

## The self-energy from function of equipment and engineering machines, ideology for sustainable energy

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### **Abstract:**

This research aims to develop a new ideology in the design of industrial design products (Apparatus and Equipment ) in homes to take advantage of the functional energies them during their functional performance, as an energy source in itself requires utilized in power generation, where instead of being the energy consumer products only ; but to be generating power at the same time during their functional performance, and storage this energy in a general battery in house for use again in the run of these products, which leads to achieve energy self-sufficiency at home, and independence from traditional energy sources, which, we call it "self-energy".

When the man began to invent machines and tools previously relied on the abilities of muscle in the energy required to provide for the operation of these machines, and the emergence of energy sources, especially the coal in industrial revolution became energy sources provide the human hardships of muscle working, and provide sources of energy power much higher than the power of man; which added a major new trends in product design and production of machinery and industrially.

Hence the ideological machine design is based on providing a source of energy for the running of these products to perform their functions, and the evolution of search for energy sources from coal to diesel fuel to gasoline, and in each transition from one species to another stage was the development of the product follower of the capabilities which provided by these sources of energy and conditions technology to activate it, and when the man was found environmental and economic problems of the exhaustion energies; he went to search for clean energy sources and renewable by same ideology and it provide energy alternatives that feed the product to perform its functions, and therefore it requires the construction of new power stations generate energy and you transmit via the power feed cables to homes and factories to running the machinery , equipment and machines in order to their part, rather than exploit the mechanical movement of these products to generate energy.

**Keywords:** Renewable energy; Self energy; Sustainable development

This article on the subject of a PhD thesis for the author of the department of Industrial design Faculty of Applied Arts, Helwan University, 2015, this research aims to develop a new ideology in the design of industrial design products (Apparatus and engineering equipment's ) in homes to benefit of the functional energies them during their functional performance, as an energy source in itself requires utilized in power generation, where instead of being the energy consumer products only ; but to be generating power at the same time during their functional performance, and storage this energy in a general battery in house for use again in

the run of these products, which leads to achieve energy self-sufficiency at home, and independence from traditional energy sources, which, we call it "**self-energy**".

**Introduction:** When the man began to invent machines and tools previously relied on the abilities of muscle in the energy required to provide for the operation of these machines, and the emergence of energy sources, especially the coal in industrial revolution became energy sources provide the human hardships of muscle working, and provide sources of energy power much higher than the power of man; which added a major new trends in product design and production of machinery and industrially.

Hence the ideological machine design is based on providing a source of energy for the running of these products to perform their functions, and the evolution of search for energy sources from coal to diesel fuel to gasoline, and in each transition from one species to another stage was the development of the product follower of the capabilities which provided by these sources of energy and conditions technology to activate it, and when the man was found environmental and economic problems of the exhaustion energies; he went to search for clean energy sources and renewable by same ideology and it provide energy alternatives that feed the product to perform its functions, and therefore it requires the construction of new power stations generate energy and you transmit via the power feed cables to homes and factories to running the machinery , equipment and machines in order to their part, rather than exploit the mechanical movement of these products to generate energy.

In addition to the development of energy sources was thought parallel, a development of industrial design products by multiple functions of the one product by growing steadily, where there are new functions or multiple functions per product; adds value to the design, and achievement more luxury for users, and on those logistics subjected to capitalism, which leads the industry around the world to achieve the greatest percentages in economic profits from consumers blockbuster to buy advanced products always, and consequently, and gradually became a human is stranger in the environment in which they lived that as a result of evolution which appearance continuous on those products, where advanced technology added to these products make the man in the inability to be knowledgeable about technical capabilities; and sometimes by harnessing for his service due to lack of knowledge of their potential functional to meet all their needs.

This technological development in the design of industrial design products (Apparatus and Equipment ) private domestic ones, which became redundant in this day and age has become ravenous for energy, since the development of these products is very fast; but that the search about sources of energy and development needs to be long periods of time is almost no less than tens of years, really energy problem that needs a new vision to keep pace with future circumstances, where instead of feeding these products by power source; it is possible that these products are a source of energy in itself through its function, and thus the ideology of self-energy in we raised this meet future sustainability requirements.

