

# WHAT YOU SHOULD KNOW ABOUT ELECTRICAL POLLUTION

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Help and information about dirty power.

## 1. INTRODUCTION

Electrical pollution, otherwise known as dirty electricity is a term used to describe a type of electrical phenomenon occurring worldwide. However, the phenomenon is not widely known, and can be complex to understand. But research and case studies have shown that consumers should learn about electrical pollution, how it is controlled and measured, the health effects, and public protection against electrical pollution.

Electrical pollution is not something you can see, smell, taste, or touch. It is not something you can sense, making it difficult for one to be aware of the presence of electrical pollution. With this in mind, it is important to understand what causes electrical pollution and what to look for in your everyday environment and home.

Many people complain about a variety of side effects to dirty power, these can include headaches, ringing in the ears, trouble focusing, and a variety of other symptoms. If you suffer from some of these symptoms then you may want to discuss this with your doctor. For more information on the health effects of dirty electricity please read 3 below [Health Effects of Electrical Pollution](#).

Electrical pollution can be controlled with special filters designed by Graham Stetzer. Graham Stetzer filters (GS filters) can help reduce the harmful electricity that enters home or office environments. The GS filters work best when the utility has an adequate neutral conductor. This means that the conductor can handle more than the standard utility practice to meet thermal or voltage regulation. For more information see 4 below [Measuring and Controlling Dirty Electricity](#).

## 2. WHAT IS ELECTRICAL POLLUTION?

Electrical pollution is not something you can see, smell, taste, or touch. It is not something you can sense, making it difficult for one to be aware of the presence of electrical pollution. With this in mind, it is important to understand what causes electrical pollution and what to look for in your everyday environment and home.

Normally occurring incidents from everyday electrical use, electric and magnetic fields, earth currents and transients and high frequency noise are sources that cause electrical pollution. Electrical pollution can be one of these causes or a combination of the causes.

Stray voltage is also a cause of electrical pollution. Stray voltage most often occurs on and off farms in localized areas. These localized areas can have poor grounding and utility infrastructure causing electrical failure. Stray voltage on farms has been detected by observing behavioral changes in farm animals and some health problems for humans. Stray voltage was one of first discovered sources of electrical pollution prior to the 1950s in areas of the rural United States.

Electric and magnetic fields, or EMF, are emitted from electrical devices or anything that uses electricity. Earth currents are low electrical currents found in soil. Natural activity deep within the earth causes some of these currents along with above ground electrical energy to produce low magnitude electrical currents. Transients and high frequency noise or signals come from the wiring of buildings, and from the use of common electrical devices found in homes and offices. The noise is created when electrical current is transmitted and interrupted.

In these characterizations of electrical pollution, high frequency signals pollute regular electrical currents traveling in wires and currents through the earth. To better understand the background for the causes of electrical pollution, it is helpful to learn the basics of how the electrical current works.

Direct current is similar to battery power where current flows back and forth between energy terminals. Alternating current is a wave-like movement of energy that oscillates back and forth, and the energy flows in the direction of the load. The rate of oscillation is defined as frequency. At an electrical grid base, the current oscillates at 60 times per second, or 60 Hz.

Regular “clean” power enters homes, buildings, and offices at 60 Hz. The increased use of electrical power overloads electrical grid base, which distributes the power. Power is “dirty” or polluted when it contains the high frequency signals flowing through overloaded wires, and not just clean 60 Hz power.

The pollution of electricity is often compared to how water is polluted. At the source, water is clean. It is what comes with the water and pollutants along its path to the recipient that makes the water harmful to humans. However, like water pollution in many ways, electrical pollution is complex and often difficult to understand for the common consumer. The causes are varied and sometimes cannot be identified with certainty. However, the bulk of overloaded electricity bases can be attributed to the reliance on electrical appliances in today’s environment.

In the 1950’s, the National Electrical Safety Code required a neutral wire to return wire to utilities. In this code it was forbidden to use the earth as a neutral return. This was a worsening problem in rural, farm areas where the currents were being returned to the soil affecting the feeding of animals. Later, the Public Service Commission allowed utilities to use grounding rods to serve as neutral wires for return. This was done instead of increasing the size of the neutral rods. Installing ground rods is a less costly solution than

making the neutral rods larger in size. The grounding rods serve as an alternate and additional pathway for the energy to return to the substation instead of to the earth.

