NORTHERN WASCO COUNTY P.U.D.

WORK SESSION OF THE BOARD OF DIRECTORS

AGENDA

JULY 17, 2018  1:00 p.m.

PUD BOARD ROOM
2345 River Road
The Dalles, Oregon

☐  A. Strategic Planning Session

This Agenda is subject to last minute changes.
Meetings are ADA accessible. For special accommodations please contact the Northern Wasco County PUD Office in advance, (541) 296-2226. TDD 1-800-735-2900.
2015 STRATEGIC PLAN
## TABLE OF CONTENTS:

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Contents</td>
<td>2</td>
</tr>
<tr>
<td>Strategic Planning Process</td>
<td>3</td>
</tr>
<tr>
<td>Mission Statement</td>
<td>4</td>
</tr>
<tr>
<td>Our Beliefs and Core Values</td>
<td>5</td>
</tr>
<tr>
<td>Operating Strategies</td>
<td>6</td>
</tr>
<tr>
<td>Customer Service Goals</td>
<td>7</td>
</tr>
<tr>
<td>Financial Goals</td>
<td>8</td>
</tr>
<tr>
<td>Legislative and Regulatory Goals</td>
<td>9</td>
</tr>
<tr>
<td>Staff, Board and Workforce Development Goals</td>
<td>10</td>
</tr>
<tr>
<td>Power Resources, Delivery System and Infrastructure Goals</td>
<td>11</td>
</tr>
</tbody>
</table>
Strategic Planning Process

- Facilitated by Hometown Connections

Dates Board and/or Management Team met during 2015 Strategic Planning Process:

- August 17, 2015
- August 18, 2015
- September 15, 2015
- September 24, 2015
- October 15, 2015
- October 16, 2015
- November 5, 2015
- December 8, 2015
MISSION STATEMENT

To provide adequate supplies of energy, at affordable competitive prices with the highest degree of reliability, in the tradition of Public Power.
OUR BELIEFS AND CORE VALUES

Local Citizens championed and fought to create our People's Utility District. They believed—and we believe—in the public's right to own and control its electric utility.

Today, our values are a legacy from our public power heritage, as well as guideposts for a changing future. We believe in:

- Public ownership and local control
- Integrity
- Keeping power rates as affordable as possible
- Providing quality customer service
- Community involvement
- Stewardship of District and Regional assets and resources
OPERATING STRATEGIES

• Customer Service – “Customer Service is a relationship that is built on trust, courtesy and professionalism.”

• Financial – “High value financial metrics and benchmarks for the electric industry are the District’s foundation that provides the most affordable power and energy.”

• Legislative and Regulatory – “Effective involvement and meaningful participation in legislative and regulatory matters that are essential to the District’s ability to properly manage change and its impact.”

• Staff, Board and Workforce Development – “Successful hiring is the first step towards career and workforce development. Continuous learning and employee training provides the opportunity for developing skills, accountability and professionalism.”

• Power Resources, Delivery System and Infrastructure – “Strength, flexibility and reliability are the hallmark characteristics in design, construction and operation of the District’s generation, transmission and distribution system.”
Customer Service Goals

1. Develop and seek new opportunities with conservation programs

2. Ensure customer satisfaction

3. Maintain open channels for customer communications
Financial Goals

1. Maintain NWCPUD’s AA bond rating metrics
2. Maintain reserve levels
3. Maintain prudent, just and equitable rates to meet retail revenue requirements.
4. Continued diligence in managing risks
Legislative and Regulatory Goals

1. Define and communicate compliance requirements

2. Understand prospective legislative and regulatory matters that affect the utility

3. Advocate for laws and regulations that are consistent with the District’s mission and goals
Staff, Board and Workforce Development Goals

1. Promote a culture of continuous improvement
2. Provide feedback to employees on work performance
3. Ensure open lines of communication
4. Manage staff levels to meet growth
5. Enhance and formalize a Board Development Plan
Power Resources, Delivery System and Infrastructure Goals

1. Pursue opportunities for greater power supply self-sufficiency

2. Maintain a highly reliable transmission and distribution system

3. Be positioned to integrate larger loads and optimal plans of service

4. Safe-guard the utility from cyber threats and stay current with industry standards
How can boards tackle the Essential Eight and other emerging technologies?

Emerging technologies are transforming companies. What should your board know about them?

Companies are looking at the next generation of digital technologies as a way to get ahead. They’re changing their strategic plans and making investments—and boards need to weigh in. To do so, directors should understand which technologies are most relevant to their company and build their knowledge about them. Is your board up to speed?
As CEOs look to the future, what is top of mind? Innovation. Nearly a quarter of CEOs around the world singled out innovation as their top priority in the coming year, according to PwC’s 20th CEO Survey. And that was followed by digital and technology capabilities.

Overseeing company strategy is one of the board’s most critical roles. Today, that can’t be done without a working knowledge of emerging technologies. The board needs to be able to dig into how the company is planning for the future, how it’s investing in emerging technologies and how it’s confronting associated risks like cybersecurity.

Getting the right people around the table

How does management see the role of emerging technologies in the business? Which emerging technologies will impact the industry and company? What will the future look like with these technologies? Directors should be asking these questions—and they need to be asking the right people. Too often, the CIO and his or her staff are the only ones involved.

While the CIO is a valuable resource, emerging technologies affect the entire business. These technologies will impact strategy, customer engagement, operations, people and talent and, importantly, compliance. The CEO, business unit leaders, legal counsel and other senior management need to be involved in the discussions.
Emerging technologies: the Essential Eight

What advances in technology should companies and boards be paying attention to?

To help companies and boards answer this question, PwC analyzed more than 150 emerging technologies and came up with what we call the Essential Eight. Every company and industry is affected differently by technologies. But these are the eight that we believe will have the most significant global impact across industries.

The Essential Eight are:

**Artificial Intelligence (AI)** — An umbrella term for technologies that perceive and learn from their environment, then act based on that information. AI includes robotic process automation, machine learning, natural language processing, and neural networks, among other technologies. The most critical difference between AI and general-purpose software is that AI enables machines to respond on their own to signals from the world at large, signals that programmers do not directly control and therefore can’t anticipate.

**Augmented Reality (AR)** — The viewer sees real-world images, but also sees or hears relevant “overlaid” digital information. For example, a warehouse worker wearing AR-enabled glasses may be able to look at a closed crate and see details about the products inside.

**Virtual Reality (VR)** — VR headsets and VR-enabled smartphones immerse users in a computer-generated 3-D environment. Spatial data, such as the data that produces a rendering of a building or a product design, becomes more real and understandable.
How can boards tackle the Essential Eight and other emerging technologies?

74% of US CEOs say that technology will either significantly impact or completely reshape competition in their industries over the next five years. 


Drones—Drones are small aircraft without a human pilot. Many focus on drones’ delivery possibilities, but data collection and data service may be where they make their mark. Drones extend existing aerial photography and sensor data collection methods.

Blockchain—Blockchain offers a decentralized ledger of all transactions across a peer-to-peer network. It can be used for fund transfers and tracking online voting, without a central certifying authority like a bank.

Internet of Things (IoT)—Physical objects such as devices, vehicles or appliances are embedded with sensors, software and network connectivity. The objects can then collect, exchange, and act on data, usually without human intervention.

3D printing—Three-dimensional objects, based on digital models, are formed by layering or “printing” layers of materials. 3D printing has the potential to turn every large enterprise, small business, and living room into a factory.

Robotics—Robots with enhanced sensing, control, and intelligence can be used to assist, augment, or automate human activities. They’re moving beyond the factory floor. Robots now interact directly with customers and employees.

PwC Governance Insights Center
Technology series
Three steps directors can take to tackle the Essential Eight and other emerging technologies

How can directors get more involved in company strategy and the impact of emerging technologies?

1. **Understand the emerging technology priorities.**
   Which emerging technologies are on management’s radar? Are any of the Essential Eight? Which ones are most relevant to the company’s strategy, operations and customers? Discussions with the CEO and senior management are important to focus the board’s attention on the prioritized technologies. Boards will want to ask:
   - Is the CEO taking an active leadership role in the company’s use of emerging technologies?
   - Who decides which technologies to focus on? Are any external parties engaged?
   - What criteria does management use to evaluate technologies? How does management prioritize them? Is it a systematic process? Does management consider the greater business context?
   - Does the company have an emerging technologies road map? Is it kept up to date? How comprehensive is it? Is it multi-year?
   - Is the company prototyping and test-piloting any new technologies to better forecast their impact?
   - Does the board agree with management’s prioritization of technologies?

*Technology must be viewed as a competitive weapon, one that merits regular discussion and decision-making in the boardroom and among the C-suite.*
2. Increase the board’s Digital IQ.

Board members can use internal company resources to build their knowledge about the prioritized technologies, including the Essential Eight. They can also turn to third parties for help. They should ensure that appropriate time is spent to get educated, which can include making time on board agendas or even holding special meetings to do deeper dives on emerging technologies. Boards will want to ask:

- How does management keep its pulse on the prioritized technologies, including Essential Eight?
- What risks and opportunities are related to these technologies?
- Who does management collaborate with and what activities do they engage in to raise their Digital IQ? Do they tap into the startup, venture capital and technology labs communities, as well as other third parties? How are the Essential Eight and any other new technologies being used by competitors and others in the industry?
- Are board members spending enough time raising their Digital IQ leveraging management or third parties? Does the board have access to individuals with the appropriate skills to oversee technology, whether on the board or outside the boardroom?
3. Build technology into the board’s strategic oversight process.

