Proposal:

Development and Implementation of the Tornado-like Wind Electro Generators

New approach to utilization of energy of wind

An Industry-Wide Proposal

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Chapter 1. A new strategy to the acquisition of wind energy

Disperse but dense distribution of WEGs

The most obvious advantages of disperse but dense distribution of small wind electro generators (DDD-approach) are the following:

• Permanent and constant development of Wind Electro Generators Industry (WEGI), which is aimed at utilization of natural reservoir of wind energy that is capable to fulfill entire existing need of electricity in USA (around 3,000 TW-h).

• Avoiding huge expenses for construction of special electricity transportation grids due to usage of existing grids for delivery of produced electricity to consumers.

• Avoiding huge expenses for construction of special gigantic hubs to support monstrous rotors.

• Smoothing out "pick-loads" and wind's "dead calm" periods.

• Obtaining required means and finances for development of WEGI, i.e. avoiding instant huge capital investments.

• Creation of a vast manufacturing property that will generate multi-billion values (electricity) during many decades at insignificant operational expenses.

The DDD-approach can be and should be developed in all three following directions:

- **Pole-based Project**
- **Residential Housing-based Project**
- **Commercial and State Building-based Project**

Chapter 2. The pole-based Project

The technical background

Our entire country is literally covered with web of hung-in-air electric and telecommunication grids. This net is supported by the many millions of poles. Each of them can be used to support also a small Wind Electro Generator (WEG), which would be generating electricity day and night…

Generated by such WEG, electric current can be immediately passed to the electric wires, which are supported by the very same poles!

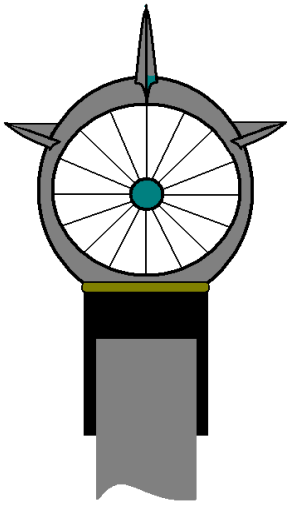
The pole-based Project naturally comprising several specific features, making it very preferable solution of the entire problem and those are the following:

- ***The produced electricity will be genuinely coincided with electricity transportation system and there will be no need for additional transportation lines to deliver produced electricity to the common electric net;***
- ***Small power of each WWG allows to use of Electronic (not Electro-mechanical) conductor to incorporate the produced variable frequency current from Wind Electro Generator in the general grid of the practically constant frequency current;***
- ***It would be much easier to vary the density of small Wind Electro Generators to satisfy the local needs for electricity all over the Country;***
- ***It would be much easier to vary the density of small Wind Electro Generator to gain the maximal effect of local specifics of wind distribution all over the Country;***
- ***It would be much easier to plan development of WEGI in accordance with any given region's capability and build WEGI without straitening region's finances and resources.***

Chapter 2. The pole-based Project

The technical background *(cont.)*

As already mentioned, ideal tornado-type wind power station, or TWEG (Tornado-type Wind Electro Generator), being placed into a current of wind with rated velocity v = 10m/s at rotary square S=1m^2 (i. e. with blades R = 0.56m long) provides electric capability of around 250W.



The schematics of appropriate wind power station that could be attached to a pole is developed by Qualitics, Inc. and is shown schematically in Figure on the left.

Built-in electric generator is connected with the local electric net, wires of which are supported by the same pole, so that produced electricity becomes immediately accommodated by and involved in common local electric grid.

Power station can be made of material like fiberplastic, designed to be assembled at attachment to the pole and will be easily replaceable. This type of device should not require any maintenance and should work non-stop for many years. If in mass production, self-cost of such device should not exceed self-cost of a cheap dishwasher machine.

Design of these TWEG-machines is done with accommodation of the genuine features of tornado exhausted tail of air that is passing through the rotary blade-wheel, so as the natural aero-dynamical nature of the external streamlining of apparatus. Exactly this approach has allowed designers to provide the following features of TWEG-machines:

- ***The very low aero-resistance to falling wind;***
- ***The direction of force of straight falling wind right down to the ground, not up or straightforward;***
- ***The direction of forces, which are caused by the side-blows of wind, right by vertical, not straightforward along the wind's blow;***
- ***The very low aerodynamic noise.***

Chapter 2. The pole-based Project

The technical background *(cont.)*

The features of TWEG provide additional stability to the pole that supports it, because TWEG minimizes the turning torque in respect to the base of the supporting pole.

"Though wires are often buried underground in new developments, there are approximately **150 million** wood poles in service throughout the United States with an additional 6 million new poles added annually. Approximately three percent of treated wood poles are retired from service each year" (North Pacific Group, 2005).

