

УДК 811.111: 620.95

Volynets A., Rabtsevich V., Ostreiko S.  
**Living plants generate electricity**

Belarusian National Technical University  
Minsk, Belarus

Imagine world in which you don't have to work in a hot stuffy office in summer. Instead you can enjoy fresh country air wherever you like. No more hassle if the batteries in your phone or other electronic equipment run low, you can charge them in any field or garden. Nonsense? Not according to recent research by Marjolein Helder and David Strik at the WUR (University of Wageningen, NL). They discovered that you can generate energy from the natural interaction that occurs in the soil of practically every garden. Their company Plante-e has developed a fuel cell which does just that.

Plant-e develops products in which electricity is generated with living plants. The products are based on a technology that was developed at Wageningen University. In 2007 the technology was patented, and Plant-e was able to get the patents from the university in 2009. The technology enables us to generate electricity with living plants at practically every location where plants can grow and water is abundantly available. The technology is based on natural processes and is safe for both the plant and the environment.

The system can work all year round, with the only downtime being if the soil completely freezes in very cold weather – giving it a significant advantage over other renewable technologies that only work in certain weather conditions and areas of the world [1].

Plant-e develops products that generate electricity with living plants. While the plant is growing, electricity is

produced. It's a small start-up company with ambitious goals. It strives to develop technology and products so we can generate electricity worldwide, both in urbanized and rural areas. With Plant-e technology we can change the way the world thinks about electricity production: natural areas can be conserved, and the production of food and feed could be combined with production of electricity. Worldwide this could be a huge transformation. Especially in places where it is needed the most, where they have no access to electricity available at all.

Living plants generate electricity; more specifically, energy can come in the form of a byproduct of photosynthesis in plants. All that is needed is light, carbon dioxide and water. Plant-e is a company that builds on that potential source of energy, aiming to do business with products that can generate electricity from plants. Based on natural processes electrons are harvested from the soil and electricity is produced while plants keep growing. The approach they use does not require damaging the plant in order to harness its energy [2].

This process is based on photosynthesis. Through photosynthesis a plant produces organic matter. Part of this matter is used by the plant for its own growth, but a large part of the matter can't be used by the plant and is excreted into the soil via the roots. In the soil, naturally occurring bacteria break down the organic matter, and release electrons in the process. The technology that Plant-e is working with makes it possible to use the electrons for electricity. Research has shown that the plants are not compromised by harvesting the electrons, so the plants can keep on growing while electricity is produced. In simple terms, electrons are a waste product of bacteria living around plant roots – plants excrete organic matter into the soil, which is broken down by bacteria. In the breakdown process electrons are released. It is possible to harvest them using inert

electrodes and turn them into electricity, without affecting the plant's growth in any way.

The technology harnesses the breakdown of organic matter produced by the plants in the soil and converts it into electricity that can be used to charge phones, power lights and cut down on a house's reliance on external electricity sources.

Plant-e's products are currently built up as modular systems. You can find this construction in the Plant-e modules and the DIY boxes (large and small). Besides this, Plant-e is developing a system that can be applied in existing wetlands; a tube system that is placed beneath the surface of the ground, in the root area of plants [3].

#### References:

1. Mode of access: <http://www.plant-e.com/>. – Date of access: 20.03.2017.
2. Mode of access: <https://www.weforum.org/>. – Date of access: 20.03.2017.
3. Mode of access: <https://techxplore.com/>. – Date of access: 20.03.2017.