**Guide Words of the Research:** Renewable energies – Sustainable energies – Self energies – Traditional energies – Functional energies – Energy tree.

### **Problem of the Research:**

1- Environmental pollution resulting from the use of traditional energies led to the damage occurred in all living organisms and human health in particular, and also traditional energies expensive on the budgets of states; and the per capita income of the consumer; it also will be reduced to depletion, so the traditional energies problem to haunt governments of the world, and make research on other sources of energy research path inevitable.

2- The economic requirements to activate the natural renewable and clean energy systems; make application secondary beside the traditional energy systems, which makes the application of renewable energy stations of the most important economic problems in this day and age, and this in itself needs a lot of research efforts and time to improve its performance, this despite the emergence of some actual applications and successful to it.

3- The presence of too many energies around us; but dispersed, wasted and unused; because searchers in energy research since the industrial revolution relied on traditional energy sources; believing that they do not depletion; even moved research into renewable energy sources, where the vision of energy-saving for consuming constructions rely on power generation and transmission to factories which consume energy through on the functional of their products, were not considered to be more functions and continuing for these constructions; including carrying of industrial products represented in apparatus and equipment may be a source of energy in itself.

**Objective of the Research:** Researcher aims to take advantage of the functional energies of the engineering products (apparatus and equipment), making it a source for power generation can benefit from it.

**Importance of the Research:** Establishment a new ideology for the design of industrial design products, where functional performance of industrial design product, which dominated his function mechanical trait, thermal trait, electrical or acoustic source to generate power in itself, where the resulting energy is stored in the storage unit, and the use in running some products to function performance once again; making industrial design products generating energy products:

1- Added value of industrial design products, where instead of being a consumer of energy and leading functions only; but to be a contribution in the generation of clean energy by exploiting the functional energy, or become energy generation, and this leads to the appearance of the turn of another design industrial product energy-saving and environmentally friendly in the same time.

2- Achieve provided the energy for these products which need to perform their functions; rather than relying on traditional energy, where they are relying on direct electrical current (DC) emerging from the function of these products, which is stored in batteries, instead of the alternative electrical current (AC) contained to us in homes especially from power stations.

- 3- Reduce dependence on traditional energy, leading to the providing in economic at the budgets of the countries, especially in third world countries, and also bring economic value to energy consumers in the homes.
- 4- If the new ideology are taking advantage of the functions of industrial design products that are a source of energy in itself, it well transformed the factories with mechanical kinetic energy in work shifts through the production machines to stations to generate clean energy; by benefit from the mechanical energy into generation energy; that It is transferred to the residential areas to contribute in the provision of a surplus of energy to meet the increased needs in consumption.
- 5- Dispensed with the establishment of nuclear power plants, where the simple error in control technique lead to an environmental disaster in the long term.
- 6- Appearance of these research ideas that support the areas of clean energy to provide the energy necessary for human needs; It represents a substitute for seeking sources of fresh water states policies to create a dam to block water from downstream countries to generate electricity, causing disputes over water between the third world countries present and the future.
- 7- Open new horizons in strategy of the industrial design products by rely on new ideology put forward in this search, which describes mixing the function by energy generation.

### **The Research Substance:**

Starting from the design of industrial design products (apparatus and equipment), which evolve with technological development permanently, and which need to energy feeding by continuously, this push us to take advantage from functions of apparatus and equipment in energy generation, where these products are a source of energy generation to themselves during the performance of their functions, and that by the new ideology in the design of apparatus, equipment and machines, where the product consume the energy needed to run from fed her the power source (battery) to perform its function and generate energy that the same time to be stored in the storage unit (battery) to used it again to contribute to the running of the same product or other products which achieves independence for the products of home energy from energy.

We find that houses the largest consumer of energy about factories, stores or other building, so what the products meet the needs of the residents of these homes, so we direct ideological advantage from the machinery and equipment in homes in energy generation in order to make the home self-energy in the framework of sustainable design that we seek to resolve in energy problems of this era.

