BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

*** * * * ***

IN THE MATTER OF ADVICE NO. 961-	**)**	
GAS OF PUBLIC SERVICE COMPANY	**)**	
OF COLORADO TO REVISE ITS	**)**	
COLORADO PUC NO. 6-GAS TARIFF	**)**	
TO INCREASE JURISDICTIONAL BASE	**)**	
RATE REVENUES, IMPLEMENT NEW	**)**	**PROCEEDING NO. 20AL-_____G**
BASE RATES FOR ALL GAS RATE	**)**	
SCHEDULES, AND MAKE OTHER	**)**	
PROPOSED TARIFF CHANGES	**)**	
EFFECTIVE MARCH 7, 2020	**)**	

DIRECT TESTIMONY AND ATTACHMENTS OF SRIDHAR KONERU

ON

BEHALF OF

PUBLIC SERVICE COMPANY OF COLORADO

February 5, 2020

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO**

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IN THE MATTER OF ADVICE NO. 961-GAS OF PUBLIC SERVICE COMPANY OF COLORADO TO REVISE ITS COLORADO PUC NO. 6-GAS TARIFF TO INCREASE JURISDICTIONAL BASE RATE REVENUES, IMPLEMENT NEW BASE RATES FOR ALL GAS RATE SCHEDULES, AND MAKE OTHER PROPOSED TARIFF CHANGES EFFECTIVE MARCH 7, 2020	)	**PROCEEDING NO. 20AL-_____G**

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GLOSSARY OF ACRONYMS AND DEFINED TERMS

Acronym/Defined Term	Meaning
2016 HTY	2016 Historical Test Year
2017 Gas Phase I	Proceeding No. 17AL-0363G
2019 Electric Phase I	Proceeding No. 19AL-0268E
API	Automatic Program Interface
AVP	Area Vice President
Commission	Colorado Public Utilities Commission
CRM	Customer Relationship Management
CRS	Customer Resource System
DACS	Digital Cross-Connect System
DMZ	Demilitarized Zone
DRMS	Demand Response Management System
ESB	Enterprise Service Bus
eSOMS	Electronic Shift Operations Management Systems
FERC	Federal Energy Regulatory Commission
GL	General Ledger
GMS	Gas Management System
HTY	Historical Test Year
IT	Information Technology
LAN	Local Area Network
LMR	Land Mobile Radio

Acronym/Defined Term	**Meaning**
LNI	Logical Network Inventories
MAOP	Maximum Allowable Operating Pressure
O&M	Operations and Maintenance
PC	Personal Computer
PNI	Physical Network Inventory
PTT	Productivity Through Technology
Public Service or the Company	Public Service Company of Colorado
Quorum System	Quorum Pipeline Transaction Management
SAP	Systems, Applications, and Projects
SCADA	Supervisory Control and Data Acquisition
WAM	Work and Asset Management
WAN	Wide Area Network
Xcel Energy	Xcel Energy Inc.
XES	Xcel Energy Services Inc.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

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IN THE MATTER OF ADVICE NO. 961-GAS OF PUBLIC SERVICE COMPANY OF COLORADO TO REVISE ITS COLORADO PUC NO. 6-GAS TARIFF TO INCREASE JURISDICTIONAL BASE RATE REVENUES, IMPLEMENT NEW BASE RATES FOR ALL GAS RATE SCHEDULES, AND MAKE OTHER PROPOSED TARIFF CHANGES EFFECTIVE MARCH 7, 2020	)	**PROCEEDING NO. 20AL-_____G**

DIRECT TESTIMONY AND ATTACHMENTS OF SRIDHAR KONERU

I. INTRODUCTION, QUALIFICATIONS, PURPOSE OF TESTIMONY, AND RECOMMENDATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Sridhar Koneru. My business address is 414 Nicollet Mall, Suite 400, Minneapolis, Minnesota 55401.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am employed by Xcel Energy Services Inc. ("XES") as the Area Vice President ("AVP") of Digital Strategy. XES is a wholly-owned subsidiary of Xcel Energy Inc. ("Xcel Energy"), and provides an array of support services to Public Service Company of Colorado ("Public Service" or the "Company") and the other utility operating company subsidiaries of Xcel Energy on a coordinated basis.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A. I am testifying on behalf of Public Service.

Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AND QUALIFICATIONS.

A. As the AVP of Digital Strategy, I am responsible for the technology, digital strategy and delivery of Information Technology ("IT") projects in the XES Business Systems organization. Business Systems provides IT services to XES and the Xcel Energy operating companies, including Public Service, primarily on a common platform, with costs allocated to specific utilities and jurisdictions consistent with the Direct Testimonies of Company witnesses Ms. Melissa L. Schmidt, Ms. Laurie J. Wold, and Ms. Deborah A. Blair. A description of my qualifications, duties, and responsibilities is set forth in my Statement of Qualifications at the conclusion of my Direct Testimony.

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. The purpose of my Direct Testimony is to support Business Systems's capital additions since the last gas Phase I rate case in Proceeding No. 17AL-0363G ("2017 Gas Phase I") and those capital additions planned through September 30, 2020. In the 2017 Gas Phase I, a 2016 historical test year was approved ("2016 HTY"). As discussed by Company witness Ms. Brooke A. Trammell in her Direct Testimony, the Company is proposing to utilize a test year in this rate case ending September 30, 2020, based upon historical costs for the 12-months ended September 30, 2019, adjusted for known and measurable changes to operations and maintenance ("O&M") expenses and revenue through September 30, 2020, and capital additions expected to close to plant in-service by September 30, 2020. ("Test Year"). As a result, in my Direct Testimony, I discuss the Company's $283.7 million (Total Company) in Business Systems's capital additions placed in

service from January 1, 2017, through September 30, 2019, and the $78.6 million (Total Company) in Business Systems's plant additions forecasted to be placed in service as of September 30, 2020. These additions are discussed in Sections V and VI of my Direct Testimony, respectively.

As I discuss in more detail below, Business Systems's capital additions from January 1, 2017 to September 30, 2019, include $112 million (Total Company) in costs for the Work and Asset Management ("WAM") system that was approved in the Company's 2017 Gas Phase I as a known and measurable adjustment to the 2016 HTY. I also note that since many of the capital projects completed by Business Systems are common gas/electric department projects, these projects were previously discussed and examined as part of the Company's 2019 electric rate case (Proceeding No. 19AL-0268E) ("2019 Electric Phase I").

Further, all of these capital amounts are provided in terms of "Total Company" amounts (i.e., total Public Service level) and these capital additions are appropriately allocated to Public Service retail gas customers and included in the cost of service that is presented by Ms. Blair. Ms. Blair discusses the allocation of common plant to the Gas Department in her Direct Testimony. Ms. Wold has calculated the monthly plant balances, which were in turn used by Ms. Blair for the year-end plant in-service balances in the cost of service.

Finally, in Section VII of my Direct Testimony, I support the $27.3 million (Total Company Gas) in Business Systems's 2019 O&M expenses and discuss

the drivers of related increased O&M from the 2017 Gas Phase I, as compared to the twelve month period ended September 30, 2019.

Q. ARE YOU SPONSORING ANY ATTACHMENTS WITH YOUR DIRECT TESTIMONY?

A. Yes, I am sponsoring the following attachments:

- Attachment SK-1: Business Systems's Capital Additions January 1, 2017–September 30, 2020;
- Attachment SK-2: Business Systems's O&M Expenses from October 1, 2018 to September 30, 2019 by Cost Element; and
- Attachment SK-3: Business Systems's O&M Expenses from October 1, 2018 to September 30, 2019 by Federal Energy Regulatory Commission ("FERC") Account.

Q. WHAT RECOMMENDATIONS ARE YOU MAKING IN YOUR DIRECT TESTIMONY?

A. As part of approving the revenue requirement developed by Ms. Blair, I recommend that the Colorado Public Utilities Commission ("Commission") approve the January 1, 2017 to September 30, 2020 Business Systems's capital additions and Business Systems's O&M expenses for the Test Year.

II. BUSINESS SYSTEMS FUNCTIONS AND RESPONSIBILITIES

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR DIRECT TESTIMONY?

A. The purpose of this section of my Direct Testimony is to provide an overview of Xcel Energy's Business Systems Business Area, including its key functions and responsibilities.

Q. PLEASE PROVIDE AN OVERVIEW OF THE BUSINESS SYSTEMS BUSINESS AREA.

A. Business Systems is Xcel Energy's centralized IT organization, providing technology services to support all aspects of the operations of the Xcel Energy operating companies, including Public Service. While some IT projects are specific to an individual operating company and/or to electric or gas jurisdictions, the majority of Business Systems work is completed on an Xcel Energy-wide basis. In this era, it is hard to identify an aspect of Xcel Energy's operations that Business Systems does not support in some manner.

Q. PLEASE DESCRIBE THE KEY FUNCTIONS AND RESPONSIBILITIES OF BUSINESS SYSTEMS.

A. The key services Business Systems provides include the following:

- *Foundational Technology Infrastructure:* Support for each employee's hardware and software needs, including providing and maintaining hardware such as computers, phones, and servers; maintaining and updating operating systems; and providing sufficient data storage capabilities. Business

Systems also provides protection from cybersecurity attacks, including but not limited to computer viruses.

- *Systems Control:* Technology support to our business areas to enable management and operation of the electric and gas system. One of the systems that we maintain is the Outage Management System, which tracks customer outages and dispatches repair crews to restore service. Business Systems also supports the Supervisory Control and Data Acquisition ("SCADA") system, which is, among other things, used to monitor the Company's gas and electric transmission and distribution systems, as further discussed by Company witness Luke A. Litteken in his Direct Testimony.
- *Customer IT Support:* Hardware and software needed to facilitate interactions with Public Service customers. These activities include maintaining the Xcel Energy website that provides important information to customers about the status of their account, safety, and Public Service operations. Business Systems also maintains the Customer Resource System ("CRS"), which is our customer information system, and which generates billing statements to Public Service retail customers on a monthly basis. Business Systems also supports the Interactive Voice Response software that enables interaction with customers via telephone keypad or speech recognition.
- *Corporate IT Support:* Business Systems provides IT support for necessary corporate functions such as Human Resources, Legal, Supply Chain, Corporate Communications, Regulatory, and Financial Management.

Q. HOW DOES BUSINESS SYSTEMS SUPPORT THE FUNCTIONS DESCRIBED ABOVE?

A. Along with our day-to-day work with the technology we have deployed, Business Systems makes capital investments and incurs O&M expenses to support other business areas and functions across Xcel Energy. I discuss these capital investments and O&M expenses throughout the remainder of my Direct Testimony.

III. BUSINESS SYSTEMS BUDGETING AND PLANNING

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR DIRECT TESTIMONY?

A. The purpose of this section of my Direct Testimony is to discuss the project development and management processes used by Business Systems, along with its capital spending, budgeting, and funding.

A. Overview of Capital Project Needs

Q. WHAT ARE THE PRIMARY DRIVERS OF BUSINESS SYSTEMS'S CAPITAL ADDITIONS?

A. The five key areas that drive the budget forecasts for Business Systems are:

- Replacing aging technology;
- Enhancing capabilities of our business and our ability to serve our customers;
- Investments to improve the customer experience;
- Addressing evolving cybersecurity threats and requirements; and
- Responding to emergent demands for IT services and solutions.

Q. GIVEN THESE BUSINESS DRIVERS, WHAT TYPES OF CAPITAL PROJECTS DOES BUSINESS SYSTEMS UNDERTAKE?

A. Business Systems's capital additions include hardware (desktop and laptop computers, servers, routers, phone systems, radio systems, microwave communication systems, and network equipment), software (computer programs), related technology infrastructure investments, and cybersecurity

solutions that support the Xcel Energy operating companies' business operations.

