

**UE 335 / PGE / 600
Buttress**

**BEFORE THE PUBLIC UTILITY COMMISSION
OF THE STATE OF OREGON**

UE 335

Information Technology

PORTLAND GENERAL ELECTRIC COMPANY

Direct Testimony and Exhibits of

Larry Buttress

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I. Introduction

1 **Q. Please state your name and position with Portland General Electric (PGE).**

2 A. My name is Larry Buttress. I am the Interim Vice President and Chief Information Officer
3 at PGE. My qualifications appear at the end of this testimony.

4 **Q. What is the purpose of your testimony?**

5 A. The purpose of my testimony is to provide the 2019 test year forecast of PGE's Information
6 Technology (IT) costs and explain the cost drivers for the increase from 2017 actuals. I also
7 provide an overview of the activities, functions, and services provided by the IT operating
8 area, as well as an update of the programs and initiatives for this functional area.

9 **Q. Why do you compare your 2019 forecast to 2017 actuals?**

10 A. As noted in PGE Exhibit 200, Section I, part B, this is because 2017 represents PGE's most
11 recent full year of actual results.

12 **Q. Please summarize the activities or functions that PGE categorizes as IT.**

13 A. IT consists of the departments responsible for developing, operating, and maintaining our
14 computer, cyber, information, and communication systems. These systems are becoming
15 increasingly important to all aspects of PGE's operations (with increasing scope, reliance,
16 and use) and this trend is expected to continue in 2019 and beyond. As PGE modernizes
17 systems and processes, like all providers of critical infrastructure, we are becoming
18 increasingly reliant on evolving technology. This increases our need for more resilient,
19 secure, and reliable systems to conduct operations and provide customer service.

20 Likewise, cyber threats to these systems have increased significantly over the years,
21 becoming more numerous and varied based on the source of the threat. More specifically,
22 the level, severity, and frequency of the threats to utilities are increasing rapidly. In 2017,

1 we blocked over 280 million events on our internet facing systems.¹ As a result, additional
2 IT hardware, software, and staffing resources to maintain, monitor and protect our systems
3 are required.

4 As PGE continues to improve the functionality of its systems and customer-focused
5 products and services (in response to customer needs and expectations), our systems are
6 experiencing incremental and continuous evolution. These systems are now more connected
7 and integrated, requiring incremental resources to provide matching cyber capabilities with
8 safer security platforms.

9 **Q. By how much do you forecast IT Operations and Maintenance (O&M) costs² to**
10 **increase?**

11 A. From 2017 to 2019, we forecast incurred IT O&M costs to increase by approximately \$24.8
12 million, from \$56.7 million to \$81.5 million as shown in Table 1 below. Because these
13 costs relate to all areas of PGE's operations, they are directly charged or allocated to
14 appropriate operating areas and appear as part of each area's O&M costs. Because the
15 majority of these costs relate to corporate systems and are allocated to all operating areas
16 rather than charged directly, we discuss IT as a whole in this testimony.

¹ In mid-November 2017, PGE received advanced information from a threat intelligent resource, with which we have partnered, that could affect certain electric safety instrumented systems. This attack aligns with one of PGE's defined threat models associated with nation state actors. The threat actors have demonstrated ability to use a cyber attack to disrupt the safety instrument from functioning, resulting in a potentially life-threatening event.

² Unless specifically indicated as capital costs, all costs in this testimony refer to O&M costs.

Table 1
Total IT Costs (\$ millions)

Category	2017 Actuals	2019 Forecast	2017-2019 Delta
Direct Charges to Operating Areas	\$ 6.6	\$10.6	\$ 4.0
Allocated Charges to Operating Areas	50.1	72.6	22.5
Labor Adjustment		-1.7	-1.7
Subtotal IT Incurred	56.7	81.5	24.8
Labor Loadings	15.5	21.4	5.8
Subtotal IT Loaded	72.2	102.8	30.6
2014-2018 IT Deferred Mechanism	1.7	0.0	-1.7
Total IT*	\$73.9	\$102.8	\$28.9

*May not sum due to rounding

1 **Q. What are the major drivers of the forecasted O&M cost increase from 2017 to 2019?**

2 A. The increase from 2017 to 2019 is primarily due to four factors: increases in hardware and
3 software maintenance agreements, the Network Resiliency Project, continuing information
4 security initiatives, and a movement in labor costs from capital to O&M. These drivers are
5 more fully explained below.

