

The Impact of Electricity on Earth, Man, Civilisation and Culture

Of the great construction projects of the last century, none has been more impressive in its technological, economic, and scientific aspects, none has been more influential in its social effects, and none has engaged more thoroughly our constructive instincts and capabilities than the electric power system. A great network of power lines which will forever order the way in which we live is now superimposed on the industrial world. ¹

What impact has electrification on the cultural and **civilizational** development of mankind? What are the effects on the human being? This article complements discussion about the health risks of electromagnetic pollution on the environment from an anthroposophic point of view.

Rudolf Steiner spoke repeatedly, for instance in 1923, on the effects of electricity. His statements give support to the opening quotation:

One major facet of the present inner working of the spirit results from the fact that in America something is starting to be considered which has already been suggested by Anthroposophy, but is of course not heard. People are now beginning to gain some insight by external means. Compare today's world with that of a century ago. You will say that there is of course a big difference. But one of the most powerful differences is not listed: the fact that our atmosphere is permeated by the telegraph, telephone wires, and so on. In Europe, compared to America, it seems at present to be child's play for the atmosphere to be pervaded by wires. In America then there exists some understanding of what this means for human beings. The suspicion is at last arising that man cannot remain unaffected by the activity buzzing through the air in telegraph wires, that man is becoming a real induction apparatus. Remember that there exists an opposite electric current in your nerves. A direct current works in your blood system. All this affects mankind today, but is hardly spoken of. ²

The four main effects of electricity

Let us recall the effects of the electric current which we encounter as basic knowledge in school: the light effect, the thermal effect, the magnetic effect and the chemical effect.

- If one connects a light bulb to an electric circuit, the filament is caused to glow.
- The iron contains a heating plate heated by the electric current: heat effect.
- Many scrap yards use huge electromagnets to lift the throwaway cars from one place to another.
- With the aid of electric current chemical effects can be achieved, for example during the process of electrolysis. In principle electrical energy is converted into chemical energy. Electroplating is one of the many practical applications of this principle.

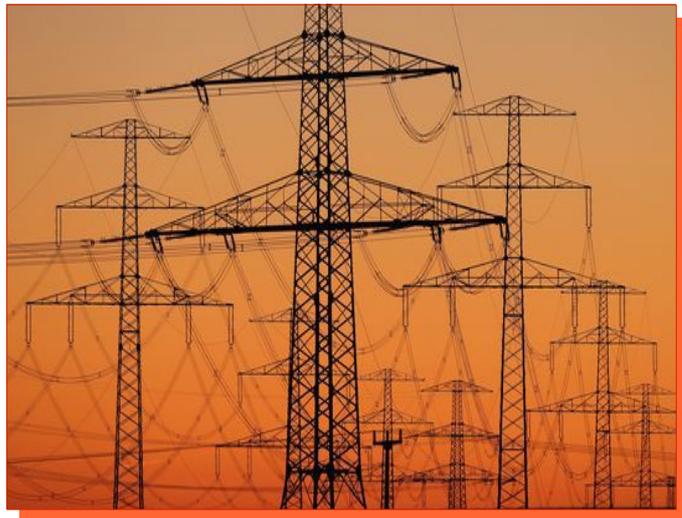
¹ Thomas Hughes, 'Network of Power', Introduction

Thomas Hughes (born 1923) is an American Historian of Technology. He is an emeritus professor of history at the University of Pennsylvania and is a visiting professor at MIT and Stanford University

² Rudolf Steiner, lecture from 11.07. 1923, in Stuttgart, GA 345, page 14

*Rudolf Steiner, *27. February 1861 in Kraljevec (present-day Croatia); †30. March 1925*

A gigantic network of cables is required to provide every household, factory, railway line and Internet server with electricity. We are hardly aware of the existence of this network. Many power lines are anyway laid underground. Masts from heavy current cables cut through a beautiful landscape and disturb our aesthetic sensibilities. But the impairment on the landscape is relatively harmless. The real danger lies in invisible electric currents flowing through the surface and underground cables. All power lines and devices operating on the basis of generating electricity also generate electromagnetic fields. Power lines, for example, produce low frequency electromagnetic fields, ELF fields (ELF = Extra Low Frequency).



