

Emerging Markets Queries in Finance and Business

Technical Means of Preservation of Renewable Human Energy's

Emilian M. Dobrescu^a, Edith Mihaela Dobre^b, Gavrilă-Păven Ionela^{c,*}

^aRomanian Academy, Department of Economics, Law and Sociology of the Romanian Academy, Calea Victoriei Street no 125, Bucharest, Romania

^bRomanian Academy, National Economic Research Institute of the Romanian Academy, 13 September Street no.13, Bucharest, Romania
^c"1 Decembrie 1918" University of Alba Iulia, N. Iorga Street, No. 11-13, Alba Iulia, Romania

Abstract

Along its millenary history, man imagined, built and implemented a set of technical means whose operating principle is based on human renewable energy's, storing this energy, given average power renewable source of man. These technical means can have miraculous effects related to human renewable energy storage. A medium force and renewable energy lifetime of the person concerned, that can be quantified as the average power sources of human-specific human and can be taken into account when making studies and research on human. Renewable energy characterizes the medium human renewable energy's and average power renewable sources of man. After solar power, emanating from our planet with water geysers and thermal energy from biomass that after, the vital energy of man can be considered a strong form of renewable for on our planet, still insufficiently known, quantified and evaluated. The study has several models to showcase, respectively, to preserve renewable human energy's sources.

© 2012 The Authors. Published by Elsevier Ltd. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Selection and peer review under responsibility of Emerging Markets Queries in Finance and Business local organization.

Keywords: renewable human energy's, storing the energy, average power renewable source of man, energy of arm, energy of legs, medium man and his renewable energy.

* Corresponding author. Tel.: +4-0745-927-639; fax: +4-0258-806-329.
E-mail address: ionelapaven@yahoo.com.

1. Introduction and a brief history

In ancient Greek myth was the real architect and sculptor Daedalus, who built legendary wings to fly his son Icarus, who is the first human known as renewable energy use of his arms, imitating the flight of birds. The two together have built the labyrinth of Crete, the Cretan king, Minos imprisoned the Minotaur. Suspected to have contributed to the escape of Theseus, who came to kill the Minotaur, after work, were imprisoned in the labyrinth of Minos. To escape, have built wings of feathers and wax and flew from maze. Fascinated by the beauty of heights, Icarus was too close to the Sun, despite his father's advice. Jealous people fly, Helios melted with heat to wax wings, and Icarus fell into the Aegean Sea, near the island, hitting the rocks and died. Since that part of the sea and the island named after him. Of the Italian Renaissance, Leonardo da Vinci is probably the most studied scholar of all time. Its concerns not only excels in painting (where he made masterpieces like Mona Lisa and Last Supper), but also in engineering, flight and water, music, theater of military equipment, of anatomy and botany, which have attracted the attention of scientists and enthusiasts of all disciplines. First bike, first tank, the first helicopter, a total of 30 machines were made today based on sketches by Leonardo da Vinci, who thought so in the first half of the sixteenth century how to use renewable energy for propulsion of all human these devices. Modern aviation is based therefore all attempts, should not forget that the Wright brothers are considered pioneers of flight with a heavier than air, which originally was powered, renewable energy still human.

2. Renewable human energy

Renewable human energy's is energy that human recovers in the body due to the specific workings of the human body and brain and that man consciously incorporates, but mainly semi and unconscious to meet all their needs.

Renewable human power is each specific power of man, that regenerates his energy through human sources. Sum of the energies of a number N people, N is reported to average power sources of man.

Renewable energy's human is made up primarily of power arms, legs energy, specific energy of each human internal organ, including the brain - the highest example of human organization of matter and energy sources.

Medium man and his renewable energy made the subject of our first study.

3. Renewable human energy can be stocked

After solar power, emanating from our planet with water geysers and thermal energy from biomass that after, the *vital energy* of man can be considered a strong form of renewable energy on our planet, still insufficiently known, quantified and evaluated. Gives vital life *force energy* of a man, that that amount of features specific man who made it to occupy its place, well established in society. Imagine that this vital energy would be measured, quantified and used, aware of every citizen of the planet - and there are over 7 billion people on this Earth. What value would result in huge ... May imagine that the complex process of rest and sleep every day, every man shall restore the life force, continually, better or less well, throughout his life. However, this fact is of great value to the economy, where every citizen has an intake, especially during its active life (usually between 25-65 years, after school and before leaving the employment, retirement). Emerging economies - Brazil, Russia, India and especially China have managed to beat the different chapters, the economies of developed countries of the world, like USA, Japan and Germany, first by adding force their citizens first and last state emerging quote is actually the most populous on the planet. There is, as our knowledge of an index or other economic means of quantifying the influence of education on vital force of a man. We can consider that every day, through specific recovery processes, rebuild their man, the physiological needs and the vital force of needs. Like the Sun, like Earth's internal forces (evidenced by its thermal energy), energy from the combustion of plants, plant or animal waste, human vital energy force are unsuspected by their physical, mental, creative or subliminal, they contain. Except for man's physical strength,

social and human sciences today take little account of studying these types of psychological forces, parapsychology, social, subliminal, that people have, each in a specific form and feature, unique to each individual and period of life of the individual forces strongly conditioned by education, tradition, culture, religion etc. All these forces are actually generating the respective forces of similar energy, renewable energy daily during the life of a man.