6 **Q. You mentioned allocated IT expenses; please elaborate about direct charging and**
7 **allocating IT expenses.**

8 A. As shown in Table 1 above, PGE’s IT costs fall into three categories: directly charged (or
9 assigned), allocated, and labor loadings. Directly charged costs relate to systems that are
10 specific to a given operating area, such as transmission, distribution, or customer service.
11 Consequently, these costs are charged directly to specific O&M accounts related to those
12 operating areas. Other IT work in the areas of voice, data, network, communications,
13 business recovery, the data center, and office systems, does not relate to any specific
14 operating area; instead, these costs apply broadly to all PGE activities and departments.
15 These costs are first charged to a balance sheet account (Account 1840004) and then

1 allocated to certain expense accounts for the various operating areas. PGE Exhibit 601
2 provides a summary of the direct and allocated charges by operating area.

3 **Q. What do the labor loadings represent?**

4 A. The labor loadings represent payroll-related costs that consist of employee benefits, pension
5 costs, incentives, payroll taxes, employee support, paid time off, and where applicable,
6 injuries and damages. These costs are applied (loaded) based on specific rates per dollar of
7 IT labor. Because the loadings are not specifically IT costs, but instead relate to total
8 compensation, we discuss them in PGE Exhibit 400 rather than here. PGE Exhibit 200
9 provides detail on payroll taxes. Finally, PGE submits its loading and allocation policies
10 annually to the Public Utility Commission of Oregon (Commission) Staff as an attachment
11 to our Affiliated Interest Report.

12 **Q. Why do labor loadings increase by \$5.8 million?**

13 A. Because labor loadings are calculated amounts, the increase in labor loadings is due to the
14 increase in IT O&M labor on which they are based. The loadings effectively move costs
15 from certain sections of the income statement to other sections. However, the net impact of
16 this on PGE's revenue requirement is zero.

17 **Q. Please explain the 2014 IT Deferral Mechanism.**

18 A. This deferral mechanism began in 2014 and its amortization will end in 2018. As part of the
19 UE 262 general rate case settlement process, parties stipulated that 2014 O&M costs
20 associated with developing IT systems should be capitalized and subject to a five-year
21 amortization. The stipulation, subsequently adopted by Commission Order No. 13-459,
22 removed approximately \$8.7 million of IT development O&M expense from PGE's 2014
23 revenue requirement and replaced it with a regulatory asset of approximately \$7.8 million.

1 The annual amortization expense of approximately \$1.7 million represents one-fifth of the
2 initial capitalized total. As noted above, this mechanism ends in 2018 and is not included in
3 PGE's 2019 test year forecast.

4 **Q. How is the remainder of your testimony organized?**

5 A. In the next section, I provide more detail on the drivers of the IT O&M cost increase.
6 Following that, I discuss an emerging technology that will impact PGE's IT solutions going
7 forward. I then provide a summary and conclusion of this testimony. In the final section, I
8 provide my qualifications.

II. IT Operations and Maintenance Costs

1 **Q. Please restate the amount of IT O&M costs in your 2019 test year forecast and the**
2 **major drivers of the increase from 2017 actuals.**

3 A. Table 1 shows that PGE's 2019 test year forecast reflects \$81.5 million of incurred IT costs.
4 This represents an increase of approximately \$24.8 million over 2017 actual costs. The
5 primary drivers of this increase are in hardware and software maintenance costs, the
6 Network Resiliency Project, continuing cyber security initiatives, and a movement in labor
7 costs from capital to O&M. I discuss each driver in more detail below.

A. Hardware and Software Maintenance Agreements

8 **Q. By how much do costs for hardware and software maintenance agreements increase**
9 **based on current and planned projects?**

10 A. From 2017 to 2019, these costs will increase by approximately \$7.0 million.

11 **Q. Why are software and hardware maintenance agreements necessary?**

12 A. These agreements are necessary to:

- 13 • Keep our software operational by having access to fixes and patches provided by
14 the vendor.
- 15 • Enable us to obtain and retain appropriate licenses, since some vendors require
16 the purchase of maintenance services as a condition of the software license.
- 17 • Receive regular upgrades to correct programming errors and provide continued
18 technical maturity.

19 PGE must provide care and maintenance for our technology investments, which extends the
20 useful life of our systems and provides the best value for customers.

1 **Q. What are the primary reasons for the increase in hardware and software maintenance**
2 **costs?**

3 A. O&M costs for maintenance agreements on hardware and software tend to increase annually
4 for the following reasons:

- 5 • Price escalation for maintenance services.
- 6 • Implementing new applications to meet new or changing requirements.
- 7 • Increasing complexity – replacing obsolete systems with more effective systems
8 that deliver greater functionality and are more complex than the old systems. In
9 such instances, the new systems increase efficiency by eliminating certain manual
10 processes and/or by meeting new requirements that the old system could not
11 address.

12 In other words, increases in the IT operational budget are indicative of purchasing new
13 technologies or expanding the usage of existing technologies.

