Energy (DOE), in partnership with the Department of Homeland Security (DHS), and in collaboration with industry, private-sector, and public-sector experts. The model was developed collaboratively with an industry advisory group through a series of working sessions and revised based on feedback from industry experts and pilot evaluations. The advisory group for the initiative included representatives from industry associations, utilities, and government. Additionally, more than 40 subject matter experts (SMEs) from industry participated in the development of the model.

Utilities generally turn to an established controls framework to assess program maturity and again in the development of plans to address maturity improvement opportunities. Ameren utilized NIST 800.53 for this purpose.

Accordingly, Ameren Illinois does not think there is a need for the states to mandate additional cybersecurity regulations or a prescribed framework.

6. Security Framework for Cloud Providers

i. Identify the key elements and value of standardized security requirements for cloud-based solution providers.

Utilities are highly regulated entities and therefore must review each cloud-based solution for potential new threats, increased risk, and mitigating cybersecurity controls in order to establish a cybersecurity baseline which would be a reflection of the utility's system controls. By having standardized security requirements for cloud-based solutions, utilities can define a consistent baseline of minimum cybersecurity controls to which the cloud-based solutions must adhere and then focus on any unmitigated threats.

ii. Identify and explain the security best-practices framework you would recommend the Commission adopt for cloud services. Explain how this framework differs from security best-practices you would recommend for on-premises systems.

Ameren Corporation (Ameren), Ameren Illinois' parent company, currently uses NIST 800.53 and PCI standards as the foundation of cloud-based services requirements.

Ameren does not think there is a need for the states to mandate additional cybersecurity regulations or a prescribed framework. Cybersecurity is changing constantly and new threats arise daily and the challenge to address these threats is constant. Ameren does not believe that the Commission could efficiently or accurately address cybersecurity concerns which could lead to risking the safety and reliability of the system, negatively impacting customers in the process.

iii. Identify the key elements and value of standardized due diligence guidelines for utilities when selecting cloud-based solution providers. Explain how this guidance is different from selecting on-premises solutions.

Ameren utilizes the same processes for on-premises and cloud-based solutions. Depending on the risks associated with the solution, the Company assesses the cybersecurity control structure used in conjunction with the solution regardless of the location, cloud-based or on-premises based.

iv. Identify the cloud services selection guidelines you would recommend for Commission adoption and explain why.

Please see Ameren Illinois' response to Cybersecurity question 6.iii.

7. Best Practices

i. Describe how best practices in protecting sensitive utility and customer information differ between cloud-based hosting and on-premises hosting.

There should not be any differences between security requirements for securing on-premises data and cloud-based data. Regardless of where customer information is being hosted the practice should be to protect the customers' information.

8. Compliance

i. Describe whether and how cloud-based solutions can improve utility compliance, privacy, and data security.

Many cloud-based providers must operate under strict audit regulations and requirements which would afford utilities the assurance that cybersecurity controls are operating effectively. Utilities may improve their compliance processes by adopting cloud-based providers' standard and repeatable control processes. This is especially true if a utility is resource constrained or is preparing to undertake a significant control implement or refresh initiative.

9. What Should Utilities Avoid Putting in the Cloud?

i. Describe the utility functions − including generation, transmission, distribution, metering, consumption, customer data management and customer experience − that should not be placed in the cloud and explain why. Would your answer depend on whether the information was placed in a public versus private cloud?

Ameren is unable to speak for other utilities, but at this time Ameren Illinois does not believe that Operational Industrial Control Systems/System Control and Data Acquisition (ICS/SCADA) should run in a Cloud offering whether it is a public or private based cloud. However, customer data operations, analytics, and non-ICS/SCADA systems can be considered in order to achieve the best customer value and experience. However, the choice of what information should or should not be stored in the cloud should be based upon the utilities own individual analysis and level of cybersecurity protection.

10. Connectivity

i. Describe how existing utility IT systems that are not currently interconnected can be made to integrate if hosted in the cloud. What are the benefits and vulnerabilities introduced by interconnecting various utility IT services?