It was the ideology of power since the industrial revolution by appearance of coal so far; and relying on renewable energies is a plants generate energy and transferred power through the cables and wires to feed the machinery and equipment, but about the ideology, which put them in this paper is a direct benefit from the function of products during the running; and for example wash machine in home ware add electric generator converts the mechanical motion into electrical energy during running for the energy is stored in the storage unit (battery) ; this is to take advantage of this energy in the running of any of the products that the source of

functioning relies on power supply DC, and this makes us dispense gradually the source of power supply AC contained to the houses from power plants which work by traditional sources (coal - diesel fuel - diesel fuel), and that the use of energy solar and wind power from higher home with the functional energy resulting from apparatus and household equipment achieves independence home from energy about traditional energy source.

Before clarify the ideological advantage of the functional energy resulting from apparatus and equipment in home details; in the first we must clarify these types of energies which produce from house products; it is as follows: **Mechanical energy - Thermal energy - Electromagnetic energy - Acoustic energy.**

### **1- Mechanical energy :**

Designers depends on the apparatus and equipment designs which require mechanical movement to take into consideration to be the driving power required for this function is much higher than necessary power to function performance; until the machine lead to its function and otherwise the machine stop! Therefore, the excess power for running the machine consume more energy, and the driving power achieve to the driving rotational motion, which is produce the functional role for machine; like running sewing machine , mixer , wash machine , vacuum cleaner or fans ..... etc.

Because the mechanical movement is the most common types of energies resulting from such products consequently the most type due exploitation for use in storing energy in storage unit (battery), it converts the mechanical motion into electrical energy through on use of energy generation (Dynamo) in the machine design with the electric motor; it also will be explained later.

### **2- Thermal energy :**

Thermal energy produced from apparatus with electro-thermal or gas-thermal, such as cooking stove or oven electric or microwave, and this thermal energy and use it to cook can be used also during the cooking process in heat water and turn it into steam, which can be passed to the turbine that converts rotational motion into electrical stored in the energy storage unit to take advantage of them after that in running of other products.

### **3- Electromagnetic energy:**

Electromagnetic energy produced from the entry into force of electrical current in the electric wires; according to the base "Fleming right hand", and that kind of energy as much as his a small value as far as what can be exploited, with the knowledge that its value much at other times near transformers and wires pressure electrolysis high a current AC electric, and electric converter which converts alternating electrical current ( AC ) into direct electric current ( DC ) is the way to take advantage of the electrical current passing through the wire, where the addition of this small adapter on certain distances to the advantage of the magnetic field by generate a direct electrical current contributes to the battery charge. And Figure 1 shows the format converter.

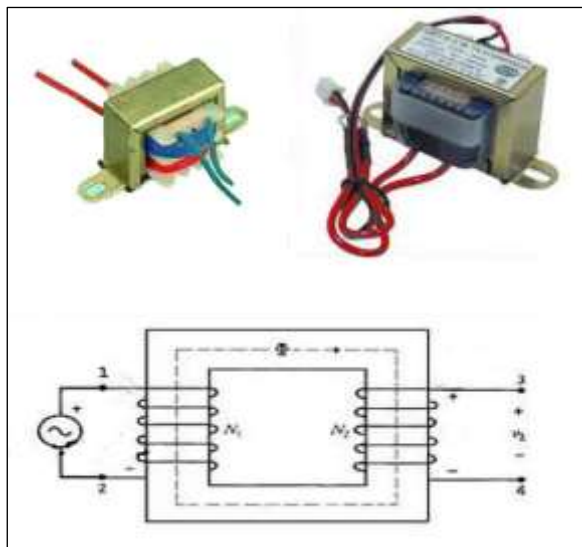


Fig (1) explains the details of the AC into to DC

#### 4- Acoustic energy:

Acoustic energy produced from the functions of industrial design products from which a high volume during a performance career, such as a vacuum cleaner or a food mixer, with the knowledge that innovations trying development these products, where does not occur elevated voices causing noise for man in the house, but the real benefit of this energy is to turn the vote resulting from these products into electrical energy contributes to the increase of energy stocks in the energy storage ( Battery )unit at home.