Generally speaking, our investments fall into the categories identified in the list above. To further underscore the importance of Business Systems's investments on behalf of Public Service customers, I describe these categories in more detail below, and I also describe the key capital projects within each category.

The need for Business Systems's investments within a utility company is just as essential as the need for investments in pipelines, meters, and fleet. In today's world, very few large businesses can function in a safe and reliable manner, or provide appropriate customer service levels, without IT investments.

Q. ARE BUSINESS SYSTEMS'S CAPITAL NEEDS READILY PREDICTABLE?

A. In some cases they are, as with long-term projects, but in other cases Business Systems must react quickly to changing IT risks and needs. For example, replacement of the Gas Department's SCADA system, discussed below, was predictable because it required several years of planning and budgeting due to the size and complexity of the project. However, many other needs are not so readily estimated – in part because IT is continuously evolving. New cybersecurity risks and new technologies are emerging all the time, requiring flexibility within Business Systems to respond to those risks and needs. Given the nature of the issues Business Systems responds to, our capital additions tend to vary from year to year

Q. PLEASE DESCRIBE AGING TECHNOLOGY PROJECTS.

A. IT assets are no different from other physical assets, in that they are subject to aging and (in this case, technical) obsolescence. A reasonably up-to-date infrastructure is necessary for the Company to continue to meet current legal and regulatory requirements, as well as the service expectations of Public Service's customers. Business Systems seeks to maximize investments by harvesting the value of existing systems prior to replacing them. However, there comes a time when we must upgrade our aging systems due to business, reliability, or compliance needs. Aging technology projects include routine refresh projects, as well as more specific projects.

Q. WHAT ARE ROUTINE REFRESH PROJECTS?

A. Given the breadth and depth of the different equipment Xcel Energy utilizes and manages, Business Systems refreshes smaller components of technology infrastructure on regular cycles. We annually budget for these replacements as routine refresh projects. An example of an aging technology routine refresh project is the Annual Personal Computer ("PC") Refresh, which upgrades approximately 20 percent of desktop and laptop computers annually.

Q. WHAT ARE SPECIFIC REFRESH PROJECTS?

A. Unlike routine refresh projects, which generally address smaller capital replacements on a regular cycle or which are routinely needed, we also must manage larger technology replacements for equipment that is nearing the end of its useful life. Specific refresh projects are often managed over a longer term, occur less frequently, and are significantly more complex than routine refresh

projects. An example of a specific refresh project is the Next-Generation Desktop project which is upgrading the operating system on Company computers from Microsoft Windows 7 to Microsoft Windows 10 to keep these technologies up to date.

Q. PLEASE DESCRIBE THE TYPES OF PROJECTS THAT ARE INCLUDED IN THE ENHANCING CAPABILITIES CATEGORY.

A. Technology can offer the opportunity to improve productivity, enhance communications between systems and between people, and use data more efficiently. Business Systems is constantly evaluating new technologies and helping business areas examine ways to increase efficiencies and enhance communications between systems that benefit the Company and our customers. Enhancing capability investments can offer efficiency benefits that outweigh their implementation costs.

Q. WHAT TYPES OF PROJECTS ARE INCLUDED IN THE CUSTOMER EXPERIENCE CATEGORY?

A. This is a new category for capital additions since our 2017 Gas Phase I, and refers to the Xcel Energy customer's direct interactions with the Company, whether by digital platforms, through the call center, in person, or otherwise. To manage that experience, we must have in place both system tools and customer interfaces that work for the customer, supporting their satisfaction with our service and their overall experience with our Company. As we utilize more modern technologies for our customers, we will simultaneously need to invest in new capabilities like data science, design, and development. We are also

utilizing our employees' innovative thinking to align with our customers' needs and expectations.

Q. PLEASE DESCRIBE THE TYPES OF CYBERSECURITY PROJECTS BUSINESS SYSTEMS UNDERTAKES.

A. Investments in cybersecurity ensure the availability, integrity, and confidentiality of our IT systems, as well as compliance with legal and regulatory obligations. These investments provide prevention, detection, containment, and repair services to protect the Company from cyberattacks and to assist in recovery if such an attack occurs. Cybersecurity does not include physical security investments, such as property security. Physical security is part of Shared Corporate Services, and is discussed by Company witness Mr. Adam R. Dietenberger in his Direct Testimony.

Q. PLEASE DESCRIBE EMERGENT DEMAND PROJECTS.

A. This category relates to projects that are typically in the early stages of planning. The Emergent Demand Account is an account created to ensure Business Systems is able to meet the cybersecurity, aging technology, and efficiency needs that inevitably emerge in a given year. Because of the ever-changing nature of technology and emerging risks, it is not possible to identify in advance all necessary projects that may arise or become critical in a given year. For example, it is not always possible to predict what kind of security risk might be created by hackers as technology continues to develop. In other situations, it may become clear during detailed project development that additional benefits or long-term cost savings could be captured by expanding the scope of a project.

The Emergent Demand Account is used to fund important and unexpected projects or changes in scope of previously-planned projects. Each year, funds are allocated to the Emergent Demand Account for these purposes. As the dollars are spent, they are re-classified to the specific project for which the expense was incurred. In this way, Business Systems's year-end cost summaries do not show expenses allocated to Emergent Demand. Similarly, there would not be any actual capital additions classified as Emergent Demand.

B. Business Systems Budget Development and Management

Q. HOW DOES BUSINESS SYSTEMS IMPLEMENT CAPITAL PROJECTS FOR PUBLIC SERVICE?

A. Although Business Systems implements some projects specific to individual operating companies, including Public Service, we achieve efficiencies of scale by performing most activities on a system-wide basis. Accordingly, many of the Business Systems projects are planned and budgeted at the Xcel Energy level, allocated or assigned to the appropriate operating companies, and implemented throughout the different operating companies. When certain projects (such as Public Service's Microwave Mountain Range Refresh Project described later in my Direct Testimony) are developed and implemented solely for Public Service or other individual operating companies, the costs are directly assigned to that utility. In other cases, common projects are allocated across Xcel Energy operating companies. Ms. Schmidt supports the Company's allocation of

common capital costs to Public Service's Gas Department in her Direct Testimony.

Q. HOW IS THE BUDGET FOR A PROJECT DEVELOPED INITIALLY?

A. Budget development, project prioritization, and project management for Business Systems leverages an established IT Governance process. IT works with each business area to determine its specific IT needs, and then these needs are prioritized based on a particular set of factors. Specifically, each Business Systems area is responsible for partnering with a specific business unit within the organization to determine that business unit's long-term strategic objectives, and identify whether IT investments can enable achievement of those objectives. In turn, these priorities are converted into a proposed Business Systems budget. The IT Governance process also monitors the end-to-end project implementation lifecycle for each proposed project, from its conception to in service, to help keep the project within budget and on schedule, and performs as expected for the specified business objective.

Q. HAS ANYTHING CHANGED IN THE IT GOVERNANCE PROCESS SINCE THE PREVIOUS RATE CASE?

A. Yes, since the 2017 Gas Phase I, the prioritization function of what was formerly the IT Governance process has been in the process of being replaced by the Technology Investment Council. Our IT capital investments continue to be driven by the needs of Xcel Energy's business areas. However, due to the rapid pace of technology evolution, it was determined that additional focus would be beneficial for leadership across the Company to better understand technology,

communication, and the decision-making process. Previously, Business Systems prioritized IT projects internally with some engagement from Business Leaders. The new IT Governance process established with the Technology Investment Council is intended to broaden the enterprise perspective when selecting a project portfolio and making tradeoff decisions across all business areas.

Q. WHAT STEPS DOES BUSINESS SYSTEMS TAKE TO MANAGE PROJECT COSTS?

A. Business Systems monitors project expenditures on a monthly basis. Deviations are evaluated and variance explanations prepared. In addition, action plans are developed to mitigate variations in actual to budgeted expenditures. These plans may increase, reduce, or delay other expenditures to support the overall authorized budget. If authorized budget adjustments are required, they are identified and approved at an appropriate level of management.

IV. BUSINESS SYSTEMS CAPITAL INVESTMENT TRENDS SINCE 2017 GAS PHASE I

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR DIRECT TESTIMONY?

A. The purpose of this section of my Direct Testimony is to provide an overview of the capital investments made by Business Systems and to discuss the primary drivers of Business Systems's capital additions since the Company's 2017 Gas Phase I, which, as mentioned earlier in my Direct Testimony, was based on the 2016 HTY. In the next section of my Direct Testimony, Section V, I address the Company's capital additions placed in service since the 2017 Gas Phase I through September 30, 2019. Thereafter, in Section VI, I address the Company's capital additions planned to be placed in service by September 30, 2020.

Q. WHAT IS THE TOTAL DOLLAR AMOUNT OF BUSINESS SYSTEMS'S CAPITAL ADDITIONS YOU ARE SUPPORTING IN THIS RATE CASE?

A. As reflected in Attachment SK-1, I am supporting $362.4 million (Total Company) for Business Systems's capital additions for the period January 1, 2017 through the end of the Test Year, September 30, 2020. Of that amount, $283.7 million (Total Company) represents Business Systems's capital additions for the period January 1, 2017 to September 30, 2019, and $78.6 million (Total Company) represents capital additions that will be placed into service by September 30, 2020. I note that all of these capital amounts are provided in terms of "Total Company" amounts (i.e., total Public Service level) and that the allocation to the

Gas Department is the only portion that Ms. Blair incorporates into her cost of service.

Further, as I discuss in more detail below, Business Systems's capital additions from January 1, 2017 to September 30, 2019 include $112 million (Total Company) in costs for the WAM system that was approved in the Company's 2017 Gas Phase I as a known and measurable adjustment to the 2016 HTY. Finally, I note that since many of the capital projects completed by Business Systems are common Gas/Electric Department projects, these projects were previously discussed and examined as part of the Company's 2019 Electric Phase I.

Q. WHAT HAVE BEEN THE PRIMARY DRIVERS OF THE COMPANY'S INVESTMENT IN BUSINESS SYSTEMS OVER TIME?

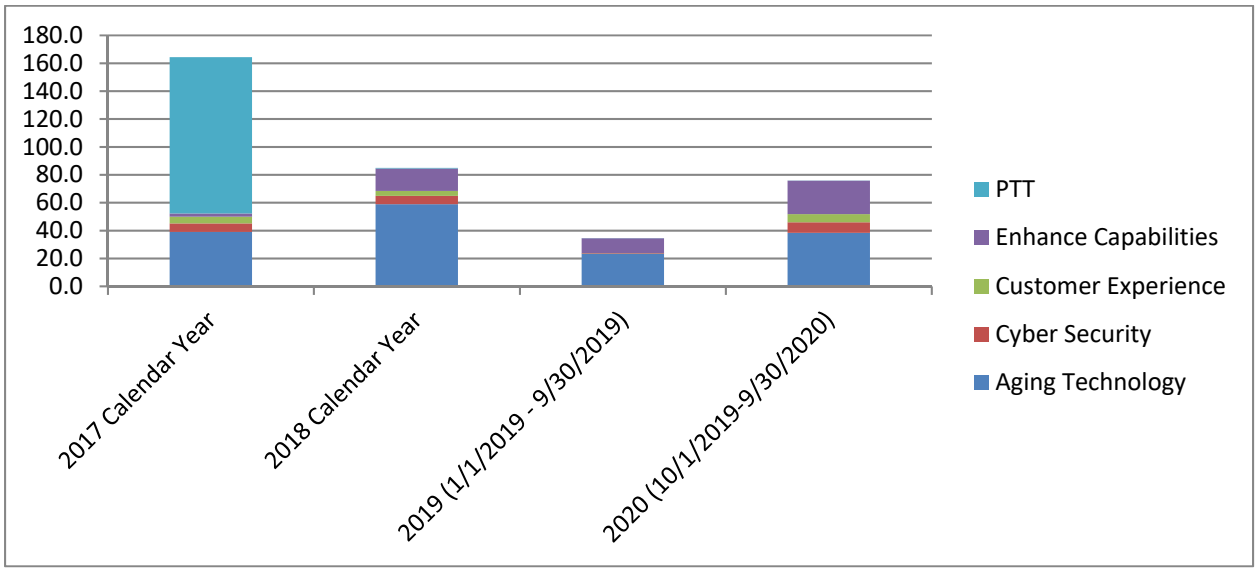
A. Business Systems had a relatively steady level of IT investment prior to 2014. However, due to the age of Xcel Energy's IT systems and the ever-changing business and regulatory requirements that affect the Company's and our customers' IT needs, we entered a phase of replacement and upgrade of these systems beginning in 2014. Future investment levels will depend on the evolving needs of the Company and the emergence of technologies over time.

