

## **The Importance of Providing Clean Power to Your Cluster**

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*Empowering People  
Through Innovation  
and Technology*

In today's world, we have become dependant on the electrical power that runs our technology. Many assume the quality and supply of electrical power will always be there when we need it. Unfortunately this is not the case.

The demand for quality electrical power is growing daily while supply remains very limited. Many countries face shortages of electrical power and must rotate use or go without. Today many communities in the United States are in various levels of power emergency. California's "rolling blackouts" are an example of this problem.

### **PROVIDING GOOD, RELIABLE POWER TO YOUR CLUSTER**

Because of the need and demand for reliability and transactional stability, as well as data safety, Power Innovations' UPQ™ (**Uninterruptible Power Quality**) technology is a necessity with every cluster system. Simply using a UPS system on your cluster network may or may not be sufficient (see "Solutions" section below for more details). If the UPS system does not isolate and then re-generate the AC power, your protection is limited, thus compromising your cluster stability and reliability. Voltage swings, harmonics, voltage transients, and many other power problems can cause erratic to catastrophic results on your system. All systems utilizing UPQ are isolated from utility power problems. This ensures clusters and/or any other vital electronic equipment is properly protected.

### **WHAT IS "CLEAN POWER?"**

Electric power is transported and delivered in a sinusoidal alternating format with positive and negative varying points of up to plus and minus 170 Volts at a frequency of 60 Hz. The effective power from this format is 120 VAC 60 Hz. If there are no variations in frequency, voltage, wave purity, or resolution, this is called "clean power."

### **HOW IS POWER CORRUPTED?**

Power is corrupted in many ways. Think of a river flowing. The source is most likely clean, but as people use the water amidst its travel downhill, they contaminate it. The same is true with electric power. Equipment attached to the AC power lines induces noise, distortions and load variation. When power demand exceeds supply, these conditions are amplified. Harmonic and transient activity also increase.

### **IS CLEAN POWER IMPORTANT?**

Most equipment is not designed for these conditions. Most computer warranties are void if power harmonics exceed five percent. Extensive exposure to dirty, fluctuating, erratic power can cause malfunction as well as damage to your system.



## **WHAT SOLUTIONS ARE AVAILABLE?**

Most power protection equipment available on the market does not address power problems in a satisfactory manner. Following is a review of commonly installed options.

Suppression devices are the most common form of power protection, but are extremely limited in their ability to protect. They act as a window, which theoretically traps harmful voltages. Unfortunately this window is so big it becomes only partially effective for large voltage inducements, and totally ineffective for harmonics and small voltage inducements.

Uninterruptible Power Supplies (UPS) are a step up from surge suppressors, but also have limitations. Most UPS systems commonly sold are “**stand-by**” and “**line-interactive**” technologies and have major limitations. The industry categorizes this equipment as “pass-through” technology because it passes through power problems rather than corrects them. When the AC supply is totally gone, the UPS switches an internal relay and begins supplying internally generated AC power to connected equipment. The quality of the generated power can vary based on brand and quality.

Isolation and regulation are critical features for protecting equipment in today’s environment. These features are incorporated in **most “online” technologies**. Online systems convert the incoming AC into a DC (direct current) format and then re-generate the AC output. This process eliminates most of the corruption while regulating the voltage of the output. These systems are extremely more complex than standby and line-interactive systems, and function all the time versus only during a power failure.

The systems designed and produced by Power Innovations for Linux NetworX cluster systems incorporate all of the online features mentioned above and more. These systems incorporate the highest efficiencies and resolution output in the industry, with advanced management and monitoring capabilities. The higher efficiencies also allow longer back-up times during AC failure on smaller batteries. These systems also are able to utilize a wide range of input voltage variations without utilizing battery power. The Power Innovations Evolocivity design provides superior density, incorporated into compute modular packaging for an attractive, integrated look and feel.

## **ABOUT POWER INNOVATIONS**

Power Innovations offers solutions to manage, generate, and store energy needs. The focus of Power Innovations is in developing technology, solutions, and products that empower you with the ability to independently supply, control and manage your electrical power needs, and eventually be independent of utility resources.

Please take a moment to become more familiar with the second necessity of life, electrical power, and what Power Innovations is doing to ensure your needs will always be met. We are excited with the solutions we have and are developing additional products to address the electrical challenges that lie ahead.