The pace of technological change is swift. Directors will want to understand and agree with management’s plans to track, and act on, prioritized technologies. By including these technologies in the ongoing strategy review, the board can keep current and address related risks. Boards should ask:

- How does the board ensure the company has a sustainable and competitive innovation strategy?
- How do the prioritized technologies drive growth against competitors? What about new competitors?
- What is the company’s action plan, timeline and estimated cost for focusing on prioritized technologies? Who is accountable for the plan?
- New technologies will impact customer engagement, operations, people and talent and compliance. Has the board evaluated those impacts? Does the company’s broader business strategy reflect any needed changes?
- How will the board monitor whether the company is successful with any prioritized technologies? Which metrics will it use?

PwC perspectives: IT oversight for boards

To help directors execute effective IT oversight, read PwC’s Directors and IT guide, which outlines a six-step structured and efficient oversight process.

To learn more, visit our Technology hub: insights for corporate board members for additional resources about the Essential Eight technologies and digital transformation.
Find additional resources here:

- PwC’s Next in Tech hub
- Tech breakthroughs megatrend: how to prepare for its impact
- 2017 Global Digital IQ: Emerging technology insights
- Directors and IT

Contacts

For a deeper discussion about how this topic might impact your business, please contact:

**Vicki Huff Eckert**
Global and US New Venture and Innovation Leader  
(408) 817 4136  
victoria.huff@pwc.com

**Paula Loop**
Leader, Governance Insights Center  
(646) 471 1881  
paula.loop@pwc.com

**Barbara Berlin**
Director, Governance Insights Center  
(973) 236 5349  
barbara.berlin@pwc.com

Project team

**Elizabeth Strott**
Senior Research Fellow  
US Integrated Content Team

**Chrisie Wendin**
Editorial Director, Technology  
US Integrated Content Team

**Karen Bissell**
Marketing  
Governance Insights Center

**Roberto Rojas**
Design  
Creative Team

**Ryan Lasko**
Design  
Creative Team
Flipping the switch
8 key focus areas for Power & Utilities in 2018
Overview

The core tenets of the power and utilities industry will always be reliability, affordability and safety. How the industry achieves those goals - which are sometime in opposition to each other - continues to evolve. There is an increasing number of variables influencing decisions around capital investments, the deployment of new technologies and differing approaches to workforce development. Of course, in this time of rapid industry evolution, neither executives, regulators nor policy makers have a crystal ball to tell them the best path. So, we are all faced with the challenge of evaluating unique circumstances and placing our bets.

With 2017 in our rear-view mirror, the industry moves forward following one of the most challenging years to date; starting with political and policy-making uncertainties, severe weather and other disasters, and culminating with historic tax reform legislation. At the same time, new digital technologies provided exciting opportunities to change the way utilities interact with their customers, while helping to significantly bend their cost curves.

As we evaluated what we believe will be the top eight focus areas or trends for the power and utilities industry in 2018, we were struck by how many of the key themes and questions intertwined - each one further complicating the task of charting the appropriate course as well as highlighting the continued need for agility and flexibility.
Looking forward

In the face of an increasingly dynamic environment, we expect companies to increase their focus on resilience in the face of natural disasters and cyber threats – while making big strides toward modernization by continuing to upgrade both the physical and digital grid.

Boosting affordability, always a top priority, is no doubt an increasingly difficult feat considering the amount of investment needed in the grid, the challenges of reducing O&M spending and flat or declining customers demand. But those leading the charge will find new ways to do this in the year ahead.

Whether implementing new technologies to make the business more efficient and effective, building even better customer relationships, smoothly integrating companies after a deal or navigating regulatory and legislative changes; people remain at the heart of success. The attention shifts to winning an aggressive fight for a different type of talent.

While, today, tax reform is naturally very top of mind for everyone in the industry, especially for tax and finance teams facing the immediate need to implement changes in time for their 2017 year-end reporting cycle, other long-terms trends continue to mature.

From financial reporting to Environmental, Social and Governance reporting, the industry will work toward improving how it tells its story to investors, customers and other stakeholders – something that is crucial for a favorable regulatory environment.

What do you think?

These top priorities are detailed in our look at the eight focus areas for 2018.

We invite you to take a look, and tell us what you think.

Did we capture your top eight for 2018?
#1. **Boosting resilience for even more extreme scenarios**

At its most basic level, resilience is commonly defined as the ability to spring back or recover, and in some cases, transform from adversity. It’s a word that has always been important in the world of power and utilities; and, perhaps, even more so following one of the most challenging years on record.

By most accounts, 2017 will be remembered as the most severe and expensive to date, with losses exceeding $300 billion, a new US annual record.¹

From back-to-back hurricanes and 100-year-floods to historic winds fueling devastating brush fires – the industry was tested at every turn and in every geographic region.

There’s reason to believe that those tests will continue into 2018 and beyond, with studies showing that the frequency of multi-billion dollar events continues to grow year-after-year.

Beyond natural disasters, resilience in the face of man-made threats certainly isn’t fading from focus either, particularly on the heels of several massive data and cybersecurity breaches that grabbed headlines across different industries in 2017.

---

¹ NOAA National Centers for Environmental Information (NCEI) *U.S. Billion-Dollar Weather and Climate Disasters*, 2017
Expecting the unexpected

When tested, utilities always try to learn from the incident and apply those lessons to improve processes – for a similar incident in the future. But from natural disasters to man-made cyber threats and security risks, each new incident can often pose a new set of challenges.

One of the more important actions companies can take in 2018 will be to expand their playbook to include new and, previously considered unanticipated extreme scenarios.

It’s important to think even bigger, and to take an even harder look at the possible risks hiding around the corner. On the cybersecurity front, it’s often referred to as evaluating your “cyber hygiene.” Much like how flossing your teeth helps you protect the areas of your mouth missed with brushing alone, it’s crucial to continue to re-evaluate your risks and mitigation strategies within your power and utility company.

Minding your gaps

While power and utility companies have put a lot of effort into boosting capabilities, tools and processes; it’s just as important for them to continually ask the following questions:

- Do we really know where our coverage gaps are?
- Do we know our vulnerabilities?
- Is the perimeter really secure?
- Have risks been escalated to leadership, the board and appropriate regulators?

Whether it’s a man-made threat or a naturally occurring one, the industry is increasingly judged by how it fairs when faced with these unforeseen and massively challenging events.

As anyone who has lived it knows, your weak spots become exceedingly obvious in a crisis. There’s continued regulatory pressure to prove your efforts to mitigate existing and emerging cyber risks.

Questions to ask

Coverage gaps?
Vulnerabilities?
Perimeter secure?
Properly escalated?

While it is not economically possible to mitigate every threat, it is critical to evaluate and re-prioritize which risks should be mitigated and how to address the remaining residual risks.

A critical component of your good hygiene is the communication of these mitigated and residual risks to executive and board leadership, while also ensuring that you’re always scanning the horizon and doing an honest self-assessment of your cyber program.
## #2. Evolving the grid to serve changing needs

In recent years, making the grid more resilient and reliable has evolved well beyond traditional “hardening” projects aimed at strengthening poles and wires – the physical backbone of the electric system. Now, grid modernization is also synonymous with efforts to make the grid more resilient and quicker to recover from events; more efficient and responsive to customer demand patterns, including load demands from electric vehicles; and more enabled to integrate distributed generation capacity and energy storage as well as other two-way power demands that the grid wasn’t originally designed to handle.

The industry is starting the year on the heels of a milestone – more than half of US electricity customers were projected to have advanced metering infrastructure (AMI) smart meters installed by the end of 2017. Between 2018 and 2020, the number of installations is expected to grow from 76 million to 90 million.²

While efforts differ by region and regulatory climate, transmission and distribution-related Capital Expenditures are on the uptick, with more than $57 billion of T&D Capex expected by the end of 2017, up 8 percent over 2016.³ In fact, 24 out of 24 investor-owned electric utilities with more than $1 billion in revenue have announced grid modernization activities or have initiatives currently underway.⁴

### Growth in smart meter installations²

<table>
<thead>
<tr>
<th>Meters (millions)</th>
<th>27</th>
<th>42</th>
<th>46</th>
<th>50</th>
<th>65</th>
<th>72</th>
<th>76</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

² Projected

---

2. *Electric Company Smart Meter Deployments: Foundation for a Smart Grid*, Institute for Electric Innovation, prepared by Adam Cooper, December 2017

3. *Edison Electric Institute - EEI Finance Department, company reports*, August 2017

4. Based on PwC analysis of publicly reported projects
Taking it to the next level

This year, we expect power and utility companies to continue increasing focus on the virtual aspects of the smart grid infrastructure, with more and more looking into implementing the following systems or technologies:

- Advanced Distribution Management Systems (ADMS)
- Distributed Energy Resource Management Systems (DERMS)
- Emerging, sensor-based, Intelligent Electric Device Management Solutions
- Power and Operational Analytics

This digitizing of the grid will help companies improve the monitoring and understanding of supply, demand and flows down to the meter level.

Companies will have more data at their fingertips than ever before. Purpose-built software and general purpose analytical platforms are being developed to make predictive and real-time decisions using this data. Because of that, the industry faces the potential of a major tipping point in 2018 – discovering even more ways to “use” this data.

With a growing need to standardize, cleanse and analyze data, we’ll see an increased need for data scientists and other specialists who will be focused on gleaning insights and, ultimately, finding better ways to serve customers and efficiently do business.

The industry faces the potential of a major tipping point in 2018
As part of the industry’s mantra for over 100 years, utilities take great pride in providing essential services at affordable rates to all customers – from working with large commercial and industrial customers to understand demand patterns, to providing assistance and protections for low income residential customers. Despite common public sentiment, gas and electric utilities have done excellent work minimizing cost increases for customers, keeping the annual growth rate below the Consumer Price Index, and lower than other comparable industries.