Q. WHAT HAS BEEN THE TREND FOR BUSINESS SYSTEMS'S CAPITAL ADDITIONS AFFECTING PUBLIC SERVICE'S RATE BASE FROM 2017 THROUGH SEPTEMBER 30, 2019?

A. As shown in Figure SK-D-1 below, Business Systems's capital investments decreased after 2017 when the Productivity Through Technology ("PTT")

initiative was completed. Since that time, Business Systems's capital investments have been relatively flat with a slight increase expected through September 30, 2020, due to increased investments aimed at improving our customers' digital experience. While Figure SK-D-1 below illustrates capital additions when projects are placed into service, it is important to note that many technology projects are planned, developed, and implemented (placed into service) over multiple years. As such, capital additions trend information will show larger increases when more or larger projects are placed in service, rather than when the expenditures are made. In addition, some of the projects in these categories continue over multiple years with portions of the projects placed in service as they are put to use each year.

Figure SK-D-1:
Business Systems's Capital Additions January 1, 2017- September 30, 2020
Public Service (Total Company)
(Dollars in Millions)



Q. PLEASE PROVIDE ADDITIONAL DETAIL REGARDING THE DOLLAR AMOUNTS DEPICTED IN FIGURE SK-D-1.

A. A more granular breakdown of this data, showing annual capital additions placed into service or planned to be placed in service by budget group for January 1, 2017 through September 30, 2020, is included in Table SK-D-1 below.

Table SK-D-1
Business Systems 2017-2020 Capital Additions
Public Service (Total Company)
(Dollars In Millions)

	2017 Calendar Year	2018 Calendar Year	2019 (1/1/2019 - 9/30/2019)	2020 (10/1/2019- 9/30/2020)
Aging Technology	36.7	58.9	23.3	38.4
Enhancing Capabilities	4.7	16.1	10.7	23.9
Cyber Security	6.1	6.0	0.5	7.5
Customer Experience	4.7	3.5	0.0	5.9
PTT	112.0	0.5	0.1	0.1
Emergent Demand*	0.0	0.0	0.0	2.9
Total**	**164.3**	**85.0**	**34.6**	**78.7**

* Because dollars that are allocated for the Emergent Demand Account are re-allocated to the specific projects for which they are spent, there are no actual capital additions classified in actual Emergent Demand.
** There may be differences between the sum of the individual category amounts and “Total" amounts due to rounding.

The dollar amounts in Table SK-D-1 are stated on a Total Company (Public Service) basis, meaning that they include both Gas Department-specific projects and common Electric/Gas Department projects stated at the total Public Service level.

Additionally, the data in Table SK-D-1 reflects capital additions, not expenditures – meaning it relates to projects being placed into service, rather than year-over-year spend. In-servicing of projects can vary widely based on Company needs and the completion date of larger projects, such as the Next-Generation Desktop project, discussed below, which had capital expenditures over several years. I note that the 2019 column only includes capital additions through September 30, 2019, and thus does not include a full 12 months' worth of capital additions, which contributes to the 2019 column showing lower capital additions compared to the other years in this table since many projects are placed in service at year end.

Q. WHAT IS THE OVERALL IMPACT OF RECENT BUSINESS SYSTEMS INVESTMENTS ON PUBLIC SERVICE'S COST OF PROVIDING UTILITY SERVICE?

A. Business Systems investments affecting Public Service's Gas Department have increased in recent years due to the need for greater focus on IT needs within the Company. Our investment evolution tracks that of the broader industry – which continues to see an upward trend in the technology investments needed to keep pace with the emergence of cybersecurity issues as well as changing customer expectations. These investments are keeping the Company operating, protecting important data, supporting customer service, and helping other areas effectively manage O&M at reasonable levels.

Q. ARE THERE ANY OTHER BUSINESS TRENDS THAT SHOULD BE DISCUSSED?

A. Yes. As the technology landscape continues to evolve, cloud computing is becoming a more common way for companies to provide IT services. This presents unique decision-making requirements as we look to future IT solutions, and can also present financial challenges because some cloud solutions might be treated as O&M whereas the same solution would be capitalized when owned by the Company. The utility financial and regulatory model does not work as cleanly in an era when the line between a company-owned asset and a cloud solution is blurred.

Q. HOW DOES THIS CHALLENGE FACTOR INTO BUSINESS SYSTEMS'S CAPITAL INVESTMENT PLANNING?

A. The Company wants to remove the capital and O&M distinction that currently exists between these two solutions. This will result in a level playing field between traditional on-premise data processing solutions and cloud computing solutions such that the Company will not have to consider the existing O&M and capital budget implications when evaluating different options (e.g., that Company-owned systems are added to rate base and enable the utility to earn a return on the assets, whereas contracts that look like O&M are not traditionally given such a return).

Q. WHAT ARE THE POTENTIAL BENEFITS OF CLOUD COMPUTING?

A. In some cases there may be cost benefits associated with transitioning to cloud computing because third-party service providers can offer pricing that is

leveraged across many customers. Additionally, cloud computing benefits may also include having the most up-to-date technology available, upgrades that are less disruptive to business operations, and increased security.

Q. HOW WILL THE COMPANY MAKE THE TRANSITION TO INCREASE UTILIZATION OF CLOUD COMPUTING?

A. The Company will need to continue to create a decision framework to identify when leveraging cloud technology may improve business objectives, productivity, and the customer experience.

Q. WHAT IS THE FINANCIAL TREATMENT OF HOSTED SOLUTIONS?

A. When capital policy requirements are met, the Company will capitalize a hosted solution in a similar way as an on-premise solution. In other scenarios, the on-premise storage is capital because the Company effectively takes ownership of the hardware and/or code, while others are O&M when they do not meet the Company's capitalization requirements. The general terms of the Company's capitalization policy is discussed by Ms. Wold in her Direct Testimony.

Q. IS THE COMPANY PROPOSING ANY PARTICULAR APPROACH TO HOSTED SOLUTIONS IN THIS PROCEEDING?

A. At this time, we are simply seeking to identify the issue because the prevalence of cloud-based solutions is increasing. This is a good example of how technology evolves quickly, raising questions and creating unexpected potential impacts that are worthy of discussion within the regulatory framework.

V. BUSINESS SYSTEMS'S CAPITAL ADDITIONS FROM JANUARY 1, 2017 TO SEPTEMBER 30, 2019

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR DIRECT TESTIMONY?

A. The purpose of this section of my Direct Testimony is to discuss Business Systems's capital additions since the 2017 Gas Phase I to September 30, 2019. All of these projects have been placed in service and have been used and useful for supporting the provision of gas service to our customers. I will then discuss the capital additions by budget grouping and provide examples of the projects that were placed into service during this period. Further details regarding these capital projects are provided in Attachment SK-1. I would also note that all references to capital spend in this Section V of my Direct Testimony are to Total Company.

Table SK-D-2 Business Systems's Capital Additions from January 1, 2017 to September 30, 2019 Public Service (Total Company) (Dollars in Millions)

	2017 Calendar Year	2018 Calendar Year	2019 (1/1/2019 to 9/30/2019)
Aging Technology	36.7	58.9	23.3
Enhancing Capabilities	4.7	16.1	10.7
Cyber Security	6.1	6.0	0.5
Customer Experience	4.7	3.5	0.0
PTT	112.0	0.5	0.1
Emergent Demand	0.0	0.0	0.0
Total Company	**164.3**	**85.0**	**34.5**

* Because dollars that are allocated for the Emergent Demand Account are re-allocated to the specific projects for which they are spent, there are no actual capital additions classified in actual Emergent Demand.
** There may be differences between the sum of the individual category amounts and "Total" amounts due to rounding.

A. Aging Technology

Q. PLEASE DESCRIBE THE BUSINESS SYSTEMS'S CAPITAL ADDITIONS RELATED TO REPLACING AGING TECHNOLOGY SINCE THE 2017 GAS PHASE I.

A. Since the 2017 Gas Phase I, and through September 30, 2019, Public Service has placed $118.8 million (Total Company) in Aging Technology capital additions into service as shown below in Table SK-D-3. A more detailed summary of all capital additions, including additions in the Aging Technology category, is provided as Attachment SK-1. As noted on Table SK-D-3 below, within Aging Technology, we further divide projects into routine refresh projects and specific individual refresh projects.

Table SK-D-3 Aging Technology Capital Additions January 1, 2017 to September 30, 2019 Public Service (Total Company) (Dollars in Millions)

Aging Technology Capital Additions	1/1/2017 to 09/30/2019
Routine Refresh Projects	
Annual Network Refresh	11.6
Annual Server Refresh	8.3
Annual Storage Project	7.7
Annual PC Refresh	6.6
Specific Individual Refresh Projects	
Gas SCADA Replacement Project	14.1
Next Generation Desktop	7.9
DMZ Redesign Project	5.7
Geospatial Integrations	4.9
Wireless Project	4.2
Dispatch Console Upgrade	3.6
Data Center Core Routing Switching Modernization Phase 2 (and Streamlining)	2.7
Microwave Mountain Range Refresh	2.4
1800 Larimer Juniper Switches Refresh	2.1
SharePoint Upgrade Project	2.0
Smallworld LNI-PNI	1.9
2019 Oracle Licenses	1.6
2018 Oracle License	1.6
2017 Oracle Licenses	1.6
Gas Distribution Risk	1.5
IrthNet Damage Prevention Project	1.5
2016 Websphere ELA Extension Project	1.4
MAOP Calculations for Gas System Project	1.4
Verint Workforce Management Project	1.2
DACS-Channel Bank Refresh	1.2
OSI PI Infrastructure	1.2
VoIP Refresh	1.0
Corporate Network Infrastructure- Core Routing	1.0
Real Property Asset Management Project	1.0
Other Aging Technology Projects	16.1
Aging Technology Total	**118.8**

* There may be differences between the sum of the individual category amounts and “Total" amounts due to rounding.

Q. WHAT ARE ROUTINE REFRESH PROJECTS?

A. Within the Aging Technology grouping, routine refresh projects refer to those projects that relate to updating or refreshing day-to-day technology on a routine basis. Budgets to upgrade technology components on an aggregate level are based on the lifecycles outlined by various original equipment manufacturers. Equipment lifecycles can differ based on each category, but generally speaking, most of our network, server, and end-user computing equipment are on an approximate five-year refresh lifecycle. The funding allocated within each specific group/year represents the aggregate of calculations to address two needs: (a) equipment replacement as outlined above; and (b) net new incremental, or "business-as-usual," growth.