Electromagnetic Fields

The use of certain technologies - for example, electricity supply network and mobile network - generates electrical, magnetic and electromagnetic fields in the human environment. These fields can be described by their strength (amplitude), cycles (wavelength) and number of oscillations (frequency). High- and low-frequency fields are differentiated, they belong - just like optical radiation -- to non-ionizing radiation. In contrast to ionizing radiation, for example X-rays, the energy of this radiation is insufficient to charge electrically atoms and molecules - to ionize. Nevertheless, this type of radiation has health-damaging consequences. Different concepts are used for protecting against immediate hazards as well as for taking precautions. ³

Opinion is divided among scientists regarding the extent of the health risks of concentrated induction on human beings. The question arises how comprehensive scientific understanding really is about the burden of radiation on the biosphere and on man.



As we have seen, the geomagnetic field is a shield protecting the Earth from the full force of the sun's energy. Without it, life could not exist. But since humanity has learned to generate and manipulate electromagnetic forces, we have created other forces beneath this shield, the likes of which have never before existed ⁴

The following statements regarding the low frequency electromagnetic fields (ELF = extremely low frequency) emanating from power lines are based mainly on the findings of Dr. Robert O. Becker, as stated in his book 'Cross Currents. The perils of electropollution, the promise of electromedicine'. The American physician Dr. Becker has done extensive research in this area and published his findings.

³ Website of the German Federal Office for Radiation Protection:: <http://www.bfs.de/de/elektro/nff>

⁴ Dr. Robert O. Becker, *Cross Currents. The perils of electropollution, the promise of electromedicine*, page 184

Power Lines and ELF Fields

A part of the American population is constantly in some form of contact with microwaves. But all of us are exposed to the 60 Hz power frequency fields which emit from the vast network of power lines and electrical wires in your home or office...⁵

Power lines in the ultra high voltage range produce energy fields. These are Extremely Low Frequency (ELF) fields from 0 to 1000 cycles per second. They include the 60-Hz line frequencies of the United States, the European 50-Hz line frequency. The submarine communication system of the U.S. Navy uses frequencies of 45 and 75Hz. It has previously been considered - and this view was scientifically justified - that an ELF field could not possibly have a biological effect. The 60-Hz radiation from heavy current cables and household appliances have a wavelength of nearly 5000 Km. ELF fields can be easily transmitted over long distances between the surface and lower layers of the ionosphere and penetrate without difficulty into the earth and sea. The U.S. Navy uses this property of ELF fields to communicate with its submarine fleet. Extremely low frequencies make it possible to connect with submerged submarines.

... Because of the unique transmission properties of ELF fields, the navy decided to try using them for this purpose. A very large antenna system with the code name SANGUINE was constructed at Clam Lake in rural Wisconsin. It was designed to operate at either 48 or 70 Hz, just above and below the 60-Hz power frequency. Despite its location in the mid-continent, the SANGUINE antenna was able to communicate with submerged submarines as far away as the Indian Ocean.⁶

Another underground antenna was planned to extend over the entire northern half of Wisconsin and Michigan. The population objected to its construction. The Navy had to carry out a study to assess the risk to agriculture, livestock and humans.

These studies were completed in 1973. The navy recruited a committee of outside experts, of whom I was one, to review the results. We met in December of that year at the Naval Medical Research Institute in Washington, D.C. While a number of results reported to us were positive, one was particularly disturbing. Dr. Dietrich Beischer, working with human volunteers at the Naval Aerospace Medical Research Laboratory in Pensacole, Florida, found that only a one-day exposure to the magnetic-field component of the SANGUINE signal produced a significant increase in the serum-triglyceride levels on nine out of ten subjects. (Serum-triglycerides are increased by stress response and are related to fat and cholesterol metabolism; increases to above-normal levels are a definite cause for concern.)⁷

The Navy now examined the operating personnel. The blood of the entire operating staff of the test antenna in Clam Lake showed elevated triglyceride levels. (Triglycerides are neutral fats, whose health effects are similar to those of cholesterol.)⁸

In a final conference it was noted that a large part of the civilian population may be at risk through these facilities. The Navy denied that this meeting ever took place and insisted that they knew nothing about scientific studies indicating possible damage to the population.