If systems are not interconnected from an on-premises solution, then individual cloud-based solutions will not help by integrating these technologies. Some benefits of an interconnected system are that it will increase productivity of workforces and provide operational efficiencies and are essential to providing the real-time situational awareness required to ensure grid reliability. Most IT systems are interconnected today and this trend will accelerate as utilities leverage the power integrating mobility and analytics and the Internet of Things (IoT) technologies to meet the needs of our customers in the future.

Cybersecurity programs must continually be enhanced and evolve to provide adequate protection of highly-interconnected systems. This requirement exists whether solutions are on-premises or cloud-based.

V. REGULATORY BARRIERS

1. Ratemaking Treatment:

i. Does current ratemaking practice discourage Illinois utilities from deploying cloud-based solutions (e.g., data analytics) provided by third party vendors?

In almost all situations identified by Ameren Illinois, the applicable Generally Accepted Accounting Principles (GAAP) requires software acquired under a cloud-based arrangement to be expensed. In certain very limited circumstances these GAAP rules allow cloud-based expenditures to be capitalized. However, under both cloud-based and on-premises scenarios, there is a significant cost to acquire and implement the software. Current Illinois ratemaking practice follows the GAAP rules. This current ratemaking practice is a disincentive for utilities to pursue cloud-based solutions, since such expenditures which were formerly capitalized, and provided a return on capital, are now expensed. This current ratemaking practice is also inequitable for ratepayers because all the costs to acquire and implement the software will be expensed, and included in customer rates, in one year rather than capitalized and amortized over the years benefitted. Ameren Illinois recommends that the Commission issue an order or initiate a rulemaking which would provide for more equitable ratepayer treatment and remove the disincentive and, instead, incent utilities to adopt and implement cloud-based solutions when they are superior to other alternatives.

Until recently, GAAP did not include explicit guidance as to how customers of cloud computing arrangements should account for the fees paid under the arrangements. Therefore, the

Financial Accounting Standards Board (FASB) adopted the following intangible asset criteria to determine if a cloud computing arrangement contains a license and can therefore be capitalized:

a) The customer has the contractual right to take possession of the software at any time during the hosting period without significant penalty; and
b) It is feasible for the customer to either run the software on its own hardware or contract with another party unrelated to the vendor to host the software.

Ameren Illinois anticipates that almost all cloud-based software contracts will not satisfy these criteria. Further, the guidance is silent regarding the accounting treatment for up-front implementation costs.

This artificial distinction in GAAP, between investing in cloud-based solutions and investing in on-premises solutions, does not make sense for three categories of costs: 1) upfront fees paid to the vendor, 2) customization costs to adapt the software to the company's specific requirements, and 3) normal implementation costs. From an operational perspective, these costs are very similar, or identical, to those that would be incurred if the Company were to purchase and own the software. In fact, the "upfront fee paid to the vendor" could be a negotiated contract payment that restores the cloud-based solution to "neutrality," in essence replicating an amount approximately equal to what the Company would have paid to purchase and own the software. There is no reasonable justification, other than this GAAP rule, that would require utilities to expense these costs immediately instead of allowing for them to be capitalized and amortized over the time periods they are expected to benefit customers.

As an alternative to capitalizing the upfront fees and implementation costs, cloud computing arrangements could be accounted for as capital leases.[1] Under capital lease

[1] The term "capital lease" is present in current GAAP within topic ASC-840 (leases). New guidance effective January 1, 2019, replaces the "capital lease" concept with a "financing lease."

accounting, the present value of the payments due under the cloud computing arrangement would be capitalized by utilities as an intangible asset. The intangible asset would have an associated capital lease obligation that would be included in the utilities capital structure as debt.

Ameren Illinois believes the FASB, which makes rules that apply to all companies that prepare GAAP financial statements, did not consider the specialized and data intensive cloud-based requirements the utility industry anticipates in the coming years. For example, various smart grid initiatives contemplate providing real-time electric and gas usage data to customers and other stakeholders across the entire energy delivery system. This will entail capturing, analyzing, and distributing very large amounts of data and this may not be possible for the utility to do in a cost-effective manner without cloud-based software.