Q. CAN YOU PROVIDE SOME EXAMPLES OF ROUTINE REFRESH PROJECTS?

A. Yes. Routine refresh projects include: the Annual Network Refresh, the Annual Data Storage Project, the Annual Server Refresh Project, and the Annual PC Refresh Project. Descriptions of these projects are provided below:

- *Annual Network Refresh:* replaces network devices (switches, routers, radios, channel banks, and voice systems) due to aging technology, out-of-support equipment, security vulnerabilities, and to enable new required capabilities. This routine refresh project included $11.6 million (Total Company) in capital additions placed into service from January 1, 2017 to September 30, 2019.

- *Annual Server Refresh:* provides for the planned replacement of aging servers prior to failure to support business growth and maintain reliability. This routine refresh project included $8.3 million (Total Company) in capital additions that were placed into service from January 1, 2017 to September 30, 2019.
- *Annual Storage Refresh:* The annual data storage project replaces data storage hardware that is no longer cost-effective to support, or that presents a significant risk to operations to aging components or lack of vendor support. This routine refresh project included $7.7 million (Total Company) in capital additions that were placed into service from January 1, 2017 to September 30, 2019.
- *Annual PC Refresh:* replaces aging desktop and laptop computers, as well as those that are lost or inoperable. This project also provides devices to new employees. This routine refresh project included $6.6 million (Total Company) in capital additions that were placed into service from January 1, 2017 to September 30, 2019.

Q. CAN YOU PROVIDE SOME EXAMPLES OF SPECIFIC REFRESH PROJECTS?

A. Yes. The Gas SCADA Replacement project, Next-Generation Desktop project, Demilitarized Zone ("DMZ") Redesign project, Geospatial Integrations, Wireless project, Dispatch Console Upgrade project, Data Center Core Routing Switching Modernization project, Microwave Mountain Range Refresh project, 1800 Larimer Juniper Switches Refresh project, and SharePoint Upgrade project are

examples of specific upgrade projects. I will describe each of these projects in turn.

Q. WHAT IS THE GAS SCADA REPLACEMENT PROJECT?

A. As discussed in greater detail in the Direct Testimony of Mr. Litteken, Public Service monitors its gas system through a SCADA system. The purpose of the SCADA system is, among other things, to remotely monitor and control the flow of natural gas into and throughout our transmission and distribution systems. Based on information received through SCADA, Gas Controllers monitoring gas operations 24 hours a day, seven days a week can identify problems (e.g., pressure drops/surges and gas flow rates) as they arise and can dispatch field personnel proactively to prevent potentially catastrophic events. This project involves replacement of the prior Gas SCADA software and the computer hardware needed to operate this complex control system. The existing Gas SCADA system needed replacement since it was over 17 years old, and upgrades were needed to meet and/or exceed existing security standards and other regulations. Business Systems began work on the Gas SCADA Replacement project in 2016 with planning and design, and this project went into service in 2018. This project represents $14.1 million in capital additions that were placed in service in 2018.

Q. HAS THE COMPANY MADE OTHER INVESTMENTS IN ITS GAS SCADA SYSTEM IN RECENT YEARS?

A. Yes. As discussed by Mr. Litteken in his Direct Testimony, the Company has been increasing the number of SCADA field monitoring devices located on our

gas transmission and distribution systems since 2012. These additional field monitoring devices provide additional data that can be used with the new SCADA software and hardware installed by Business Systems to allow greater visibility into our gas system.

Q. WHAT IS THE NEXT-GENERATION DESKTOP PROJECT?

A. As noted previously, this project involves an upgrade of the Company's current operating system from Microsoft Windows 7 to Microsoft Windows 10. The purpose of this project is to move the enterprise desktop computing devices to the most current standard operating system, and to standardize vendor support for maintenance and defect resolution by ensuring overall stability and continuation of patching practices, thereby minimizing security vulnerabilities. The software upgrades also enable greater business capabilities and efficiencies, such as mobile and tablet technologies across our business. This project is being placed in service in several phases given the number of impacted devices across the Company. The project included $7.9 million in capital additions that were placed into service in 2018.

Q. WHAT IS THE DMZ REDESIGN PROJECT?

A. In computer security, a DMZ (sometimes referred to as a perimeter network) contains and exposes an organization's external-facing services to a larger and untrusted network, such as the Internet. The purpose of a DMZ is to add an additional layer of security to an organization's local area network ("LAN") – i.e., an external network node can access only what is exposed in the DMZ – while the rest of the organization's network is firewalled. This project completes the

design, build-out, and validation of the new cyber-secure internet facing DMZ infrastructure and encompasses Phase I of the DMZ redesign program, which will be managed separately from other phases. This project represents $5.7 million in capital additions that were placed in service in 2018.

Q. WHAT IS THE GEOSPATIAL INTEGRATIONS PROJECT?

A. The Geospatial Integrations Project will allow the capability of the new Systems, Applications, and Projects ("SAP") WAM system functions to synchronize asset locations within the Company's Geographic Information System. This project facilitates and supports the asset life cycle including services performed on the various device types in the field. This project represents $4.9 million in capital additions that were placed into service in 2017.

Q. WHAT IS THE WIRELESS PROJECT?

A. This project involved implementing a closed Land Mobile Radio ("LMR") system for Public Service. An LMR is a wireless communications system intended for users (subscribers) in vehicles (mobile) or on foot (portables). Private LMRs are used widely across utility organizations to meet a wide range of communication requirements, including coordination of people and materials, important safety and security needs, and quick response in times of emergency. The primary objective of this program is to deploy secure communications equipment across the metropolitan area crews, allowing them to complete their work for customers with reliable communications between team members as needed. The reliability of the current system was at risk due to aging hardware that has been in service for 15 years, when the industry standard life-cycle for LMR systems is generally

accepted as 10 years. Further, major components within the system are no longer supported. The legacy system is also deficient in satisfying functional needs due to the increased area of Company operations that are regulation-driven safety improvement requirements, security, and emergency response procedures. This project represents $4.2 million in capital additions that were placed in service in 2017 and 2018.

Q. WHAT IS THE DISPATCH CONSOLE UPGRADE PROJECT?

A. This project involved replacing the current Public Service radio dispatch console system, which was developed for the marketplace over 20 years ago and is used for our communications with field personnel. The updated version will have expanded capabilities to support mobile and fixed data applications and will enable increased productivity and safe operations. A full replacement of this system was needed as vendor support of critical components for the radio dispatch console system expired at the end of 2018. This project represents $3.6 million in capital additions that were placed in service in December 2018.

Q. WHAT IS THE DATA CENTER CORE ROUTING SWITCHING MODERNIZATION PROJECT?

A. The project will deploy and modernize the existing core switching and routing capabilities, while ensuring reliability, facilitating ease of internal network support and internal network, also known as LAN, growth. This project represents $2.7 million in capital additions that went into service in 2017.

Q. WHAT IS THE MICROWAVE MOUNTAIN RANGE REFRESH PROJECT?

A. This project will replace the Company's microwave components for communication in the mountain terrain that are no longer supported by the vendor. Replacement will help ensure continued reliability, meet communication requirements, reduce safety concerns, and minimize replacement costs. If these components are not replaced on a cycle, there is an increasing risk of failed systems impacting the availability, stability, and supportability of this system, which could cause loss of data and related business functions. The project represents $2.4 million in capital additions from January 1, 2017 to December 31, 2018.

Q. WHAT IS THE 1800 LARIMER JUNIPER SWITCHES REFRESH PROJECT?

A. The project replaced identified end-of-life Juniper network switches at Xcel Energy's 1800 Larimer Street location with Cisco equipment utilizing current technologies that will provide improved network reliability. Switches are devices in a computer network that connect other devices together. Multiple data cables are plugged into a switch to enable communication between different networked devices and manage the flow of data. The project represents $2.1 million in capital additions placed into service in June 2019.

Q. WHAT IS THE SHAREPOINT UPGRADE PROJECT?

A. This project upgraded our SharePoint software from version 2007 to version 2013. SharePoint is a web application that enables employees to collaborate from across all business units and to work more efficiently by letting users share documents and data while maintaining security and version control. The

Company also utilizes SharePoint in regulatory proceedings to share information such as discovery responses with intervenors, which reduces rate case expenses incurred related to production and service of case materials. This project represents $2.0 million in capital additions that were placed into service in 2018.

Q. WHAT IS THE SMALLWORLD LNI-PNI PROJECT?

A. This project tied our networks together into one seamless platform. The solution provides a centralized network inventory for wireless, fiber, site inventory, Wide Area Network ("WAN") circuits, and hardware components. The project allows for enabling enterprise data access, timely updates, asset tracking, and improved security. This project represents $1.9 million in capital additions that were placed into service in June 2019. These capital additions included all wireless, fiber, site inventory, WAN circuits, and hardware components necessary to complete this project.

Q. PLEASE BRIEFLY DESCRIBE THE OTHER SPECIFIC REFRESH PROJECTS THAT WERE PLACED IN SERVICE BETWEEN JANUARY 1, 2017 TO SEPTEMBER 30, 2019 TO REPLACE AGING TECHNOLOGY.

A. Examples of other projects in the Aging Technology category with capital additions over $1 million that were placed into service during the period January 1, 2017 through September 30, 2019 include:

- *Oracle Licenses Project:* This is an on-going project to upgrade the Company's Oracle database software to the latest version of Oracle as well as to purchase additional licenses for this software. Currently, there are

several different versions of this database software being used throughout the Company and many of these versions are no longer supported by the vendor. By upgrading to the latest version of Oracle, the Company will be on a fully-supported version of this software which will increase reliability and reduce security concerns. Consolidating and standardizing to a current version will reduce operating costs. This is a lifecycle upgrade to a core technology – performing proactive lifecycle management of core technology is key to effectively managing the IT operating budget and maintaining secure and stable IT systems. The project represents $1.6 million in capital additions that were placed in service in 2017, $1.6 million in capital additions that were placed in service in 2018, and $1.6 million in capital additions that were placed in service in 2019.

- G*as Distribution Risk Project*: This project involved replacing the existing gas distribution risk analysis software with a new tool that is integrated with other critical applications, allowing utilization of an advanced probabilistic risk algorithm that will incorporate available asset, operational, and maintenance data calculations. The current application needs to be replaced because it is not compatible with updated critical applications and utilizes a first generation risk algorithm. The new software's probabilistic risk algorithm assures Xcel Energy's continued compliance with applicable regulations. The project represents $1.5 million in capital additions placed in service in 2018.
- *IrthNet Damage Prevention Project*: This project combines our IrthNet and other damage prevention software into a single package to operate from one

application. The IrthNet software was at the end of its life in 2017 and was coupled with our other damage prevention software to create a single solution that will provide underground locating, safety, work assignment, communications, and reporting for regulatory locating and damage prevention programs. The project represents $1.5 million in capital additions placed in service in 2018.

- *WebSphere ELA Extension Project:* WebSphere is a core component of multiple critical systems, including the enterprise service bus, that enables the integration between multiple information systems. This project extended the license agreement for this software in compliance with Websphere software licensing terms and provided access to a new version of the family of products. The project represents $1.4 million in capital additions placed in service in 2017.
- *Maximum Allowable Operating Pressure ("MAOP") Calculations for Gas System Project:* The objective of this project was to improve our ability to calculate the MAOP to comply with the current Pipeline and Hazardous Materials Safety Administration regulations.[1] The project deployed new software to calculate MAOP without any data translation and to integrate the new tool with other critical systems. The project represents $1.4 million in capital additions placed in service in 2017.

[1] *See* 49 C.F.R. § 192.619.