For electronic systems to store energy, says Dr. Loreto Mateu M. Saez is required near the source location (a source of ambient radiation, a vibrating source, a solar energy source, etc.). Tools available to supply electricity generated from the conversion of the human can be mobile or portable computer (laptop). The human body can be considered in this case as an energy storage, renewable obvious.

There are two ways of converting human energy into electricity: power can be gained from the daily actions of the user or can be created intentionally by the user. Arjen J. Jansen uses the term "human power" as shorthand for "human energy system that supplies various consumer products". Various researches have been made to highlight the different ways to provide electricity resulting from the conversion of human energy: a) the force exerted by body parts in the regular work; b) temperature variation of the human body; c) the resulting energy various chemical reactions of the human body. For example, the main objective of the research group Energy System Staff (PES) from Delft University of Technology (Netherlands) was the conversion of muscle power exercised by people at work in electricity. Researchers have observed that the PES group activity exerted by human muscle power becomes active instead of passive power in most of the investigations.

Starner has also the power of man as a possible power source for portable computers. He examines the production of energy from respiration, body heat, blood transport, arm movement, typing or walking. The option to harvest energy resulting from daily human activity involves the development of techniques and discrete devices, depending on the type of human energy to be converted. Here are some examples of such techniques and devices.

4. Preservation models of renewable human energy's

In his dissertation, "Storing energy from human power passive", presented in January 2004, under the direction of Francesco Moll Echeto, Loreto Mateu Saez makes a review of renewable energy conservation patterns that allow the human being, models used, depending on the technological power and the ability of human knowledge that age, from antiquity to the present. Here are some contemporary designs that allow the use, storage, renewable energy storage and conservation of man:

4.1. Energy obtained by cycling

Bicycles - to name the most popular technical means of human travel - was invented in the nineteenth century in Europe. The world population currently exists, especially in China, the world's most populous country, about one billion bicycles, which provides in many regions of these countries, sometimes in the heart of heavily populated cities, the main means of transport. The bike is also a very popular way of leisure, being adapted for use in many other areas of human activity, such as that of toys for children, fitness, military applications, courier services, and sports called cycling.

Today, cycling is becoming increasingly used as a means of transport and, therefore becomes a means of protecting the environment, the lack of any polluting effects on it.

Form and basic configuration of the frame, wheels, pedals, seat and handlebars have suffered only minor changes in 1885, when it was built the first model of bicycle chain. Since then, many important details of construction of a bicycle was improved, particularly with the advent of modern materials and manufacturing computer-aided design. They have allowed the spread of special models for those who practice a particular type of cycling. Bike considerably influenced history, both cultural and in industry.

In the early years, bicycle construction drew on existing technologies, but lately bike to turn helped to develop the technologies, both old fields and in new ones. For example, there were various studies and research to reveal how it can be converted into electrical energy manpower, submitted for our ride just by pedaling.

Thus, by pedaling a bicycle, in a village in Laos, lack of energy, there was electricity running a personal computer. A Linux PC also send signals via a wireless connection to a relay station powered by solar energy. Power PC is via a car battery charged by a person riding a bicycle fixed, 1 minute of pedaling power generated to operate about 5 minutes of your PC.

For about three decades, the company Windstream Power Systems Incorporated has designed and manufactured independent power systems, renewable energy using human! Windstream offers over 30 years so-called "human power generation." For example, human power generator, MKII can be cycled or turned by hand resulting in a current of about 125 watts to rot in cycling and 50 watts, enough to power neon lights more today, economic, if current product by turning by hand. It was created and a special bicycle, Bike Power, which is equipped with a generator, wheel bearings and friction, all mounted on a steel base, in order to generate an output of 100-300 watts.

The company produced the devices named Nissho Aladdin power (Aladdin's power) or Stepcharger (Charger feet), which are powered by simple movements of the legs while walking a man, devices that can generate power up to 6 watts. Freeplay company developed also a similar product called Freecharge Portable Power Marine, who can work with solar and wind.

