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August 19, 2016

Dr. Karen Wayland
Energy Policy and Systems Analysis
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

Re: Quadrennial Energy Review

Dear Dr. Wayland:

The Utilities Technology Council (UTC) respectfully provides the following comments in connection with the Quadrennial Energy Review (QER). UTC is a global trade association representing for-profit and not-for-profit electric, gas, and water utilities on issues involving utility information and communications technology (ICT).

We appreciate the opportunity to submit comments/input late in the process, and also look forward to an enhanced dialogue with the Department of Energy as the next phase of the QER is completed and implemented. In so doing, UTC urges DOE to recognize, as part of the QER, that utility information and communications technology (ICT) is integral to reliable and secure utility services. UTC, therefore, recommends policies that promote access to suitable spectrum by utilities, pipeline companies and other critical infrastructure industries (CII), as described more fully below. Coupled with access to spectrum and promoting the deployment of fiber-based networks, UTC also believes that improved cybersecurity forms the basis of reliable, resilient, and secure networks to support the critical infrastructure needs of today and tomorrow, including smart networking, electric vehicles, and future applications. By supporting utility ICT in these ways, the federal government will also promote broadband access and economic growth in rural America, as well as interoperable communications during emergency response, which will also help to promote faster restoration of electric, gas and water services in the aftermath of hurricanes and other natural and manmade disasters.

I. Background and Introduction.

In the first installment of the QER, the Department of Energy recognized that the development and use of information technologies on the grid is a "key element" to grid modernization and integration of renewables.[1] The report recognized three impediments related to communications: 1) comprehensive communication and data standards need to be developed; 2) no uniform approach to characterizing the grid services that end-use devices can provide; and 3) communication and control interface devices between the customer as a distributed generator and the distribution system limit the types of service that the distributed generator can provide. While the Department of Energy estimates there are $59 billion in benefits from grid modernization for consumer applications, "[c]apturing these benefits requires building

[1] *See Quadrennial Energy Review: Energy Transmission, Storage, and Distribution Infrastructure*, Department of Energy (April 2015) at http://energy.gov/sites/prod/files/2015/07/f24/QER%20Full%20Report_TS%26D%20April%202015_0.pdf.

communication networks, allowing the components to interoperate and respond to a facility-wide control."[2] In this regard, the report highlights the issue of electric vehicles, and cites reports that conclude that "there could be the potential for overloading elements of the local distribution system," if large numbers of PEVs were to be charged at the same time as residences also see peak loads.[3] As a potential solution to this problem, smart grid could allow electric vehicles to provide services to the grid, particularly related to demand response and load balancing, and moreover could enable a shift in charging to off-peak periods and help avoid additional generation requirements.[4] Therefore, the primary recommendation by the report was to "[p]rovide grid modernization research and development, analysis, and institutional support."[5] In addition, the report recommends the industry should "[i]mprove grid communication through standards and interoperability."[6] UTC echoes these recommendations and provides the following comments to refine these recommendations in the area of communications and information technologies for grid modernization.

In the second installment of the QER, the Department of Energy asks a number of questions that are related to the issue of developing and using communications and information technology to support utility operations.[7] The areas of inquiry that are relevant to communications and information technology are "distributed energy resources (DER)," "information and technology," "resilience," and "physical and cybersecurity." Other areas of inquiry are also indirectly impacted by communications and information technology, such as "electricity consumption and energy efficiency by sector."[8] UTC provides the following comments in response to the questions raised by the Department of Energy in the second installment of the QER.

II. Utilities Rely on Communications and Information Technology to Provide Safe, Efficient And Secure Electric Services to the Public.

As the international trade association for the operations technology, telecommunications, and information technology interests of electric, gas and water utilities and other critical infrastructure industries, UTC has a unique perspective and a direct interest in the QER. Created in 1948, UTC continues to advocate for policies that promote the development of telecommunications and IT to support the safe, reliable, efficient and secure delivery of utility energy and water services to the public at large. Its members include all types of utilities -- large investor-owned utilities that may serve millions of customers across multi-state service territories, as well as smaller electric cooperative and municipal utilities that may serve a few thousand customers in rural areas and isolated communities.

Each of UTC's members own, manage and control extensive integrated IT and telecommunications networks that support their core services. These networks provide both voice and, increasingly, data services, which utilities use for dispatch as well as service restoration and for grid modernization (otherwise known as smart grid). Owing to the critical nature of the underlying essential services that they support, these communications systems must meet high standards for reliability and availability, many of which exceed the standards of commercial communications service providers. In

[2] *Id.* at 3-15.
[3] *Id.* at 3-16.
[4] *Id.*
[5] *Id.* at 3-25.
[6] *Id.*
[7] Department of Energy, *QER 1.2: An Integrated Study of the U.S. Electricity System* (Feb. 4, 2016)(hereinafter, "Second Installment"), *visited at* http://energy.gov/sites/prod/files/2016/02/f29/Second%20Installment%20Briefing%20Memorandum_0.pdf.
[8] Second Installment at 21.

addition, as utilities continue to deploy smart grid and similar applications into their networks, they need to extend the coverage and increase the capacity of their networks.