How is sound energy converted into electrical current in household appliances or equipment? By putt the microphone switches the sound frequencies to electrical pulses that we connect to the energy storage unit. This method is analogous to what happens in the microwaves, where the sound frequencies are converted into electrical pulses that are transferred to the unit Called "amplifier", which amplifies the electric vibrations and transmits them to the speakers that transmit the sound to the listening rooms, but in our proposal we stop when the electrical oscillators are transferred to the battery.

One of the most important proposals for this kind of energy to make real use of it is to turn street and street noise into electrical energy that contributes to increasing the energy stored in the proposed battery in the light poles, where the energy stored in the volume with the poles of the light is charged with solar energy and wind power Also at the same time making the beam of the tree energy.

#### The ideology of utilizing the functional energy resulting from industrial design products:

The ideology of the utilization of functional energy resulting from industrial design products, the thesis of this paper, includes the future perception of the new design in the design of industrial design products (Apparatuses and engineering equipment). By clarifying the types of energy produced by household appliances, mechanical energy is the most energy Available in the equipment and equipment in the house, and we divide the existing products in the house as we propose the exploitation of the energies resulting from these products to the following:

- Energy consumed, such as (television, computer, satellite receiver, refrigerator, lighting units).
- Energy-saving and energy-generating products at the same time, such as (fan, food mixer, vacuum cleaner, washing machine, broom, sewing machine, egg racket, meat grinder, air conditioning fan).

The second type is the most types of products that achieve mechanical movement that can be used in generating energy. The stages of benefiting from these products are as follows:

The replacement of engines in equipment and equipment from AC motors to continuous electric motors for the operation of these products, and redesigned so that dynamo generators are combined with continuous electric motors; Engine and generator, and we call this new compact unit (**MG**) relative to the (**Motor - Generator**), Figure (2) shows the new unit, where the movement of the engine during the performance of the function of the product is transported directly to the generator at the same time, Electric power for the product to perform functions The generator converts mechanical movement into electrical power to charge the movement of energy storage unit (battery) at the time. Figure (3) shows how to install the MG unit with the inside of the washing machine, as the example.

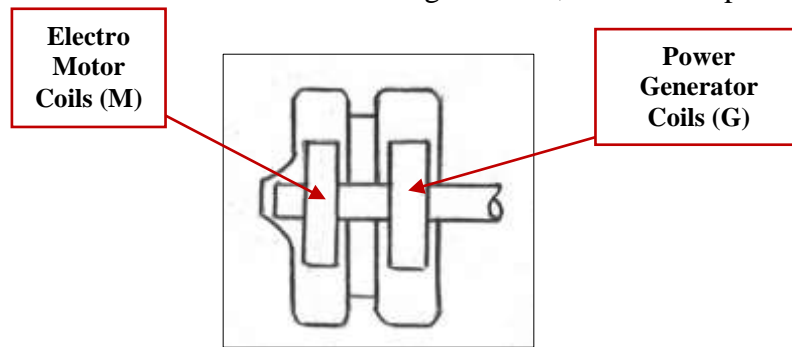


Fig (2) shows the unit (MG)

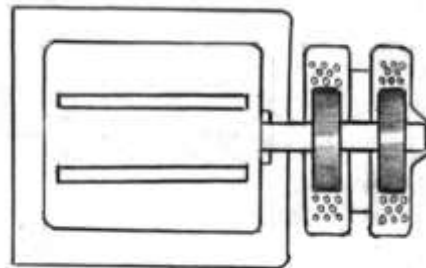


Fig (3) shows merge the MG unit with the inside part of the washing machine

To achieve the system of power generation and storage must be installed a general unit to store energy in the home with an adequate storage capacity of many products that draw energy from the battery to perform its functional role and the energy to the battery to be charged again, and the power wire in all products is four-pin rather than two-sided, as shown in figure 4, where two of them transfer the power from the public storage unit in the home to power the continuous battery-powered motor, and the other two are transferring the generator current to charge the battery at the same time.