The use of electricity has dramatically increased in the past 50 years causing stress on the electrical infrastructure. In 1950, 10 billion kilowatt-hours of electricity were sold nationwide. Fifty years later, it was reported in the year 2000 that American consumers used 65 billion kilowatt-hours of electricity.

Those concerned about electrical pollution say the size of neutral wires to make sure energy is returned to its source needs to be much larger. The current regulated size of the neutrals is not large enough to handle the load due to the greater use of electricity. The currents that are not properly directed are emitted into the environment or into homes or offices where electrical devices are widely relied upon by consumers. Neutral wires are not often sized for the modern electrical load. Power that is misdirected into the earth or home environments contains a much higher frequency than the 60 Hz classification making it “dirty” or unclear.

Knowing that consumers use a more significant amount of electricity in today’s modern environment, there is a concern that electrical pollution is affecting humans. Those concerned about electrical pollution advocate for stricter regulations and for the widespread use of filters to measure and control “dirty” electricity. Considering electrical pollution can come from a variety of sources, the subject is complex and there is still a lot to be learned on the topic. In the meantime, some technology has been created to measure and control electrical pollution. This is especially important for those who have realized they are “electrically sensitive” and are experiencing health problems which are attributed to electrical pollution.

### **3. HEALTH EFFECTS OF ELECTRICAL POLLUTION**

While the term electrical pollution is not a scientific term, there has been a lot of research and case studies done to understand the connection between electrical pollution and human health.

Dr. Robert O. Becker, author of *Cross Currents* and the *Body Electric* stated that “I have no doubt in my mind that at the present time that the greatest polluting element in the earth’s environment is the proliferation of electromagnetic fields. I consider that to be far greater on a global scale than warming...” (The Health Effects of Electrical Pollution by The National Foundation for Alternative Medicine, Washington, D.C. pg 2).

With the worldwide increased consumer demand of electricity, those who study electrical pollution maintain that the modern electrical environment is dangerous to human health. With the abundance of computers and other electrical appliances, exposure to “dirty” electricity has increased significantly. Researchers of electrical pollution explain that the current electricity distribution infrastructure cannot properly handle the increased electricity dependence and demand of modern appliances. Therefore, millions of people are being exposed to harmful electrical phenomena. The wires and transformers are not

only delivering the juice to run electrical devices, but are also the carrier of dangerous high frequency currents.

The high frequency currents most commonly created by computers and other electronic devices are circulated by various wires and systems, emitting the high frequency currents into home or office environments. Many cases have been documented where decreasing the amount of “dirty” electricity has lessened the effects of health problems and complications. Some of those health problems being attributed to electrical pollution include fibromyalgia, attention deficit disorder, asthma, chronic fatigue syndrome, diabetes, and asthma. There are also cases that detail that electrical pollution aggravates other preexisting conditions like multiple sclerosis and migraine headaches.

The faculty and staff at Mindro Elementary School in Melrose, Wisconsin could not figure out why its students and teachers had various health problems during the school year. The story of this school’s experience is documented in *The Health Effects of Electrical Pollution* by The National Foundation for Alternative Medicine, Washington, D.C.

One teacher at the school reported that since becoming an instructor there she had chronic fatigue and developed a migraine headache problem disabling her to instruct her students. Two other teachers in the story reported that their allergy problems significantly worsened during the school year. The school could also not explain various behavior problems of students, not experienced outside of the school year. In the story, a teacher relates that during the school year, she experienced fatigue, headaches, stress, and malaise which end at the conclusion of the school year.

The school installed the GS filters in the school to reduce electrical pollution in the building. Teachers reported a significant improvement in the behavior of the students and the well being of teachers. Before the filters were installed, the affected teachers could not find reasoning for the health problems and strange behavior in students. After two months, the affected teachers experienced improvement in their health. One of the teachers stated, “I have not changed my work habits, or anything in my personal life that would contribute to these changes I have noticed,” said teacher Constance M. Alvin (*The Health Effects of Electrical Pollution* by The National Foundation for Alternative Medicine, Washington, D.C. pg 5.)