In recent years, the majority of those savings have come from the generation side of the business: low gas prices unleashed from domestic shale, more efficient combined-cycle turbines and the plummeting cost of wind and solar.

To some degree, these savings have helped to offset the rising costs of running a transmission and distribution business due to important investments in grid modernization, customer service, cybersecurity and other efforts to move the industry forward.

It’s tough to imagine generation costs going much lower, so in order to make those essential investments and keep rates affordable, utility management teams must look beyond generation for cost savings and productivity increases.

Finding hidden opportunities

Utilities are standing up their own innovation organizations to explore new technologies and rethink how they’ve done things in the past. With “bots” booking journal entries (accounting), ordering materials (supply chain) and responding to customer requests (customer service); automation is already transforming back offices into efficient, data-driven organizations. Productivity gains in the field, on the other hand, have remained largely untapped.

Expect that to change, though, as utilities pilot more projects with drones, IoT sensors, machine learning and augmented reality. Many of these new technologies – which are among PwC’s eight essential technologies to watch in the coming years – have the potential to pay for themselves as they take on administrative tasks that allow employees to focus on more value-added work. And, beyond pure cost-savings from automation, many of these new technologies are also helping increase reliability and decrease safety incidents.

Technological advancements are upending the traditional utility business model, presenting power and utility companies with an uncertain path forward in a yet-to-be-defined future. Rather than resisting these changes, however, more and more utilities are embracing new technologies, focusing on their change-management capabilities, disrupting their own business models, and finding that they can still provide safe, reliable and affordable services while operating with lower costs enabled by technology.
#4. (Re)defining the workforce of the future

It’s no secret that the push to find more cost-effective and efficient means to operate through the use of emerging technologies will have an impact on every corner of the organization.

In 2018, we’ll see power and utility companies take more steps toward embracing automation, robotics and augmented intelligence to evolve their business – from the back office to field operations, a top area for growth.

Agility and adaptability will continue to grow in importance for existing staff. In PwC’s cross-industry survey, Workforce of the Future, 74 percent of employees said they are embracing this new norm, and ready to learn new skills or re-train to remain employable in the future.6

This shift will come as more and more members of the industry’s workforce near retirement age – a reality that utilities have faced for years. As the industry tries to replenish this departing workforce, they’re seeking different skills like data analytics and other highly sought-after talents.

For power and utilities to win in this competition for talent, they will need to “up their game” in the year ahead. Those who succeed will do so by taking a different approach to how they promote the industry to potential recruits.

6. Workforce of the future: The competing forces shaping 2030, PwC, 2017
Overcoming image obstacles

As the industry looks for talent with different skills than they have in the past, it faces enormous competition from a host of other industries that are all trying to entice the same people. The technologically endowed have a wealth of choices.

Initially, many aren’t drawn to a highly regulated sector, like utilities, whose safety and risk-averse culture can be perceived as predictable and not as cutting-edge as tech or other more glamorous industries. Those within the industry know that the stereotype is becoming more and more invalid, particularly for leading-edge companies.

In reality, power and utility companies are making great strides in innovation, while offering a lot of the qualities that the up-and-coming generations (aka Millennials and Generation Z) seek in the workplace, including:

• Being a vital player in wind, solar and other “green” technologies, like electric vehicles
• Empowering consumers to make their own choices about energy consumption
• Providing a flexible work environment that fosters work-life integration
• Demonstrating a commitment to the community through service projects and charity work

Utility executives are often the first to admit, the industry isn’t always the best at telling their story. Being more aggressive on this front, is what could make the difference in the 2018 battle for talent.
#5. Embracing a new customer relationship to stay relevant

“Keeping the lights on” will always be table stakes for the industry; but as power and utility companies know, that role continues to evolve well beyond the basics. Building a stronger and better relationship with customers will grow in importance even more during 2018.

That means, continuing to develop digital technologies that give customers easier access to their energy information, improving processes and practices, and ensuring that every interaction is valuable and consistent.

**One often untapped opportunity**

Power and utility companies may have the most to gain by taking bigger steps toward becoming trusted energy advisors or partners, specifically to their commercial and industrial customers.

As utilities are seeing first hand, when there’s a gap in this area, leading C&I customers are filling the void by appointing their own energy managers. Some are taking it a step further by investing directly in their own wind and solar generation at a growing rate – a reported 7.72 gigawatts of new renewable capacity added by large corporations since 2015.7

It seems likely that these investments will only continue, especially as many of these C&I customers evaluate how to invest potential tax reform windfalls. Which also means there is growing opportunity for utilities to play a role in helping C&I customers navigate all the steps involved in connecting to the grid and more.

Non-traditional (i.e. non-utility) competitors are often salivating in the wings, more than ready to jump in to help with everything from renewable implementation, to smart meter integration and energy management.

---

**The tipping point**

To a large extent, time is of the essence as expectations in this area continue to increase as each day passes. There’s a potential tipping point on the horizon where utilities can either lay claim to this new energy advisor and partner role, or further lose their relevance on the sidelines.

Those who are further ahead in this area, tend to have the following things in common:

- They recognize the need and the threat of not acting
- They have a strategy or plan for getting there
- They already get the basics right (good customer service, fast response times, etc.)

There are financial stakes on the line as well. With some C&I companies taking steps that enable them to generate their own electricity, increasingly there’s a potential for utilities to be responsible for maintaining the grid serving these large companies, often without revenue to offset those costs.

Small- and medium business customers as well as more advanced residential customers are also important in this financial equation. The more and more these groups can get what they need elsewhere, the more likely utilities could be left with a remaining customer base that skews more costly or difficult to serve.

As those of you who are living this every day know, evolving this relationship with customers doesn’t happen overnight, and it needs to be earned each and every day.
#6. Running the next play with tax reform

With the most significant overhaul of the US tax code in more than 30 years now in the end zone, the ball has been tossed to companies to determine their tax reform readiness, and exactly how reform will impact their business, cash flows and capital investments for years to come.

For the power and utilities industry, the passage of the Tax Cuts and Jobs Act comes after tirelessly working throughout 2017 to ensure that decision makers on Capitol Hill understood the industry’s top priorities, which included those listed in the tax reform scorecard below.

## Tax reform scorecard

<table>
<thead>
<tr>
<th>Status</th>
<th>Priorities</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>Reducing the Corporate Tax Rate</td>
<td>Corporate tax rate reduced from 35% to 21%.</td>
</tr>
<tr>
<td>✓</td>
<td>Maintaining interest deductibility for corporate debt</td>
<td>Limits generally applied to interest deductions, with those limits becoming stricter in 2022. However, regulated utilities are specifically excluded from the limitations on the deductibility of interest.</td>
</tr>
<tr>
<td>✓</td>
<td>Keeping state and local tax deductions</td>
<td>Deductibility maintained, which will prevent taxing local infrastructure investments twice.</td>
</tr>
<tr>
<td>✓</td>
<td>Maintaining tax normalization and addressing excess deferred taxes</td>
<td>The normalization of excess deferred income taxes at the 21 percent rate will generally provide regulated utilities the opportunity to reduce rates charged to customers over the book life of the property.</td>
</tr>
<tr>
<td>✓</td>
<td>Keeping dividend tax rates low and on par with capital gains tax rates</td>
<td>No changes made to the dividend and capital gains rates. Rates remain in parity which is important to industry investors.</td>
</tr>
</tbody>
</table>

---

While the impacts will be different depending on varying tax positions and business models – in general, the provisions are expected to be largely beneficial for the industry, with Edison Electric Institute calling it a “win for America’s electricity customers and for investment in critical energy infrastructure.”

**Next wave of work begins**

The impacts will be felt across power and utility organizations, particularly within tax and finance teams. As 2018 is underway, they are now shifting from evaluating how tax reform “could” impact their processes and systems, to how it “is” impacting the business. Just over half, or 55 percent, of power and utility professionals polled by PwC in December of 2017 said they had modeled some or all possible tax reform scenarios to prepare their company for implementation. Now, those models must turn into reality.

Time is of the essence. With no grace period for recognizing the tax effects in the period of enactment, one of the most pressing focus areas at the start of 2018 is the impact on year-end reporting.

Top questions that are being considered include:

- What are the impacts on deferred income tax balances, tax regulatory assets / liabilities, unremitted foreign earnings assertions, etc.?
- What are the expectations of our regulators with respect to the excess deferred income taxes?
- How will I need to adjust my financial statement disclosures?
- How do (or whether) the states in which our business operates conform to the new federal law changes?
- Are my systems ready for the new law changes?
- How should I deal with the necessary changes in processes, controls and data needs?
- How might the tax law changes impact other areas of my business?

To a large extent, this will be a year of adjusting, adapting and activating, as questions that were previously uncertain, become clearer. It will be a year of seeking and receiving guidance from states, regulators and tax experts.

---

#7. Continuing to make the most of M&A

With tax reform finally law, dealmakers will have a little less uncertainty to navigate as they evaluate purchases and sales within the power and utilities industry. The verdict is still out, though, on how much impact tax reform will have on merger and acquisition activity, if any. We expect the deal market to stay warm in the year ahead, perhaps driven more by other factors. Namely, we expect the major players who significantly led deal activity over the past few years to complete their integration efforts and potentially return to the deals table this year.

According to an analysis of PwC’s quarterly North American Power & Utilities Deals Insights, there have been consistent trends driving a very robust deals market in the past few years (particularly in 2016) – 216 deals worth more than $355 billion since 2014. We expect continued interest in the deals market in 2018 and, likely, the coming years.