III. Utilities Need Access to Spectrum for Reliable Wireless Communications.

In order to cost effectively meet this escalating demand for communications, utilities have an increasing need for suitable spectrum, particularly in a frequency range below 1 GHz to provide sufficient capacity and coverage to support data services. Currently, utilities do not have any dedicated spectrum, and many utilities have been forced to relinquish some of their existing spectrum bands to make way for commercial wireless providers. Therefore, to acquire sufficient spectrum, utilities must compete with commercial providers at auction or strive to find other means to meet their needs. As a practical matter, acquiring spectrum at auction is actually a very limited option because competition is fierce, often rendering this spectrum cost-prohibitive. Also, the geographic areas of the license simply do not conform to utility service territories. As an alternative, many utilities seek to share the spectrum with others; however, interference and congestion in these bands is a considerable problem, which will only worsen as competition for spectrum increases. Also, utilities have access to narrowband licensed spectrum, but this significantly constrains throughput speeds. Smart grid and other additional utility applications will require throughput higher speeds.

In order to meet their growing needs, many utilities have turned to using unlicensed spectrum, but this is subject to power restrictions and interference from other users. They also often acquire licensed spectrum in higher frequency bands, which means significantly poorer propagation, or necessary coverage, and significantly more infrastructure costs to deploy the networks. In short, finding available spectrum is a challenge, particularly spectrum with sufficient bandwidth and low frequency to provide the capacity and coverage that utilities need in order to rely on their ICT infrastructure for its primary purpose – reliability.

That said, there are certain opportunities for utilities to access spectrum. Specifically, the Federal Communications Commission (FCC) is considering providing utilities with access to spectrum at 4.9 GHz.[9] This spectrum would provide 50 MHz of capacity, using licensed spectrum that would be relatively free from interference. The spectrum would be shared with public safety, which could promote opportunities for interoperability during emergencies, as well as promoting partnerships with public safety to construct, operate and maintain communications networks. The FCC is expected to issue a further notice of proposed rulemaking in this proceeding to decide whether and to what extent utilities would have access to this band. Utilities also need coverage as well as capacity, and they will need access to spectrum in lower frequency ranges that would provide more favorable coverage.

UTC and other industry organizations support sharing spectrum with federal government agencies to provide more favorable coverage and additional capacity for smart grid and other increasing communications requirements. One band that appears to be suitable for sharing is the 406.2-420 MHz band. This band was identified by the President's Council of Advisors on Science and Technology (PCAST) as suitable for sharing, and PCAST has also suggested that utilities could share spectrum with federal government incumbents, citing UTC in its report.[10] Tests by the National Telecommunications

[9] *See* Amendment of Part 90 of the Commission's Rules, *Report and Order and Further Notice of Proposed Rulemaking*, WP Docket No. 07-100, 24 FCC Rcd 4298 (2009) (*Report and Order*).
[10] *See* President's Council of Advisors on Science and Technology, *Report to the President: Realizing the Full Potential of Government Held Spectrum to Spur Economic Growth*, *visited* at http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf. (stating that "[t]here appear to be a number of applications that are too local or too small to warrant dedicated

and Information Administration (NTIA) in 2007 showed that the 406.2-420 MHz band was only being used three to five percent during the busiest times of the day in Washington, D.C., which was the most heavily used geographic part of the country for this band.[11] Not only does this band appear suitable for sharing, it is aligned with utility legacy communications infrastructure and there is standardized equipment that is commercially available that could be used in the band. As such, utilities could effectively use this band to meet their communications needs, if it was made available to utilities for sharing with the federal government.

Utilities need reliable communications in order to ensure the safe, efficient and secure delivery of electricity, gas and water services. While utilities are interested in sharing spectrum, they need certainty that utility communications will be appropriately protected from interference and will have priority access to available capacity on shared networks, particularly during emergencies. For example, utilities are interested in sharing the 700 MHz public safety broadband network, but there is uncertainty over whether utility communications will have priority access on the network. As a technical matter, utilities can share the 700 MHz public safety broadband network with public safety, because LTE is capable of providing multiple and very granular levels of priority access. It really becomes a policy matter to ensure that utilities have some level of priority access to enable reliable communications, including during emergencies. As such, UTC supports policies that will promote spectrum sharing by utilities by protecting against interference and providing priority access for utility communications.[12]

IV. Utilities Are Deploying Fiber to Ensure Electric Reliability and Promote Broadband Access.

At the same time that utilities need access to spectrum to meet their increasing communications needs, they are also facing increasing challenges and developing innovative solutions for wireline communications. Specifically, utilities are challenged by the impact of the IP-transition, as carriers migrate from legacy circuit-switched, analog communications networks and services. This has imposed increased costs and reliability issues on utilities. Replacement services may not provide the same level of reliability as the legacy services, particularly with regard to back up power and latency. At the same time, replacement services may be much more expensive than legacy services. Finally, carriers may discontinue services altogether, particularly in rural and remote areas, which would threaten to cut off communications to critical assets, such as substations.

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spectrum, but which would benefit from or require some form of spectrum access protection," and that "[t]he Utilities Telecom Council (UTC) has made a proposal to use Federal spectrum for use for an electrical smart grid.")