Ameren Illinois and its parent company Ameren Corporation have cautiously adopted various cloud computing arrangements. Currently, the Company is utilizing several cloud computing arrangements. Safety1Source is its safety management system. Aclara is a customer energy management portal. ARCOS is the cloud-based solution used for crew callout and scheduling to find, assemble, and track repair crews to enhance service restoration and emergency response. ServiceNow is the Company's IT Service Management system. The ticket management system for customer underground locate requests is Irthnet. Datanet is utilized as a real estate records information management system. Trailhead GIS is utilized by its sister company as its Lake of the Ozarks Shoreline Management GIS. Zonar provides fleet telematics and GPS tracking for on-and off-road fleet assets.

As with other software and infrastructure vendor offerings, utilities should evaluate cloud solutions on the basis of the following criteria.

- Functionality: Utilities must conduct a thorough evaluation of the solution based upon business functionality and technical requirements.

- Privacy and Security: When considering solutions, utilities must completely evaluate them based upon current cyber security standards and requirements.
- Business Case: Thorough cost/benefit analysis that compares the cost of on-premises deployment and on-going support with cloud deployment and on-going support must be completed. Accelerated value realization can be reflected in the business case based upon ability to rapidly deliver new functionality, compared to on-premises delivery model.

In summary, the ICC should clarify that in cloud-computing arrangements upfront fees paid to cloud providers (including amounts paid to restore neutrality), customization costs and implementation costs are intangible assets. These costs should be included in the Intangible Asset account in Property, Plant and Equipment, and thereby become eligible for rate base treatment. Despite the GAAP rule, the ICC should direct or order utilities to capitalize the three categories of cost previously discussed. Alternatively, the ICC should allow utilities to account for cloud computing arrangements as capital leases whereby the present value of the payments due under the arrangement would be capitalized by utilities as an intangible asset. Such intangible asset would have an associated capital lease obligation that would be included in the utilities capital structure as debt.

The Company suggests that the most expedient way to accomplish this is by Commission order. As an alternative, with a more lasting effect, this could also be accomplished through a rulemaking proceeding.

ii. Describe any reasonable justification for accounting ratemaking distinction between investing in cloud-based solutions and investing in on-premises solutions.

Please see Ameren Illinois' response to Regulatory Barriers question 1.i.

iii. Describe whether and how utilities are adopting cloud-based solutions despite its accounting treatment.

Please see Ameren Illinois' response to Regulatory Barriers question 1.i.

iv. *Identify alternative ratemaking treatments that would render Illinois utilities indifferent in either choosing to deploy cloud-based solutions provided by third party vendors or continuing with on-premises IT systems owned by the utility.*

1. For each alternative identified, identify the costs and benefits of implementing that alternative.

Please see Ameren Illinois' response to Regulatory Barriers question 1.i.

2. For each alternative identified, identify Illinois administrative rules that would need to be revised, and the revision(s) required, in order to implement that alternative.

Please see Ameren Illinois' response to Regulatory Barriers question 1.i.

2. Other Barriers:

i. *Identify and explain any other regulatory barriers that discourage Illinois utilities from deploying cloud-based solutions (e.g., data analytics) that would otherwise be in the best interest of the utility and its customers. For each barrier identified, identify Illinois administrative rules that would need to be revised, and the revision(s) required, to eliminate that barrier.*

Other than those previously identified in these comments, Ameren Illinois is not aware of any other regulatory barriers.

VI. <u>Additional Benefits of Cloud Deployment:</u>

1. Describe the types of cloud-based technologies available for electric, gas, and water utilities.

As previously discussed, there are many cloud-based technologies for utilities and many traditional applications could be housed on the cloud.

Cloud computing has many dimensions. A few of those dimensions include:

- Use of third-party hardware such as servers or telecom infrastructure.
- Use of third-party software platforms such as Salesforce.com, Microsoft 360, etc.
- Use of applications developed by the utility or a third-party using a platform provided by an organization such as Microsoft or Salesforce.com and hosted by a hardware service provider such as Amazon.

Cloud computing applications may be applied to most business functions. Additionally, electric and gas utilities may use cloud computing applications for asset performance, predictive maintenance, energy efficiency, system performance, and customer usage and interfaces among many other possibilities.