- **Race for renewables** - Almost half of the deals volume, 117 since 2014, was related to renewable energy, with 25 corporate deals worth almost $21 billion and 92 renewable asset deals worth over $30 billion. With renewable portfolio standards, reductions in manufacturing costs, increasing customer demand for renewable generation, and the near-term phase down of key federal tax incentives; the renewables market will continue to be a focus area in 2018.

- **Growing generation** - Traditional fossil and nuclear generation assets and competitive retail and merchant generation companies accounted for 70 deals worth almost $74 billion since 2014. With several factors driving current wholesale power prices to historic lows, merchant generators and diversified utilities alike have had to reevaluate their balance sheets, often finding interest from private equity buyers.


![Diagram showing the number of deals in different sectors: regulated electric, gas, and water utilities; gas transport and electric transmission infrastructure; IPPs and traditional generation assets; renewables.]

*Source: Analysis of PwC North American Power & Utilities Deals Insights*
• **Generation (continued)** - 2018 should provide some limited relief for merchant generators, with FERC focused on price formation as well as tax reform removing some uncertainty and potentially improving cash flows. Despite this, the current market is encouraging buyers and sellers of generation assets to pursue deals to either privatize to pursue longer-term value or combine to enhance operational synergies.

• **Infrastructure interests** - The transformative shift in generation mix seen over the last half decade, combined with stagnant load growth in traditional electric utility operations, has stoked infrastructure deal activity, driving nearly $82 billion in electric transmission and gas pipeline infrastructure deals since 2014. As coal and nuclear plants retire and more wind, solar and natural gas generation is relied upon to generate power, new pipelines will be needed to transport gas from shale resources to gas-fired power plants. Additionally, new transmission lines will be needed to deliver renewable electricity to the population centers demanding it. 2018 will no doubt bring more activity in this area, especially with infrastructure high on the Trump Administration’s priority list.

• **Strategic acquisitions** - With 34 deals worth over $167 billion since 2014 – 45 percent of the $373 billion total – strategic acquisitions of regulated electric, gas and water utilities have offered buyers stable, regulated returns. They’ve also potentially added geographic diversity, growth opportunities and synergies. However, regulators will continue to scrutinize regulated utility deals to ensure proper sharing of benefits and to protect customer interests.

**Ongoing opportunity**

With the premiums currently baked into deal prices, dealmakers need a succinct strategy going in, and must clearly articulate their vision – particularly around strategy, execution and integration. The key targets for the message are, of course, regulators, Wall Street and, most importantly, customers. Those with the most success, do this from “day one.” These more seasoned acquirers recognize the importance of that vision, and will often bring strategy and execution teams into the room from the onset to analyze synergies and value capture opportunities, and to set the right path forward.
#8. Leading the way in responsible investing and reporting

More and more, investors are not only looking for a strong financial performance, but they’re also considering Environmental, Social and Governance, or ESG, criteria in their investment decisions. In fact, reports show that sustainable and responsible investments in the United States have grown from $639 billion in 1995 to $8.7 trillion in 2016 – accounting for one out of every five investment dollars.\(^{12}\)

**8.7 trillion**

1 out of 5 dollars

$$$$$

Sustainable & responsible investments

During the 2017 proxy season, a handful of shareholder proposals on environmental issues, like climate change, gained majority shareholder support. This is the first time we have seen these types of proposals pass, and they did so with the help of some of the largest institutional investors.\(^{13}\)

Utility boards are taking note: 60 percent of directors from energy and utilities companies “very much” think their companies should take climate change into account when forming Company strategy, compared to only 18 percent of all directors surveyed in PwC’s annual Corporate Directors Survey.

Gender and racial diversity on boards have also become a clear priority for institutional investors in 2017, and again, our sector is at the forefront: 44 percent of energy and utility directors believe gender and racial diversity “very much” enhances board performance, compared to 34 percent of all directors. Further, 78 percent of energy and utilities boards have prioritized diversity as a critical criterion for search firms, compared to just 57 percent of all companies.

Certainly, there is always room for improvement, but power and utilities companies are listening to shareholders and striving to address environmental, social, and governance concerns.

Diversity prioritized by board

\[78\% \quad \text{Energy & Utility} \]

VS.

\[57\% \quad \text{All Companies} \]

Source: PwC 2017 Annual Corporate Directors Survey


\(^{13}\) **The governance divide: Board and investors in a shifting world**, PwC 2017 Annual Corporate Directors Survey
Telling your story

The power and utilities industry is proactively responding to investor concerns around ESG. In fact, Edison Electric Institute is piloting a reporting template aimed at helping electric companies provide investors with more uniformity and consistency for ESG and sustainability metrics.14 The effort, which will roll out more broadly in 2018, is the result of an EEI working group comprised of member utilities, investor and banking groups and other industry representatives, including PwC.

To continue increasing awareness about all that they do in this space, companies should proactively tell their story, demonstrating their ongoing commitment to responsible stewardship.

Reporting and other communication should:

• Describe how the company creates value for society and for shareholders in a mutually reinforcing way
• Be clear about the company’s short, medium and long-term goals and overall strategy to manage key trends and risks
• Outline the financial and non-financial metrics and targets it uses to evaluate performance
• Provide reliable insight into how the company is performing against its goals

The most successful will likely apply this messaging consistently across all communication channels – from investors to customers.

---

14. EEI Launches pilot environmental, social, governance and sustainability reporting template. EEI news release, Dec. 4, 2017
All industries, power and utilities included, are increasingly measured by their commitment to moving the world forward. While it doesn’t often get the credit it deserves, the power and utilities industry is undoubtedly a key player in this realm, supporting more than 7 million jobs and investing more than $100 billion in infrastructure in 2017 alone.¹⁵

We feel like a broken record when we say this, but the industry will also be measured by how it adapts and embraces the pace of change that keeps increasing by leaps and bounds. We’ve all seen how swiftly technology that was only mentioned a year or so ago, is now a very real part of our everyday lives. That momentum will not slow in 2018. It’s an exciting time for the industry as well as one that will continue to challenge companies at every turn.

What’s top of mind for you? We’d love to discuss this with you further.

¹⁵. *Powering America*. Edison Electric Institute, Infographic, August 2017. Data represents electric IOUs, munis, coops, public power, IPPs
Let’s talk

Author
Michael (Casey) A. Herman
US Energy, Utilities and Mining
Co-leader, Partner
(312) 298-4462
michael.a.herman@pwc.com

Affordability
Jenny Koehler
US Power & Utilities
Advisory Leader, Partner
(415) 498-7488
jennifer.koehler@pwc.com

Resilience
Alan Conkle
US Power & Utilities Risk
Assurance Leader, Principal
(312) 298 4461
alan.conkle@pwc.com

Todd Jirovec
PwC Strategy&, Principal
(214) 746-6525
todd.jirovec@pwc.com

Marissa Michel
US Lead Global Crisis
Center Director
(703) 682-5876
marissa.o.michel@pwc.com

Workforce
Karen Brennan-Holton
US Power & Utilities Human
Capital Leader, Principal
(678) 419-1329
karen.brennan-holton@pwc.com

Matt Wilson
US Cybersecurity & Privacy
Practice, Director
(678) 427-1042
matthew.l.wilson@pwc.com

Philip McLemore
US Power & Utilities Human
Capital, Director
(925) 878-9210
philip.r.mclemore@pwc.com

Grid Modernization
Mike Chapman
US Power & Utilities
Managing Director
(415) 498-6264
michael.w.chapman@pwc.com

Customer
Jim Curtin
US Power & Utilities Customer
Leader, Principal
(713) 356-5188
james.m.curtin@pwc.com

ESG
Alexis Crow
Advisory Geopolitical
Opportunity, Director
(212) 203-8609
alexis.a.crow@pwc.com

Tax Reform
Robin Miller
US Power & Utilities
Tax Leader, Partner
(312) 259-9529
robin.d.miller@pwc.com

Deals
Jeremy Fago
US Power & Utilities
Deals Leader, Principal
(720) 931-7285
jeremy.fago@pwc.com

Kenyon Willhoit
US Power & Utilities
Deals, Director
(720) 931-7462
kenyon.a.willhoit@pwc.com

Affordability
Jenny Koehler
US Power & Utilities
Advisory Leader, Partner
(415) 498-7488
jennifer.koehler@pwc.com

Geoff Plese
US Power & Utilities Digital
Customer, Principal
(678) 428-3876
geoffrey.e.plese@pwc.com

Todd Knapp
US Power & Utilities Principal
(646) 471-5499
todd.m.knapp@pwc.com

Managing Director
US Power & Utilities
Why digital transformation is now on the CEO’s shoulders

Big data, the Internet of Things, and artificial intelligence hold such disruptive power that they have inverted the dynamics of technology leadership.

by Thomas M. Siebel

When science and technology meet social and economic systems, you tend to see something akin to what the late Stephen Jay Gould called “punctuated equilibrium” in his description of evolutionary biology. Something that has been stable for a long period is suddenly disrupted radically—and then settles into a new equilibrium. Analogues across social and economic history include the discovery of fire, the domestication of dogs, the emergence of agricultural techniques, and, in more recent times, the Gutenberg printing press, the Jacquard loom, urban electrification, the automobile, the microprocessor, and the Internet. Each of these innovations collided with a society that had been in a period of relative stasis—followed by massive disruption.

