



# Power Quality: Who's Responsible?

## A team approach to keeping your operations on track



Power quality is very important to anyone who relies on equipment and systems that are sensitive to electrical disturbances. The impact of power quality disturbances can be substantial — even the smallest variation can have significant implications for your business in the form of lost time, productivity and revenue.

By developing a partnership approach to power quality issues, we can work together to keep your operations running smoothly. We Energies is here to help you:

- Learn about power disturbances and why they happen
- Understand customer and utility power quality responsibilities
- Evaluate and choose a power quality professional

### Power Disturbances

Power disturbances can have their source in either the utility or customer wiring system and equipment. These disturbances can be classified into categories that can vary in effect, duration and intensity. Some types of equipment, especially if manufactured outside the U.S., can be very sensitive to the resulting voltage changes.

Disturbance Type	Description	Symptoms
<b>Power Outage</b>	Total interruption of electrical supply <ul style="list-style-type: none"> <li>• Momentary (less than one minute)</li> <li>• Long-term (one minute or more)</li> </ul>	<ul style="list-style-type: none"> <li>- System shutdown</li> <li>- Loss of computer/controller memory</li> <li>- Hardware/product loss or damage</li> </ul>
<b>Transient (Surge)</b>	A subcycle disturbance in the AC waveform, resulting in a sharp but brief voltage increase	<ul style="list-style-type: none"> <li>- Computer lock-up, processing errors, data loss</li> <li>- Burned circuit boards, electrical insulation damage, equipment damage</li> </ul>
<b>Sag/Swell</b>	Any short-term (½ cycle to 3 seconds) decrease (sag) or increase (swell) in voltage	<ul style="list-style-type: none"> <li>- Memory loss and data errors</li> <li>- Equipment shutdown; motors stopping or stalling and decreased motor life</li> <li>- Flickering lights</li> </ul>
<b>Noise</b>	An unwanted high frequency electrical signal that alters the normal voltage pattern (sine wave)	<ul style="list-style-type: none"> <li>- Lock-up of sensitive equipment</li> <li>- Data loss and processing errors</li> <li>- Distorted audio and video reception</li> </ul>
<b>Harmonic Distortion</b>	The alteration of the normal voltage pattern due to equipment generating frequencies other than the standard 60 cycles per second	<ul style="list-style-type: none"> <li>- Electrical equipment/wiring overheating</li> <li>- Decreased motor performance</li> <li>- Improper operation of breakers, relays or fuses</li> </ul>
<b>Under/Overvoltage</b>	Any long-term change (more than 1 minute) below or above normal voltage levels	<ul style="list-style-type: none"> <li>- Dim or bright lights</li> <li>- Equipment shutdown; overheating of motors or lights</li> <li>- Reduced efficiency or life of equipment</li> </ul>

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If you are experiencing operational disruptions due to power quality events, you want to get the problem resolved as quickly as possible. We should be your "first responder" in power quality investigations to ensure that your incoming power meets mandated specifications.

### Who's responsible for power quality? We all are!

We Energies responsibilities:

- Deliver steady-state voltage within prescribed parameters.
- Limit overall harmonic distortion and radio/TV interference at the point of service.
- Provide service within Public Service Commission of Wisconsin guidelines. See appendix A for details.

Customer responsibilities:

- If your operations are sensitive to short-term power disturbances, purchase and install surge protection, voltage regulation, ride-through systems, etc. to limit the effect of these disturbances on your equipment.
- Ensure that internal voltage levels are compatible with the needs of your equipment and systems.
- Limit injection of harmonics and radio/TV interference into the utility distribution system.

To resolve any power quality problem, contact us to begin the investigation. Our service team will determine the quality of the power entering your facility. Any problems that are our responsibility will be diagnosed and corrected at no charge to you. Our service team also will work with you and your electrician or electrical contractor to resolve other power quality issues you may have.

### The partnership approach to power quality investigation

The partnership approach to power quality issues provides the best chance for successful problem resolution. It is simply information sharing, cooperation and ongoing dialogue between you, us, and your electrical contractor or on-site electrician. Each has a different perspective and knowledge of certain factors that may not be known by the others. For example:

- We may have temporarily switched your facility to an alternate feeder
- You may have added new equipment that is highly sensitive to voltage fluctuations
- Your electrician/electrical contractor may have revised the grounding scheme for a line of machine tools

This hypothetical scenario illustrates that the situation cannot be fully understood unless all three parties share their knowledge. So get the dialogue started – and keep it going throughout the process.

We can be your guide throughout the investigation and resolution process. We also can act as your sounding board on the findings and recommendations of your chosen power quality professional.

### Choosing a power quality professional

If you are still experiencing problems after We Energies has verified the quality of the incoming power, you may need the services of a qualified power quality professional. There are several types of power quality service providers in the marketplace:

#### *Electrical Contractors*

Electricians working for your electrical contractor can typically identify and resolve most of your power quality problems.

#### *Independent Electrical Testing Firms*

These services provide specialized staff and diagnostic equipment to analyze and make recommendations regarding the most complicated power quality problems. The testing firm recommendation is normally implemented by your electrical contractor, consulting engineer or other electrical professional.

#### *Consulting Engineers*

Engineering firms are typically retained on an individual project basis, and may provide:

- New installation design or design/build (proactive power quality mitigation)
- Power quality investigation and resolution recommendations
- Mitigation equipment installation and implementation project management

Each of these service providers has a specific role in helping you ensure that your internal electrical environment is compatible with your equipment and system needs. However, there is a wide range of capabilities among the firms in each category, and multiple approaches to diagnosing and resolving your power quality concerns. These factors can make it difficult for you to know where to turn and what to expect.

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### What to look for in your power quality service provider

Electrical professionals are happy to discuss their relevant background and experience in providing power quality-related services. Specific topics you might consider in your search include:

- Depth and breadth of experience providing power quality diagnostic and mitigation services
- Training and education in power quality matters
- Investigation procedure – approach and expectations
- Approach to monitoring (How many devices? What is monitored? How long?)
- Professional licenses and membership in professional associations
- Whether or not they are tied exclusively to a particular solutions manufacturer
- Approach to developing a business case for investing in a power quality solution

Feel free to discuss these topics with each power quality service provider that you consider.

### Contact us

Please contact us whenever we can help you with power quality or any energy service issues. Call your We Energies representative or contact our Business Division at [bizdivision@mail.we-energies.com](mailto:bizdivision@mail.we-energies.com). or 800-714-7777, ext. 7700.

### Appendix A

The following summarizes certain key points related to power quality within the Public Service Commission of Wisconsin regulations that govern We Energies.

1. **PSC113.0702** requires the steady state service voltage to be “reasonably constant” within the following limits:
  - a. Non-industrial services — within plus or minus 5 percent of nominal voltage
  - b. Industrial services of 500kW or less — within plus 5 percent and minus 10 percent
  - c. Industrial services over 500kW — within plus or minus 10 percent. In Michigan, steady state service voltage must be maintained within plus or minus 5 percent for all service types.  
The term “steady state service voltage” as used above means the rms voltage after all sags, swells and transients have decayed to a negligible value.
2. **PSC113.0703** states that momentaries, sags, surges and other short-term (and generally unavoidable) disturbances shall not be considered a violation of the rules. However, an “unreasonable” number of these events may indicate a need for repairs or improvements to We Energies equipment (determined case-by-case).
3. **PSC113.0704** states that utilities shall make reasonable efforts to investigate voltage harmonics at the service entrance. If the source of the harmonics is another customer, the utility must notify that customer, who must then correct the problem. There is a similar provision in PSC113.0707 regarding radio and television interference.