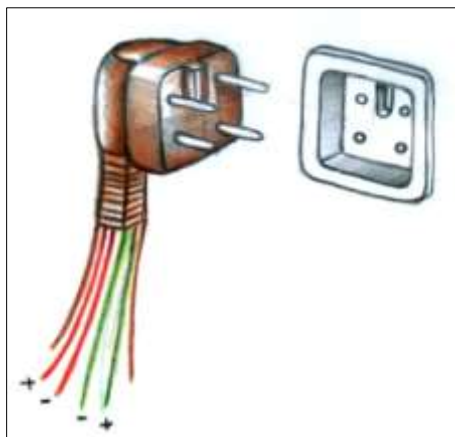


Fig (4) shows the four-pin in power supply

So when we use them to operate to meet our needs, we have consumed energy from the energy storage unit. At the same time, it generates power to charge the general battery in the home again, which does not mean that the energy consumed equals the energy (Figure 5) shows how energy is traded between the household energy unit and some home appliances. In this diagram, we observe that it is powered by solar and wind power, where these types of energy cannot be dispensed with in its positive in supporting the functional capacities of industrial design products by contributing to battery charging as well.

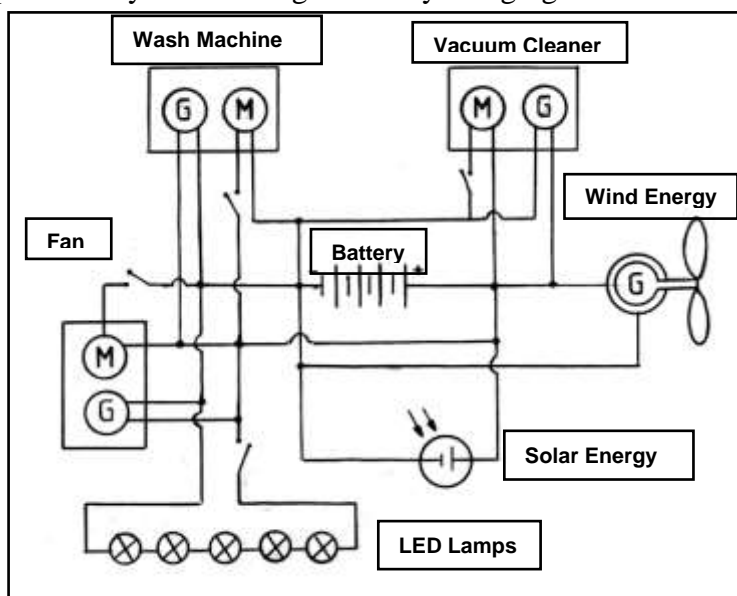


Fig (5) shows a plan for the distribution of energy between some products And the energy storage unit with the contribution of solar and wind energy

Due to our constant needs for industrial design products to meet our needs, it is under the name of sustainability, but our needs for the use of home appliances vary according to our needs to operate and benefit from them. Definition of self-energy is:

**The sustainable energy and renewable energy changing resulting from the functions of industrial design products whose functional performance results is mechanical energy, thermal energy, electromagnetic energy and acoustic energy.**



Thus, energy has passed through three stages through the stages of development of the energies that man sought until the idea of self-energy ideology was presented in this research:

- Exhaustive energy (traditional energy).
- Renewable energy.
- Self-energy.

In order to approximate the importance of the ideology presented in this research for power generation, we may turn to an approximation of the energy generated by the functions of industrial design products in the home. For example, the types of products are as shown in Table 1. These products have the electrical capacity and the number of laps per minute for their electric motors, and the rate of operation is dictated by the nature of their operation to meet our needs in the homes. (Kwh) per month as shown in Table (1) as follows:

Table (1) shows the energy consumption of the supposed products

The products	Power by watt	Operating rate per minute per month	Energy consumed per month in Kw.h
Mixer	600	24	0.24
fan	75	8400	10.5
The suction	50	240	0.2
Washing machine	700	1440	16.8
Vacuum cleaner	1000	180	3
<b>Total power consumed by AC power</b>			<b>30.74</b>

And the imposition of the use of a power generator integrated with the engines according to the concept presented in this research and generator with the following specifications: 150 RPM - current power 10 amp- 12 volts voltage, the following table (2) shows the same previous products with the approximation of the energy produced by those products with the same operating times.

