UTAH DEPARTMENT OF COMMERCE
Division of Public Utilities

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Comments

To: Public Service Commission of Utah

From: Utah Division of Public Utilities

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Date: May 1, 2023

Re: **Docket No. 23-999-09,** Proposed Rulemaking Regarding Utah Code Title 54, Chapter 25, Electric Power Delivery Quality Act

The Division of Public Utilities (Division) offers the following comments to the Public Service Commission of Utah (Commission) for the proposed rulemaking under the Electric Power Delivery Quality Act.[1] The Division's comments are guided by its statutory objectives, which include the directive to promote rules that are just, reasonable, and in the public interest.[2]

Issue

The Commission issued its Notice on March 17, 2023, seeking comments in Docket No. 23-999-09 for Proposed Rulemaking Regarding Utah Code Title 54, Chapter 25, Electrical Power Delivery Quality Act.[3] The Commission requested that any interested person submit comments by May 1, 2023, and reply comments by June 15, 2023. The following comments and suggestions summarize the Division's understanding of the proposed rulemaking and provide guidelines that ensure the rule will facilitate reasonable system performance.

[1] H.B. 389, 65th Leg. 2023 Gen Session (Utah 2023).
[2] Utah Code Annotated Section 54-4a-6, https://le.utah.gov/xcode/Title54/Chapter4A/54-4a-S6.html.
[3] *See Public Service Commission's Notice,* Docket No. 23-999-09, March 17, 2023, https://pscdocs.utah.gov/misc/23docs/2399909/3273402399909n3-17-2023.pdf.

The Division recommends that the Commission consider Utah Administrative Code R746-313, Electric Service Reliability, as the foundation for this proposed rulemaking, taking into consideration Institute of Electrical and Electronics Engineers (IEEE) Standard 1159-2019 and Federal Energy Regulatory Commission (FERC) Standard 1846. Using R746-313 as a model, and informed by IEEE 1159-2019 and FERC Standard 1846, the Division recommends that the reporting template be similar to the one approved by the Commission in Docket No. 22-035-34.

Background

On March 14, 2023, Governor Spencer Cox signed into law HB 389, Electrical Power Delivery Quality Amendments (HB 389). HB 389 requires the Commission to make rules for:

1) Establishing the submission of an electrical power delivery quality plan;
2) Establishing procedures for the review of an electrical power delivery quality plan;
3) Establishing the procedures for the review of the implementation of an electrical power delivery quality plan; and
4) Any other rules that the Commission determines are necessary to protect the public interest and to implement Utah Code Title 54, Chapter 25.

In establishing these rules, the Commission is required to consult with qualified utilities, utility-scale electricity providers, and other state agencies.[4] HB 389 becomes effective May 3, 2023.[5]

R746-313 conceptually touches on power quality.[6] However, as discussed below, reliability is different than power quality. Rule R746-313 is primarily concerned with "reliability," which deals mainly with power interruptions.[7] However, HB 389 is concerned with "electric power delivery quality," defined as "the suitability of power delivered to customers as measured in comparison to accepted industry standards on voltage and power quality."[8] HB 389 goes beyond the reliability and interruptions issues addressed in R746-313, HB 389 relates to monitoring, reporting, and correcting power quality issues.

[4] *Id*.
[5] See https://le.utah.gov/~2023/bills/static/HB0389.html.
[6] Utah Admin. Code Rule R746-313, https://casetext.com/regulation/utah-administrative-code/public-service-commission/title-r746-administration/rule-r746-313-electrical-service-reliability.
[7] Utah Code Annotated Administrative Code Rule R746-313-2(10) defines "reliability" as "the degree to which electric service is supplied without interruptions to customers."
[8] H.B. 389, 65th Leg. 2023 Gen Session (Utah 2023).