Punctuated equilibrium is useful as a framework for thinking about disruption in today’s economy. US auto technology has been relatively static since the passage of the Federal interstate-highway act, in 1956. Now the

---

1 See Stephen Jay Gould, *Punctuated Equilibrium*, Cambridge, MA: Harvard University Press, 2007. Gould pointed out that fossil records show that species change does not advance gradually but often massively and disruptively. After the mass extinctions that have occurred several times across evolutionary eras, a minority of species survived and the voids in the ecosystem rapidly filled with massive speciation. Gould’s theory addresses the discontinuity in fossil records that puzzled Charles Darwin.
synchronous arrival of Tesla, Uber, and autonomous vehicles is creating chaos. When it’s over, a new equilibrium will emerge. Landline operators were massively disrupted by cell phones, which in turn were upended by the introduction of the iPhone, in 2007—which, in the following decade, has settled into a new stasis, with handheld computing changing the very nature of interpersonal communication.

The evidence suggests that we are seeing a mass disruption in the corporate world like Gould’s recurring episodes of mass species extinction. Since 2000, over 50 percent of Fortune 500 companies have been acquired, merged, or declared bankruptcy, with no end in sight. In their wake, we are seeing a mass “speciation” of innovative corporate entities with largely new DNA, such as Amazon, Box, Facebook, Square, Twilio, Uber, WeWork, and Zappos.

Mass-extinction events don’t just happen for no reason. In the current extinction event, the causal factor is digital transformation.

**AWASH IN INFORMATION**

Digital transformation is everywhere on the agendas of corporate boards and has risen to the top of CEOs’ strategic plans. Before the ubiquity of the personal computer or the Internet, the late Harvard sociologist Daniel Bell predicted the advent of the Information Age in his seminal work *The Coming of Post-Industrial Society*. The resulting structural change in the global economy, he wrote, would be on the order of the Industrial Revolution. In the subsequent four decades, the dynamics of Moore’s law and the associated technological advances of minicomputers, relational databases, computers, the Internet, and the smartphone have created a thriving $2 trillion information-technology industry—much as Bell foretold.

In the 21st century, Bell’s dynamic is accelerating, with the introduction of new disruptive technologies, including big data, artificial intelligence (AI), elastic cloud computing (the cloud), and the Internet of Things (IoT). The smart grid is a compelling example of these forces at work. Today’s electric-power grid—composed of billions of electric meters, transformers, capacitors, phasor measurement units, and power lines—is perhaps the largest and most complex machine ever developed. An estimated $2 trillion is being spent this decade to “sensor” that value chain by upgrading or replacing

---


the multitude of devices in the grid infrastructure so that all of them are remotely machine addressable.\(^4\)

When a power grid is fully connected, utilities can aggregate, evaluate, and correlate the interactions and relationships of vast quantities of data from all manner of devices—plus weather, load, and generation-capacity information—in near real time. They can then apply AI machine-learning algorithms to those data to optimize the operation of the grid, reduce the cost of operation, enhance resiliency, increase reliability, harden cybersecurity, enable a bidirectional power flow, and reduce greenhouse-gas emissions. The power of IoT, cloud computing, and AI spells the *digital transformation* of the utility industry.

A virtuous cycle is at work here. The network effects of interconnected and sensored customers, local power production, and storage (all ever cheaper) make more data available for analysis, rendering the deep-learning algorithms of AI more accurate and making for an increasingly efficient smart grid. Meanwhile, as big data sets become staggeringly large, they change the nature of business decisions. Historically, computation was performed on data samples, statistical methods were employed to draw inferences from those samples, and the inferences were in turn used to inform business decisions. Big data means we perform calculations on *all* the data; there is no sampling error. This enables AI—a previously unattainable class of computation that uses machine and deep learning to develop self-learning algorithms—to perform precise predictive and prescriptive analytics.\(^5\)

The benefits are breathtaking. All value chains will be disrupted: defense, education, financial services, government services, healthcare, manufacturing, oil and gas, retail, telecommunications, and more.\(^6\) To give some flavor to this:

- **Healthcare.** Soon all medical devices will be sensored, as will patients. Healthcare records and genome sequences will be digitized. Sensors will remotely monitor pulse, blood chemistry, hormone levels, blood pressure, temperature, and brain waves. With AI, disease onset can be accurately

---


predicted and prevented. AI-augmented best medical practices will be more uniformly applied.

• **Oil and gas.** Operators will use predictive maintenance to monitor production assets and predict and prevent device failures, from submersible oil pumps to offshore oil rigs. The result will be a lower cost of production and a lower environmental impact.

• **Manufacturing.** Companies are employing IoT-enabled inventory optimization to lower inventory carrying costs, predictive maintenance to lower the cost of production and increase product reliability, and supply-network risk mitigation to assure timely product delivery and manufacturing efficiency.

**THE NEW ENGINE OF CHANGE: CEOS**

Perhaps the most unique aspect of this technology trend is that digital transformation is being driven from the top, personally mandated by the CEO. This is something new.

In the past 70 years of computing, the world advanced from the vacuum tube to the transistor to the semiconductor, from mainframe computing to minicomputing to personal computing to the Internet. Software evolved from bespoke custom programming to on-premises, packaged enterprise application software and then to software as a service (SaaS)—cloud-resident solutions. Among the fruits: increased productivity and profitability, a lower cost of operation, and economic growth.

I witnessed many of these tech-adoption cycles over the past 30 years. With the promise of performance improvements and productivity increases, such innovations were introduced to industry through the IT organization. Over months or years, and after multiple trials and evaluations, each gained the attention of the chief information officer, who was responsible for technology adoption. The CEO was periodically briefed on the cost and result.

With the 21st-century digital transformation, the adoption cycle has inverted. What I’m seeing now is that, almost invariably, global corporate transformations are initiated and propelled by the CEO. Visionary CEOs, individually, are the engines of massive change that is unprecedented in the history of information technology—possibly unprecedented in the history of commerce.
Something fundamentally important is happening, and it’s something that corporate leaders find highly motivating—and urgent. Michael Porter of the Harvard Business School speculates that the new world of smart, connected devices represents a sea change in the fundamental dynamics of competition. Porter suggests that the Internet of Things isn’t simply a matter of competitive advantage; it is existential. More darkly, John Chambers, of Cisco Systems, predicts that 40 percent of today’s businesses will fail in the next ten years; 70 percent will attempt to transform themselves digitally, but only 30 percent will succeed. “If I am not making you sweat,” he told an executive audience, “I should be.”

The competitive effects are playing out in the marketplace. In autos, think of Tesla as IoT on wheels. Tesla’s market capitalization is roughly equivalent to that of General Motors even though its revenue is less than one-twentieth of GM’s. Tesla collects terabytes of data from its vehicles and uses machine learning to improve predictive maintenance, self-driving capabilities, and the driving experience of its cars significantly and continuously. The more miles driven, the more data Tesla collects, and the more it grows as a competitive force. A consumer can configure and purchase a customized new Tesla from the company’s website in eight minutes. In retail, Amazon is digitally transforming the industry with data, AI, and network effects. Its share of the US e-commerce market is 34 percent and could increase to 50 percent by 2021.

In response, some farsighted CEOs are revamping their playbooks. Isabelle Kocher, CEO of Engie, an integrated energy company based in Paris, has assembled a C-suite team to step up the transformation of the company. Together they have updated its strategy with new business targets that include specific expectations for digital value creation. Other CEOs we work with are thinking through scenarios to anticipate future disruption, asking questions like “what are our customers really buying, do they really need us, or could a digital competitor provide a better insight or product at a lower cost?” They’re using these “what if” cases to break out of cloistered mind-sets and reallocate investments for future digital efforts. One healthcare CEO used scenarios to craft a road map for hundreds of next-generation

---

8 Julie Bort, “Retiring Cisco CEO delivers dire prediction: 40 percent of companies will be dead in 10 years,” Business Insider, June 2015, businessinsider.com.
application improvements across its businesses. Where new talent is required to bolster C-level efforts, CEOs are recruiting for roles such as chief digital officer with the authority and budget to make things happen.

Other CEOs are seeking inspiration by organizing visits to the headwaters of disruption, at companies like Apple, Tesla, and Uber. (My company has hosted more than 30 such visits in 2017 alone.) They’re retooling executive perspectives with boot camps on digital innovation. They’re also reaching across company and industry borders to share and promulgate best practices. In Germany, leading industry CEOs formed a working group, Industrie 4.0, to advise the federal government on industrial policy needed for the “fourth industrial revolution,” grounded in IoT and AI. Hundreds of leading companies have formed the Industrial Internet Consortium to accelerate the adoption of “cyberphysical systems” in energy, healthcare, manufacturing, smart cities, and transportation.

Digital transformation is about sweeping change. It changes everything about how products are designed, manufactured, sold, delivered, and serviced—and it forces CEOs to rethink how companies execute, with new business processes, management practices, and information systems, as well as everything about the nature of customer relationships. I’m seeing leaders who get this. They’re all over it: they want to launch five transformation initiatives right now; they’re talking to me and every digital leader they know about where the technology threats are coming from; and they’re hiring the best people to advise them. Yet I’m shocked by—even fearful for—the many CEOs I know who seem to be asleep at the switch. They just don’t see the massive disruption headed their way from digital threats, seen or unseen, and they don’t seem to understand it will happen very quickly.

So when I see CEOs who may be experimenting here and there with AI or the cloud, I tell them that’s not enough. It’s not about shiny objects. Tinkering is insufficient. My advice is that they should be talking about this all the time, with their boards, in the C-suite—and mobilizing the entire company. The threat is existential. For boards, if this isn’t on your agenda, then you’ve got the wrong agenda. If your CEO isn’t talking about how to ensure the survival of the enterprise amid digital disruption, well, maybe you’ve got the wrong person in the job. This may sound extreme, but it’s not.
It’s increasingly clear that we’re entering a highly disruptive extinction event. Many enterprises that fail to transform themselves will disappear. But as in evolutionary speciation, many new and unanticipated enterprises will emerge, and existing ones will be transformed with new business models. The existential threat is exceeded only by the opportunity.