- *Verint Workforce Management Project*: This project replaced the current Contact Center tool used to support workforce management and Quality Assurance practices. The purpose of this project was to provide performance monitoring capabilities creating increased modeling capabilities matching resource skills and staffing with call load. Without this project, the Quality Assurance team would be unable to effectively identify opportunities to increase customer engagement and satisfaction improvements. There is also risk of hardware and software failures as the former system was no longer supported by the vendor in mid-2015. This project represents $1.2 million in capital additions that were placed in service in 2018.
- *DACS-Channel Bank Refresh*: This project refreshed aging/end-of-life and out-of-support Digital Cross-Connect System ("DACS") and Channel Bank equipment at critical network sites to minimize future marginal service and device failures, times to resolve, and impacts to network users. These devices are used for "grooming" telecommunications traffic, switching traffic from one circuit to another in the event of a network failure, supporting automated provisioning, and other applications. This project represents $1.2 million in capital additions that were placed in service in 2017.
- O*SI PI Infrastructure Project:* This project upgraded hardware and refreshed software on existing OSI PI servers with additional resources, added new servers to support high availability, and created new development and testing environments. The project represents $1.2 million in capital additions that were placed in service in February 2019.

- *VoIP Refresh*: This project refreshed hardware and software to stay in support with the vendor. The VoIP (voice over internet protocol) project converts voice information into digital packets sent over the internet. This project represents $1.0 million dollars of capital additions that were place into service in 2017.
- *Corporate Network Infrastructure- Core Routing*: This project is a refresh of network infrastructure on the corporate side and includes new LAN optical infrastructure for Corporate fiber, fiber optic termination equipment, and upgraded routing and switching equipment. This project focused on replacing out-of-support equipment and standardizing equipment. The project represents $1.0 million dollars of capital additions and went in service in 2018.
- *Real Property Asset Management Project*: This project involved upgrading software the Company utilizes to operate and maintain its facilities. The project will improve decision-making and property management processes, improve facility budget management, and provide improved analytics related to property management. This project represents $1.0 million in capital additions placed into service in 2018.
- *Other Aging Technology Projects*: Many of the "Other" Aging Technology projects noted in Table SK-D-3 are smaller in terms of the total dollars of capital additions. An example of such a project is the TeraData Software project ($0.3 million) that refreshed the Company's database management technology and allowed for expanding business needs. Other examples are

the Business Intelligence project ($0.9 million) which was a refresh of business intelligence reporting; the SailPoint Extension project ($0.6 million) that involved an update to the Learning Management System. These "other" Aging Technology projects in total represent $16.1 million of capital additions since the 2017 Gas Phase I.

B. Enhancing Capabilities

Q. PLEASE DESCRIBE THE COMPANY'S CAPITAL ADDITIONS IN THE ENHANCE CAPABILITIES CATEGORY SINCE THE 2017 GAS PHASE I.

A. Since the 2017 Gas Phase I, Public Service has placed $31.4 million (Total Company) in capital additions into service to enhance capabilities, as shown below in Table SK-D-4. A more detailed summary of all capital additions, including additions in the Enhancing Capabilities category, is provided as Attachment SK-1. I discuss the projects that account for the majority of the costs from January 1, 2017 to September 30, 2019 in this capital budget grouping below. I note that I will also discuss the $112.6 million in investments made as part of the Company's PTT initiative in this section.

Table SK-D-4
PTT and Enhancing Capabilities Capital Additions
January 1, 2017 to September 30, 2019
Public Service (Total Company)
(Dollars in Millions)

Productivity Through Technology Initiative Capital Additions	1/1/2017 to 09/30/2019
PTT Initiative	112.6
PTT Total	**112.6**
Enhancing Capabilities	**1/1/2017 to 09/30/2019**
PTT Phase 3 WAM	6.6
Demand Response Management System Replacement Project	5.0
WAN Improvements	2.8
Mobile Computing Infrastructure	2.3
Telecom Expense Management	1.5
Distribution Records Management	1.1
IT Service Request Automation	1.0
Other Enhancing Capabilities Projects	11.1
Enhancing Capabilities Total	**31.4**

* There may be differences between the sum of the individual category amounts and “Total" amounts due to rounding.

Q. WHAT IS THE COMPANY’S PTT INITIATIVE?

A. PTT is the name we have given the overall initiative to replace Xcel Energy’s outdated general ledger (“GL”) and WAM systems, which are obsolete. Prior to the PTT initiative, Xcel Energy relied on outdated GL and work and asset management technologies. Overall, PTT is a large, integrated effort to replace a set of aging technologies that are central to our business with an SAP Enterprise Resource Planning platform. As part of the PTT initiative, the GL Replacement project was placed in service in December 2015. The Company provided a detailed discussion of the PTT initiative in the Direct Testimony of Company witness Timothy R. Brossart filed in the 2017 Gas Phase I.

Q. PLEASE DESCRIBE THE CAPITAL ADDITIONS THAT THE COMPANY MADE AS PART OF THE PTT INITIATIVE SINCE THE 2017 GAS PHASE I.

A. A significant project that was completed as part of PTT since the 2017 Gas Phase I was the implementation of the WAM system. A WAM system or systems is the core technology for overseeing utility work planning and scheduling, designing jobs and collecting costs, outage management, vendor contract management, materials procurement and management, and asset maintenance and support. Xcel Energy had three core WAM systems: Maximo 5.2, which is our Energy Supply WAM system; Corporate Passport, which is the WAM system for Supply Chain (procurement) and the other Business Areas; and Nuclear Passport, which is a separate WAM system used by Xcel Energy's nuclear plants. Through the WAM portion of the PTT initiative, Xcel Energy is replacing these three old systems with an integrated solution that provides current technology and will work in tandem with our new GL system. In the 2017 Gas Phase I proceeding, the Commission found that the costs of the WAM system "were prudently incurred, and that the 2017 costs associated with the WAM project, which was put into service in October of 2017, are known and measurable and should be added to the 2016 HTY as *pro forma* adjustment."[2] The WAM project represents $112.6 million in capital additions that were placed service in 2017 and 2018.

[2] *In the Matter of Advice No. 912-Gas Filed by Pub. Serv. Co. of Colo, et. al.*, Proceeding No. 17AL-0363G, Decision No. C18-0736-I at 40 (mailed date Aug. 29, 2018).

Q. WHAT IS THE PTT PHASE 3 WAM PROJECT?

A. The PTT Phase 3 WAM project builds upon the existing SAP enterprise application system by delivering new functionality to specific areas of SAP. This project will provide continuous improvement through additional enhancements to the existing software and technology to make the application more efficient and continued security requirements. These improvements include new functionality to increase efficiencies, remove bottlenecks, and eliminate manual processes. An example of certain enhancements like the "follow-me" function allows field service technicians to establish a work order on the spot as they identify issues in the field. The work order is then assigned back to them so they can make the repairs while onsite, as opposed to the work order going through a central dispatch and potentially being assigned to either another crew or the same crew but perhaps on a different day. This project represents $6.6 million in capital additions that were placed into service in 2019.

Q. PLEASE PROVIDE EXAMPLES OF OTHER PROJECTS THAT HAVE BEEN COMPLETED SINCE THE 2017 GAS PHASE I TO ENHANCE THE CAPABILITIES OF THE COMPANY'S SYSTEMS.

A. Examples of other projects that have been completed in this category include the Demand Response Management System ("DRMS") Replacement Project, WAN Improvement project, Mobile Computing Infrastructure project, Telecom Expense Management project, Distribution Records Management project, and the IT Service Request Automation project. I will describe these projects in more detail below.

Q. WHAT IS THE DEMAND RESPONSE MANAGEMENT SYSTEM REPLACEMENT PROJECT?

A. The DRMS Replacement project involved deploying a new DRMS that will allow the Company to manage all aspects of their demand response programs through a single, integrated system. This new system will have the necessary capabilities to ensure the Company is able to meet its existing compliance obligations, position the Company to grow its demand response programs in the future, and to increase customer choice in these programs. This project included $5.0 million in capital additions that were placed into service in September 2018.

Q. WHAT IS THE WAN IMPROVEMENT PROJECT?

A. This is a multi-year project to make reliability and capacity improvements to the Company's WAN. Public Service's WAN is a communications network primarily composed of private optical ground wire fiber and a collection of routers, switches, and private microwave communications that are supplemented by leased circuits from a variety of carriers as well as satellite backup facilities. The WAN is an intermediate link in the Company's communication system that provides high-speed, two-way communications capabilities and connectivity in a secure and reliable manner between Public Service's core data centers and its service center, generating stations, and substations. Improvements to the WAN are needed to keep up with increasing communication needs of the Company's substations, Energy Supply sites, Service Centers, and third parties. This project represents $2.8 million in capital additions that were placed in service prior to September 30, 2019.

Q. WHAT IS THE MOBILE COMPUTING INFRASTRUCTURE PROJECT?

A. The Mobile Computing Infrastructure project involved building a mobile computing framework and support infrastructure that enables Xcel Energy to empower end-users by extending and delivering corporate application and data access mobile devices regardless of ownership, device manufacturer, or operating systems. This project represents $2.3 million in capital additions that went into service in 2017.

Q. WHAT IS THE TELECOM EXPENSE MANAGEMENT PROJECT?

A. This project involved an examination of all of the Company's existing telecom services and constructing new network circuits to improve the Company's telecom services. Previously, this process was managed by IBM and this new software allows the Company to manage these circuits in-house. This project represents $1.5 million in capital additions that were placed into service in 2018.

Q. PLEASE BRIEFLY DESCRIBE OTHER PROJECTS THAT WERE PLACED IN SERVICE TO ENHANCE CAPABILITIES SINCE THE 2017 GAS PHASE I.

A. Below are descriptions of other projects that were placed in service since the 2017 Gas Phase I to enhance the capabilities of the Company's technology and its ability to serve customers:

- *Distribution Records Management*: This project involves building a new records management system to manage content within existing applications through federated control and remote policy management. This new records management system will allow the Company the ability to consistently and accurately manage record retention in accordance with internal and external

policies. This project represents $1.1 million in capital additions that were placed into service in 2017.

- *IT Service Request Automation*: This project updated an existing application that had grown obsolete and implemented a service broker to provide a unified data hub for all software applications and services. By having a unified data hub for all software applications, we will be able to quickly identify when software or applications are down and in some cases, implement back-up measures to restore or work around the down software. This project represents $1.0 million in capital additions that were placed in service in 2018.
- *Other Enhancing Capabilities Projects*: Many of the remaining "Other" Enhancing Capabilities projects identified in Table SK-D-4 are smaller in terms of the total dollars of capital additions. An example of such a project is the Blue Prism Software project ($0.5 million) that allowed for automation of several key finance functions. Other examples are the Digital Signage project ($0.2 million) to improve communication and engagement among Company employees, The Private Cloud Infrastructure project ($.5 million) to enable cloud services and assist with audit other capability. These "other" Enhancing Capabilities projects in total represent $11.1 million of capital additions since the 2017 Gas Phase I.

C. Cybersecurity

Q. WHAT TYPES OF CAPITAL PROJECTS TO ADDRESS EVOLVING CYBERSECURITY THREATS AND REQUIREMENTS HAS THE COMPANY PLACED INTO SERVICE SINCE ITS 2017 GAS PHASE I?

A. As shown in Table SK-D-5, since its 2017 Gas Phase I, Public Service has placed $12.6 million in cybersecurity-related capital additions into service. A more detailed summary of all capital additions, including additions in the Customer Experience category, is provided as Attachment SK-1. I discuss the projects that account for the majority of the costs from January 1, 2017, to September 30, 2019, in this capital budget grouping below.