14 **Q. What types of new or expanded systems are you implementing?**

15 A. Examples of new or expanded technologies include:

- 16 • New software to host the Western Energy Imbalance Market (Western EIM).
17 This system was been discussed at length in PGE's previous general rate case,
18 Docket No. UE 319, PGE Exhibit 300.
- 19 • Increased monitoring and visibility tools associated with IT operations and
20 cybersecurity including network analysis, threat monitoring, and security analysis;
- 21 • A new Residential Energy Analysis Program (Opower), provided by Oracle. This
22 program will be replacing PGE's current Energy Tracker program, which is no
23 longer supported by the software provider.

- 1 • Microsoft Office 365 service fees plus additional deployment of Microsoft
2 software. PGE has moved this application to the cloud because it is the most
3 effective strategy to maximize functionality and speed. I discuss cloud services in
4 more detail in Section III below.
- 5 • Planned expansion of process intelligence (PI) software for energy asset
6 monitoring and analysis.
- 7 • Increased deployment of our security event and incident management tool.
- 8 • New software to support better internal control monitoring.
- 9 • Oracle Customer Care and Billing software for the new customer information
10 system and meter data management system. These systems comprise PGE's
11 Customer Touchpoints project discussed in detail in PGE Exhibit 900, Section III.
12 The Customer Touchpoints project is the largest and final component of PGE's
13 Customer Engagement Transformation program, which is also the final
14 component of PGE's overall 2020 Vision initiative.

15 **Q. Please provide a brief description of the 2020 Vision initiative.**

16 A. 2020 Vision was a roughly ten-year initiative to implement a set of projects that would
17 collectively modernize and consolidate our technology infrastructure. The ultimate purpose
18 was to replace a multitude of existing software applications with fewer “enterprise”
19 applications that provide integrated functionality for PGE's operations. Because 2020
20 Vision entailed a number of projects over many years, PGE discussed it at length in the
21 following general rate cases: Docket Nos. UE 215 (2011, PGE Exhibit 600), UE 262 (2014,
22 PGE Exhibits 600 and 900), UE 283 (2015, PGE Exhibits 700 and 1000), UE 294 (2016,

1 PGE Exhibits 600 and 900), and UE 319 (2018, PGE Exhibits 500 and 900). As noted
2 above, PGE Exhibit 900 discusses the final phase (Customer Touchpoints) of 2020 Vision.

3 **Q. If one of the goals of the 2020 Vision initiative was to replace numerous applications**
4 **with fewer enterprise systems, why would PGE's maintenance agreement costs**
5 **increase?**

6 A. As the number of applications decrease through consolidation, PGE experiences an increase
7 in the maintenance agreement costs associated with: 1) new and more effective enterprise
8 applications with greater functionality; and 2) expanded use of existing applications. The
9 increase in maintenance fees is especially pronounced as we replace homegrown software,
10 which requires no maintenance expense other than internal labor to provide support.
11 Further, the replacement applications are not only greater in size and complexity because
12 they are enterprise applications, but they also provide greater functionality than the systems
13 they are replacing. Consequently, maintenance fee costs are increasing as a result of 2020
14 Vision.

B. Network Resiliency Project

15 **Q. What are PGE's forecasted costs for the Network Resiliency Project?**

16 A. PGE forecasts a total of approximately \$15.0 million in network resiliency capital costs. The
17 costs are projected over a three-year project lifecycle as follows: \$6.0 million in 2018, \$6.5
18 million in 2019, and \$2.5 million in 2020. In addition to updating and modernizing the
19 network, PGE will also have to operate and maintain it, the cost for which we forecast to be
20 approximately \$2.0 million annually beginning in 2019. These costs are currently forecast
21 as non-labor O&M in the test year forecast.

1 **Q. Please describe the Network Resiliency Project.**

2 A. Network Resiliency is a current project to update and modernize the IT network in order to
3 meet PGE's growing business and security needs as well as the demands of a changing IT
4 environment, which together are resulting in an exponential growth in data flow and
5 expanding number of system interfaces.

6 **Q. Please define "IT network".**

7 A. An IT or computer network, also called a data network, is a series of points or nodes,
8 interconnected by communication paths for the purpose of transmitting, receiving and
9 exchanging data, voice, and video traffic. In a complex system like PGE's, a network
10 provides communication services for systems (e.g., computers, servers, applications,
11 databases, phones, generation sites) that exchange information. The network is equivalent to
12 a highway system that directs or routes traffic. The network moves data much like a
13 highway facilitates the movement of vehicles. It provides the "road" on which data travels
14 to send work orders to line crews to restore customer outages, to connect customers to our
15 website to make payments, or to allow external Western EIM Operators to turn up a turbine
16 at a PGE generation plant. The network is one of the most important and integral parts of
17 IT, on which our systems rely to support PGE's business. It is also a key component to
18 protect and secure the data and systems, and how they are used.