Thomas M. Siebel is the chairman and CEO of C3 IoT. Previously, he founded Siebel Systems, serving as its CEO and chairman from 1993 until its acquisition by Oracle, in 2006.
The Leading Edge: Where is the Industry Headed?

Public Power Forward Summit
December 12, 2017 | 8:30 a.m.

Robert Cromwell
Interim Power Supply & Strategic Planning Officer
Seattle City Light
Topics

• Overview of the Pacific Northwest system
• Regional electric utilities and Balancing Authorities
• Federal law that governs the four states
• Regional market and Energy Imbalance Market
• Distribution systems and the customer interface
• Technology adoption and our customer relationship
• Seattle City Light – How are we adapting?
Pacific Northwest Electric Utilities

• Bonneville Power Administration (BPA)
  o 59,300 Gigawatt Hours
  o 133 Wholesale Customers

• 136 Public Power Utilities
  o 78,800 Gigawatt Hours (includes power from BPA)
  o 2.4 Million Customers

• Six Investor-Owned Utilities
  o 84,900 Gigawatt Hours
  o 3.9 Million Customers
# Northwest Balancing Authorities

<table>
<thead>
<tr>
<th>Utility/Organization</th>
<th>Retail Sales*</th>
<th>Customers</th>
<th>Generation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPA</td>
<td>59,300</td>
<td>165</td>
<td>79,619</td>
</tr>
<tr>
<td>PAC</td>
<td>54,318</td>
<td>1,800,000</td>
<td>60,959</td>
</tr>
<tr>
<td>Idaho Power</td>
<td>14,196</td>
<td>534,000</td>
<td>12,175</td>
</tr>
<tr>
<td>PSE</td>
<td>20,445</td>
<td>1,128,000</td>
<td>24,607</td>
</tr>
<tr>
<td>Avista</td>
<td>8,497</td>
<td>377,000</td>
<td>11,495</td>
</tr>
<tr>
<td>PGE</td>
<td>18,971</td>
<td>860,000</td>
<td>22,323</td>
</tr>
<tr>
<td>Seattle City Light</td>
<td>9,400</td>
<td>500,000</td>
<td>5,971</td>
</tr>
<tr>
<td>Mid-Columbia PUD’s</td>
<td>7,920</td>
<td>103,000</td>
<td>20,347</td>
</tr>
<tr>
<td>Tacoma Power</td>
<td>4,581</td>
<td>176,000</td>
<td>2,417</td>
</tr>
</tbody>
</table>

*Gigawatt hours
Northwest Balancing Authorities
Market Ideas and Discussions

• Market Creation for the Future
  o Attempts at Regional Transmission Organizations
  o Complications to the Idea
  o BPA and Public Power Utilities
    ▪ West Coast or Northwest only
    ▪ Day Ahead Markets
    ▪ Hydro Only System

• Voluntary or Legislated
The Distribution System Evolves

• Focusing on the wires business at a time of change
• Customer usage changes – LED and energy efficiency penetration
• Energy efficiency and conservation role
  o Do we still need to buy it or just promote it?
• Distributed generation
  o What is the utility’s role?
• Meeting customer power quality reliability expectations
• Environmental goals and carbon reduction
Advanced Metering Integration

- Resources move from the field to the office
- The development of data to better understand our customers
- The business relationship with self generation and storage customers will be transformed
- The third party interface through product integration and interaction for comfort, security, and efficiency
- Customer information and billing system overhaul
- Social media and portals
<table>
<thead>
<tr>
<th>Market Driven</th>
<th>Generation</th>
<th>Power Supply</th>
<th>Transmission</th>
<th>Transmission Distribution</th>
<th>Meter</th>
<th>Consumer Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market</td>
<td>Market</td>
<td>Regional Transmission Organization</td>
<td>Load Serving Entity</td>
<td>Advanced Metering Infrastructure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Northwest</td>
<td>BPA/ Seattle City Light</td>
<td>BPA/ Seattle City Light</td>
<td>BPA/ Seattle City Light</td>
<td>Seattle City Light</td>
<td>Value of reliability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Money to Consumers
Business Challenges – Electric Rates

- The retail interface and technological advancements need to be preceded by new billing systems and rates design
- We have not yet created rates for the future of deep EE and high EV / Solar PV penetration
- Difficult to embrace a 21st century model of customer interaction with 20th century rate design
- We will have to interface with energy production behind the power interface of our systems and cost recovery structures
- If we don’t change, our customers will
- System growth costs need to be allocated fairly and provide customers accurate price signals
Costs vs. Revenue

Out of Balance

Residential Service Cost vs. Rate Revenue

- Energy: 42%
- Distribution: 28%
- EE Incentives: 22%
- Discounts & Programs: 5%
- Customer Service: 2%
- Revenue: 93%
- Customer Service: 7%
Technology Deployment at Seattle City Light

- Automation on feeder circuits
- State-of-the-art network operations and protection
- Network growth – new Denny Substation
- Non-wires alternatives to capacity adds (DERs)
- Electric vehicle systems and support
- Mass transit electric vehicles
- NeighborGrids
Electric Vehicle Systems and Support

- City of Seattle Drive Clean Initiative
- Seattle City Light Public DC Fast Charging Stations Pilot Program
Climate Change Adaptation Plan

• Ensure that Seattle City Light can continue to deliver reliable power
• Assess vulnerabilities of infrastructure and operations
• Identify critical actions to increase climate resilience
• Implement near-term actions to adapt to a changing climate
Actions to Address Key Climate Vulnerabilities

- Get Informed: Assess seasonal changes in energy demand and water availability
- Get Prepared: Harden infrastructure and enhance emergency response to floods, landslides, and wildfires
- Take Action: Department of Energy Partnership for Energy Sector Climate Resilience participant
Transitioning Public Power Forward to the Future

Public Power Forward Summit
December 11, 2017 | San Francisco, California

Sue Kelly
President and CEO
American Public Power Association
Association Members—A Diverse Community

- 1,400 member public power utilities, ranging from very large to very small
- *Median* size: 1,977 meters
- The common thread: public power utilities are vital to their communities, not only providing power, but supporting key community priorities, reflecting community values, supporting local economies
Why Are We Here?

• We are seeing rapid changes in our industry:
  – New technologies
  – New competitors
  – New ways of living
  – New customer choices and expectations

• “Business as usual” will not be enough in this new environment; we need to anticipate what customer needs/wants will be and move to supply them
  – “I skate to where the puck is going to be, not to where it has been.” Wayne Gretzky
Electric Utility Industry Outlook—

• Unclear federal regulatory policies
• More distributed generation (DG)
• Expanded use of new technologies: advanced grid, storage, Electric Vehicles (EVs), smart meters
• Increasing industry complexity—many new players (can be partners or competitors)
• Flat (or even declining) load growth in most regions due to increased energy efficiency (EE) and demand response (DR)—a new reality for our industry
Electricity Utility Industry Outlook (cont’d)

- Customer expectations are increasing; lower tolerance for outages
- Need for new investment to make grid smarter
- Cyber/physical security concerns must be addressed or we will face the consequences
- Workforce turnover is an issue
- Low level of knowledge by public and many policy makers of how we do what we do—leads to unrealistic expectations
What More and More Customers Will Want (Commercial and Industrial)

- Industrial and commercial customers increasingly want green/sustainable energy to meet corporate goals
- Following lead of Tesla, Mercedes-Benz, Apple, Google, Facebook, Walmart
- They are entering into direct contracts with suppliers and aggregating their loads to buy renewable power supplies
- If we do not help our customers meet these goals, they can do it themselves
What Some Retail Customers Already Want (and More Will Want in the Future)

• Increasingly, residential customers want to:
  – Use technology to control their electric usage
  – Tell Siri or Alexa to pay their electric bill
  – Invest in their own onsite power and storage facilities, so they never experience an outage

• Public power utilities have to up our game — if we cannot provide these services on our own (or with each other), we need to partner with third parties that have the necessary products and skills to do this
One View of the Utility Future

• “Cleaner” resource mix (fewer fossil fuel resources, more carbon-free/renewables)
• More demand side resources (DR, EE, DG) and microgrids; more decentralized approach (under the banner of “resilience”)
• Full time-of-use rates/smart meters/smart appliances/energy storage/latest technologies—informed and empowered customers with many choices
• New uses for electricity—e.g., transportation
But There Are The Unavoidable Facts…

• You need transmission and distribution (and storage) to support this; the grid will need substantial investment (not to mention cyber/physical security!), and the costs must be recovered

• We already have substantial investments in long-lived wholesale generation assets

• Consumer appetite for increased utility bills is very limited at best

• Any loss of reliability will not go down well
How Can Public Power Keep Up?

• We must recalibrate our thinking
• We need to redefine our relationships with our retail customers, thinking beyond just “keeping the lights on and the beer cold”
• Can no longer stay in our “comfort zone”--on our side of the meter, providing basic electric service and sending bills; we must diversify the menu
We Need to Be Prepared to...