In accordance with the Commission's Orders in Docket Nos. 08-035-55,[9] 13-035-01,[10] 15-035-72,[11] and 20-035-22,[12] R746-313 established electric service reliability requirements and reporting. In Docket No. 20-035-22, the Division recommended the Commission establish a work group to review Rocky Mountain Power's (RMP) reliability baseline standards based on other parties' concerns about power reliability and quality.[13] On June 16, 2020, RMP filed reply comments supporting the Division's recommendations.[14] On June 23, 2020, the Commission issued an Order directing the Division and RMP to establish a work group (Group) led by the Division with the purpose of examining RMP's reliability baseline standards and making recommendations.[15]

In compliance with the Commission's June order, the Division and RMP convened the Group on August 4, 2020. In addition to the Division and RMP, participants included the Office of Consumer Services, Utah Association of Energy Users (UAE), Utah Petroleum Association (UPA), Utah Mining Association, and Clean Harbors Aragonite Inc. (CHA). On December 21, 2020, the Division filed a memorandum containing the Group's recommended changes to the control limits and the baseline notification levels.[16] Additionally, the Group concluded that reporting metrics related to power quality was equally important and should be reported separately from the annual reliability metrics. In its Order Modifying Reliability Control Limits and Baseline Notification Levels issued January 26, 2021, the Commission approved the proposed "2021 SAIDI and SAIFI control zones and baseline notification levels as recommended by the Group and presented in the DPU

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[9] *See* Commission Order, Docket No. 08-035-55, June 11, 2009. https://pscdocs.utah.gov/electric/08docs/0803555/62486Order%5bDOCKETED%5d.pdf.
[10] *See* Commission Order, Docket No. 13-035-01, December 20, 2016. https://pscdocs.utah.gov/electric/13docs/1303501/2908801303501and1503572omrclabnl12-20-2016.pdf
[11] *See* Commission Order, Docket 15-035-72, December 20, 15-035-72. https://pscdocs.utah.gov/electric/13docs/1303501/2908801303501and1503572omrclabnl12-20-2016.pdf
[12] *See* Commission Orders, Docket No. 20-035-22, June 23, 2020 and January 26, 2021, respectively, https://pscdocs.utah.gov/electric/20docs/2003522/3143552003522o6-23-2020.pdf, and https://pscdocs.utah.gov/electric/20docs/2003522/3170962003522omrclabnl1-26-2021.pdf.
[13] Docket No. 20-035-22, *Comments from the Division of Public Utilities* filed June 1, 2020, https://pscdocs.utah.gov/electric/20docs/2003522/314067DPUCmnts6-1-2020.pdf.
[14] Docket No. 20-035-22, *Rocky Mountain Power's Reply Comments* filed June 16, 2020, https://pscdocs.utah.gov/electric/20docs/2003522/314292RMPRplyCmnts6-16-2020.pdf.
[15] Docket No. 20-035-22, *Commission Order* issued June 23, 2020, at 2, https://pscdocs.utah.gov/electric/20docs/2003522/3143552003522o6-23-2020.pdf.
[16] Docket No. 20-035-22, *Division of Public Utilities Memorandum* filed December 21, 2020, https://pscdocs.utah.gov/electric/20docs/2003522/316802DPUMemWrkGrp12-21-2020.pdf.

Memo."[17] Although that order primarily dealt with the reliability baselines, the Commission also noted that "representatives of the Group's industrial customers raised concerns associated with power quality, including the impact of sags and swells on industrial customers, and requested the Group explore the possibility of developing power quality metrics."[18] These power quality metrics were subsequently discussed further in Docket No. 22-035-34.

On June 28, 2022, RMP filed its proposed Power Quality Reporting template in Docket No. 22-035-34.[19] This template was approved by the Commission on November 1, 2022.[20] The UAE, Clean Harbors Aragonite, and UPA filed comments in the docket.

On February 14, 2023, RMP submitted its first annual Power Quality report in Docket No. 23-035-05, based on the template approved in Docket No. 22-035-34.[21] The parties acknowledged that the reporting template was a work in progress and would likely be revised over time.

