

# ***What is 'Dirty Electricity'?***

## ***A Consumer Information Fact Sheet***

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### **Introduction**

The area of electrical pollution and power quality is inherently complex and multifaceted. For many, it is a challenge to understand what information is fundamental and what is incidental. This is further exacerbated by the common use of misleading terminology such as “stray voltage”, and the misinformation by those working to marginalize and delegitimize the concept of electrical pollution.

**The fact is electrical pollution is real** as are its associated health effects. Similarly, the beneficial effects of the Graham-Stetzer Electric filter (the filter) are genuine, just as the readings of the Graham-Stetzer meter (the GS meter) are appropriate for measuring electrical pollution. The purpose of this document is to compile a simple, integrated, quantified reference that provides an understanding for those interested in how the filter and meter work.

**The filter is based upon 100 year-old electromagnetic theory and 50 year-old power engineering principles.** These proven concepts and the associated technology have been redesigned and reapplied to help reduce home and office electrical pollution. Essentially, the filters provide a low impedance path for high frequency currents from the hot wire(s) to the neutral wire return path bypassing the customer loads. The optimal filter frequency range is from 4 kHz to 100 kHz, while there is decreasing filtering action above 100 kHz and below 4 kHz. Please note that a more comprehensive description of the filter is provided at [www.stetzerelectric.com](http://www.stetzerelectric.com).

### **Note:**

Direct current (dc) is like a battery where current flows between the terminals. Alternating current (ac) is wave-like and oscillates back and forth, though the energy flows in the direction of the load. Frequency refers to the rate of oscillation. The base unpolluted grid current oscillates at 60 times per second (defined as 60 Hz), while communications oscillates at a very fast rate, typically millions of times per second or Hz.

### **Measuring Electrical Pollution**

Defining and measuring harmful electrical pollution is analogous to defining and measuring harmful drinking water. **It is not the water that is harmful, it's what comes with the water. Similarly it is not (in general) the 60 Hz electric power, it is what comes with the 60 Hz power that is the problem.** Quite simply, pollution is the problem.

To extend this comparison further, just as a water meter is not an appropriate instrument to measure water pollution, normal (averaging or RMS) meters are not appropriate instruments to measure electrical pollution. There is a subtle but fundamental difference between measuring the volume of polluted water or polluted electricity and measuring the amount of pollution present. While most electrical meters measure the amount of

polluted electrical energy; the GS meter measures the amount of harmful electrical pollution.

**A human or animal is perhaps the most appropriate 'meter' to measure how harmful the levels of electrical pollution are.** A balance of empirical evidence and theory shows that electric current enters the body more readily at higher frequencies, while current through the body (body current) is increasingly harmful at these higher frequencies. The GS meter displays this by measuring the sum of the voltages for frequencies above (but not including) 60 Hz, weighing the higher frequencies to reflect their greater impact on humans and animals.

**The GS meter measures electrical pollution on home and office power lines.** This pollution may be caused by internal factors within these environments by, for example, electronic equipment that often distorts the 60 Hz power wave when creating dc power from the ac power. A distorted 60 Hz power wave is a normal 60 Hz wave polluted by the presence of higher frequency voltages and currents (often multiples of harmonics of 60 Hz.). Energy is conserved when transforming ac to dc (with minimal transformation losses), but some of the original 60 Hz energy is also transformed to higher frequency energy that flows back onto the ac conductors. Pollution may come from a neighbor's or even the utility's own load. The utility delivers this pollution to your home.

For example, if you share a transformer with another home and their computer creates high frequency distortion, as most computers do, these high frequency currents may find it easier to flow into your home rather than flow through the transformer and on to the substation. In general, utility companies have not protected pollution sensitive customers from the 'downstream effects' of pollution-creating customers.

Further information on the meter product is available at [www.stetzeretric.com](http://www.stetzeretric.com).

### **Reducing Electrical Pollution**

If the utility has an adequate neutral conductor (for 60 Hz and higher frequencies and requires more than the standard utility practice meeting thermal and voltage regulation), the filter product normally provides a total solution, unless there is inward radiation which is not affected by the filters. If the utility neutral is not adequate, the filter normally provides benefit, though problems normally remain at a reduced level. For example, if the feeder neutral (think of it as a wastewater return pipe for electricity) is inadequate, there will often be flows of ground current to the customer site. Ground current is not affected by the filter and it can cause health problems.

Utility people sometimes incorrectly claim that the filter is part of the problem when the neutral is inadequate, since it routes high frequency currents from the hot wire to the grounded neutral. This is a fallacy. The problem is that the neutral is inadequate, not the filter. The high frequency currents can reach the neutral in many ways including, for example, through customer loads or induction from the phase to the neutral wire.

**The filters route the high frequency currents to the neutral.** By the laws of circuit analysis this normally reduces the high frequency voltages being measured by the meter. There are three 'end cases' when installing a filter does not decrease the meter reading:

1. When the distortion being measured by the meter is outside the effective range of the filter. This is a primary reason why a non-zero meter reading is acceptable. This effect usually comes from frequencies above 60 Hz and far below 4 kHz.
2. When the electrical locations of the meter and the filter are 'distant', such as being on different circuits in a home.
3. When adding the filter enables a local current oscillation between the filter and the circuit it is connected to for a specific frequency. This is called local resonance. This is possible but unusual and is preventable by simply adding another filter.

The relationship between GS meter measurements and body current, and between body current and health have been qualitatively established by empirical evidence. It is establishing the processes that link these relationships and by quantifying the cause and effect that remain the most pressing challenges.

### **GS Meter Readings and Health Correlation**

*Disclaimer, the author has no biology or medical experience. All statements in these areas are 'second hand'. It is suggested that interested readers review papers by the attributed authors, a number of which are available on [www.stetzerelectric.com](http://www.stetzerelectric.com).*

In convincing fashion, empirical evidence shows that reducing the electrical pollution as measured by the GS meter tends to generally improve the health of affected people. Like other forms of pollution, electrical pollution probably affects most people, but some people are more sensitive or susceptible. It is these people who show the most improvement when filters are added.

If the initial pollution level is high (a few hundred on the GS meter) and the filters reduce it to a safe level of 30 or better, improvements can be dramatic. Recovery time after the electrical pollution is reduced tends to be cumulative over a period of days, weeks or even longer.

Finally, based upon experience with animals, one reason that electrical pollution tends to affect so many people in so many ways is that body currents tend to impair the immune system. While body current uses bone marrow as a conducting path, removing the body current tends to reverse the impairment process. Improved health follows.

There are many references (see below) on the harmful impact of electricity on health. Books by Robert O. Becker and J. Patrick Reilly, to name two prominent authors. As well, recent papers by Dr. Magda Havas (available on-line at [www.stetzerelectric.com](http://www.stetzerelectric.com) and included in this package) reveal the health benefits of installing the filters, and includes references to those who suffer from diabetes, chronic fatigue, attention deficit, for example.