Table SK-D-5
Cybersecurity Capital Additions
January 1, 2017 to September 30, 2019
Public Service (Total Company)
(Dollars in Millions)

Cybersecurity Capital Additions	1/1/2017 to 09/30/2019
Security Incident & Event Management	2.2
Cyber Defense Center	1.6
Certificate & Key Management	1.0
Other	7.8
Cybersecurity Total	**12.6**

* There may be differences between the sum of the individual category amounts and “Total" amounts due to rounding.

Q. PLEASE BRIEFLY DESCRIBE CAPITAL ADDITIONS PLACED IN SERVICE SINCE THE 2017 GAS PHASE I TO ADDRESS EVOLVING CYBERSECURITY THREATS AND REQUIREMENTS.

A. Below are descriptions of projects that were placed in-service since the 2017 Gas Phase I to address evolving cybersecurity threats and requirements:

- *Security Incident and Event Management*: The Security Incident and Event Management system will allow the Company to increase security visibility with automated monitoring 24 hours a day, seven days a week, get alerted in real-time and contain threats at network speed, streamline audits and compliance reporting, quickly stop external attacks and internal misuse, and perform rapid root cause analysis with built-in or third-party intelligence capabilities. This project represents $2.2 million in capital additions placed in service in 2017.
- *Cyber Defense Center*: This project established a cyber-defense center to include cyber security and enterprise continuity teams in order to better detect, respond to, and protect Xcel Energy against cyber threats and incidents. This project represents $1.6 million in capital additions that were placed in service in 2017.
- *Certificate & Key Management:* This project involved implementing an administration/management system covering digital certificates and encryption keys to improve cyber security. This project represents $1.0 million in capital additions that were placed in service in December 2018.
- *Other Cybersecurity Projects*: Many of the remaining cybersecurity projects are smaller in terms of the total dollars of capital additions. An example of

such a project is the Firewall Management project ($0.7 million) that establishes and manages the firewall rulesets for the Company's network to prevent and identify unauthorized access to these systems. Other examples are the CyberArc project ($0.7 million) which allows the Company to manage and audit password security; the Secure File Transfer Program ($0.2 million) which allows the Company to manage USB storage device usage; and the Advanced Endpoint Protection ($0.7 million) which allows the Company to monitor and manage the Company's network. These "other" Cyber Security projects in total represent $7.0 million of capital additions since the 2017 Gas Phase I.

D. Customer Experience

Q. PLEASE DESCRIBE THE COMPANY'S CAPITAL ADDITIONS IN THE CUSTOMER EXPERIENCE CATEGORY.

A. This is a new category of Business Systems capital investments that emerged since the 2017 Gas Phase I that seek to improve the Company's direct interactions with customers. More specifically, we are utilizing more modern technologies that our customers have come to expect through experiences with other companies including interactive websites, account management options, and smart phone applications. As shown in Table SK-D-6, since its 2017 Gas Phase I, Public Service has placed $8.2 million (Total Company) in capital additions into service to improve the customer experience. A more detailed

summary of all capital additions, including additions in the Customer Experience category, is provided as Attachment SK-1.

Table SK-D-6
Customer Experience Capital Additions
January 1, 2017 to September 30, 2019
Public Service (Total Company)
(Dollars in Millions)

Customer Experience Capital Additions	1/1/2017 to 09/30/2019
Enhanced Customer Outage Experience (aka XE.com Remediation)	3.4
Interval and Complex Billing Project	3.2
Mobile Application Customer Engagement project (MKT-CX)	1.4
Other Customer Experience Projects	0.2
Customer Experience Total	**8.2**

* There may be differences between the sum of the individual category amounts and “Total" amounts due to rounding.

Q. WHAT IS THE ENHANCED CUSTOMER OUTAGE EXPERIENCE PROJECT?

A. This project assessed the functions and reliability of the Xcel Energy website environment, xcelenergy.com (XE.com), for identification of risks and deficiencies. The Xcel Energy website provides customers with important information regarding the status of their accounts, safety information, and information regarding Public Service’s operations. This project increased the maximum capacity thresholds of the website for high-usage periods to improve the reliability and security of the site. The project also delivered improvements to the website environment through replacement of hardware and the addition of new services and enhancements to improve the accessibility of the site for our customers. This project represents $3.4 million in capital additions placed into service in 2017.

Q. WHAT IS THE INTERVAL AND COMPLEX BILLING PROJECT?

A. The Interval and Complex Billing Project is designed to create a new set of capabilities to improve the billing accuracy and efficiency of our most complex rates and to support billing. The project will help inform customers of their usage to drive increased customer satisfaction, and may decrease energy consumption. This project represents $3.2 million in capital additions placed into service in 2018.

Q. WHAT IS THE MOBILE APPLICATION CUSTOMER ENGAGEMENT PROJECT?

A. Our customers are increasingly interacting with the Company via their mobile devices. This project involved the creation of a new mobile application to provide a better platform for our customers' mobile devices. This application includes features such as outage reporting and status, view and pay bill options, and energy management. Overall, the application provides the ability to further engage our customers on their mobile devices to improve the user experience and increase customer satisfaction. In addition, the new application will serve as a platform for us to tie in future technologies and digital customer touch points. This project represents $1.4 million in capital additions that were placed into service in 2017.

E. Emergent Demand

Q. ARE THERE ANY CAPITAL PROJECTS TO ADDRESS EMERGENT DEMAND OR OTHER BUSINESS SYSTEMS NEEDS FROM JANUARY 1, 2017 TO SEPTEMBER 30, 2019?

A. As reflected in Table SK-D-1 above, the Emergent Demand Account for 2017, 2018, and through October 30, 2019, has been fully utilized at the time of filing of this rate case. All specific capital projects previously budgeted for emergent demand in these years have been classified to the appropriate budget grouping as those funds have been spent.

VI. BUSINESS SYSTEMS'S CAPITAL ADDITIONS FROM OCTOBER 1, 2019 THROUGH SEPTEMBER 30, 2020

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR DIRECT TESTIMONY?

A. The purpose of this section of my Direct Testimony is to provide an overview of the Business Systems capital additions that have been or will be placed in service between October 1, 2019 and September 30, 2020. As reflected in Table SK-D-7 below, the Company will place into service $78.6 million (Total Company) in Business Systems's capital additions during this period. I will discuss the capital additions by budget grouping below and provide support for the projects that will be placed into service between October 1, 2019 and September 30, 2020. I would also note that all references to capital spend in this Section V of my Direct Testimony are to Total Company.

Table SK-D-7
Business Systems's Capital Additions from
October 1, 2019 to September 30, 2020
Public Service (Total Company)
(Dollars In Millions)

	10/1/2019 to 9/30/2020
Aging Technology	38.4
Enhancing Capabilities	23.9
Cybersecurity	7.5
Customer Experience	5.9
PTT	0.1
Emergent Demand	2.9
Total Company	**78.6**

** There may be differences between the sum of the individual category amounts and "Total" amounts due to rounding.

A. Aging Technology

Q. WHAT CAPITAL PROJECTS TO REPLACE AGING TECHNOLOGY ARE INCLUDED IN THE BUSINESS SYSTEMS'S FORECAST?

A. Business Systems's projected investments to replace aging technology between October 1, 2019 to September 30, 2020, total $38.4 million (Total Company) as shown in Table SK-D-8 below. A more detailed summary of all forecasted capital additions, including additions in the Aging Technology category, is provided as Attachment SK-1.

Table SK-D-8
Aging Technology Capital Additions
October 1, 2019 to September 30, 2020
(Total Company)
(Dollars In Millions)

Aging Technology Capital Additions	10/1/2019 to 09/30/2020
Routine Refresh Projects	
Annual Storage Project	4.0
Annual Network Refresh	2.7
Annual Server Refresh	2.1
Annual PC Refresh	2.1
Specific Refresh Projects	
WAN Improvements	7.6
Next Generation Desktop	5.2
Microwave Mountain Range Refresh	2.7
10G Backhaul	2.6
Tapeless Data Center	2.1
eSOMS Project	2.3
Other Aging Technology Projects	5.1
Aging Technology Total	**38.4**
** There may be differences between the sum of the individual category amounts and "Total" amounts due to rounding.	

Q. WHAT ARE THE MAJOR ROUTINE REFRESH PROJECTS PLANNED FOR OCTOBER 1, 2019 TO SEPTEMBER 30, 2020?

A. There are three major routine refresh projects with capital additions projected for October 1, 2019, to September 30, 2020:

- $4.0 million in Annual Storage Refresh,
- $2.7 million in Annual Network Refresh,
- $2.1 million in Annual Server Refresh, and
- $2.1 million in Annual PC Refresh.

I discussed each of these projects in more detail in my Direct Testimony related to the January 1, 2017 to September 30, 2019, capital additions in Section V.A, above. The capital investments in these projects is consistent with the historic annual investments in these routine projects. The only slight outlier is the Annual Storage Refresh, which has slightly higher capital additions during this time period due to the timing of service dates for these investments.

Q. WHAT IS THE WAN IMPROVEMENT PROJECT?

A. As discussed in Section V.A, this project is a multi-year project that involves reliability and capacity improvements to the Company's WAN. This project represents $7.6 million in capital additions that were placed in service in 2019 or that will be placed in service before September 30, 2020.

Q. WHAT IS THE NEXT-GENERATION DESKTOP PROJECT?

A. As discussed in Section V.A, this project is a multi-year project that involves upgrading the Company's current operating system from Microsoft Windows 7 to Microsoft Windows 10. This project is being placed in service in multiple years due to the number of devices that are impacted across the Company. The project includes $5.2 million in capital additions that were placed into service in December 2019.

Q. PLEASE BRIEFLY DESCRIBE THE REMAINING SPECIFIC REFRESH PROJECTS PLANNED FOR THE OCTOBER 1, 2019 TO SEPTEMBER 30, 2020 PERIOD THAT ARE LISTED IN TABLE SK-D-8.

A. The other specific refresh capital additions projects that were identified in Table SK-D-8 above to replace aging technology include the following:

- *Microwave Mountain Range Refresh Project*: As discussed in Section V.A above, this project will replace microwave components that are no longer supported by the vendor per end-of-life guidelines. This project represents $2.7 million in capital additions that were forecasted to be placed in service in December 2019 but, since the rate case budget was finalized, this in service date was moved to the first quarter of 2020.
- *10G Backhaul Project*. Xcel Energy's existing corporate communications backbone has insufficient capacity to handle the increasing amounts of data and communication. This project will ensure there is adequate capacity for new major projects such as GL, WAM, in-house back up, Gas SCADA, and

other capital projects. Without this capacity, the system performance will degrade and these systems may not operate as efficiently. This project represents $2.6 million in capital additions that were placed into service in December 2019.

- *Tapeless Data Center Project:* The Company must store large amounts of data for backup and recovery in the case of system outages. The Company currently utilizes a tapeless solution to backup this data. This project will make improvements to the Company's current tapeless data center that is over ten years old to better protect the Company's data and to improve data recovery capabilities following system outages. This project represents $2.1 million in capital additions that that were placed into service in November 2019.
- *Electronic Shift Operations Management Systems ("eSOMS") Project:* This project will implement software and associated business processes to prevent accidental startup of hazardous equipment while a worker is in direct contact with the isolated equipment. This project is required for personal safety, and eSOMS is the industry standard in ensuring that dangerous systems are properly shut off and not able to re-start until the work on the isolated equipment is complete. This project represents $2.3 million in capital additions that were forecasted to be placed in service in December 2019 but, since the rate case budget was finalized, this in service date was moved to the first quarter of 2020.