The Division's understanding of the goal of this rulemaking process is to establish an administrative rule that differentiates service reliability from power quality and creates requirements for the monitoring and reporting of key power quality metrics. The Division proposes that, to the extent possible, the work done in Docket No. 22-035-34 be used to guide the proposed rulemaking required under HB 389. Further work may be required and subsequent rule revisions could be needed as understanding, technology, and industry standards evolve.

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[17] Docket No. 20-035-22, *Order Modifying Reliability Control Limits and Baseline Notifications Levels filed January 26, 2021,* https://pscdocs.utah.gov/electric/20docs/2003522/3170962003522omrclabnl1-26-2021.pdf.

[18] Id.

[19] Docket No. 22-035-34, *Rocky Mountain Power's Proposed Reporting for Power Quality* filed June 28, 2022, https://pscdocs.utah.gov/electric/22docs/2203534/324661PrpsdRprtngPwrQlty6-28-2022.pdf.

[20] Docket No. 22-035-34, *Correspondence from Gary L. Widerburg* filed November 1, 2022, https://pscdocs.utah.gov/electric/22docs/2203534/326013CorresWiderburg11-1-2022.pdf.

[21] Docket No. 23-035-05, *Rocky Mountain Power's Power Quality Report for the Period of January through December 2022* [hereinafter *RMP's Power Quality Report*], https://psc.utah.gov/2023/02/14/docket-no-23-035-05/.

Discussion

Power service reliability is too often considered to be the same as power quality. In reality, the terms are not interchangeable.

Oak Ridge National Laboratory's Toolkit for Reliability Measurement Practices,[22] describes service reliability as "having to do with total electric interruptions - complete loss of voltage, not just deformations of the electric sine wave." Reliability does not cover sags, swells, impulses, or harmonics. Reliability indices typically consider such aspects as:[23]

- the number of customers;
- the connected load;
- the duration of the interruption measured in seconds, minutes, hours, or days;
- the amount of power (kVA) interrupted; and
- the frequency of interruptions.

Power reliability can be defined as the degree to which the performance of the elements in a bulk system result in electricity being delivered to customers within accepted standards and in the amount desired. The degree of reliability may be measured by the frequency, duration, and magnitude of adverse effects on the electric supply.[24]

The typical metrics generally used to measure reliability are System Average Interruption Frequency Index (SAIFI), System Average Interruption Duration Index (SAIDI), Customer Average Interruption Duration Index (CAIDI), and Momentary Average Interruption event Frequency Index (MAIFIe), defined in IEEE Standard 1366.[25]

Power quality, on the other hand, is defined by IEEE as "the measure, analysis, and improvement of bus voltage, usually a load bus voltage, to maintain that voltage to be a sinusoid at rated voltage and frequency." [26]

Today's electronic loads are susceptible to transients, sags, swells, harmonics, momentary interruptions, and other disturbances that historically were not as big of a cause for concern.

[22] Oak Ridge National Laboratory, U.S. Dept. of Energy, Measurement Practices for Reliability and Power Quality: A Toolkit of Reliability Measurement Practices 3 (2004) [hereinafter *Measurement Practices*], https://info.ornl.gov/sites/publications/Files/Pub57467.pdf.
[23] *Id.* at 3.
[24] Id.
[25] *Id*.
[26] Id.

