



How can we help to save the planet?

The LFree project develops a revolutionary technology that proposes to decentralize the means of production of electricity and drinking water and to use solar energy (free) to do so.

1) Decentralization of the means of production: the solutions envisaged

a) Reducing the size of production facilities:

- Reduced investment costs and, ultimately, the price of electricity and treated drinking water.
- The distribution of energy is made more flexible and mobile by better installation capacity in remote areas without incurring additional costs for the community.

Underlying Scientific Principle: Fresnel Linear Refraction (Snell-Descarte's Law) allows to concentrate solar energy more efficiently and drastically reduces the need for large areas to do so (which involve investment costs and technical limitations).

Finally, we produce our own electricity at home and if we have not produced enough, we use our neighbor's, it costs less than using a large power plant that pollutes!

b) Pooling the sources of individual production: greater flexibility

By pooling the sources of electricity and / or drinking water, it is possible to:

- Drastically reduce investment and maintenance costs (thermal power plants, wastewater treatment plant) that are the responsibility of the community...
- Propose better access to electricity and drinking water by making it more equitable
- Flexibility of electricity and drinking water production capacity to better meet an exceptionally high demand (peak production): the place of production is also the place of use.

Underlying technical principle: The development of connected objects which allows communication between individual micro powerplants, in particular by line carrier current (PLC), enables the deployment of smart grids.

Finally, these smart grids can meet the need for energy or drinking water wherever it is, with instant reactivity.

2) Optimization of energy production and its use

Optimizing energy production goes first by reducing energy losses!

a) Reducing energy losses

By limiting energy conversion losses (thermal energy / mechanical energy / chemical energy), energy production is optimized and the production of greenhouse gases and fine particles, sources of pollution, is reduced.



b) Using unavoidable energy produced

Unavoidable energy is the amount of energy ineluctably present or trapped in certain processes. Renewable energy is by definition intermittent and highly dependent on environmental conditions. The sun especially brings effective thermal radiation only for 4 to 6 hours per day. This poses the difficulty of its use on demand. On the contrary, fossil energy allows permanent use but pollutes by releasing greenhouse gases and fine particles.

Underlying scientific principle: the internal combustion engine uses the chemical energy of fossil fuel to produce mechanical energy on demand: it is this combustion process that is used by thermal power plants. In this process, 70% of the energy used is lost as heat (called unavoidable heat). It is possible to use the waste heat to preheat the water so that it reaches its vaporization temperature quicker when subjected to the concentrated energy of the sun. This makes it possible to optimize thermal electrical energy by reducing the use of fossil energy at the individual scale of the dwelling. The 30% efficient energy can be used when the weather conditions do not allow producing electricity on demand.

c) Storing energy

Storing the energy in the form in which it was produced not only reduces energy losses but also enables it to be used in its most suitable form depending on its storage time: indeed, the thermic, mechanical or even electrical energy cannot be stored by the same means and for the same duration. So it's smart to know how to use it better: that is what the LFree project proposes.

3) Innovation in Wastewater Treatment

There are a multitude of toxic substances released by humans into the environment. Some of these substances cannot be degraded either by natural phenomena (chemical reactions) or by living organisms (enzymatic reactions ...). These substances are found in the environment and concentrate along the food chain (some pesticides and carcinogens). Current treatment techniques are therefore ineffective. These substances are generally destroyed at temperatures well above 200 °C.

Underlying scientific principle: Thermodynamics teaches us that at atmospheric pressure and irrespective of the power with which water is heated, this liquid water will remain at a temperature of 100 °C until the last drop of water evaporates. On the other hand, under pressure, the liquid water rises to much higher temperatures which allow the destruction of these substances dissolved in the water.

a) Co-generating electricity and drinking water

The production of steam makes it possible to produce water freed from pathogenic organisms (parasites, bacteria, viruses) but also toxic substances. The mechanical energy produced by the turbine in which the steam passes under pressure makes it possible to produce electricity. The expanded vapor can be condensed to produce potable water.

Underlying scientific principles: Thermodynamics optimize the cycle of state change to reduce energy expenditure (use of latent heat of vaporization). The persistent substances initially present in the water are either destroyed by prolonged exposure to temperatures well above 200 °C or precipitated to have reached the solubility product due to the evaporation of the water.



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87, rue du Président Salvador Allende – 92700 Colombes FRANCE – Email: info@bio-s-team.com SIRET: 820 809 705 00016 RCS Nanterre

b) Production of natural fertilizers

In environments not contaminated by persistent substances, the natural precipitation of substances dissolved in water allows the production of natural fertilizers.

4) Communication between devices and the development of smartgrids

Pooling the means of producing drinking water and electricity requires the establishment of communication between the appliances. The networked micro-power stations work a little on the decentralized Internet model. Thanks to the smart grid and new communication protocols, the power grid itself can be used via line carrier currents (PLCs) to circulate information in high speed and bidirectionally in low and medium voltage

Underlying technical principle: G3-PLC technology provides the speed, robustness and range required by large-scale carrier networks. G3-PLC employs advanced broadband communication techniques to achieve 300 Kbps through the noisy environment of power lines. The sharing and interdependence of micro-power plants will create new opportunities for economic development, less based on competition and more cooperation.

Conclusions:

There is currently sufficient knowledge to develop this breakthrough technology allowing to:

- A) Reduce the use of fossil fuels, thus pollution, and the production of greenhouse gases.
- B) Produce electricity in an appropriate manner and to get rid of persistent substances at a lower cost in order to improve our health.
- C) To store energy and drinking water in an appropriate manner.

Your contribution to the Indiegogo fundraising campaign is important because it allows you to measure public involvement and your personal interest in implementing this solution for the future. A goal to achieve exists but you can contribute to the height of your means. Whatever the sum, your participation is important because it validates the existence of a market therefore the interest to develop this technology. From a certain amount of contribution, you can claim the counterparties presented on the site.