Studies on Heavy Current Cables

Experiments in the 70s on rats exposed to these areas over 3 generations showed an increased infant mortality and lower birth weight. The result was similar to that in which animals were exposed to constant stress.

⁵ Dr. Robert O. Becker, *Cross Currents. The perils of electropollution, the promise of electromedicine*, page 184

⁶ Dr. Robert O. Becker, *Cross Currents. The perils of electropollution, the promise of electromedicine*, page 201

⁷ Dr. Robert O. Becker, *Cross Currents. The perils of electropollution, the promise of electromedicine*, page 201/202

⁸ Elevated triglyceride levels are a health risk. They promote the formation of blood clots or atherosclerosis of the blood vessels.

At that time Dr. Becker received a letter from a British doctor. Dr. Perry, who worked for the NHS (British National Health Service), had found that people who lived near power lines suffered more frequently from mental disorders and suicide. Epidemiologist Dr. Nancy Wertheimer of the University of Colorado has also studied the effects of magnetic fields emitted by power lines, not with heavy current cables, but with connection lines running above ground from tower to tower. The results were startling: 60-Hz magnetic fields with strengths of only 3 milligauss (three thousandths of a gauss)⁹ were in a significant statistical relationship to the incidence rate of childhood cancer (leukemia).

Meanwhile, the health risk of ELF fields is taken very seriously by an increasing number of scientists. Denis Henshaw¹⁰, professor of physics at the University of Bristol, Great Britain, member of SAGE (Stakeholder Advisory Group on ELF EMFs) and Head of the Human Radiation Effects Group, is concerned about the effects of ELF fields.

In a press release in 2007¹¹ on the publication of the first interim report of SAGE, he expressed his disappointment that the report does not include sufficient measures to protect the public. The research results of Dr. Robert O. Becker in the 1960s and 1970s and the dangers to which he pointed were openly and seriously taken up by scientists such as Denis Henshaw.

Dr. Robert O. Becker:

The Hazards are Real

While the foregoing review of what has happened in this area since the 1950s may seem complicated, the reports listed are only a small fragment of what is available. In 1963 I was asked to write an article reviewing the scientific literature on the biological effects of magnetic fields. I was able to list a total of forty-four published papers, the oldest from 1892. In the year since then, so many scientific papers on this subject have been published that I have completely lost track. In 1974, the Office of Naval Research began collecting published scientific reports from around the world in the general area of "biological effects of nonionizing electromagnetic radiation" and publishing abstracts as a digest. This digest is still being published, and the volume of reports has now grown to a point at which more than a thousand scientific papers on this topic are published each year.

The same time period also saw the establishment of three organized scientific societies concerned with this area of inquiry (see the resources section of this chapter). At present, two of thies societies publish international scientific journals, and additional journals are planned. Clearly, this is an expanding area of scientific interest and concern.

*The questions with which we began this chapter appear to have been answered: **all** abnormal, man-made electromagnetic fields, regardless of their frequencies, produce the same biological effects. These effects, which deviate from normal functions and are actually or potentially harmful, are the following:*

- *effects on growing cells, such as increases in the rate of cancer-cell division*
- *increases in the incidence of certain cancers*
- *developmental abnormalities in embryos*

9 Gauss is a measuring unit for measuring electromagnetic field strength, often used in astrophysics

10 Denis Henshaw professor of physics, University of Bristol. Head of the Human Radiation Effects Group
Homepage: http://www.phy.bris.ac.uk/people/henshaw_dl/index.html