For these more sensitive loads, the quality of electric service can be as important as its reliability. Power quality is not a new concept, but it is increasingly a concern with the expansion of variable renewable energy generators and the loss of mass synchronization provided by large thermal generators.[27]

There are many measures and indices of power quality. Some of the more common indices are the following:

- Total harmonic distortion (THD);
- The ratio of the root-mean-square (RMS) value of the sum of the individual harmonic amplitudes to the RMS value of the fundamental frequency K factor;
- The sum of the squares of the products of the individual harmonic currents and their harmonic orders divided by the sum of the squares of the individual harmonic currents crest factor;
- The ratio of a waveform's peak or crest to its RMS voltage or current flicker; and
- A perceptible change in electric light source intensity due to a fluctuation of input voltage. It is defined as the change in voltage divided by the average voltage expressed as a percent. This ratio is plotted vs the number of changes per minute to develop a "flicker curve."[28]

The proposed rulemaking should include definitions and practices that better define power quality monitoring and metrics associated with Volt-Amps Reactive (VAR) power. These definitions and practices should address such phenomenon as harmonic distortions and RMS transients, oscillatory and impulsive transients, and sags, in addition to the CAIDI, SAIFI, SAIDI, and MAIFIe reliability metrics mentioned above.[29]

These reliability and power quality definitions are foundational but not exhaustive. The Commission's proposed rule should lay the groundwork for meeting the requirements of HB 389 and be just, reasonable, and in the public interest in its application in order to meet Utah's utilities' and utilities' customers' interests. The Division recommends the definitions found in IEEE 1159-2019 as a starting point. The rule should also take care to limit its scope to only those facilities and connections covered by its statutory jurisdiction. The interstate transmission system may present numerous issues with its connections to the state-

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[27] *See* Open Power Quality, A Beginner's Guide to Power Quality, *Voltage, Frequency, and "Perfect" Power Quality,* https://openpowerquality.org/docs/intro-power-quality.html.
[28] Measurement Practices, supra note 22.
[29] IEEE Standard 1159-2019, Recommended Practice for Monitoring Electric Power Quality, Definitions, at 11-12.

jurisdictional transmission and distribution systems. The Commission should not shy away from making rules key to those connections providing high quality power to Utahns, but it may require clear and careful drafting.

The Division offers the following comments regarding the proposed rulemaking under HB 389. Although not exhaustive on such a complex issue as power quality monitoring, reporting, and correction, the Division offers its comments to lay a foundation for the Commission to establish a rule for the monitoring and reporting of power quality. The Division does not believe power quality correction should be included in the rule because each power quality issue is unique and difficult to define in rule in a manner that would adequately address every situation.

1) Establishing the submission of an electrical power delivery quality plan

Power quality monitoring is necessary to characterize electromagnetic phenomena at a particular location on an electric power circuit. In some cases, the objective of the monitoring is to diagnose incompatibilities between the electric power source and the load. In others, it is to evaluate the electrical environment at a particular location to refine modeling techniques or to develop a power quality baseline. In still others, monitoring is used to predict future performance of load equipment or power quality mitigating devices. In any event, an important task in any monitoring project is to clearly define the objectives of monitoring.[30]

There are several important reasons to monitor power quality. The primary reason underpinning all others is economic, particularly if electromagnetic phenomena are adversely affecting critical process loads. Effects on equipment and process operations can include misoperation, damage, process disruption, and other such anomalies. These disruptions are costly because unexpected interruptions of a profit-based operation often require additional steps in order to continue production after an interruption. In addition, equipment damage and subsequent repairs cost both money and time. Product damage can also result from electromagnetic phenomena, requiring that the damaged product be either recycled or discarded, both of which are economic issues.[31]

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[30] IEEE 1159-2019, IEEE Recommended Practice for Monitoring Electric Power Quality, at 34.
[31] Id.

In addition to resolving equipment disruptions, a database of equipment tolerances and sensitivity can be developed from monitored data. Such a database can provide a basis for developing equipment compatibility specifications and guidelines for future equipment enhancements. In addition, a database of the causes of recorded disturbances can be used to make system improvements. In rulemaking, parties will be well-serve3d by clearly identifying which parts of a full power quality monitoring program lie with the utility and which ones lie with its more sophisticated customers. This will enable clear identification of problems and solutions for the utility, its customers, and regulators.

