
# ENERGYMONEYSAVER.COM

# ENERGY WHITEPAPER

EnergyMoneySaver.com

By Lynn6 Energy Systems

## What Electrical Pollution is Costing You

Undetectable to human senses, Electrical Pollution is a difficult subject for many people to understand. It is critical to any homeowner, business owner, institution or facility to understand the effects of this pollution on its energy costs.

What is electrical pollution? Also referred to as Dirty Power, the primary causes of electrical pollution are electromagnetic fields, high frequency noises, transient energy events and even the Earth's own magnetic currents. Stray voltage, improper currents caused by faulty grounding, can also be a common source of dirty power in more rural areas.

## Understanding Electricity

Before the basics of electrical pollution or dirty power can be properly explained it is necessary to examine how a normal electrical current should work.

Direct Current, commonly known as DC electricity, allows for the flow between energy terminals, most commonly those of a battery. The electrical grid that feeds your home uses AC electricity, or Alternating Current. In AC power, a wave- like oscillation of energy moves back and forth like waves on a beach, but, in each oscillation, more electrons move toward the device being powered (the load) than move away from it.

Electricity switches directions and the rate at which it does so is called the frequency, or voltage. In the United States, 60 Hertz, or 120 changes of direction per minute, is the common voltage.

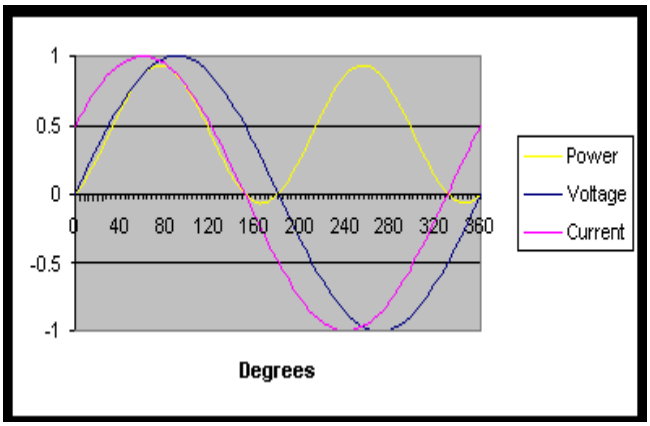
When voltage is created by a generator there is an instant of drag, similar to when you begin to pedal an exercise bike; even though the wheel isn't touching the ground, it still takes more energy to get the wheel moving initially than it does to keep it moving. There is a split second delay between when the voltage is applied and when the actual current flows.

This split second delay causes a loss of power when the current eventually reaches the load and if the voltage and the current where exactly in sync there would be no such inefficiency or momentary loss of power. As the current alternates, this phenomenon can be plotted on a graph as a sine curve.

One thing to remember is that because the load can use power regardless of the direction it is flowing, it gains just as much energy from the voltage and current being at -1 as it does from them being at 1, which is why the yellow line peaks under both circumstances.

The greater the delay between voltage application and current flow the more energy is lost on every passage. If the delay were enough that the voltage and the current curves were exactly opposite, there would be no power delivered at all.

The power lost to those dips in the yellow curve is the “reactive power” and represents power that goes back to the power company unused, even though you have paid for it!




As you can see, the pink line (current) lags behind the blue line (voltage) just slightly. As a result, the yellow line (power) dips beneath the 0 mark (i.e. the load-bearing device actually loses a tiny amount of power) during that brief time when the voltage has passed the zero mark but the current has yet to catch up. (Keep in mind that, because the load can use power regardless of the direction it's flowing in, it gains just as much energy from the voltage and current being at -1 as it does from them being at 1 -- which is why the yellow line peaks under both circumstances.)

The greater the delay between voltage application and current flow,

the more energy is lost on every passage. If the delay were enough that the voltage and current curves were exactly opposite, there would be no power delivered at all.
The power lost to those dips in the yellow curve is called "reactive power", and represents power that goes back to the power company unused even though you've paid for it.