2. In electric utilities:

i. Identify specific software services not currently deployed in Illinois available to engage customers in distributed generation, distributed storage, demand response, and energy efficiency programs. Are those tools available as on-premises and cloud solutions, or is only one option available?

Cloud-based energy efficiency (EE) software applications critical to the EE industry, most of which Ameren Illinois is using directly or indirectly through a contractor, include:

- Program and portfolio tracking systems used by program administrators
- Systems that allow program implementers and customers to submit projects, receive status reports and request incentives.
- Behavior programs that allow customers to use third-party services and data to monitor weather and resultant impact on usage.
- Demand response programs that control customer equipment such as thermostats.

The process for interconnecting and managing the database of distributed generation/parallel generation customers, locations, characteristics, etc. needs to be automated due to existing and predicted levels of distributed generation (DG) interconnections.

Such an automated process would need to interact with other Company databases (such as GTech, the Company's mapping tool, and potentially CSS, its customer service system) which may be cloud-based in the future.

Speaking specifically to the DG interconnection process system/database, it is unknown whether such a solution is currently available in both Cloud and non-Cloud versions.

- We haven't conducted a purchasing process for the system.

- Software selection criteria would include protection for customer-identifiable data and links to other Company systems that can't be exploited for hacking purposes.

ii. Identify specific services not currently deployed in Illinois that could provide customer engagement portals that improve customer engagement, increase customer satisfaction, and help meet regulatory mandates for verified energy savings and demand reduction.

While Ameren Illinois cannot identify specific services that are not currently deployed by electric utilities in Illinois, the Company does use a Peak Time Rewards program for Demand Response. Ameren Illinois developed the capability in Ameren-hosted applications to calculate rewards. The rewards are posted online using a cloud-based solution for customers to access.

AIC also uses a cloud-based solution to present account information to customers online.

3. In water and gas utilities:

i. Identify the types of software or services not currently deployed in Illinois that could improve customer engagement and increase customer satisfaction.

Ameren Illinois does not have a list of software or services not currently deployed by water and gas utilities in Illinois; however, the Company does use a cloud-based solution to provide information to customers about their bills and usage on the web. The Company also uses a cloud-based solution to generate and send billing alerts, usage alerts, and weekly cost summaries to residential customers using text and/or e-mail.

ii. Identify the types of software or services not currently deployed in Illinois that could detect leaks and inefficiencies, improve conservation, and lower operating costs.

Ameren Illinois uses a cloud-based solution to analyze meter data from AMI, AMR, and legacy meters. The functionality we have implemented to date includes automated clearing of stopped/stuck meter orders for electric and gas, automated orders for investigation of

theft/diversion of AMR/AMI electric service, and analysis of AMI network performance to determine route cutover to over-the-air billing. For leak detection, we are working with our AMI technology vendor to develop that functionality, but that will be an in-house hosted application that will flag leaks.

4. Describe any additional feature benefits to a utility when adopting a cloud-based solution. For example, what are the benefits of cloud software that analyzes consumption patterns, identifies malfunctioning meters, reduces unbilled energy, or engages in predictive maintenance and load forecasting, among other things.

Ameren Illinois uses a cloud-based solution to analyze meter data from AMI, AMR, and legacy meters. The functionality we have implemented to date includes automated clearing of stopped/stuck meter orders for electric and gas, automated orders for investigation of theft/diversion of AMR/AMI electric service, and analysis of AMI network performance to determine route cutover to over-the-air billing.

Our current road map for meter-related cloud-based analytics is available on the next page. These activities focus more on the operations, as opposed to customer engagement analytics. We are also doing some in-house customer engagement analytics work which consists of, but is not limited to, data mining to develop propensity scores to drive customers to use our web-based self-service options.

Asset Performance software is beneficial in predictive maintenance and system planning. Ameren Illinois is currently engaged in a data analytics pilot tied to substation transformers and gas storage compressors.

Services provided are available through multiple vendors resulting in a competitive acquisition process.

VII. CONCLUSION

Ameren Illinois appreciates the opportunity to provide comments in response to the Commission's Notice of Inquiry and looks forward to continued progress and discussion on these important issues.

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Respectfully submitted,

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