Finally, equipment compatibility problems can create safety hazards resulting from equipment misoperation or failure.[32] In comments last year, CHA and the UPA asserted that they have faced power quality problems that create environmental and safety risks. According to CHA, "[w]ith each interruption, voltage sag, surge, or momentary outage that occurs, CHA faces significant safety and environmental risks, as well as great financial impact."[33] The UPA related its members' experiences:

> UPA's refining member companies have faced significant impacts for many years, typically, with multiple power quality events annually. Those impacts are far reaching with the potential to result in not only significant business cost but also emission limit exceedances and material environmental impacts. Small power anomaly can and have resulted in a need to stabilize operations, necessitating flaring to ensure continued safe operations.[34]

Problems related to equipment misoperation can be assessed only if customer disturbance reports are kept. These logs describe the event inside the facility: for example, what equipment was affected, how it was affected, the weather conditions, and any incurred losses.[35]

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[32] *Id*.
[33] Docket No. 22-035-34, *Clean Harbors Aragonite's and The Utah Petroleum Association's Comments,* July 26, 2022, at 2, https://pscdocs.utah.gov/electric/22docs/2203534/324982CleanHarborsAragoniteUtPetroleumCmnts7-26-2022.pdf.
[34] *Id*. at 4.
[35] IEEE 1159-2019, *supra* note 30, at 35.

For example, the NV Energy electric system indicates that eighty percent of electrical disturbances that cause poor power quality come from within a customer's facility. Powering on and off very large equipment, wiring errors, poorly specified or improperly serviced power conversion equipment, grounding loops and even normal daily operations can foster power quality issues that lead to production disturbances and lost data. External network issues such as severe weather, utility fault clearing, power line accidents, and other external network issues like grid switching or power-factor correction capacitors represent the remaining twenty percent of power quality problems. These disturbances, whether internal to the customer or external, often generate spikes or power interruptions that can instantly damage equipment. Worst of all, these incidents are completely unpredictable and beyond anyone's control.[36]

Equipment tolerance needs to be considered in power quality monitoring. For example, a specific adjustable speed drive (ASD) can be sensitive to an overvoltage or undervoltage condition, but there can also be a significant variation to the same phenomena among ASDs built by other manufacturers. Power quality monitoring should attempt to characterize individual process equipment by matching monitoring results with reported equipment problems. This characterization of individual loads shows which equipment needs protection and what level of protection is required. IEEE Standard 1250, Clause 4, provides a good description of the effects of electromagnetic phenomena on various power system equipment loads.[37] This is an area where clearly identifying utility and customer responsibilities will be most helpful.

Utilities are required to follow FERC Standards, specifically FERC Standard 1846, VAR: Voltage and Reactive Control.[38] Ideally, the customer interconnection process established in Utah Administrative Code Rule R746-312, Electrical Interconnection,[39] discovers and finds solutions for potential power quality issues before they become an issue. But as

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[36] NV Energy, *Customer Service Reliability and Power Quality,* https://www.nvenergy.com/publish/content/dam/nvenergy/brochures_arch/help/brochures/power-appliance-equipment-reliability.pdf.
[37] IEEE 1159-2019, supra note 30, at 35.
[38] Federal Energy Regulatory Commission, 18 CFR Part 40, at 478, https://www.ferc.gov/sites/default/files/2020-04/E-13.pdf.
[39] Utah Admin. Code Section R746-312, https://casetext.com/regulation/utah-administrative-code/public-service-commission/title-r746-administration/rule-r746-312-electrical-interconnection.

explained earlier, generating resources and loads change. Therefore, the need to monitor and report VAR issues as they arise is one reason for this proposed rulemaking. The Division surmises that RMP would be responsible for monitoring its system on the utility side of the meter and the customers on theirs. However, the Division understands that RMP offers its services to help customers monitor power quality issues within their facilities. A clear rule supplemented with a cooperative approach between the utility and its most sophisticated customers will be the most fruitful for resolving concerns customers have raised about their power quality. While RMP has a long record of cooperative work with its larger customers, those relationships periodically strain.