[11] National Telecommunications and Information Administration, *Spectrum Sharing Innovation Test Bed: Examining Dynamic Spectrum Access Sharing Techniques* (March 2009), visited at http://www.its.bldrdoc.gov/media/33544/DrocellaIsart2010.pdf. *See also* National Telecommunications and Information Administration, NTIA Report TR-07-448, *Measurements to Characterize Land Mobile Channel Occupancy for Federal Bands 162-174 MHz and 406-420 MHz in the Washington, D.C., Area* (July 2007).

[12] Comments of UTC and EEI on FirstNet's Initial Interpretation of its Authority (Oct. 27, 2014), *visited at* https://www.regulations.gov/contentStreamer?documentId=NTIA-2014-0001-0040&attachmentNumber=1&disposition=attachment&contentType=pdf. See also Comments of UTC on FirstNet's Second Interpretation of its Authority (Apr. 28, 2015), *visited at* https://www.regulations.gov/contentStreamer?documentId=NTIA-2015-0001-0071&attachmentNumber=1&disposition=attachment&contentType=pdf.

In response, utilities are deploying fiber and microwave communications deeper into their networks to replace the leased lines from the carriers and to provide more reliable and robust communications to distribution and transmission critical assets. These fiber networks can be leveraged to support a variety of utility applications, and they can be used to also support the delivery of broadband services to residential consumers and businesses. This is an increasing trend among electric cooperative utilities, which are deploying fiber to the home networks to provide broadband services, as well as to support smart grid communications. These utilities are offering various different broadband service packages -- including gigabit services – to 100 percent of homes in areas that had no broadband access before. The benefits are substantial – promoting economic growth, improved education, and better health care – and help to attract new businesses with better paying jobs, which allows people in these areas to stay closer to home and improve their standards of living and quality of life. In addition, the deployment of these fiber networks has significantly reduced outages and restoration times, as well as improved the quality of utility services. Municipal utilities, such as EPB in Chattanooga, have deployed fiber-to-the-home networks to support broadband and smart grid. In the past three years, Chattanooga's unemployment rate has dropped to 4.1 percent from 7.8 percent and the wage rate has also been climbing. Chattanooga has also experienced the third highest wage growth of all mid-size U.S. cities, and has added many high-tech jobs paying an average of $69,000 a year This underscores the substantial benefits that can be achieved by encouraging utilities to deploy communications networks and provide better service to people and businesses across America.

V. Cybersecurity Is Strengthened by Reliable and Resilient Utility Communications and IT Systems.

One of the other benefits from better communications is improved cybersecurity. Whereas in the past utilities could simply isolate their critical assets from remote access, today utility critical assets are increasingly interconnected with each other and are more vulnerable to backdoors, spoofing, and simple denial of service attacks from a variety of threat vectors. These threats are increasingly sophisticated and coordinated, including attacks from nation states. While it is impossible to prevent attacks from occurring, the risks can be mitigated through tools and process-based solutions, which include improving the reliability and resiliency of the underlying communications networks that support IT applications. Therefore, UTC believes that the QER provides an opportunity to improve the security of utility infrastructure through an integrated energy policy that combines risk-based strategies and targeted outreach, coordination and collaboration with key stakeholders.

UTC submits that it is in the national security interests of the country to protect utilities from physical and cyber threats by hardening utility communications networks and improving resilience to recover from attacks. A strong communications network is a strong defense against outside threats. In that regard, it is important to emphasize that the Metcalf Incident included an attack to cut off the communications systems running to the substation. The key point here is that the attackers recognized the importance of these communications systems to protect the substation. If the attackers recognized this, government should recognize it too. Improving communications networks should help to defend against cyber security attacks as well. Stronger encryption protocols are but one example, but there are other ways that strengthening communications networks could help to defend utilities against cyber-attacks, including improving spectrum options.

VI. Conclusion.

In conclusion, communications policy does not currently align with energy policy. UTC believes that the QER provides an opportunity to promote utility spectrum access and utility wireline networks as

part of an integrated energy policy for affordable, clean, and secure energy and energy services, which are essential to improving U.S. economic productivity, enhancing our quality of life, protecting our environment, and ensuring our Nation's security. As you are well aware, the Department of Energy and the industry have made significant investments in smart grid technology solutions. Over $4.5 billion in smart grid grants under the Recovery Act have been matched by utilities to deploy millions of smart grid devices all across the country. Unfortunately, these investments and the overriding national policy goals of energy independence and security in smart grid are put at risk if the underlying communications networks that enable the applications are unreliable or inoperable because of insufficient spectrum access or vulnerabilities from dependence on carrier networks that are being transitioned or discontinued altogether. As such, the Department of Energy, which is responsible for awarding the grants and overseeing the deployment of smart grid demonstration projects, has a direct financial interest – as well as a policy interest – in seeing suitable spectrum made available for smart grid.

UTC looks forward to working with the Department of Energy and submits that the QER represents an opportunity to take an integrated approach to develop policies that protect utility infrastructure through the implementation of improved utility communications.

Respectfully,

Joy Ditto