Table (2) shows the approximation of the energy produced by the assumed products

The products	Operating rate per minute per month	R.P.M of product motor	Energy generator			Energy generated per month by Kw.h
			R.P.M of generator	The intensity of the output current	Volt	
Mixer	24	1000	1000	6.67	12	0.032
fan	8400	1350	1350	9	12	15.12
The suction	240	1500	1500	10	12	0.48
Washing machine	1440	1500	1500	10	12	2.88
Vacuum cleaner	180	2000	2000	13.33	12	0.48
<b>Total energy generated by the constant current</b>						<b>18.99</b>

In the previous table, the energy output is 18.99 kw.h per month, demonstrating that only the mechanical energy generated by these products gives us such energy; which contributes to the charge of the battery as previously described; These products used the energy stored in the storage unit to function, thus achieving independence for household energy products from traditional energy and gradually.

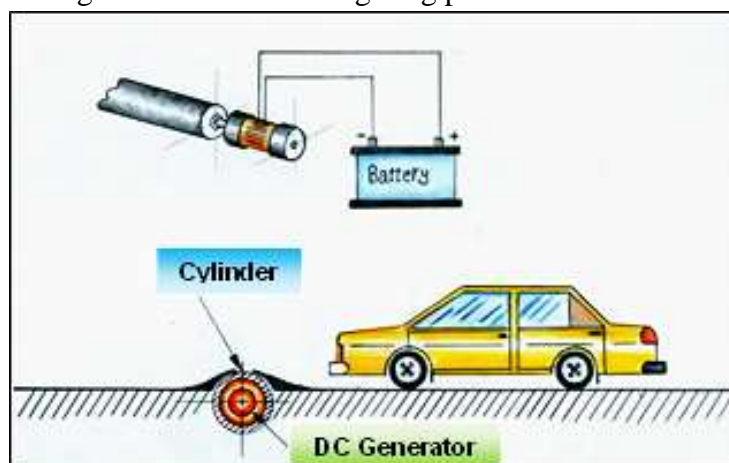
### **Innovative proposals within the framework of the ideology proposed to take advantage of the functional energies resulting from many directions, which produce mechanical energy:**

In the framework of the utilization of the functional capacities of industrial design products (appliances and engineering equipment's), especially the home to achieve independence of energy according to the claim of the research, and by meditating the functions of products that produce mechanical energy, whether inside the house or outside to take advantage of its capacity to generate energy was the emergence These inventions are of paramount importance before the introduction of the self-energy ideology that requires the development of the design of equipment and equipment from energy-consuming products to energy-consuming and energy-consuming products at the same time, and innovative proposals as follows:

#### **1- Benefit of cars moving on road in energy generation:**

Today, the traffic of cars has become a solid basis in our lives to move between different places. This has led to increases in car purchases every year. Roads and streets are not absorbing these increases in almost all the countries of the world, especially in Egypt. Cars are not compatible with the urban expansion in roads and streets to solve traffic problems. Moreover, the means of transport, whether they are based on diesel as a source of energy, such as private cars or even natural gas, are considered to be huge consumers of energy sources. And all of it on what Transportation causes the greatest percentage of pollution of the environment and the consequent risks, so this innovation puts the following scenario:

Road traffic is continuous day and night; even on public holidays, bumps are called "energy-based bumps or energy-friendly bumps." This is made of Cylinder with road width in the middle of the print as shown in Fig. (6). When the car passes through the mold, the rotary motion is transferred to the cylinder, which in turn transfers the motor to the gearbox to double the speed, from which the rapid rotary movement is transferred to the constant generator, which is stored in the battery and to benefit from this electrical energy Sold This is in the different needs, where replacement sodium-based sodium lamps need to be replaced by continuous light emitting diodes in the road lighting poles.



**Fig (6) shows how to benefit of road traffic in power generation**

This is a step in interaction with innovation, where the electric energy stored in the battery can be used to illuminate street lighting poles and remove its energy consumption from exhausted energy sources.

## 2- Benefit of train moving in energy generation:

Today, the subway has become a vital means of transportation in light of the transportation crises that plague the capitals of the world. Due to the semi-regular movement of the subway with long trams on railway tracks, it can be used to install continuous generators along the subway route from the first station to the last station. Up to it, where the number of symptoms on which the iron tape on which the subway is going to be the number of generators, a rectangle contact road with a roughness attached to the bottom of the metro transmits the horizontal mechanical movement of the metro to rotary wheels installed in generators as shown in Figure (7) where the electric energy is generated from the generators and transported to the electric batteries.