Q. WHAT TYPES OF PROJECTS ARE INCLUDED IN THE "OTHER" CATEGORY IN TABLE SK-D-8?

A. Examples of projects included in the "other" category are the Satellite project ($0.7 million) which involves upgrading the Company's satellite connections to address emergency cut-over and performance. Another project is the CRS Technology Stack and Windows 10 project ($0.6 million) that will refresh the technology stack (i.e., the list of all the technology services used to build and run one single application) with current, supported versions of technology to ensure a fully supported customer information system. The Active Directory project ($0.5 million) is also included in the "other" category and will replace infrastructure and upgrade the Company's directory software to the most recent versions to keep this technology current. Finally, the PowerPlan Application Upgrade project ($0.4 million) will upgrade to the newest version of software and allow the software to remain in support from the vendor. These "other" Aging Technology projects in total represent $5.1 million of capital additions for the October 2019 to September 2020 period.

B. <u>Enhancing Capabilities</u>

Q. WHAT CAPITAL PROJECTS TO ENHANCE CAPABILITIES ARE PLANNED FOR OCTOBER 1, 2019 TO SEPTEMBER 30, 2020?

A. Business Systems anticipates that capital additions for enhancing capabilities from October 1, 2019 to September 30, 2020 will total $23.9 million (Total Company), and the major capital projects are listed below in Table SK-D-9.

Table SK-D-9
Enhancing Capabilities Capital Additions
October 1, 2019 to September 30, 2020
(Total Company)
(Dollars In Millions)

Enhancing Capabilities Capital Additions	10/1/2019 to 09/30/2020
ESB Environment Refresh	8.4
Gas Transaction System	5.0
Enterprise Operational Monitoring	2.4
Network Inventory and Planning Solution	1.4
PTT Phase 3 (WAM)	1.1
Network Automation Platform Implementation	1.0
Other Enhancing Capabilities Projects	4.6
Enhancing Capabilities Total	**23.9**
** There may be differences between the sum of the individual category amounts and "Total" amounts due to rounding.	

Q. WHAT IS THE ESB ENVIRONMENT REFRESH PROJECT?

A. The Company's existing software applications include its Enterprise Service Bus ("ESB") — a software architecture on the Company's servers that is used for enabling communication between multiple mutually-interacting software applications. The ESB provides reliable inter-system communication of information, and provides a common and consistent integration point for systems to send and receive data. The ESB Environment Refresh project upgraded the existing asset to ensure reliable data integrations between different software. This project represents $8.4 million in capital additions that were placed into service in December 2019.

Q. WHAT IS THE GAS TRANSACTION SYSTEM PROJECT?

A. This project supports the growing gas transportation business by replacing the existing Gas Management System ("GMS") tool with a new and more

robust system, the Quorum Pipeline Transaction Management ("Quorum System"). Prior to implementing the Quorum System, Public Service managed its gas transportation business using internal resources and through the GMS tool, which was a home-grown gas transactional mainframe computer system. The GMS tool had been in use since the 1990s and was used to schedule gas, manage receipts and deliveries of gas, aggregate and manage gas measurement, and prepare volumetric allocations for billing purposes. However, use of the GMS tool is not currently aligned with the North American Energy Standards Board nomination cycles, and updates to align with industry standards and improved operational requirements were needed.

In addition to limitations on the legacy system's capabilities, it was also nearing the end of its life. As a result, we undertook an extensive Request for Proposal process and selected the Quorum System to replace the legacy GMS system. The Quorum System offers a more modern platform for managing all aspects of the gas transport business, from measurement to the preparation of the final allocation statement for billing. Other benefits of the Quorum System are discussed by Mr. Litteken in his Direct Testimony. The Quorum System began managing the gas scheduling, confirmation, and allocation process, as well as gas measurement, beginning on or about July 1, 2019.

Q. WHAT INVESTMENTS DID BUSINESS SYSTEMS MAKE TO BRING THE NEW QUORUM SYSTEM ON-LINE?

A. To implement the new Quorum System, Business Systems implemented the technology as part of the Gas Transaction System project. This project represents $5.0 million in capital additions that were placed into service in December 2019.

Q. CAN YOU DESCRIBE THE OTHER PROJECTS THAT ARE PLANNED FOR OCTOBER 1, 2019 TO SEPTEMBER 30, 2020 THAT WILL ENHANCE THE CAPABILITIES OF THE COMPANY'S EXISTING SYSTEMS?

A. Yes, I will describe each in turn:

- *Enterprise Operational Monitoring:* The project enables additional monitoring of existing and new critical systems and hardware to provide necessary alerts to prevent failures before they occur. This project represents $2.4 million in capital additions that were placed into service in December 2019.
- *Network Inventory and Planning Solution:* This project develops a central repository to store information about the Company's current inventory of network assets. This inventory will allow the Company to better assess aging technology needs. This inventory will include wireless, fiber, site inventory, WAN circuits, and hardware components. This project represents $1.4 million in capital additions that were placed into service in December 2019.

- *Network Automation Platform Implementation:* This project provides an automation platform for the Company's network to enable network changes automatically and with more limited human intervention. This project represents $1 million in capital additions that were forecasted to be placed in service in December 2019 but, since the rate case budget was finalized, this in service date was moved to the first quarter of 2020.

Q. WHAT TYPES OF PROJECTS ARE INCLUDED IN THE "OTHER" CATEGORY IN TABLE SK-D-9?

A. The projects in the "other" category include the Telecom Expense Management project ($0.6 million) that will perform audit, payment, and management of telecom invoices. Another example is the Network and Inventory Management Solution project ($0.6 million) that will develop a central repository for all network information. The Unix Configuration Manager project ($0.4 million) is another project in the "other" category and will enable agile work flows in platform and cloud services. The Video Conferencing Enablement project ($0.3 million) will provide technology to increase the Company's video conferencing capabilities. These "other" Enhancing Capabilities projects in total represent $4.6 million of capital additions for the October 2019 to September 2020 period.

C. Cybersecurity

Q. WHAT CAPITAL PROJECTS TO ADDRESS CYBERSECURITY THREATS ARE INCLUDED IN THE 2020 BUSINESS SYSTEMS FORECAST?

A. Business Systems's projected cybersecurity-related capital additions from October 1, 2019, to September 30, 2020, will total $7.5 million (Total Company), and the major capital projects are listed below in Table SK-D-10.

Table SK-D-10
Cybersecurity Capital Additions
October 1, 2019 to September 30, 2020
(Total Company)
(Dollars In Millions)

Cybersecurity Projects Capital Additions	10/1/2019 to 09/30/2020
Security Technology Refresh	2.6
Host Intrusion Prevention for Servers	1.0
Other Cybersecurity Projects	3.9
Cybersecurity Total	**7.5**
** There may be differences between the sum of the individual category amounts and "Total" amounts due to rounding.	

Q. WHAT IS THE SECURITY TECHNOLOGY REFRESH PROJECT?

A. This is an ongoing project to update the Company's critical cyber-security technology as these needs arise and includes improvements to perimeter security, internal infrastructure security, application security, and involves implementing vulnerability management to protect sensitive customer and business information. This project represents $2.6 million in capital additions that will be placed in service prior to September 30, 2020.

Q. WHAT IS THE HOST INTRUSION PREVENTION FOR SERVERS PROJECT?

A. The project will increase security efforts within Xcel Energy's Business System infrastructure server environment to minimize the risk of cyber-attacks to these servers from exterior sources outside the Xcel Energy physical network. The project will also provide anti-virus software for the Company's virtual servers. This project represents $1.0 million in capital additions that will be placed into service in September 2020.

Q. CAN YOU PROVIDE SOME EXAMPLES OF PROJECTS INCLUDED IN THE "OTHER" CATEGORY IN TABLE SK-D-10?

A. Projects in the "other" category include the Data Lake project ($0.4 million) that will improve our cyber security through better security analytics to respond to threats and will provide more intelligence-driven security. Another project is the SailPoint Phase 4 project ($0.4 million) which will make necessary upgrades to improve our auditing and reporting capabilities. Another project is the Enterprise Database Security Phase II project ($0.3 million) that will enhance the Company's ability to control access to structured data within the Company. The "other" projects in the Cybersecurity category comprise $3.9 million of capital additions that will be placed in service before September 30, 2020.

D. Customer Experience

Q. WHAT CAPITAL PROJECTS ARE INCLUDED IN THE 2020 BUSINESS SYSTEMS FORECAST TO IMPROVE THE CUSTOMER EXPERIENCE?

A. Business Systems anticipates that capital additions to improve the customer experience from October 1, 2019 to September 30, 2020 will total $5.9 million (Total Company), and the major capital projects are listed below in Table SK-D-11.

Table SK-D-11
Customer Experience Capital Additions
October 1, 2019 to September 30, 2020
(Total Company)
(Dollars In Millions)

Customer Experience Capital Additions	10/1/2019 to 09/30/2020
Digital Channel Platform	2.2
Platform Infrastructure and Technology	1.4
Other Customer Experience Projects	2.4
Customer Experience Total	**5.9**

** There may be differences between the sum of the individual category amounts and “Total" amounts due to rounding.

Q. PLEASE DESCRIBE THE DIGITAL CHANNEL PLATFORM PROJECT.

A. Through this project, we will build out, enhance, and redesign several components of our customers’ digital interactions with the Company. This work includes enhancing and modernizing our online digital platforms, including MyAccount, our mobile application, and our customer facing website, www.xcelenergy.com. It also involves building out our New Customer Connections channel, enhancing our Contact Center, and utilizing

"Single Screen" technology, which I discuss in greater detail below. This project represents $2.2 million in capital additions that will be placed into service in September 30, 2020.

Q. CAN YOU DESCRIBE THE MYACCOUNT, XCELENERGY.COM, AND MOBILE APPLICATION WORK THAT IS PART OF THE DIGITAL CHANNEL PLATFORM PROJECT IN MORE DETAIL?

A. Yes. This work will provide a new digital presence for our customer channels, providing more user-friendly interfaces and offering more capabilities for customer data management. As part of the xcelenergy.com, mobile app, and MyAccount re-design and re-platform, we will conduct a content, user experience, and visual design heuristic assessment to identify pain points for the customer and optimize the customer experience. In addition to the functions customers have today, the re-design will allow them to request additional services, see the status of any requests, and make appointments for any service issues. The MyAccount re-platform will allow for customers to set up their preferences, pay their bills or set up automatic payment options, and receive information on their energy usage.

Q. WHAT IS THE NEW CUSTOMER CONNECTION WORK THAT IS PART OF THE DIGITAL CHANNEL PLATFORM PROJECT?

A. To provide a more efficient and transparent process, we will be building out our Customer Connect channel, which will provide a better experience for builders, developers, and other larger Commercial & Industrial customers who

engage with Xcel Energy to request new, as well as resumed or stopped service. Specifically, we will revamp the customer interface to provide better information to customers about the phase or status of their line extension process, improve the builders' call line, and improve the process for communicating with parties engaged in that process.

Q. PLEASE PROVIDE MORE INFORMATION ABOUT THE CONTACT CENTER WORK THAT IS PART OF THE DIGITAL CHANNEL PLATFORM PROJECT.

A. This program involves redesigning our Contact Center for customers. Specifically, natural language processing will be inputted into the contact center to field inbound calls and reroute the caller to the proper call agent. This will help customers get to subject matter experts regarding their issues and resolve them more quickly. This improvement will also reduce the number of times it is necessary for a customer service agent to reroute calls. Finally, this work will streamline the visibility of customer information to call center specialists, enabling them to respond to customer questions more immediately with necessary information at hand.