Fitness clubs are already imagined, machines that convert mechanical energy into electrical energy handled by people and which people could recharge while portable devices are moving. Was measured as 10 minutes of pedaling on a bicycle could generate 2 watts and could reload, therefore, a mobile phone.

A special idea is charging a mobile phone via a device fitted to a bicycle, where with a click, the energy generated by the dynamo bicycle can charge the mobile phone of the cyclist. These bikes, equipped with dynamo used to charge a mobile phone are already commonplace.

4.2. Power stored in walking

Walking is considered one of ordinary human activities, which are associated with more energy. Piezoelectric materials, dielectric elastomers and rotation generators have been used to store energy resulting from walking by the MIT Media Laboratory.

Piezoelectric effect was discovered by Jacques and Pierre Curie in 1880. Curie brothers discovered that certain materials subjected to mechanical forces, undergoes electric polarization, proportional to the force applied. Curie brothers have also found that these materials when exposed to an electric field undergo a mechanical deformation. This effect is known as inverse piezoelectric effect.

Experts have already examined the electronic circuits to convert the electricity to the piezoelectric element in a stable output voltage. The first consists of a bridge circuit composed of diodes connected to the piezoelectric element to rectify the output voltage. Load is transferred to a tank capacitor charging once the voltage exceeds a certain value. At the time of the reservoir capacitor is connected to a linear regulator that provides a stable output voltage. The second circuit replaces the high-frequency switching regulator line to a point on another controller, in order to improve device efficiency. Piezoelectric energy source human walking has resulted in low frequency (approximately one cycle per second), high voltage (hundreds of volts produced), low current (in the order of 7-10 amps) and low-current pulse duty cycle.

Piezoelectric inserts have been imagined in ordinary shoes, which contain a power conditioning system from walking with these shoes. Controlling and regulating circuit is not activated until the tank capacitor voltage does not exceed a certain amount of tension. There is a power circuit in order to gather input voltage - a voltage sufficient to activate the circuit switches. Once the control circuit is activated, a switch working fine detector is detected input voltage when the input signal reaches the maximum voltage and switch off when a low voltage change. Electric converter efficiency is about 18%, and the system is able to continuously supply electricity while walking occurs the person concerned. English researcher, Trevor Baylis already upgrade the electric shoe

capable of charging batteries of mobile phones to operate an MP3 or any portable device power supply stored in energy than walking. The prototype is described as a pair of desert boots, fitted with two small solar panels located in the toes, the sun still falling while walking during the day. A "sock" piezoelectric crystal is placed in the heel boots. Since January 2000, Trevor Baylis Americans John Barry James Monteith and filed a patent for their idea of recognition of electric shoe. Then, they founded the Electric Shoe Company (ESC), in partnership with Texon, producing annually more than 11 billion parts and accessories for footwear.

Two electric prototypes Baylis shoes were tested in an experiment conducted in Namibia in 2000. One of the prototypes was a pair of boots supplied piezoelectric. After several hours of walking boots are partially charged battery of a piezoelectric cell phone and he could have made phone calls with this energy. ESC is now working to create an electricity generator mounted in a shoe, but John Trevor Baylis is confident that the piezoelectric solution is best for lower costs and higher profitability. Currently, ESC is developing a new piezoelectric substance, in order to improve the piezoelectric material that generates very high voltages and currents of low intensity.

4.3. Energy resulting from the power of arm movement

From 1990 to present, the number of devices that use human energy resulting from arm movement is growing. Swiss watches, Maestro brand is a valid example in this respect. In 1992, Japanese company Seiko Kinetic product has launched, a wrist watch powered by a micro generator that converts the movement mechanism inside the clock electricity stored in a capacitor, while the hour hand that is worn by the user. As mentioned, the idea was not new, but improved technology Seiko.

Average output power generated when the watch is worn on hand is 5 microwatts. After Seiko, Swatch Group launched another watch that is Self-energy mechanical force resulting from the processing of the human arm, the clock ETA Autoquartz Self.

Trevor Baylis, inventor of the English that I mentioned above, has prepared a Freeplay radio BayGen cheap that works with the energy obtained by turning a crank. BayGen Freeplay requires only a few calories mechanical human consumption to operate. If the user rotates the crank for 30 seconds, the energy store 30 minutes to listen to the radio. Free play radio continued to grow by adding a capacitor and then, of some tiny rechargeable batteries from solar panels.

Another portable radio, powered by alternative energy system is Dynamo & Solar radio (D & S), produced in China. It can be powered by batteries charged from a micro-solar panel or a dynamo hand loaded. Turning the handle to a moderate speed to produce a current of 25 mill amperes intensity and time of 11 hours can fully charge the battery device, while micro-solar panel can charge 0-5 mill amperes battery with a cloudy day or a maximum of 48 milliamps on a sunny day.