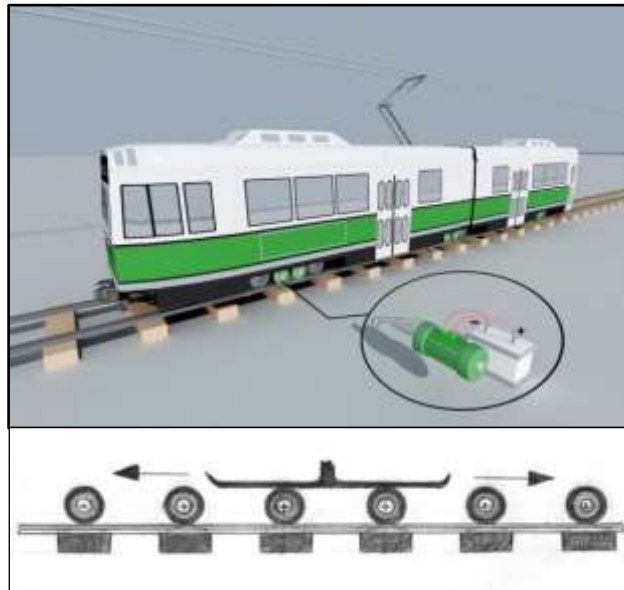


Fig (7) shows how to benefit of train moving in energy generation

And we can imagine the rates of the movement of the subway daily, which supports the positive idea of taking advantage of the movement throughout the day in power generation, and is using this energy in the lighting of underground stations and provide the consumption of traditional energy to illuminate those stations, as well as different ways to benefit of the surplus Of energy, for example, to benefit of the surplus of this energy in the provision of energy for the poles of the lighting located above the ground for streets, roads and bridges.

## 3- Benefit from bushing of water in piping in energy generation:

The state spends a lot of energy to pump drinking water into the main pipelines, from which the water moves to the subways, from the pipes to the water supply to the houses. On the other side, the houses have water pumps for the upper stages. The pumping of water is evident by the tap water drop. Therefore, the use of the mechanical movement of the water in the pipes by creating a unit is a feather fan that moves the horizontal mechanical movement of the water in the pipes to a rotational movement in a clockwise direction as shown in Fig. (8), (9) the motion is transferred to a double gearbox to transfer the appropriate speed to the generator. This energy is stored in the battery to be used for other consumption purposes.

In our homes, 5 people live continuously using water throughout the day, consuming drinking water, preparing food, ablution, bathing, washing and other need for water

consumption, thus saving energy is an effective incentive to utilize the water pump In pipes to achieve self-energy at home.



Fig (8) shows the unit installed on the water pipes with fan blades, gearbox and power generator

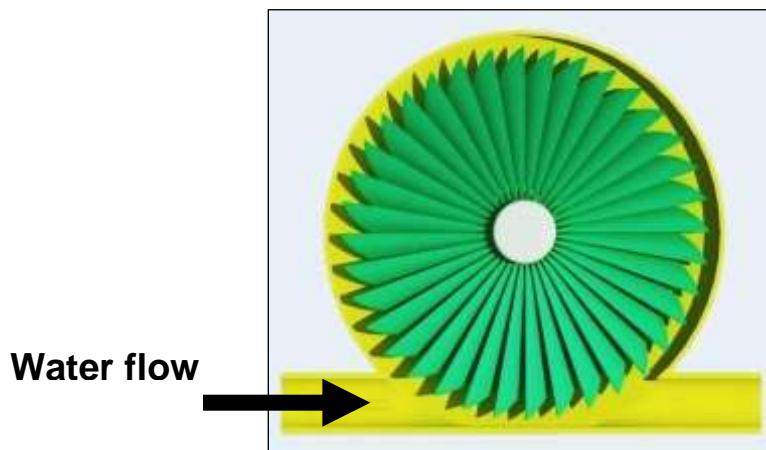


Fig (9) illustrates the blades of the propeller that convey the horizontal Flow of water to a rotational motion of the energy generator

#### 4- Revolving door to energy generator:

The muscle movement of man represents wasted energy and is always dispersed since the creation of man until our modern era, and the design of industrial design products for the purpose of comfort and well-being of man, but many of the energies of man wasted and not exploited, is the perception of the use of the revolving door that was designed on the old doors of hotels In the provision of energy, which is supposed to install this section at the entrances of colleges, universities, schools, government bodies and private bodies and the entrances of metro stations, railways and airports or all that is the movement of entry and exit of individuals ..... Etc.