19 The network not only has to be robust enough to handle the increasing magnitude of data
20 flow, but it also has to be flexible enough to cope with more frequent changes and new
21 requirements. Business initiatives like the Western EIM and Customer Touchpoints rely on
22 a network that is reliable, flexible, secure, and provides business continuity. The network
23 links applications, users, and other systems (e.g., bank transfers). Without a properly

1 functioning network, applications cannot be accessed, which, as these systems have become
2 more critical to our operations, would result in the business's inability to function.

3 **Q. Why does the existing network need to be updated and modernized?**

4 A. PGE's current network has reached a point where it will not meet PGE's business units'
5 requirements or needs. The increased use of IT systems to run PGE's business, including
6 the heavy reliance on data, has pushed the demands on the network to be faster and more
7 flexible. Just like the ever-increasing dependence many people have on their home
8 connection to the internet, PGE's business needs have been increasing, which require a
9 faster and more reliable network. The current network also cannot keep up with constantly
10 increasing cyber security threats. Because the network has evolved over time, network
11 security is complex and difficult to maintain. The updated and modernized network will
12 provide a more secure and flexible security platform.

13 Expanding on the road analogy, the current network is like a road that was built for a
14 certain level of traffic, a given size of cars and trucks, and so many interchanges for on and
15 off traffic. As the number of vehicles and their size increases, and as more interchanges are
16 built, the old road will become inadequate to the demands. Traffic that used to flow freely
17 becomes mired in congestion. The updated and modernized network is then analogous to
18 the road being widened significantly and the interchanges being redesigned to allow
19 smoother flow. In summary, the current network design has limitations associated with
20 flexibility and scalability, which detracts from our ability to modernize PGE's information
21 systems and applications.

1 **Q. What are the specific benefits of network resiliency?**

2 A. Network resiliency will provide increased reliability, flexibility, and mobility to the business
3 and to our customers. Using updated network technology, security can be configured and
4 maintained for sensitive data in any PGE data center or external provider (e.g., cloud
5 provider). This foundation work will create a resilient network where hardware failure will
6 not stop applications from being available to customers. The new technology will be
7 flexible to enable expansion of current or future data centers by allowing application
8 mobility without a complete rebuild of the application. Additionally, the new network
9 design will enable movement of applications to new facilities, public cloud, or private cloud
10 offerings. This is accomplished by maintaining security policies that move with
11 applications.

12 In addition, the Network Resiliency Project represents a network that is: modular to
13 reduce total system failures, flexible to reduce the impact to business functions, and reliable
14 to deliver excellent customer service. If PGE's IT department can keep systems functioning
15 during a major event, then our employees can perform their jobs and help restore power as
16 quickly as possible to our customers. The new network design will enable reduction of
17 impacts across the enterprise, and enhance resiliency to improve business continuity for
18 business and customer applications. The new design is also intended to support future
19 improvements and upgrades of PGE data centers, increasing bandwidth requirements, ability
20 to support cloud offerings, business continuity, and improved information security.

21 **Q. Have any PGE systems already benefited from network resiliency improvements?**

22 A. Yes. Numerous systems and applications have benefited from network resiliency work
23 including PortlandGeneral.com, web payment, the interactive voice response system, and

1 our customer service applications. Each of these provides critical information and services
2 to PGE customers.

C. Information Security Program

3 **Q. By how much do you expect non-labor IT O&M costs to increase due to PGE's**
4 **Information Security Program?**

5 A. From 2017 actuals to the 2019 forecast, non-labor IT O&M costs will increase by
6 approximately \$10.1 million to perform the necessary activities of the Information Security
7 Program.

8 **Q. Please describe PGE's Information Security Program.**

9 A. PGE's Information Security Program began in 2017 and is a multi-year effort to maintain the
10 security, reliability, and safety of our computers, control systems, and other cyber assets that
11 help operate the grid, from cyber vulnerabilities. This project enables safe, resilient power
12 delivery to our customers while maintaining a collaborative and integrated approach to
13 security.

14 **Q. What is the basis of this program?**

15 A. As discussed in UE 319 (PGE Exhibit 500), PGE hired outside consultants to conduct a
16 comprehensive review of our Information Security Program and one of their primary
17 recommendations was to create a centralized, enterprise-wide security operations center,
18 with detailed steps to achieve that goal. In response, PGE developed the Information
19 Security Roadmap,³ which we provide as confidential PGE Exhibit 602. PGE continually
20 updates its Information Security Roadmap to address the changing information security
21 environment.