11 Press release: <http://www.electric-fields.bris.ac.uk/Sagepressrelease.pdf>

- alterations in neurochemicals, resulting in behavioral abnormalities such as suicide
- alterations in biological cycles
- stress responses in exposed animals that, if prolonged, lead to declines in immun-system efficiency
- alterations in learning ability

These bio effects interrelate to influence the clinical state of a human being who is chronically exposed to any abnormal field. For example the stress effect results in a number of stress-related diseases. If prolonged, these decreases the efficiency of the immune system, resulting in an increases incidence of infectious diseases and cancers. The concurrent effect of the promotion of cancer-cell growth and the increase in the malignant characteristics of these cells leads to an increased incidence of cancers with faster-than normal rates of growth. (Note that all of these effects are cancer-promoting, not cancer-causing) ¹²

Dr. R. O. Becker further writes:

The Role of Abnormal Electromagnetic Fields

Our ability to generate the entire spectrum of electromagnetic fields is a two-edged sword. With no understanding of the relationship of these fields to living organisms, we have produced a global environmental alteration that has profound implications for human health. Now that we finally become aware of the serious consequences of this mistake, we have the responsibility to take actions to reduce this threat to future generations. ¹³



So much for the impact of electromagnetic fields on the physical aspect of the biosphere. But as we shall see, electromagnetic fields also affect in significant ways the soul, mind, consciousness and will of the human being. We know that thoughts, feelings and consciousness shows up as an electrical activity of the brain and can be measured using an encephalogram. ¹⁴

It now seems an obvious question whether and to what extent the above-described electromagnetic fields, especially ELF radiation, can affect the human mind. Usually, we assume that our behaviour is determined by the way the brain receives information, and forwards it to the consciousness to then decide for one or the other course of action.

It is hardly surprising that there are scientists earnestly researching about how human behaviour can be affected by means of electromagnetic fields, for example Dr. José R. Delgado.¹⁵ His book 'Physical Control of Mind: Toward a Psychocivilized Society' reports the statement of a tested person:

"Doctor, I think your electricity is stronger than my will" ¹⁶

Mind, Consciousness and Electromagnetic Fields

In the early sixties, Dr. Robert O. Becker established the postulate that external magnetic fields could change the basic operations of the brain where they intervene in

¹² Dr. Robert O. Becker, *Cross Currents. The perils of electropollution, the promise of electromedicine*, page 215

¹³ Dr. Robert O. Becker, *Cross Currents. The perils of electropollution, the promise of electromedicine*, page 217

¹⁴ The electroencephalography (EEG, brain encephalon of Greek, graphein, to write) is a method of medical diagnostics and neurological research to measure the summed electrical activity of the brain by recording the voltage fluctuations at the head surface

¹⁵ José Manuel Rodríguez Delgado (August 8, 1915 – September 15, 2011) was a Spanish professor of physiology at [Yale University](http://www.yale.edu), famed for his research into mind control through electrical stimulation of regions in the brain.

¹⁶ Dr. José R. Delgado, *Physical Control of Mind: Toward a Psychocivilized Society*, page 114

its normal internal direct current electrical system.

In laboratory tests along with Dr. Howard Friedman, a psychologist at the Upstate Medical Center at the State University of New York, it was found that constant magnetic fields did not affect the response time of volunteers if they had the greater strength of 15 gauss, while the action of much weaker fields amounting to 0.1 and 0.2 gauss caused significant and quite different effects. These extremely low frequencies (ELF) are also found in micropulsations.¹⁷ Micropulsations are slight variations of the Earth's normal geomagnetic field, but are much weaker than the main components which move at around 10 Hz.

In a number of publications and presentations it was concluded, according to Becker, *the magnetic field of the earth is an important physiologic factor for living organisms. It appears that behavioral changes of an undesirable nature, either quite evident or subtle, may result from exposure to environments having lower or higher field strength than "normal" or those having either no fluctuation or cyclic fluctuation at frequencies other than those to which we are adjusted.*¹⁸

Becker speaks of an 'archaic direct current system existing in our body,' and that this DC system reacts sensitively to external low frequencies.