• Develop new rate designs to meet increased levels of DERs
• Handle flat and even decreasing demand for electricity from traditional loads
• Help customers reduce their usage through energy efficiency, demand response
• Develop and support new loads--electric vehicles and even heating
• Incorporate storage to expand use of renewables and better align demand and supply (could even be the humble water heater?!)
Public Power Forward

• To help our member utilities deal with these changes, the Association developed its “Public Power Forward” strategic initiative
• Our Goal: Make public power utilities the *service providers of choice* in their communities
• As public power utilities, we have some built-in advantages:
  – Community owned and controlled
  – Not-for-profit--no separate class of shareholders that must be “fed”
• But we need to capitalize on our strengths
Public Power Forward: Association Member Toolbox

- Policy research and analysis for members: what are DOE, states, other utilities/sectors doing on DG, DR, EE
- Provide options/case studies/best (and not-so-best) practices; share the lessons learned!
- Make sure federal and state policymakers and thought leaders understand public power’s views
- Communication toolkits: to educate member communities and retail customers on these issues
Research Available to Members

• Public Power Forward page on Association website ([https://www.publicpower.org/public-power-forward](https://www.publicpower.org/public-power-forward)) has many resources, including new white papers on:
  – Recent policy developments on DG, including state updates
  – Comprehensive overview of battery storage
  – Electric Vehicles (December 13 webinar as well)
Association Provides the Tools, Members Make the Decisions

Utility members must decide when/how to revise their rates, services and operations to:
• offer their retail customers more options such as green power, DG (including solar PV—community and rooftop), DR (including storage), and EE
• modernize utility operations; add new loads (electric vehicles, for example)
• Make sure interests of all customers are protected when doing this
This Summit Is An Important Part of Our Public Power Forward Effort

• Learn from industry technology leaders
• Learn what policy makers think
• Learn from each other, ask questions
• Help the Association help you in 2018 and beyond—what do you need us to do to best support you?
• Take what you learn home, and figure out what works for you—no two public power utilities are alike!
Moving Public Power Forward

- Collaboration will help us all move forward
- We need to demonstrate our *continuing* value to the communities we serve (remember, memories are short!)
- Public power has a great opportunity if we stay true to our ideals and roots while adapting our mindsets and services to this new era!
Strategic Plan
Scenario Planning

What does the future hold?
Who do we want to become in that future?

July 17, 2018
AGENDA

**Review** of six potential futures and their associated conditions as related to energy.

**Discuss** how our local system and community could respond if they became true.

**Decide** which future is most likely from our perspective(s) and decide where resources should be applied to address the outcomes.

**Board’s View** Questions, discussion and direction going forward
1. **Mad Max** – Columbia Generating Station is closed due to radiation leaks, the lower snake dams are breached due to a new biological opinion, federal carbon pricing regime implemented, and natural gas drilling using fracking technology is outlawed federally due to environmental concerns.
   a) Wholesale Electric Market: High prices due to lack of natural gas and lower supply in the region combined with carbon policies
   b) Wholesale Gas Market: High prices due to low production from conventional drilling technology
   c) BPA Tier 1 Rates: High rates due to less generation to spread costs over, slightly offset by better prices for secondary energy
   d) Tier 1 System: Lower by 1,600 MW firm energy (loss of approx. 25%)
   e) Alternative Resource Pricing: Capital costs remain steady for conventional generation, renewables continue to be cheaper year-over-year
   f) Carbon and Environmental Policies: Carbon pricing implemented at $40/ton of CO$_2$
   g) Utility Load Growth: Some growth isolated in certain areas, but continued low growth due to energy efficiency and economic conditions
**THE GREEN MILE**

**The Green Mile** – Federally mandated 50% RPS implemented for all utilities, feed-in tariff for distributed generation federally mandated, federal carbon pricing regime implemented, all coal plants must be retrofitted with best emissions technology available or shut down.

a) Wholesale Electric Market: Prices remain steady at current levels with offsetting forces of zero marginal cost renewables build out and increased prices for conventional generation

b) Wholesale Gas Market: Prices remain low due to low demand from both residential and utility sector, continued price reduction in drilling technology

c) BPA Tier 1 Rates: Steadily increasing rates due to continued need for capital investment and no support from secondary sales, lower customer load put on BPA due to distributed generation at local utilities

d) Tier 1 System: Remains steady at current levels

e) Alternative Resource Pricing: Large investments in renewable generation drives costs even lower, conventional generation remains steady for capital costs

f) Carbon and Environmental Policies: Carbon pricing implemented at $40/ton of CO₂

g) Utility Load Growth: Large load loss due to feed-in-tariff and customers incentivized to put solar panels or wind generation behind-the-meter
IT’S A WONDERFUL LIFE

It’s a Wonderful Life – Canada admits they were getting a great deal and give in on the Columbia River Treaty, economic conditions vastly improve across the country driving load growth, environmental and renewable advocates play less of a role in policy making.

a) Wholesale Electric Market: Prices increase due to increased demand from load
b) Wholesale Gas Market: Prices increase due to high demand from both residential and utility sector
c) BPA Tier 1 Rates: BPA finds another low-cost source of funds and is able to control expenses to keep rates steady for an extended period of time, increased surplus sales help with increased generation due to Columbia River Treaty
d) Tier 1 System: Increases of 400 MW are realized from the revamped Columbia River Treaty
e) Alternative Resource Pricing: Generation costs remain steady for both renewable and conventional generation
f) Carbon and Environmental Policies: No major changes to current policies
g) Utility Load Growth: Load growth returns across the region as economic growth spurs all sectors to increase electric demand
Wall Street – The world economy booms and interest rates jump to 10%, commodity prices break out of their slump rise across the board, fracking technology drives natural gas prices even lower.

a) Wholesale Electric Market: Market prices stay low from abundant natural gas supply
b) Wholesale Gas Market: Prices depress even further to historical lows
c) BPA Tier 1 Rates: The combination of the high interest rates and low surplus energy sale prices drive BPA rates through the roof year over year
d) Tier 1 System: The federal system remains the same as today
e) Alternative Resource Pricing: Cost of generation increases as the prices for steel and concrete rise with the global market
f) Carbon and Environmental Policies: No major changes to current policies
g) Utility Load Growth: Load growth returns across the region as economic growth spurs all sectors to increase electric demand
Back to the Future – Tesla releases a new electric car that is both affordable and relieves any range anxiety along with a breakthrough innovation in battery storage making residential batteries both affordable and effective, federal feed-in-tariff for solar generation implemented, the emergence of micro-grids begins to take hold.

a) Wholesale Electric Market: Market is swamped with excess generation driving prices down
b) Wholesale Gas Market: Prices depress even further to historical lows
c) BPA Tier 1 Rates: BPA is faced with little to no secondary sales as well as a dwindling Tier 1 sales picture driving rates higher
d) Tier 1 System: The federal system remains the same as today
e) Alternative Resource Pricing: The increased investment in solar drives down the price of that generating source, all other conventional generation remains the same
f) Carbon and Environmental Policies: Feed-in-tariff implemented federally for solar generation
g) Utility Load Growth: Load growth is retracting as customers invest in both solar and batteries in mass numbers moving peak load times to off-peak hours and little to no demand outside of extreme weather situations
TRADING PLACES

Trading Places – BPA prevails in the courtroom and a biological opinion that relaxes restrictions on the federal dams is passed, the Columbia River Treaty is renegotiated for a more favorable NW position, a federal carbon tax is established, natural gas exports drive up the domestic price of gas.

a) Wholesale Electric Market: Prices increase due to carbon taxes and increased prices for natural gas
b) Wholesale Gas Market: Exports drive prices to a more worldwide price, pushing domestic prices higher due to global competition
c) BPA Tier 1 Rates: BPA rates begin to decline with the increased surplus sales revenue combined with increased generation from the system
d) Tier 1 System: Increases of 400 MW are realized from the revamped Columbia River Treaty and another 100 MW from the new biological opinion
e) Alternative Resource Pricing: Generation costs remain steady for both renewable and conventional generation
f) Carbon and Environmental Policies: Carbon pricing of $40/ton is established federally
g) Utility Load Growth: Load growth remains low
# Scenario Solutions & Impact Areas

<table>
<thead>
<tr>
<th></th>
<th>Power Supply Solution</th>
<th>Capital Investment</th>
<th>Resourcing (staff, contractor, etc.)</th>
<th>Financial Plan</th>
<th>Technology Plan</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mad Max</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Green Mile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It's a Wonderful Life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back to the Future</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trading Places</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Northern Wasco County PUD*
What Kind of a Utility Does NWCPUD Want to Become?

- Ensure large customers cover their marginal costs plus a net margin that can contribute to expanded utility program offerings
- Smooth glide path over time: acquire all customer growth without sharp negative cash or rate impacts
- Loads in Oregon are generally growing – enable load growth in NWCPUD service area to benefit from low-cost NWCPUD power (give all customers the opportunity to drink from the watering hole)
OVERVIEW
NORTHERN WASCO COUNTY PUD STRATEGIC DIRECTION

Strategic Dials

Key Strategic Dials – The art of finding the optimal balance

- Rates
- Reliability
- Risk
- Revenue
- Regulatory Compliance
<table>
<thead>
<tr>
<th>Consumer Owned Utilities (COU)</th>
<th>Base/Basic/Facility Charge</th>
<th>Residential kwh</th>
<th>Average Bill (1200 kwh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klickitat County PUD</td>
<td>$20.32</td>
<td>$0.0949</td>
<td>$134.20</td>
</tr>
<tr>
<td>Northern Wasco County PUD</td>
<td>$20.00</td>
<td>$0.0547</td>
<td>$85.64</td>
</tr>
<tr>
<td>Wasco Electric COOP</td>
<td>$27.50</td>
<td>$0.0894</td>
<td>$134.78</td>
</tr>
<tr>
<td>Hood River Electric COOP</td>
<td>$15.00</td>
<td>$0.0705</td>
<td>$99.60</td>
</tr>
<tr>
<td>Skamania PUD</td>
<td>$21.75</td>
<td>$0.0739</td>
<td>$110.43</td>
</tr>
<tr>
<td><strong>Average in the Mid-Columbia</strong></td>
<td><strong>$20.91</strong></td>
<td><strong>$0.0767</strong></td>
<td><strong>$112.93</strong></td>
</tr>
</tbody>
</table>

**Columbia River Gorge Electric Utility Rates**

- **Base/Basic/Facility Charge**
- **Average Bill (1200 kwh)**
Customer rate disparities exist between investor-owned utilities (IOUs) and consumer-owned (municipal, cooperative, peoples utility district) utilities (COUs). Rate disparities are often pronounced where COU territories exist within or are directly adjacent to IOU territory. Understanding rates disparities informs the discussion about Clean Energy Jobs. This handout from CUB highlights the disparities between IOU and COU customer rates. All data is publicly available via the Oregon Public Utility Commission's annual Oregon Utility Statistics reports.