Q. PLEASE PROVIDE MORE INFORMATION ABOUT THE SINGLE SCREEN PROGRAM THAT IS PART OF THE DIGITAL CHANNEL PLATFORM PROJECT.

A. Currently, Company call center agents utilize numerous screens when communicating with customers on the phone. Combining numerous screens

into one screen that contains all the information needed for our agents will simplify the experience for our employees and benefit customers who will receive the information they need more quickly and efficiently. The "Single Screen" work will also be integrated with Artificial Intelligence capabilities to help decipher what the inbound call is most likely about, and help identify the most immediate fix to the issue. In addition, the single screen will show the agent the current bill, history of payments, and payment plan options that are tailored specifically to the caller. Finally, this screen will suggest support offerings for the customer's home that can help save money or simplify their energy experience.

Q. PLEASE DESCRIBE THE PLATFORM INFRASTRUCTURE AND TECHNOLOGY PROJECT.

A. Xcel Energy's technological architecture has become increasingly intertwined, with core systems running at maximum capacity to support the need for emerging capabilities. To relieve the pressure from these critical core systems, new data layers will be added to aggregate key information and manage extra capabilities, while providing flexibility and added capacity. To accomplish this, we will develop an Automatic Program Interface ("API"), which is a set of routines, protocols, and tools for building software applications to ensure our software components can "talk" to each other. The API platform will personalize and save preferences for our employees and customers. The platform infrastructure also includes our operations model

connectivity and security, and our data architecture and governance. This work will allow the legacy applications to function in the manner they were designed, eliminating significant current customization that is very costly to maintain. This project represents $1.4 million in capital additions that will be placed into service in 2020.

Q. WHAT TYPES OF PROJECTS ARE INCLUDED IN THE "OTHER" CATEGORY IN TABLE SK-D-11?

A. The projects that are included in the "other" category include the Customer Relationship Management ("CRM") project ($0.6 million) and the Data Analytics and Automation project ($0.4 million). The CRM project involves building out our existing Salesforce CRM tool to better understand and serve our customers. The redesigned platform will enable us to track the different relationships with our customers, whether that is commercial, residential, industrial, or on a different basis. It will allow for real-time business updates to mobile applications, automated updates to the customer mobile application without requiring customers to manually update the application itself, and updates to MyAccount with minimal development support, all supporting improved customer and employee experiences.

The Data Analytics and Automation project develops the systems for data architecture and governance, analysis, metrics, and baselines for our customer platforms, as well as systems automation. The work will allow us to both automate processes that currently require manual intervention. The

"other" projects in the customer experience category comprise $2.4 million of capital additions that will be placed in service before September 30, 2020.

E. Emergent Demand

Q. ARE THERE ANY CAPITAL PROJECTS TO ADDRESS EMERGENT DEMAND OR OTHER BUSINESS SYSTEMS NEEDS REMAINING IN THE BUSINESS SYSTEMS FORECAST FOR OCTOBER 1, 2019 TO SEPTEMBER 30, 2020?

A. As reflected in Table SK-D-12, there is currently approximately $2.9 remaining in the forecast to address emergent demand between October 1, 2019 and September 30, 2020. Once the needs for this period are determined, these funds will be allocated to specific capital projects and classified to the appropriate budget grouping.

Table SK-D-12
Emergent Demand
October 1, 2019 to September 30, 2020
(Total Company)
(Dollars In Millions)

Emergent Demand	10/12019 to 9/30/ 2020
Emergent Demand	2.9
Emergent Demand Total	**2.9**

Q. HAS THE COMPANY MANAGED, AND WILL THE COMPANY MANAGE, ITS BUSINESS SYSTEMS-RELATED CAPITAL ADDITION PROJECTS DURING THE TEST YEAR PERIOD TO ENSURE THE FINAL, ACTUAL COSTS ARE REASONABLE AND PRUDENT?

A. Yes.

VII. BUSINESS SYSTEMS O&M

Q. WHAT IS THE PURPOSE OF THIS SECTION OF YOUR DIRECT TESTIMONY?

A. The purpose of this section of my Direct Testimony is to provide an overview of O&M expenses for Business Systems, as well as a discussion of the Business Systems's O&M expenses for the 12 months ending September 30, 2019. I note that these O&M expenses for Business Systems are stated in terms of "Total Company Gas" which is the portion of the Public Service amount allocated to the Gas Department. I also describe the drivers of the approximate $1.2 million annual O&M cost increase since the 2017 Gas Phase I, which was based off of the 2016 HTY.

Q. WHAT ARE THE TYPES OF COSTS THAT BUSINESS SYSTEMS INCURS FOR O&M?

A. I described above the various work that is performed by Business Systems. To perform this work, Business Systems generally incurs O&M costs in seven categories:

- *Network Services:* Costs related to the maintenance of existing circuits, phones, microwave and radio systems, and other IT communication assets. Network activities provide operations and management of the Company's internal and external data transmission requirements.
- *Software:* Includes costs for maintenance payments to software vendors pursuant to license agreements associated with various software

applications and desktop tools. These fees must be paid to secure vendor support for troubleshooting, enabling access to vendor patches, fixes, and version upgrades.

- *Application Development and Maintenance:* Costs associated with the development, enhancement, maintenance, and consultation on new or existing IT systems.
- *Labor:* Costs associated with all employees in the Business Systems department.
- *Distributed Systems Services:* Costs related to maintenance agreements on servers and data storage, PC maintenance, and help desk services for computer users.
- *Contract Labor/Consulting:* Consists of fees and expenses for consultants or knowledge base experts that are not employees of Xcel Energy.
- *Other:* Includes employee expenses, mainframe, outsourcing services not included in the other categories, shared asset allocation, small purchases for administrative materials, fleet expenses, and addressing Company anti-virus needs.

Q. WHAT WERE BUSINESS SYSTEMS'S ACTUAL 2019 O&M COSTS?

A. Our actual O&M expenses for the period October 1, 2018 to September 30, 2019 totaled $27.3 million. Table SK-D-13 below breaks down the amount of overall O&M costs by the categories I discussed above. Attachments SK-2

and SK-3 provide an accounting of these expenses by Cost Element and FERC account, respectively.

Table SK-D-13
Business Systems's O&M
(Dollars In Millions)

Business Systems's O&M Expenses October 1, 2018 to September 30, 2019 (Dollars in Millions)	
Cost Category	**Total**
Network Services	$1.9
Software	$8.4
Application Development and Maintenance	$5.3
Labor	$2.5
Distributed Systems Services	$0.4
Contract Labor/Consulting	$1.9
Shared Asset	$5.1
Other	$1.8
Total Company Gas	$27.3

Q. ARE THE $27.3 MILLION IN O&M COSTS FOR BUSINESS SYSTEMS FOR OCTOBER 1, 2018 TO SEPTEMBER 30, 2019 THAT YOU DESCRIBE ABOVE REFLECTED IN THE COST OF SERVICE PRESENTED BY MS. BLAIR?

A. Yes. This level of O&M expense is reflective of the ongoing O&M expense expected by Business Systems, and does not need to be adjusted for the Test Year.

Q. EARLIER YOU MENTIONED THAT THERE IS A $1.2 MILLION ANNUAL INCREASE IN O&M WHEN COMPARING THE 2016 HTY TO THE PERIOD ENDING SEPTEMBER 30, 2019. PLEASE DISCUSS.

A. The major drivers are shown in Table SK-D-14 below.

Table SK-D-14
Business Systems's O&M Drivers
(Dollars In Millions)

Drivers of O&M Expenses from 2016 HTY to 2019 (Dollars in Millions)			
	2016 HTY	**Driver Amount**	**2019 (10/1/2018 to 9/30/2019 Actuals**
Total O&M (Adjusted)	$26.1		
Internal Labor		$1.2	
Contract Labor/Consulting/DSS/ADM/ Network Services		$-3.3	
Software Maintenance and Licensing		$3.6	
Other		$-0.3	
Total Company Gas	**$26.1**	**$1.2**	**$27.3**

Two major drivers explain the $1.2 million O&M increase from the 2016 HTY to the period ending September 30, 2019. First, Company labor costs increased by $1.2 million between 2016 and 2019. The increase is largely due to in-sourcing efforts that increased internal labor costs, which were offset at the same time by contract labor costs decreasing by $3.3 million in the areas of Distributed Systems Services, Application, Development, and Maintenance and Network Services. Salary and merit pay increases also contributed to the increase in internal labor costs.

Second, Business Systems has experienced an increase in Software Maintenance and Licensing expenses of $3.6 million. Software Maintenance cost increases are driven by new projects, increased licensing costs driven by the number of users, upgrades required to maintain support for software, and limiting security vulnerabilities. Of the $3.6 million software increase, PTT enterprise software costs resulted in $1.3 million of the Software Maintenance expense increase from the 2016 HTY. Other minor changes are a reduction of $0.3 million.

Q. IS THE COMPANY'S BUSINESS SYSTEMS'S O&M OF $27.3 MILLION FOR THE PERIOD OCTOBER 1, 2018 THROUGH SEPTEMBER 30, 2019 A REASONABLE BASIS ON WHICH TO ESTABLISH BUSINESS SYSTEMS'S O&M COSTS FOR THE TEST YEAR?

A. Yes.

VIII. RECOMMENDATIONS AND CONCLUSION

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS

A. In summary, as part of approving the cost of service developed by Ms. Blair, I recommend the Commission approve the January 1, 2017 through September 30, 2020 Business Systems capital additions and Business Systems's O&M expenses for the Test Year, as further detailed in and supported by my Direct Testimony.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

Statement of Qualifications

Sridhar Koneru

I am the Area Vice President of Digital Strategy for Xcel Energy Services Inc. As the AVP of Digital Strategy, I am responsible for the technology, digital strategy, and delivery of IT projects in the XES Business Systems organization.

I have over 20 years of experience in the field of IT. I joined Xcel Energy in 2015 as a Senior Director of Enterprise IT Systems before moving into my current role in 2017. Prior to joining Xcel Energy, I was employed for 14 years at the Target Corporation where I first served as a Senior Technical Architect of Merchandising and Marketing Technologies and then a Manager of Store Technology. In 2008, I was promoted to the role of Group Manager of International and U.S. Store Solutions Delivery, and then finally as the Director of Business Technology Management.

I graduated from R.V. College of Engineering in Bangalore, Karnataka, India, where I earned a Bachelor of Engineering, Electronics, and Telecommunications. I also have a Master's certificate from George Washington University in IT and Project Management.

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

* * * *

IN THE MATTER OF ADVICE NO. 961-GAS OF	)	
PUBLIC SERVICE COMPANY OF COLORADO	)	
TO REVISE ITS COLORADO PUC NO. 6-GAS	)	
TARIFF TO INCREASE JURISDICTIONAL BASE	)	PROCEEDING NO. 20AL-_____G
RATE REVENUES, IMPLEMENT NEW BASE	)	
RATES FOR ALL GAS RATE SCHEDULES, AND	)	
MAKE OTHER PROPOSED TARIFF CHANGES	)	
EFFECTIVE MARCH 7, 2020.	)	

AFFIDAVIT OF SRIDHAR KONERU
ON BEHALF OF
PUBLIC SERVICE COMPANY OF COLORADO

I, Sridhar Koneru, being duly sworn, state that the Direct Testimony and attachments were prepared by me or under my supervision, control, and direction; that the Direct Testimony and attachments are true and correct to the best of my information, knowledge and belief; and that I would give the same testimony orally and would present the same attachments if asked under oath.

Dated in Minneapolis, MN, this 31st day of January, 2020.

Sridhar Koneru
Area Vice President, Digital Strategy

Subscribed and sworn to before me this 31st day of January 2020.

Notary Public

REBECCA E. MONSON
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2022

My Commission expires 1-31-2022