

## WIRELESS TRANSMISSION OF ENERGY

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There is a hypothesis that Tungus meteorite was a result of experiments which were made by one of well-known scientists. But this phenomenon is not an approved fact. However, carrying out such experiments potentially could be the cause of that case. The experiment was aimed to achieve one of the most tremendous phenomenon - Wireless Transmission of Energy (WTE).

From the first steps of electricity science and physics there was a dream about WTE. That this dream is not fruitless, testify convincing achievements of modern radio engineering. But before speaking about all those innovations which already had time to take root into our life, let's consider what wireless transmission of electricity itself represents.

Actually the term wireless transmission of electricity does not absolutely approach for the given phenomenon, because in such type of transfer one wire should be present. It is "earth". For the first time such idea was offered and was embodied in life by Serbian scientist Nikola Tesla. First the ingenious inhabitant of the United States used in the successful tests a principle of electric fluctuations in a unique wire - the earth. In the XX-th century Tesla began to build a big laboratory with a huge vibrator getting a huge budget at those times in one million dollars. In suburb of Colorado he built a tower (see figure on the right).

With its help in the first experiment the scientist managed to light an order of two hundred 50-watt bulbs on distance of 42 kilometers from laboratory without use of wires. The so-called vibrator was a transformer of a large size. Its primary winding consisted of several coils of the thick wire which were reeled up on a steel fence with diameter of 25 meters. The second winding was allocated on dielectric cylinder into fence. Primary winding with spark interval and capacitor produced oscillating circuit which created necessary frequency. The second winding was connected with the big earthed metal sphere which was located on a roof of the laboratory with height of 60 meters. The received construction is known under the modest name "Tesla transformer". In 1905 it was put into operation driven by dynamic engine with three hundreds horse powers and created the electro-magnetic fluctuations with frequency 150 kHz and length of a wave about 2000 meters. The turned out circuit (where the Earth – was a unique "wire") had voltage 30000 V, and the resounding potential of a sphere reached seven million volts. As a result of the big loadings the sphere started glowing, from a metal surface artificial lightning sparks were scattering on some tens of meters, owing to ionization of air round the laboratory device. The ground near laboratory was saturated with electricity, periodically changing the charge. Such phenomenon received the name "pulsing pump". Tesla received length about 42 kilometers by self-distribution of concentrated waves on a planet surface. So from Colorado with the frequency 150 kilocycles per second electromagnetic waves converged by circles in an opposite point of the Earth, hit



each other and moved back to the laboratory. Such waves, emitting original "echo", strengthened several times capacity of the transformer. They forced to "vibrate" the whole planet, the American scientist decided to allocate each point of the earth with electricity ... However, miracle did not happen. The reason of that fact was low efficiency (about four percent) and very expensive cost of installation. It was not comprehensible and that equipment could hardly pay back itself.

After Tesla's experiment nobody repeated these tests so successfully. Only in 2007 Marin Soljatic, an assistant professor in MIT's Department of Physics and Research Laboratory of Electronics, described his and his MIT colleagues' research on that wireless future. Its technology of energy transmission received the name WiTricity. It was based on using coupled resonant objects. Two resonant objects of the same resonant frequency tend to exchange energy efficiently, while interacting weakly with extraneous off-resonant objects. A child on a swing is a good example of this. A swing is a type of mechanical resonance, so only when the child pumps her legs at the natural frequency of the swing she is able to impart substantial energy. The investigated design consists of two copper coils, each a self-resonant system. One of the coils, attached to the power source, is the sending unit. Instead of irradiating the environment with electromagnetic waves, it fills the space around it with a non-radiative magnetic field oscillating at MHz frequencies. The non-radiative field mediates the power exchange with the other coil (the receiving unit), which is specially designed to resonate with the field. The resonant nature of the process ensures the strong interaction between the sending unit and the receiving unit, while the interaction with the rest of the environment is weak.

Working on the WiTricity project, Soljatic's group moved so far apart. From laboratory focus technology could apply in use. The sizes of receptions and sending devices were reduced and a literal sense was pushed in the household and electronic engineering. The transferring coil is included in the socket. The reception – is connected to the consumer. It is

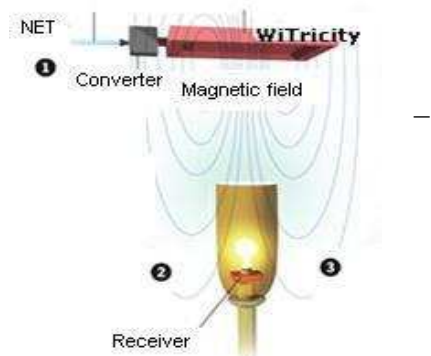


paradoxical, but considerable quantity of consumers promotes to increase efficiency which so is in quite good repartitions about 95 per cent.

Corporation WiTricity introduced technology and achieved good result in the liquid-crystal-screen, receiving electricity by the first prototype of a household set WiTricity. The handle coil lays on a floor, a reception coil – on a table (see figure on the left).

Now the company wants to improve the technology. Namely, they want all electric appliances receive energy from air when they are in magnetic field. It will be very user-friendly for us when we come home our mobile phone will charge automatically.

In figure on the right: 1 – special scheme translates a usual alternating current of high-frequency; it feeds the transferring coil creating oscillating magnet field. 2- the reception coil in the device-consumer should be adjusted on the same frequency. 3 – resonant communication between coils transforms magnetic



field into an electric current which feeds a lamp. In figure on the left: according to the authors of the system one coil on a ceiling will supply its energy to all appliances in a room – from several lamps and TV to the laptop and a DVD-player. In the principal of group consumer increasing efficiency is clearly seen.

Besides the advantages of wireless transmission there are disadvantages. One of them is clogging our environment by magnetic fields. Another disadvantage is influencing the wiring transmissions. But if we want to use wireless transmission we must not use wire one.