Similarly, Shivani Arjuna, whose story is also detailed in *The Health Effects of Electrical Pollution* (page 6), started experiencing unexplained health problems including peaks in high blood pressure and heart arrhythmias. After \$18,000 in testing, her doctors simply said she was experiencing panic attacks. She was not satisfied with this diagnosis and continued to analyze other possible conclusions. She continued to suffer with poor sleep, intestinal problems, and tension. In *The Health Effects of Electrical Pollution*, Arjuna is quoted saying, “I was so weak I felt as if I was made of paper. I was nearly an invalid. My husband cared for me.”

Dave Stetzer, an industrial engineer with Stetzer Electric, co-creator of the GS filters came to Arjuna's home. Stetzer reported that the levels of radio-frequency currents in Arjuna's home were the highest he had ever seen. A typical home requires 20 filters to rid the environment of the high frequency currents. It took 37 filters to reduce levels in Arjuna's home (The Health Effects of Electrical Pollution by The National Foundation for Alternative Medicine, Washington, D.C. pg 6.) Arjuna now leads educational sessions on the effects of electrical pollution.

Catherine Kleiber, who began the Web site [electricalpollution.com](http://electricalpollution.com), started experiencing health problems in 1996. She and her new husband had moved to a farm in southern Wisconsin. Kleiber had not experienced any significant health problems up till her move to the farm at age 23. She started experiencing fatigue, chills, fever, and dry throat among other problems on a consistent basis. For three years, the doctors could not determine the source of her sudden health problems. Doctors finally diagnosed Kleiber with chronic fatigue syndrome.

Kleiber started recognizing that her symptoms worsened at certain times of the year and during weather patterns. Her symptoms would get worse when it rained or was particularly dry. She tried to figure some type of rhyme or reason to the patterns for her symptoms. Kleiber discovered that her symptom patterns matched up with period peak electrical demand and changes in soil conductivity. She investigated the patterns and discovered the phenomenon called electrical pollution in a story in an agricultural publication that discussed problems with stray voltage on farms in Wisconsin. After reading more, she disconnected all electricity in her home to see if it made any difference in her health. She soon noticed that she was sleeping better and her symptoms were reducing.

Kleiber also began using the filters in her home to reduce the amount of electrical pollution entering her home. While it may be impossible to completely rid a home or office of electrical pollution, the filters have proven effective for those affected, like Kleiber. She launched [electricalpollution.com](http://electricalpollution.com), one of the main sources for information on electrical pollution found on the World Wide Web. She encourages legislative bodies and other officials to further investigate the effects of electrical pollution. She wants stricter regulations on utility companies to improve the electrical infrastructure to reduce the amount of high frequency currents running into homes and offices.

Not everyone is "electrically sensitive" like Kleiber or some of the staff and students of the Wisconsin school. Electrical pollution researchers maintain that everyone is exposed to electrical pollution, but some are more affected by its presence and at varying degrees. It may also be impossible to rid the environment of electrical pollution, but the filters have proven to help those who have discovered they are sensitive to the high frequency currents.

Instances of health problems related to electrical pollution are not limited to Wisconsin or rural farm areas. Instances have been discovered all over the country and worldwide. According to Arthur Firstenberg and Susan Malloy, authors of the article "Electrical

Sensitivity,” posted on [latitudes.org](http://latitudes.org), officials Near Fort Dix, New Jersey in a town called Brick, were trying to understand why eight out of every 1,000 children born in Brick since 1994 are autistic. Medical professionals could not figure out the cause of the significant cases of autism. A 750,000-watt Doppler weather radar instrument had been installed in 1994 in nearby Fort Dix. The authors of the article believe that the reason for the increased cases of autism is could possibly be attributed to electrical sensitivity to the emissions from the Doppler radar equipment.

While neither the Environmental Protection Agency nor the Center for the Prevention of Disease Control have published studies or policy on electrical pollution, there is a lot of unofficial research being done on the topic of electrical pollution and its potential health effects. Electrical pollution could be considered a modern day problem, coming along into society because of the increased demand for electricity in today’s world. With this in mind, those worried about electrical pollution have been lobbying for stricter regulation and legislation to curb the problem. They are fighting for solutions to possibly alleviate health problems associated with electrical sensitivity to high frequency currents.

#### **4. MEASURING AND CONTROLLING ELECTRICAL POLLUTION**

A filter and meter have been created to measure and control electrical pollution. The filters are inexpensive and have proven to be effective in controlling harmful high frequency currents from entering homes or offices.