The electric power generators are installed at the top of the door as shown in Fig. (10), (11) Upon entering and exiting the above mentioned places, the rotary mechanical movement moves from the revolving door to the power generators installed at the top, We can imagine that as part of the constant movement of individuals day and night, this will lead to the generation of electrical energy stored in the battery, which we use for lighting purposes of these facilities, as well as the surplus energy that can lead us to save energy for computers and

television in building or to the other according to the processing possibilities of these buildings and facilities of other requirements needed by the human.



Fig (10) shows how to use the revolving door in power generation

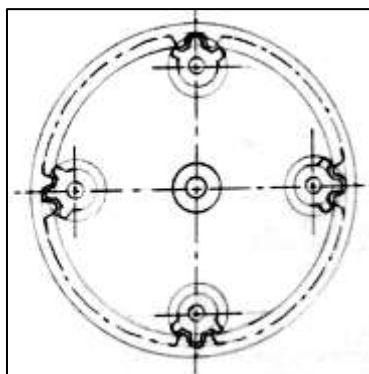


Fig (11) is the horizontal displacement of the rotary transmission  
From the rotor gear to the four power generators.

**5- Benefit of the mechanical movement of machines and production lines in the factories to convert the factory into a power station:**

Within the framework of the proposed ideology to utilize the functional capacities of industrial design products in the generation of energy and self-realization of energy, a strategy is presented to benefit from the mechanical functionalities resulting from the production equipment and production lines in the factories, where the electrical generators are installed to transform the mechanical movement of the factories, It is sometimes used in electrical energy, which is used in the lighting of factories or the transfer of this energy to be used in the lighting of streets and roads, or to transfer this energy to be used by houses to participate in the realization of the self In this context, the plants become power plants and not only the producers of the products, Figure (12) illustrates a fictional fee for a public authority for details of a production line with power generators installed.

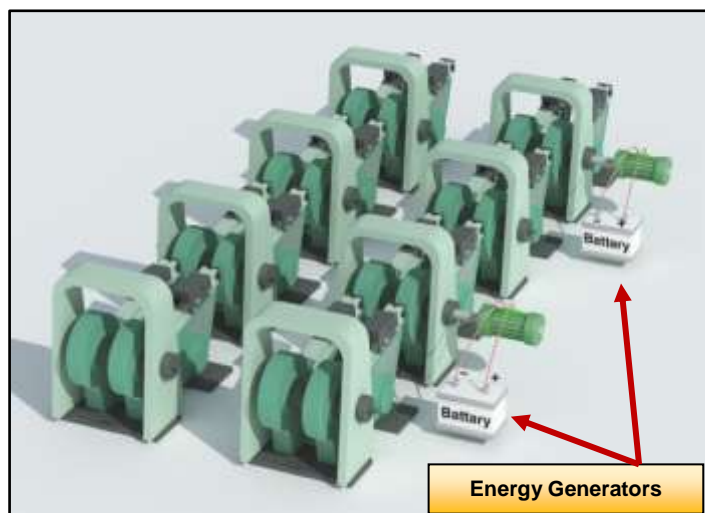


Fig (12) a sketch of the details of a production line with power generators installed

### Research results:

The emergence of the self-energy ideology, which makes the products energy-generating instead of being consumed only, which achieves the independence of the home from the energy of traditional energy, where the use of the functional energies resulting from industrial design products (machines, apparatus, engineering instrument ) in the generation of energy and converted into electrical energy is storage in the energy storage (battery) in the home, thus achieving the sustainability of the energy needed by the home, and the energies resulting from appliances and household equipment represented in the following: Mechanical energies - thermal energy - electromagnetic energy – energy.

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