2) Establishing procedures for the review of an electrical power delivery quality plan

Troubleshooting and solving power-related problems involves a number of issues. Many problems are solved by the following methods: careful evaluation of the loading and loads, verification of correct wiring and grounding of the electrical system, installing power monitoring equipment to obtain system data and characteristics, and/or involving the local power provider to understand if there were coincidental events on their system. However, no single method covers every problem, and one should not limit oneself to diagnosing a power problem simply by looking at only one piece of information.[40]

Measurement of electromagnetic phenomena includes both time and frequency domain conducted parameters, which can take the form of overvoltages and undervoltages, interruptions, sags and swells, transients, phase imbalance, frequency deviations, and harmonic distortion. Non-conducted environmental factors can also influence load equipment, although these types of disturbances are not considered in this recommended practice. Such factors include temperature, humidity, electromagnetic interference (EMI), and radio frequency interference (RFI).[41]

Utilities, understandably, are reluctant to violate any of the standards they are required to follow in order to provide safe, adequate, and reliable service. To that end, utilities monitor power reliability and quality at various points throughout their systems from the generator to the load. The Division understands that the identification of any remaining power quality

[40] IEEE 1159-2019, *supra* note 30, at 63.
[41] *Id.* at 34.

issues is best done at the specific fault location or the customer's site as issues arise on an individual basis.

The Division's understanding of this proposed rulemaking process is to develop a more in-depth monitoring and reporting process across a system basis and better identify power quality issues locally. The collected information should be timely and adequate in order to form correction plans for power quality issues on identifiable system issues or on an individual basis near the customer's site. To be clear, the Division does not suggest RMP should be responsible for monitoring customer-side resources. Rather, the system ought to provide monitoring near enough to load that system problems can be readily assessed for their contribution to customer-experienced power quality issues. The Division recommends the Commission keep the same February reporting timeline as that established in Docket No. 22-035-34.

3) Establishing the procedures for the review of the implementation of an electrical power delivery quality plan

IEEE 1159 offers procedures for developing power quality monitoring and interpretation. This recommended practice provides useful information for power quality monitoring projects. It provides definitions, summaries, and characterizations of typical power quality phenomena that lead to power quality problems. The recommended practice discusses monitoring instruments and selecting the appropriate instrument for the task, which also includes information on the application of the monitors relating to safety, monitoring locations, sensing inputs, and measurement thresholds. It also provides information on validating the data, extracting the critical data, and interpreting both summaries and critical events.[42]

More specifically, IEEE 1159 encompasses the monitoring of characteristics of electric power systems. It includes consistent descriptions of conducted electromagnetic phenomena occurring on power systems. This recommended practice presents definitions of nominal conditions and deviations from these nominal conditions that may originate within the source of supply or load equipment or may originate from interactions between

[42] IEEE 1159-2019, *supra* note 30, at 8.

the source and the load. It also discusses measurement techniques, application techniques, and the interpretation of monitoring results.

IEEE 1159 provides users with a consistent set of terms and definitions[43] for describing power quality phenomena. An understanding of how power quality phenomena affect the power system and end-use equipment is required in order to make monitoring useful. Proper measuring techniques are required to safely obtain useful, accurate data. Appropriately locating monitors, conducting systematic studies, and interpreting the study results will enhance the value of power quality monitoring. The purpose of this recommended practice is to assist users, as well as equipment and software manufacturers and vendors, by describing techniques for defining, measuring, quantifying, and interpreting electromagnetic phenomena on the power system.