## Back to the Real World

So, "clean" power is produced at the power plants at a voltage of 60 Hz, with only a tiny lag between the voltage and current. As the electricity travels from the power plant to your business, however, all of the factors mentioned earlier (along with several others) can distort the waveforms of the voltage and the current, or add additional waveforms of outside origin that interfere with the voltage and current.

You can draw an analogy to the way in which water becomes polluted. Generally, from the moment it burbles to the surface, water is clean. But as the water flows downstream, it picks up stray soil, animal droppings, industrial by-products, and other flotsam and jetsam, making it impure and possibly unsafe. Like water pollution, electrical pollution comes from many sources, is often almost impossible to trace the precise roots of, and it's hard to tell exactly what damage it's doing until it's too late.

The problem is that most modern equipment, from control panels to electric motors, require certain specific qualities of electricity to function optimally. Electric motors can overheat and jam up if voltage drops too low. Electronics like computers and control panels can short out and fry if voltage shoots too high. And of course massive amounts of electricity gets wasted if those waveforms get too far apart and the 'power' line drops below zero for too much of its length.

## An Important Aside: How Power Goes Bad

There are several types of 'bad energy' caused by electrical pollution.

- Power Surges (or Power Spikes)

We've all heard of and used surge protectors to avoid the hazards of

this, the most feared form of electrical pollution. A power surge happens when the amount of current flowing through the line spikes. On the graph, picture it as the pink line shooting upwards past 1 and up to 40 or 50 for a split-second. This electrical event can destroy electronics with ease.

- Power Sags

Power Sags are the opposite of power surges, but are generally caused by a very large load suddenly hitting the grid -- particularly your local (in-facility) power supply. Events such as the startup of a heavy-duty motor can cause this short-term radical drop in current. Power sags are known to crash hard drives and ruin other sensitive electronic equipment.

- Undervoltage

Commonly called a 'brownout', undervoltage is what happens when the voltage from your power line dips suddenly for a noticeable period of time. While less dangerous than other electrical events, undervoltage is responsible for the corruption of data being transferred at the time as well as a reduction in equipment lifespan.

- Overvoltage

Just what you might expect, overvoltage is a long-term but lower-level power surge that is much less dangerous to equipment, but still has profound effects on the lifespan of electronics.

- Line Noise

Electrical line noise is essentially the implantation of a new waveform on the existing flow of current and voltage through your electrical line. Line noise is the 'background static' you hear on a long-distance phone call, and can similarly cause data corruption and slow down of data transfer times along a computer network.

- Waveform Distortion

Several common pieces of equipment including fax machines and copiers can actually corrupt the waveform of the energy flowing along your lines, which can cause sensitive equipment to overheat and can damage hardware.

## Why Should I Care?

Quite simply, if you run a facility or complex of any size, your equipment is not only suffering a significantly reduced lifespan because of the 'dirty power' phenomenon, but it's actually costing you significantly on your power bill as well.
Power companies trying to resolve these forms of electricity pollution have spent billions of dollars, but in actuality, most of the work that can be done these days must be done on the part of the receiver, not the transmitter, of the energy.

## Enter EnergyMoneySaver

Our Electricity Consumption Management Systems offer a momentous tool for saving electricity by automating basic functions like shutting off lights and heat -- but they also offer powerful passive savings in the form of a complex device that uses advanced techniques to not only reduce extremes (both high and low) in the voltage coming through your power lines, but to re-create damaged waveforms and even drive the voltage and current waveforms closer together, dramatically reducing the reactive (wasted) power used by your devices.

That's how, with an ECMS from EnergyMoneySaver installed at your facility, we can guarantee a 15% reduction in your energy bill before you engage in any active energy-saving measures. Dirty power doesn't need to be causing equipment failure or driving up your energy costs anymore.

**Just call EMS**.

Toll Free!

866-966-3460

Visit Us!

www.EnergyMoneySaver.com