The [Graham-Stetzer](http://www.stetzer.com) (GS) meter and GS filters are the most common tools to measure and reduce electrical pollution. The technology used to create the GS meters and filters is based on electromagnetic theories and power engineering principles. The filters provide a low impedance path for high frequency currents from the hot wire(s) to the neutral wire path bypassing the customer loads (Hughes, Dr. Art B., What is Dirty Electricity? Stetzer Electric [www.stetzer.com](http://www.stetzer.com)). Filter frequency ranges from 4 kHz to 100 kHz provide optimal results for cleaning the electricity. Any frequencies above 100 kHz or below 4 kHz are hard to detect by the filters.

Averaging or RMS meters do measure the amount of electricity present, but the GS meters have demonstrated their ability to measure the amount of harmful electricity present. Electrical current enters the body more readily at higher frequencies, and body current at those higher frequencies can be harmful. The GS meter measures currents at those higher frequencies by measuring the sum of the frequencies above 60 Hz.

Electrical pollution in home and offices can be caused by internal factors. Some internal factors may include electronic equipment that distorts 60 Hz power when the dc power has created ac power. A distorted 60 Hz wave is a normal 60 Hz current polluted by high frequency voltage and currents. Some of the 60 Hz normal currents can be converted into a higher frequency when flowing back to ac conductors.

Electrical pollution is not caused by the actual power itself, but what comes along with it in transfer and production. This is why it is also possible for the electricity in your home

or office to be polluted by outside and near sources, like neighbors or through an internal electrical system, in an office building for instance. If you share a transformer with another office or home, their electronic devices could be producing high frequencies currents or distortion in your home through computers or other appliances. Currents from that transformer that are intended to be directed back towards the neutral may flow to your home or office instead due to overload. This is considered a downstream effect.

Utility companies have not created solutions to protect customers from these downstream effects commonly produced by the shared transformers and electrical infrastructure of neighbors and office buildings. A GS meter can measure the amount of electricity flowing into your home or office that may be occurring at harmful higher frequencies.

While the meter measures the amount of harmful electricity present, the Graham Stetzer filters (GS filters) can help reduce the harmful electricity that enters home or office environments. The GS filters work best when the utility has an adequate neutral conductor. This means that the conductor can handle more than the standard utility practice to meet thermal or voltage regulation. This information would have to be attained from the utility company to understand if the filters could work properly in your home or office. If the conductor can thwart inward radiation from occurring, then the filters can be a complete solution for someone trying to rid their home or office of electrical pollution and harmful high frequency currents.

Filters can be a fully effective means to end the circulation of electrical pollution into homes or offices. However, there are some circumstances that can affect the functionality of the filters and let electrical pollution in. The neutral conductor must be adequate. The filters route harmful electrical pollution high frequencies to the neutral. If the filters are not working properly, it may not be the filter but the neutral. This would have to be investigated through the utility company. GS meter readings show how much the filter is working against electrical pollution in the home or office environment. If the meter readings are still showing high frequencies, it could be the neutral as previously mentioned, or several other instances. According to Stetzer Electric, the manufacturer of the filters and meters, there are three end cases when installing a filter does not decrease the filter reading.

The first case would be if the meter were measuring distortion outside of the effective range of the filter. The range of the filter cannot read frequencies under 4 Hz or more than 100 Hz. This answers the question of why a non-zero meter reading would not be acceptable. Second, if the electrical locations of the meters are on different circuits in a home or office, they may be too distant for the meters. Last, local resonance can occur that affects the performance of the GS filters. Local resonance occurs when a filter enables local current oscillation between the filter and the circuit which is connected to a specific frequency. Local resonance can often be corrected simply by adding another filter.

By installing the filters and meters in homes and offices, those affected by electrical pollution have seen improvement in health problems. Not everyone is affected by

electrical pollution in apparent ways, but some people have attributed certain [health problems](#) to the presence of electrical pollution. Reducing the high frequency currents by use of the filters has proven effective in lessening the intensity of health problems attributed to the presence of electrical pollution. As mentioned previously, it is important that filters are installed correctly to optimize performance and results.