The Division concludes that some groundwork for monitoring and reporting power quality issues has been laid in Docket Nos. 22-035-34 and 23-035-05. The power quality reporting in Docket No. 23-035-05 is premised around the SEMI-F47 curve and based on system data and information and then broken down into root causes. The SEMI-F47 curve was developed to illustrate the need for ride through capabilities of semiconductor manufacturing equipment during less than optimum voltage for whatever reason. IEEE Standard 1547-2018 defines ride through capability as the "ability to withstand voltage or frequency disturbances inside defined limits and to continue operating as specified."[44]

Although the SEMI-F47 curve is informative about root causes of power quality issues, the information lacks a deeper dive into the potential issues. The template is a work in progress and supported by numerous parties with the intent of revising it as needed. The Division would support additional metrics as needed that are reasonably achievable and cost prudent (like MAIFIe, for example) to better identify power quality related issues that more specifically identify areas of concern relating to transients, sags, swells, harmonics, and momentary interruptions. The recent power quality report filed by RMP in Docket No. 23-

[43] *Id.*, Annex C, Glossary, at 90-93.
[44] IEEE Standard 1547-2018, Criteria and Requirements for Interconnection of Distributed Energy Resources (DER) with Electric Power Systems (EPS).

035-05 illustrated areas of concerns that are more related to procedural attributes than electromagnetic phenomena that require attention for performance improvement.[45]

All the efforts to obtain information are meaningless unless the investigator has enough knowledge and skill to evaluate it and produce a solution from the available data. Interpreting a power monitor's output is perhaps the most critical part of the process of power monitoring. Given the limits and variety of practical field tools and the tremendous range of distribution system and load characteristics, interpretation remains very dependent on the experience and skill of the investigator.[46] The outcome of the monitoring, which is primarily the responsibility of the utility, must be interpreted and presented in readily understandable terms.

The Division concludes that reporting should be on a system basis and not include customer-specific metrics unless that customer authorizes the utility to provide it to the public or under administrative confidentiality rules. Of course, some localized data might be near the customer, particularly where a large customer has the utility-system equipment designated to serve the customer's load. The Division is unaware of the current data available to RMP to compile power quality metrics other than the reliability metrics mentioned above. The Division recommends that RMP include MAIFIe metrics in addition to the current SEMI-F47 and convene the Group to consider other metrics that can be performed reasonably, timely, and cost effectively to monitor power quality on a system basis. Whether other metrics, existing or newly-created, are needed can be addressed as we learn more.

4) Any other rules that the Commission determines are necessary to protect the public interest and to implement Utah Code Title 54, Chapter 25

The Division's duty under Utah Code Section 54-4a-6 is to act in the public interest in order to provide the Commission with objective and comprehensive information, evidence, and recommendations consistent with the objective to promote safe, healthy, economic, efficient, and reliable operation of all public utilities and their services. Specifically, Section 54-4a-6 tasks the Division with: (1) providing for just, reasonable, and adequate rates, charges, classifications, rules, regulations, practices, and services of public utilities; and (2)

[45] RMP's Power Quality Report, supra note 20, at 6.
[46] IEEE 1159-2019, *supra* note 30, at 63.

making the regulatory process as simple and understandable as possible so that it is acceptable to the public; feasible, expeditious, and efficient to apply; and designed to minimize controversies over interpretation and application.[47]

The Division understands power quality issues are sometimes detected at a specific location on the system or customer and can be difficult to monitor and find resolutions to repair the problem. The Division is always concerned with just and reasonable costs associated with these types of activities. The utility should have a measure of discretion to address power quality issues in a reasonable manner without shifting costs to other customers while keeping the system running well. Good rules on power quality monitoring can help ensure adequate information exists to evaluate and potentially improve utility performance without unduly burdening the utility.

Utah Code Title 54, Chapter 15, Net Metering of Electricity, offers guidance in this matter. Specifically, Section 54-15-106, although geared towards behind the meter customer generation, serves well to inform customers of their obligation to ensure, to the best of their ability, to maintain their equipment, apparatuses, and buildings as such to ensure a reasonable amount of ride through capability for voltage sag events.