³ This was previously referred to as the Cyber Security Roadmap, but has evolved and been renamed.

1 **Q. What is the difference between the Information Security Roadmap and Program?**

2 A. The Information Security Roadmap is the multi-year plan that IT has developed and
3 continues to update in order to specify the initiatives needed to address the information
4 security risks and threats. The Information Security Program is the governance structure
5 that implements the roadmap initiatives.

6 **Q. What are the primary components of the Information Security Program?**

7 A. There are five primary components of our Information Security Program:

- 8 • Risk-based Decision Making – to anticipate business needs, understand business
9 risks and maintain our security expertise in order to provide clear and timely
10 reporting of security risks to drive decision making.
- 11 • Coordinated Incident Response – to proactively deter, detect, delay, and respond
12 to threats associated with operational technology, informational technology, and
13 physical security.
- 14 • Integrated Security Operations – to proactively monitor and respond to physical,
15 informational, and operational security threats.
- 16 • Culture of Security – to educate and maintain a vigilant workforce that is able to
17 operate securely.
- 18 • Customer Satisfaction and Safety – to act as a responsible steward of customer
19 information and secure the assets that protect customers, employees, and
20 shareholders.

21 **Q. What types of risks is PGE addressing with the Information Security Program?**

22 A. The electric industry is continually being targeted in more sophisticated and complex attacks
23 against operational technologies and traditional corporate systems. The most significant

1 threats are posed by nation-state groups such as Russia, North Korea, and China. The
2 following examples serve to emphasize the nature of these threats:

- 3 • Russian hacking organizations have become more advanced in their capabilities,
4 as displayed with the compromise of a Wolf Creek Nuclear Operating
5 Corporation power station near Burlington, Kansas.⁴
- 6 • A Michigan utility experienced an attack that resulted in a ransom payoff.⁵
- 7 • A 2016 Verizon breach report demonstrates a direct correlation between an
8 Incident Command System being compromised and a cyberattack against
9 SCADA⁶ platforms.⁷

10 **Q. How many cyber threats does PGE encounter per year?**

11 A. PGE experiences nearly 300 million attacks per year. In fact, 2017 was the first year PGE
12 has been able to accurately track the total number of such attempts. This capability is a
13 direct result of instituting the Information Security Program, wherein the increased staff and
14 technology investments have enhanced PGE's ability to identify and respond to these
15 threats. We expect the number of attacks to continue to increase over time, as we increase
16 visibility into threat environments and position our defensive protections more effectively.

17 **Q. How specifically is PGE addressing the increasing threats related to information
18 security?**

19 A. By continuing to identify and evaluate the threats, and modify the Information Security
20 Program accordingly, we are building our capabilities that include threat management,
21 vulnerability management, and increasing the visibility into PGE's operations. It is our

⁴ <https://www.nytimes.com/2017/07/06/technology/nuclear-plant-hack-report.html>.

⁵ <https://www.wsj.com/articles/how-a-u-s-utility-got-hacked-1483120856>.

⁶ Supervisory control and data acquisition.

⁷ http://www.verizonenterprise.com/resources/reports/rp_data-breach-digest_xg_en.pdf.

1 customers' expectation that we not only provide safe reliable power, but that we also protect
2 their information. Data breaches, such as the numerous significant ones that occurred in
3 2017⁸ are a primary focus for PGE's efforts in this area. In addition, we must continue to
4 escalate our efforts to improve the security and operational reliability of PGE's critical
5 infrastructure. While we are required by the Federal Energy Regulatory Commission to
6 protect the Bulk Electric System, our efforts must continue well past these requirements and
7 protect corporate (e.g., financial and customer) systems as well.

8 **Q. Please describe the current key initiatives of the Information Security Roadmap.**

9 A. The current key initiatives of the Information Security Roadmap include:

- 10 • Asset Discovery and Management – to identify and better understand PGE's
11 hardware and software assets in order to the determine vulnerabilities in the
12 technology environment.
- 13 • Vulnerability Management – to develop a comprehensive program that covers all
14 assets and adequately detects and reports vulnerabilities in the assets to best
15 identify risk.
- 16 • Identity and Access Management – to understand the lifecycle of user identity and
17 access to systems. This will improve PGE's lifecycle governance including
18 processes and tools to enable effective management.
- 19 • Incident Response – to define and develop an enterprise-wide incident response
20 process and plan to efficiently and effectively respond to future potential
21 incidents.

⁸ <https://www.identityforce.com/blog/2017-data-breaches>.