Further indications by Becker point to consequences of great importance arising from this research, because our thoughts and actions are determined to a certain degree by electromagnetic fields around us. We cannot see these fields, but to ignore them, says Becker, is dangerous.

*The darker side of the problem, the ability to control the human mind, now assumes far greater importance than when Jose Delgado first proposed this possibility in 1969. The political and military implications cannot be, and apparently have not been, ignored.*¹⁹

Dr. Becker indicates that military circles take quite seriously the effect of low frequency fields on human beings, and apply these fields for the purpose of influencing consciousness. The aim seems to be the elimination of free will. Such research is supported and financed by the American military. Questions of ethics and freedom, of the inviolability of the individual, ultimately of human dignity, are denied. Adverse effects on the civilian population of electromagnetic fields through military control devices in peacetime are accepted.

This article does not want a move away from technology. There is no way back from technological development. Modern technology is necessary for the spiritual development of mankind and has created significant opportunities. But much would be gained if it becomes every man's deep desire to really understand the technologies we use, to master them and become aware of particular effects on man's body, mind and soul. If we do not care about all this and are indifferent towards it, then we leave the practical application of these fields and their effects on humans entirely to the military, business and industry.

What can we do?

One answer lies in calling upon people, businesses, private and public institutions to take into account the risks as well as the benefits of purchasing equipment which has an effect on people and the environment. Everyone who uses technology should feel an obligation to inform themselves about its collective effects.

Demand ultimately governs what is produced!

17 Micropulsations are geomagnetic variations. They are formed at the edge of the magnetosphere, spread up to the ionosphere, and radiated from there as electromagnetic waves to the ground

18 Dr. Robert O. Becker, *Cross Currents. The perils of electropollution, the promise of electromedicine*, page 220

19 Dr. Robert O. Becker, *Cross Currents. The perils of electropollution, the promise of electromedicine*, page 228

To maintain the health of our children, of future generations and of the planet Earth should be in the interest of every single person. The Earth is the foundation for the further development of mankind.

To save what can still be saved is only part of what is at stake. The input quotations from Thomas Parke Hughes and Rudolf Steiner relate to the energy side of the electromagnetic forces. Those forces have since been effective in many ways, for example in the field of information media. They are now shaping us to a never expected extent in the cultural field and in all aspects of life. This shaping demands not only knowledge and understanding of the complex workings of electromagnetic fields. It will demand a new and profound ethics and should not be left to certain circles in the military, business and medicine, for the purpose of maintaining power and the imposition of economic interests and greed for profit.

From the postscript by Becker's book '*Cross Currents. The perils of electropollution, the promise of electromedicine*':

*An informed public is the only defence against the forces of the military and medical establishments that seek to prevent further development of the new concepts of life, energy and medicine. It was for that reason that I undertook the task of writing this book.*²⁰

A quotation from a lecture given by Rudolf Steiner on the 16th of December 1904:
(Temple Legend)

The occult investigator obtains his truth from the one side, the physical scientist from the other. Just as Freemasonry has developed out of working masonry, out of the building of cathedrals and temples, so one will in future learn to build with the smallest of building blocks, with entities of condensed electricity. That will call for a new kind of masonry. Then industry will not be able to carry on more as it does today. It will become so chaotic and will only be able to work purely out of the struggle for existence per se, as long as man does not know... (Gap)

... Then it would be possible for someone in Berlin, to drive into the city with a cab, while in Moscow a disaster he had caused was taking place. And nobody at all would have any inkling that he had been the cause of it. Wireless telegraphy is the beginning of this. What I have portrayed is in the future. There are only two possibilities available: Either things go on chaotically, as industry and technology have done until now, in which case it will lead to whoever has the possession of these things being able to cause havoc, or else it will be cast in the moral mould of Freemasonry...²¹

Wilfried Zimmermann

20 Dr. Robert O. Becker, *Cross Currents. The perils of electropollution, the promise of electromedicine*, page 296

21 Dr. Rudolf Steiner, *The Temple Legend and the Golden Legend* Rudolf Steiner Press London, page 114