Utah Administrative Code R746-312, Electrical Interconnection, specifically Section R746-312-14(3)(b), allows the Commission to require "any post-installation testing necessary to ensure compliance with IEEE standards or to ensure safety." As mentioned earlier, generation resources, transmission and distribution technologies, and loads change. It is the obligation of both the utility and customer to ensure their systems comply with current standards.

As mentioned earlier, reliability and power quality have mistakenly been thought to be synonymous. However, the two terms are related, and power quality issues may cause reliability issues. The concepts needed in this rulemaking are similar to those in the existing reliability rule, with the addition of power quality specific components discussed above. In addition, the reporting requirement has already been vetted and approved in Docket No. 22-

[47] Utah Code Ann. Section 54-4a-6, https://le.utah.gov/xcode/Title54/Chapter4A/54-4a-S6.html.

035-34 and noted as a work in progress. Power quality reporting under a new rule should harmonize appropriately with the existing reliability reporting.

One challenge is designing a rule that includes the necessary metrics based on just and reasonable monitoring methods and establishes clear reporting requirements that requires the utility to present the results in an understandable way to investigators who may or may not have the necessary background to understand the complexities of power quality. Another challenge is to create a rule that does not impose undue cost to customers or cost shifting to other customers if the power quality issue is isolated to a single customer that caused the issue to the system. The proposed rule should not lead to guidance on how to correct a power quality issue, as those corrective issues can be broad in scope and difficult to apply uniformly.

The Division is aware of the complexities and costs of monitoring reliability and power quality but lacks the expertise to determine the appropriate metrics to monitor power quality, other than tracking MAIFIe at least at a minimum to further identify momentary sags pending a group discussion. Over time, the Division may develop or contract for additional expertise to evaluate or develop appropriate metrics. In addition to identifying power quality issues, the reporting should provide a means to identify root causes and solutions that will improve system performance.

For now, R746-313 may serve as a useful model for the reporting timelines and structures required for this proposed rulemaking, taking into consideration IEEE Standard 1159-2019 and FERC Standard 1846. The Division concludes that the reporting template approved by the Commission in Docket No. 22-035-34 is appropriate with the understanding that the template will be revised over time as needed to present pertinent power quality issues on a system basis. Appendix A is attached for additional resources.

HB 389 identifies certain requirements concerning interconnection requests. The Division recommends the Commission reference R746-312 for this portion of the proposed rulemaking as these topics are covered in the Level 1, 2, and 3 Interconnection Review Screens under R746-312.

Conclusion

The Division's comments are guided by its statutory duty to act in the public interest by providing for just, reasonable, and adequate rules and regulations. Although they are distinct, electric service reliability and power quality are often thought to be synonymous. Power quality can lead to reliability issues, and reliability issues can lead to power quality issues. However, where reliability issues are more physical (failures) by nature, power quality is more functional (operative) and dynamic. Power quality issues are generally grappled with by those with an in-depth understanding of power generation, transmission, distribution, and consumption. This proposed rulemaking particularly needs to address the aspects of monitoring and how RMP presents the results to investigators who lack in-depth knowledge to identify issues and suggest solutions to improve system performance.

cc: Jana Saba, Rocky Mountain Power
Michele Beck, Office of Consumer Services
Service List

Appendix A – Additional Resources

IEEE Standard 1159 covers monitoring the quality of electric power.
https://standards.ieee.org/ieee/1159/6124/

EPRI – Power Quality and Reliability Benchmarking and Standards December 2010
https://www.epri.com/research/products/1019914

Open Power Quality – A beginner's Guide to Power Quality
https://openpowerquality.org/docs/intro-power-quality.html

FERC E-13 at 478 Section 1846-1847 VAR Correction
https://www.ferc.gov/sites/default/files/2020-04/E-13.pdf

FERC_Principles for Efficient and Reliable Reactive Power Supply and Consumption
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