- 1 • Business Impact Analysis (BIA) – to update planning based on: 1) the assessment
2 and prioritization of critical PGE business functions and processes; and 2) the
3 identification of potential business interruption risks and impacts. PGE will
4 leverage the BIA to make informed process and capability improvements
5 associated with disaster recovery to create a more resilient technology
6 infrastructure.
- 7 • Security Awareness and Training – to strengthen and enhance an enterprise-wide
8 security awareness program for all employees, and conduct targeted training for
9 security staff.

10 **Q. How do you prioritize the cybersecurity initiatives?**

11 A. PGE uses a risk-based approach to prioritize information security initiatives. Understanding
12 risk means understanding the relationship between:

- 13 • Vulnerability, such as a system with a known but unaddressed weakness.
- 14 • Threat, such as a bad actor propagating viruses or worms.
- 15 • Consequence, such as physical damage, loss of public safety, and/or financial
16 loss.

17 A risk-based approach prioritizes components for protection, as well as the threats and
18 vulnerabilities that require attention.

19 **Q. You mentioned previously that PGE continually updates the Information Security
20 Roadmap. Have there been changes to the Roadmap since PGE's previous rate case?**

21 A. Yes. One of the more significant changes is accelerating the timeline to implement the
22 remaining initiatives to address the full scope of recommendations. It is critical that we

1 place our cyber security initiatives on a fast track for completion by 2020 due to increasing
2 threats that we face on a daily basis.

3 **Q. Why did you accelerate the implementation of your Information Security Roadmap?**

4 A. PGE determined it was necessary to expedite the implementation timeline of our
5 Information Security Roadmap in order to maintain the essential security, reliability, and
6 safety of our systems. Cyber threats are increasing at an alarming rate and it has become
7 evident that the longer timeframe to implement our Information Security Roadmap would
8 significantly increase PGE's risk of incurring a serious cyber-attack. As grid technology
9 evolves, so do threats to its integrity. While PGE has spent significant effort increasing its
10 cyber security capabilities in recent years, our intent is to stay abreast of increasing cyber
11 threats and implement the corresponding best practices to prevent those threats from
12 circumventing PGE systems. As PGE continues to implement new tools, conduct risk
13 assessments, vulnerability assessments, and penetration tests, we better understand our cyber
14 risks.

D. IT O&M Labor

15 **Q. Please describe the change in IT O&M labor costs.**

16 A. From 2017 to 2019, we project that IT O&M labor costs will increase from approximately
17 \$20.2 million to \$28.1 million. This increase occurs although:

- 18 • Total IT full time equivalent employees (FTEs) are flat – 304.3 FTEs in 2017 and
19 306.7 FTEs in 2019.
- 20 • Total IT labor costs do not increase at a rate greater than PGE's overall rate of
21 escalation.

1 **Q. To what, then, do you attribute this increase in IT O&M labor?**

2 A. From 2017 to 2019, IT is experiencing a decline in capital labor due to the elimination of
3 approximately 50 IT positions assigned to work on the Customer Touchpoints capital project
4 that is being completed in 2018. This reduction in capital labor is replaced by increasing
5 O&M labor, the elements of which are as follows:

- 6 • Approximately \$4.1 million for ongoing annual support of the completed
7 Customer Touchpoints systems.
- 8 • Approximately \$2.4 million for increased O&M labor associated with the
9 Information Security Program efforts described above. In short, some of the
10 information security costs are capitalized and some are charged to O&M in
11 accordance with generally accepted accounting principles.

III. Emerging Technology

1 **Q. Is PGE currently evaluating an emerging technology for potential changes to its**
2 **technology environment?**

3 A. Yes. Although cloud computing is not a new concept, over the years cloud-based services
4 have significantly matured and stabilized to the point where they represent a viable
5 technology platform.

6 **Q. What is cloud computing?**

7 A. Traditionally, organizations with an IT presence hosted applications and services in-house
8 (also known as on-premises) and provided internal services directly to customers and
9 employees. With cloud computing, this operating model evolves to a shared-services and
10 shared-infrastructure environment, enabling an organization to reduce its on-premises IT
11 footprint in favor of internet-based and internet-enabled products and services that operate
12 on a subscription basis.⁹ Cloud computing offers the ability to vastly scale computing
13 power, flexibility, and availability. It also offers many flexible service models that are
14 responsive to dynamic business needs.

15 **Q. What services does the cloud offer?**

16 A. Common cloud service models include:

- 17 • Infrastructure as a service – virtual machines and other low-level services are
18 provided to the customer in place of physical hardware. This service is good for
19 quickly ramping up and down infrastructure.

⁹ PGE's definition of cloud computing aligns with the National Institute of Standards and Technology (NIST) publication SP 800-145. See PGE Exhibit 600 Work Papers for a copy of the NIST document.