Freeplay, the company that created the radio BayGen, created and marketed, and other devices powered by the human arm movement: the new Freeplay radios with rechargeable batteries from solar panels. Freeplay has also produced three different models of radios Ashlight, arm movement that transforms energy into electrical energy via a rotation mechanism. 30 seconds of rotation of the hand produces an 8-minute radio operation Ashlights. A mobile phone charger that uses the energy of regular human arm is also available to consumers, it allows mobile phone users to make emergency calls and by using spinning mechanism that provides energy to produce 2-3 minutes of talk and several hours of "heightened energy independence" for each 45 seconds of spinning. All these products are composed of an alternator and a crank type high capacity rechargeable battery. Alternator efficiency is very high - about 75%.

Another company that offers products that are supplied with the power of human energy is Atkin Design and Development (AD & D). Their prototype is a Sony radio, which provides 1.5 hours of listening as a result of stored energy by spinning for 60 seconds. Another prototype of the company is a Motorola phone charger, which provides for 2 hours of "energy independence" and 10 minutes of talk time, obtained by turning the device for 60 seconds. AD & D work lamp provides 15 minutes of light spins following a mechanical device for 60 seconds, which can be used as fitting the radio and phone charger.

Nissho Allandinpower hand is a device that works on a mechanism by turning a crank power. It produces 1.6 watts of power when the handle is turned 90 times per minute. The device is able to provide energy for general applications such as a phone or lighting a lamp, 1 minute drive of the device gives a minute, when a phone is a device powered by spin.

4.4. Energy resulting from pressing the power key

J.M. Paradiso and his team presented a piezoelectric button that can transmit wireless digital identification code, using mechanical energy given by pressing a button, without the need for batteries. The generated code is broadcast through a transmitter. The transmitter converts mechanical energy action to send a signal to the receiver. MIT Media Laboratory has developed a piezoelectric generator with a yield of 7%. Mechanical energy conversion into electricity is through a device called piezoelectric skylight, which was developed by NASA and cosmonauts on the International Space Station. Thus, the energy generated by typing on a laptop is not enough to continuously power a laptop, but can be used to recharge its secondary. A device with such properties has been patented by U.S. company Compaq in 1999, the device was invented by Adrian Crisan, an engineer by Romanian origin from Compaq, which reduces the size batteries, making them last longer. Compaq has not yet commercial laptop to use this device. The resulting mechanical energy recovery system consists of pressing each key attached magnet and coil around each magnet, each keystroke is triggering the recovery of energy, moving the magnet coil and causes a current that is stored in a pump the accumulated tension and thus provides energy to recharge the battery.

5. Results and conclusions

Renewable human energy's, storing the energy, average power renewable source of man, energy of arm, energy of legs, medium man and his renewable energy are important issues whose uses have been imagined in all ages present human civilization on Earth.

The presented devices are - most of them - in commercial use, confirm the numerous scientific and practical concerns of human renewable energy recovery.

We deem it necessary to increase these concerns - and practical study - quantification, registration and storage of renewable human energy, an amount of potential forces, still insufficiently known and used, encompassing renewable energy of each of the people living on the planet Terra.

We appreciate also that in Romania, Romanian Academy research institutes and research institutes of the Ministry of Research and Development can and should do more in renewable energy recovery human and applied field known enough of our country.

References

- Dobrescu, M., Emilian, Dobre, M. Edith and Paven Gavrilă, Ionela *Medium man and his regenerate energy*, EUBSR 2012, International Conference, 3-5 may 2012
- Drake, J., *The greatest shoe on Earth*, in Wired, Issue 9.02, February 2001;
- Kuipers, R. J., *Engineering a human powered mp3 player*, Graduation report, Delft University of Technology, Delft, 2003
- T. Kazazian and AJ Jansen, Eco-design and human-powered products, in Proceedings of the Electronics Goes Green 2004, 6-10 September 2004.
- Paradiso, J. și Feldmeier, M., *A compact, wireless, self-powered pushbutton controller*, in Proceedings of Ubicomp 2001: Ubiquitous computing, September 2001
- Saez, Loreto Mateu, *Energy Harvesting from Passive Human Power*, PhD Thesis Project Electronic Engineering, Thesis Advisor: Francesco Moll Echeto, January 2004;
- Stamer, T. și Paradiso, J. *Human generated power for mobile electronics*, in Low-Power Electronics, CRC Press, chapter 45.
- *** Windstream Power Systems Inc., [Http://www.windstreampower.com](http://www.windstreampower.com) website, visited on June 17, 2011, at 8.23.
- *** Atkin Design and Development Ltd., on the web-site <http://www.windup-powerup.co.uk>, visit on 17 June 2011, time 8.56