## **5. LEGISLATION AND REGULATION OF ELECTRICAL POLLUTION**

Electrical pollution originates from misdirected currents. Instead of flowing back to its neutral due to overload, the currents flow into the ground to produce high frequency currents. These currents can be harmful to people who are “electrically sensitive” causing health problems in some cases.

Electrical pollution researchers and those trying to stop its spread claim that the only way to fix this growing problem is to encourage the passage of legislation and the enforcement of regulations to be strictly followed by utility companies. This is difficult, however. The difficulty stems from the fact that electrical pollution is not yet an issue being addressed nationally, or by federal agencies. With this in mind, regulatory actions would have to be taken on a state and local level.

The Electrical Power Research Institute (EPRI) and the Institute of Electrical and Electronics Engineers (IEEE) have identified remedies for electrical ground currents ([www.electricalpollution.com/legislation.html](http://www.electricalpollution.com/legislation.html)). These remedies correct routing problems and keep electricity at clean levels of 60 Hz when entering environments like homes or office buildings. These remedies would be templates for regulation of utility companies to clean up its dirty electricity. But getting the regulations to be passed and installed is the hard part.

Legislation has been introduced in the state of Wisconsin in 2002 to require that utilities allow no current on the grounding rods except during a fault situation. Simply put, this would control the ground currents problem, which is considered the center of the electrical pollution origination.

In the 2003 Wisconsin assembly, more legislation was introduced to protect consumers from dirty power. Rep. Barbara Gronemus introduced the Electrical Consumer Bill of Rights, Bill AB 529. The Electrical Consumer Bill of Rights included provisions that would have defined objectionable current flow on grounding rods as a current, steady state of five seconds or more. The bill would have also required that utility companies remedy any current objectionable flow problem within one month of receiving a complaint. It also states that if a suit is filed due to the failure of the utility company to fix the problem, treble damages must be awarded. In addition, the Electrical Consumer Bill of Rights would have levied considerable fines on electrical utility companies that did not follow regulations or remedy problems within stated timelines.

A Wisconsin Assembly hearing was held for AB 529 in the Committee of Energy and Utilities. Many of those Wisconsin residents affected by electrical pollution came forward to share with the legislature the details of the effects of electrical pollution. Those affected were not just the ones with health problems, but even farmers who had lost their farms because of stray voltage effects on cattle. The hearing was reported to have been very long, and included perspective from many residents and the utility companies, who have insisted there is no problem. The bill failed to progress any further in the legislature.

The Electrical Consumer Bill of Rights was similar to legislation previously introduced in 2001, called the Electrical Pollution Bill. The Electrical Pollution Bill would have also levied considerable fines to utility companies for not following regulation and fixing problems with ground currents. It would have also established time frames the utility company must follow with regard to addressing consumer complaints and correcting problems.

The Wisconsin legislature has not been successful in passing the electrical pollution legislation yet. No similar bills have yet to be introduced into the 2005 Assembly regarding electrical pollution problems.

Those trying to stop the worsening of electrical also say that other things can be done, on the national level to stop electrical pollution. In Europe, harmonic filters for non-linear, time varying loads are required for certain electrical devices. Legislative force could be used in this case, as it could be a law to require that electronic devices contain the filters. It is more costly to manufacture the products with the filters, but proponents say it is worth the extra costs to alleviate electrical pollution. Instituting laws to require the harmonic filters would be a complimentary action to legislation to regulate utility companies in their grounding rod practices.

The legislation introduced in Wisconsin could serve as guides for other states looking to regulate its electrical pollution problems. Those trying to stop the spread of electrical pollution say that customer education and the spread of information is their best tool against this growing problem.

## **6. SELECTED RESOURCES**

Stetzer Electric - <http://www.stetzerelectric.com/> Manufacturers of dirty electricity filters and meters.

Electrical Pollution Solutions - <http://www.electricalpollution.com/> Information about electrical pollution.

Get Pure Power - <http://www.getpurepower.ca/> Canadian distributor of Graham-Stetzer filters.

Stray Voltage— <http://www.strayvoltage.org/> StrayVoltage.org is an award-winning Web site that is a resource for stray voltage information and helps foster community dialogue to find solutions to this important topic.

Power Watch– <http://www.powerwatch.org.uk/> Founded in 1988 Powerwatch.org.uk has been informing people to the dangers of EMFs.