- 1 • Platform as a service – applications and database services are provided without
2 access to the underlying operating systems and hardware. Portlandgeneral.com is
3 a good example of platform as a service.
- 4 • Software as a service – the service provider delivers the application without
5 access to lower level components. PGE’s recent deployment of Microsoft Office
6 365 is an example of this cloud-based technology.

7 **Q. What are the benefits of the cloud?**

8 A. Cloud based services have the potential to provide PGE with a new level of flexibility in
9 how we manage and organize our IT capabilities, and improve provisioning of service.
10 Utilizing cloud-based services instead of traditional data center services provides more
11 stability and predictability for costs (i.e., with the burden of maintenance shifted to cloud
12 providers, costs become more predictable over time). Additionally, migrating functions to
13 the cloud results in more rapid scaling to meet increased customer and business demands.
14 The benefit to customers is realized through the ability to develop, deploy, and maintain
15 new and existing applications more quickly and effectively than is currently possible. This
16 directly supports PGE’s efforts to listen, lead, and adapt to our customer expectations and
17 enables us to evolve the way we do business along with a rapidly evolving technology
18 landscape. PGE will be able to strategically develop, deploy, and maintain new and/or
19 existing applications more quickly, with more flexibility, cost savings, increased reliability,
20 minimized down time, and enhanced security.

21 **Q. How is PGE currently using cloud computing?**

22 A. As noted by the examples above, PGE has several applications that have been successfully
23 migrated to cloud-based services, including our time collection system (myTime), the

1 customer-facing website (portlandgeneral.com), and email services (Microsoft Office 365).

2 Over time, PGE expects to move an increasing number of applications to the cloud as it
3 becomes a more viable alternative to in-house computing. Current initiatives that are
4 developing cloud-based applications include the Human Resource Optimization Program, IT
5 Service Management, perimeter and endpoint security services, customer energy usage
6 analysis, energy recovery analysis, crisis management, and Microsoft suite migration.

7 **Q. Will PGE move more applications to cloud-based computing?**

8 A. Yes. Eventually we will be moving toward more cloud-based computing to the extent that it
9 offers a number of advantages including improved delivery time, better disaster recovery,
10 and simplified configuration management. Several of our neighbor utilities including
11 Arizona Public Service, Pacific Gas & Electric, and Southern California Edison are actively
12 expanding their investment in cloud-based services. Ultimately, we plan to take a measured
13 and careful approach to cloud-based computing that effectively weighs the costs, benefits,
14 and risks of comparable systems.

IV. Summary and Conclusions

1 **Q. Please provide a summary of your testimony.**

2 A. As PGE moves to more technology-based operations, the costs for operating and
3 maintaining our IT systems will not only increase, but so will the costs to provide the
4 necessary level of information security. Consequently, the test year forecast reflects the
5 costs needed to accomplish the 2019 portion of this on-going transition. More specifically,
6 the increase in IT O&M costs from 2017 actuals to the 2019 test year forecast is the result of
7 four primary drivers which I summarize as follows:

- 8 • Hardware and software maintenance agreements – these costs are a necessary
9 aspect of functioning hardware and software systems because they provide: 1)
10 appropriate licenses for the needed number of users; 2) access to vendor-provided
11 fixes and patches to keep the systems operational; and 3) regular upgrades to
12 correct programming errors and maintain continued technical maturity.
- 13 • Network resiliency – these costs support PGE’s project to update and modernize
14 the IT network in order to meet PGE’s growing business and security needs as
15 well as the demands of a changing IT environment. Due to the exponential
16 growth in data flow and expanding number of system interfaces, PGE’s existing
17 network has reached a point where it will not meet these needs or have the
18 flexibility to meet new requirements. Without a properly functioning network,
19 applications cannot be accessed, which, as these systems have become more
20 critical to our operations, would result in the business’ inability to function.
- 21 • Information Security – these costs will allow PGE to maintain the security,
22 reliability, and safety of our computers, control systems, and other information

1 assets that help operate the grid from cyber vulnerabilities. Because of the
2 magnitude and sophistication of attacks and the expectation that they will only
3 expand over time, PGE has enhanced its efforts to address these threats in order to
4 maintain the essential security, reliability, and safety of our systems.

- 5 • Labor costs – these costs reflect: 1) the completion of PGE’s Customer
6 Touchpoints project, which has reduced IT labor that will be charged to capital;
7 and 2) an offsetting increase in IT O&M labor used to operate and maintain the
8 Customer Touchpoints systems as well as perform certain activities associated
9 with the Information Security Program. In spite of these changes, IT FTEs
10 remain flat from 2017 to 2019 and overall IT labor costs increase at a very
11 moderate level.

12 **Q. What do you specifically request of the Commission?**

- 13 A. I request that the Commission approve the IT-related costs that PGE has included in its 2019
14 test year forecast. These costs are appropriate and necessary to continue the transition to
15 more technology-based operations.