Generally, although there are some exceptions to the rule, electric rates for both residential and commercial and industrial customers and greenhouse gas emissions (GHGs) are higher in IOU service territories than in neighboring COU service territories because COUs purchase the overwhelming majority of their power needs from the Bonneville hydro system. Hydropower rates are typically lower, and hydropower generation does not result in the release of GHGs. IOUs account for 74 percent of customers and just over 65 percent of MWh sales in Oregon, whereas COUs account for greater than 25 percent of the remaining customers and just over 30 percent of sales. Six electricity service suppliers account for the remaining customers and sales.

As evidenced in **Chart 1** below, IOU customer rates have risen for the past decade. **Chart 1** highlights both residential and commercial and industrial customer revenues per kWh in cents. The third category, “All Customers”, represents an average of IOU customers in Oregon, but excludes a small number of Electricity Service Supplier customers.

**Chart 1** - Investor-Owned Utility Customer Revenue Per kWh (cents) Years Ending 12/31/2007 through 12/31/2016

**Chart 2** - Investor-Owned & Consumer-Owned Electric Utility Customer Revenue Per kWh (cents) Year Ending 12/31/2016

**Chart 3** - Investor-Owned vs. Select Consumer-Owned Utility All Customer Revenue Per kWh (cents) Year Ending 12/31/2016

**Chart 4** - Investor-Owned vs. Select Consumer-Owned Residential Customer Revenue Per kWh (cents) Year Ending 12/31/2016

**Chart 5** - Investor-Owned vs. Select Consumer-Owned Commercial & Industrial Revenue Per kWh (cents) Year Ending 12/31/2016

**Chart 6** - Itemized Investor-Owned & Consumer-Owned Electric Utility Customer Revenue Per kWh (cents) Year Ending 12/31/2016
Chart 2 compares electric IOU and COU customer revenue per kWh (in cents) from IOUs and COUs during year ending 12/31/2016.

Chart 3 compares all customer revenues from Oregon’s IOUs with a targeted selection of COUs. Clean Energy Jobs would subject Clatskanie and Umatilla to emission reductions because they exceed the annual 25,000 metric ton GHG emissions cap. Oregon Trail, Surprise Valley, Midstate, Forest Grove, Northern Wasco, and McMinnville are adjacent to or exist within IOU territory.
Charts 4 and 5 separate data from Chart 3 into residential customer revenues per kWh in cents and commercial and industrial customer revenues per kWh in cents.
**Chart 6**

Itemized Investor-Owned & Consumer-Owned Electric Utility Customer Revenue Per kWh (cents) Year Ending 12/31/2016

<table>
<thead>
<tr>
<th>Investor-Owned Utility</th>
<th>Residential</th>
<th>Commercial &amp; Industrial</th>
<th>All Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific Power</td>
<td>11.50</td>
<td>8.68</td>
<td>9.91</td>
</tr>
<tr>
<td>Portland General Electric</td>
<td>11.40</td>
<td>8.68</td>
<td>9.88</td>
</tr>
<tr>
<td>Idaho Power</td>
<td>10.08</td>
<td>7.20</td>
<td>7.98</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cooperative</th>
<th>Residential</th>
<th>Commercial &amp; Industrial</th>
<th>All Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Oregon Electric</td>
<td>17.96</td>
<td>13.99</td>
<td>16.94</td>
</tr>
<tr>
<td>Coos-Curry Electric</td>
<td>12.26</td>
<td>9.89</td>
<td>11.30</td>
</tr>
<tr>
<td>Clearwater Power</td>
<td>11.84</td>
<td>11.17</td>
<td>11.70</td>
</tr>
<tr>
<td>Blachly-Lane</td>
<td>11.81</td>
<td>5.75</td>
<td>7.62</td>
</tr>
<tr>
<td>Wasco Electric</td>
<td>11.14</td>
<td>9.36</td>
<td>10.18</td>
</tr>
<tr>
<td>Columbia Power</td>
<td>11.08</td>
<td>9.73</td>
<td>9.93</td>
</tr>
<tr>
<td>Lane Electric</td>
<td>11.02</td>
<td>9.77</td>
<td>10.85</td>
</tr>
<tr>
<td>Columbia Basin Electric</td>
<td>10.64</td>
<td>7.95</td>
<td>8.07</td>
</tr>
<tr>
<td>Columbia Rural Electric</td>
<td>10.53</td>
<td>22.41</td>
<td>8.57</td>
</tr>
<tr>
<td>Douglas Electric</td>
<td>10.22</td>
<td>10.39</td>
<td>10.24</td>
</tr>
<tr>
<td>Consumers Power</td>
<td>9.78</td>
<td>7.79</td>
<td>9.20</td>
</tr>
<tr>
<td>Oregon Trail Electric</td>
<td>9.69</td>
<td>6.93</td>
<td>8.03</td>
</tr>
<tr>
<td>Salem Electric</td>
<td>9.35</td>
<td>8.19</td>
<td>8.92</td>
</tr>
<tr>
<td>Surprise Valley Electrification</td>
<td>9.31</td>
<td>8.31</td>
<td>7.88</td>
</tr>
<tr>
<td>Midstate Electric</td>
<td>8.85</td>
<td>7.72</td>
<td>8.26</td>
</tr>
<tr>
<td>Central Electric</td>
<td>8.81</td>
<td>6.97</td>
<td>8.24</td>
</tr>
<tr>
<td>Umatilla Electric</td>
<td>8.59</td>
<td>5.62</td>
<td>5.76</td>
</tr>
<tr>
<td>Harney Electric</td>
<td>8.16</td>
<td>9.20</td>
<td>6.66</td>
</tr>
<tr>
<td>Hood River Electric</td>
<td>7.70</td>
<td>5.90</td>
<td>6.78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Municipally-Owned Utility</th>
<th>Residential</th>
<th>Commercial &amp; Industrial</th>
<th>All Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eugene Water &amp; Electric Board</td>
<td>10.66</td>
<td>7.12</td>
<td>8.52</td>
</tr>
<tr>
<td>City of Drain Light &amp; Power</td>
<td>9.28</td>
<td>8.55</td>
<td>8.92</td>
</tr>
<tr>
<td>City of Ashland</td>
<td>8.56</td>
<td>8.92</td>
<td>8.53</td>
</tr>
<tr>
<td>City of Cascades Locks</td>
<td>8.38</td>
<td>6.93</td>
<td>7.96</td>
</tr>
<tr>
<td>City Bandon</td>
<td>8.27</td>
<td>8.30</td>
<td>8.41</td>
</tr>
<tr>
<td>City of Monmouth</td>
<td>8.08</td>
<td>7.39</td>
<td>7.85</td>
</tr>
<tr>
<td>Hermiston Energy Services</td>
<td>8.05</td>
<td>7.18</td>
<td>7.66</td>
</tr>
<tr>
<td>Canby Utility</td>
<td>7.90</td>
<td>5.80</td>
<td>6.73</td>
</tr>
<tr>
<td>City of Forest Grove Light &amp; Power</td>
<td>7.52</td>
<td>6.21</td>
<td>6.81</td>
</tr>
<tr>
<td>Milton-Freewater City Light &amp; Power</td>
<td>6.90</td>
<td>6.45</td>
<td>6.77</td>
</tr>
<tr>
<td>Springfield Utility Board</td>
<td>6.60</td>
<td>5.49</td>
<td>6.31</td>
</tr>
<tr>
<td>City of McMinnville Water &amp; Light</td>
<td>6.15</td>
<td>5.38</td>
<td>5.61</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Peoples Utility District</th>
<th>Residential</th>
<th>Commercial &amp; Industrial</th>
<th>All Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emerald</td>
<td>9.95</td>
<td>9.60</td>
<td>9.81</td>
</tr>
<tr>
<td>Tillamook</td>
<td>9.64</td>
<td>6.46</td>
<td>8.04</td>
</tr>
<tr>
<td>Central Lincoln</td>
<td>9.19</td>
<td>5.35</td>
<td>6.60</td>
</tr>
<tr>
<td>Columbia River</td>
<td>7.78</td>
<td>0.93</td>
<td>6.64</td>
</tr>
<tr>
<td>Northern Wasco County</td>
<td>6.56</td>
<td>5.20</td>
<td>5.56</td>
</tr>
<tr>
<td>Clatskanie</td>
<td>6.15</td>
<td>5.36</td>
<td>5.42</td>
</tr>
</tbody>
</table>

**Chart 6** summarizes electric IOU and COU customer revenue statistics from year ending 12/31/2016. Data in each utility subgroup are sorted in order of residential revenues, followed by commercial and industrial, and all customers.