V. Qualifications

1 **Q. Please describe your qualifications.**

2 A. I received a Bachelor of Science Degree in Business Administration and Computer Science
3 from Oklahoma State University. My employment with PGE started in January 2018, as the
4 Interim Vice President and Chief Information Officer. Prior to that, I served for over a
5 decade as Executive Vice President and Chief Information Officer at the Bonneville Power
6 Administration. I have held other leadership and management positions at WaferTech
7 (Camas, WA), Mitsubishi Silicon (Salem, OR), and Sun Refining and Marketing
8 (Philadelphia, PA). I have served on the advisory board of EnergySec, and on the Electric
9 Sector Coordinating Council, focusing on cyber security improvements across the federal
10 sector and the electric utility industry. I have served as a member of UNITE electric utility
11 consortium of CIOs, and have held a Federal Top Secret Security Clearance from the
12 Department of Energy, since 2008.

13 **Q. Does this conclude your testimony?**

14 A. Yes.

List of Exhibits

<u>PGE Exhibit</u>	<u>Description</u>
601	Summary of IT Costs
602C	Information Security Roadmap

IT Summary by Operating Area

Function	2015 Actuals	2016 Actuals	2017 Actuals	2018 Forecast	2019 Forecast	2019-2017 Delta	Annual % Delta 2017-2019
Production							
Direct	264	254	284	-	-	(284)	
Allocated	7,264,124	9,557,999	9,488,192	10,351,792	13,242,601	3,754,409	18.1%
IT Deferral	312,972	312,972	312,972	312,971	-	(312,972)	
Total Production	7,577,359	9,871,224	9,801,447	10,664,763	13,242,601	3,441,154	16.2%
Power Operations							
Direct	1,022,349	1,011,868	1,131,388	1,741,991	1,811,106	679,718	26.5%
Allocated	1,772,266	1,492,874	1,229,314	2,572,951	3,048,341	1,819,027	57.5%
IT Deferral	-	-	-	-	-	-	
Total Power Ops	2,794,615	2,504,742	2,360,702	4,314,942	4,859,447	2,498,745	43.5%
Transmission							
Direct	301,316	595,346	336,288	849,037	905,296	569,008	64.1%
Allocated	1,470,604	1,407,217	1,248,931	1,701,175	2,170,720	921,789	31.8%
IT Deferral	56,099	56,099	56,099	56,099	-	(56,099)	
Total Transmission	1,828,018	2,058,662	1,641,318	2,606,310	3,076,016	1,434,698	36.9%
Distribution							
Direct	981,509	3,388,577	3,309,027	4,101,971	4,319,390	1,010,363	14.3%
Allocated	17,722,661	20,826,809	24,847,843	26,583,499	33,920,877	9,073,034	16.8%
IT Deferral	415,443	415,443	415,443	415,443	-	(415,443)	
Total Distribution	19,119,613	24,630,829	28,572,314	31,100,913	38,240,267	9,667,954	15.7%
Customer Svc							
Direct	3,742,323	2,751,874	3,060,158	9,053,399	9,070,386	6,010,229	72.2%
Allocated	13,434,747	14,072,169	15,072,179	15,543,512	19,833,715	4,761,536	14.7%
IT Deferral	527,466	527,466	527,466	527,466	-	(527,466)	
Total Customer Svc	17,704,536	17,351,509	18,659,803	25,124,377	28,904,101	10,244,299	24.5%
A&G							
Direct	996,930	423,274	665,351	11,691	11,988	(653,363)	-86.6%
Allocated	10,565,799	11,975,293	11,816,014	12,617,309	16,139,740	4,323,726	16.9%
IT Deferral	424,821	424,821	424,821	424,821	-	(424,821)	
Total A&G	11,987,550	12,823,388	12,906,186	13,053,822	16,151,728	3,245,542	11.9%
Totals							
Direct	7,044,691	8,171,193	8,502,496	15,758,089	16,118,167	7,615,671	37.7%
Allocated	52,230,200	59,332,360	63,702,473	69,370,238	88,355,995	24,653,521	17.8%
IT Deferral	1,736,800	1,736,800	1,736,800	1,736,800	-	(1,736,800)	
Totals by Operating Area	61,011,692	69,240,354	73,941,770	86,865,128	104,474,162	30,532,392	18.9%
Labor Adjustment	-	-	-	(988,147)	(1,666,230)	(1,666,230)	
Adjusted Grand Total	61,011,692	69,240,354	73,941,770	85,876,981	102,807,932	28,866,162	17.9%

Exhibit 602C

Protected Information Subject to Protective Order 18-047