CONCLUSION:

If even only each third pole would carry TWEG, we would be able to have 50 million Wind Electro Generators with at least, 200W-power capacity each, or 10GW-power capacity combined.

It would be equal to 10 London Arrays!

If even we would attach the said WEGs only to ¾ of new poles that each year are replacing old ones, we will add more than 1GW.

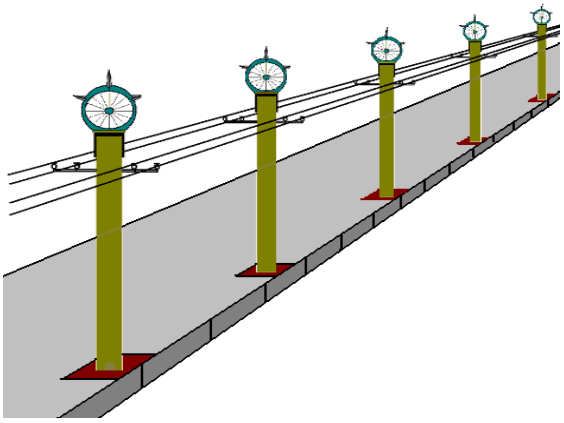
In other words, we will build 1 London Array per year!

Chapter 2. The pole-based Project

The economical background *(cont.)*

At current market price of $0.1 for 1kW-h of electricity, the pole-based WEG with only 200W capacity per pole will produce commodity of $175 per WEG annually.

If even the price of each WEG attached to a pole will be $1,250.00, this WEG will pay-off within 8 years. It makes Pole-based WEG Industry more profitable than even Home Mortgage Industry!



CONCLUSION:

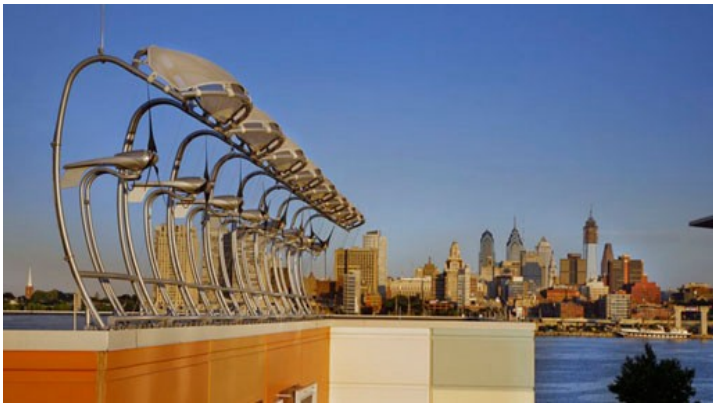
Suggested Pole-based Project is cheaper to implement and faster paying-off than the London Array (gigantic Wind Farm) approach!

Chapter 3. The Residential housing-based Project

The technical background

Another independent implementation of WEGI is based upon installation of Wind Power Stations on the roofs of residential buildings.

The idea of such implementation of wind power stations in not new: the displayed picture shows aggregated 8 tri-blades rotary machines of the small (up to 1kW) capacity that are attached to the roof of a building (product of AeroVironment, Inc.).



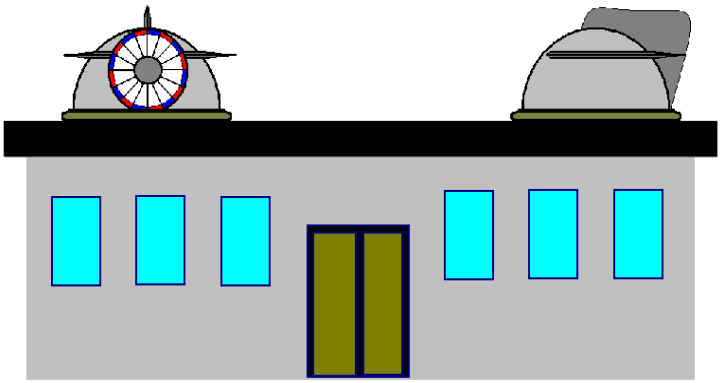
There are at least 60 Million residential houses in USA. If each second house is carrying TWEG with minimal power of 2.5 kW, working only one third of year at locally available average wind, **the residential houses-based WEG will be capable to provide 50 GW**, which is an equivalent of the more than **12** such stations as Drax Power Station, or **50** London Arrays!

Therefore, implementation of WEG only in the residential aspect will provide at least **50 GW** of power of electricity, which is equal to the prevention of burning of at least **100 million tons of coal annually** and **producing of around 19 million tons of ash and 285 million tons of carbon dioxide each year.**

Chapter 3. The Residential housing-based Project

The technical background *(cont.)*

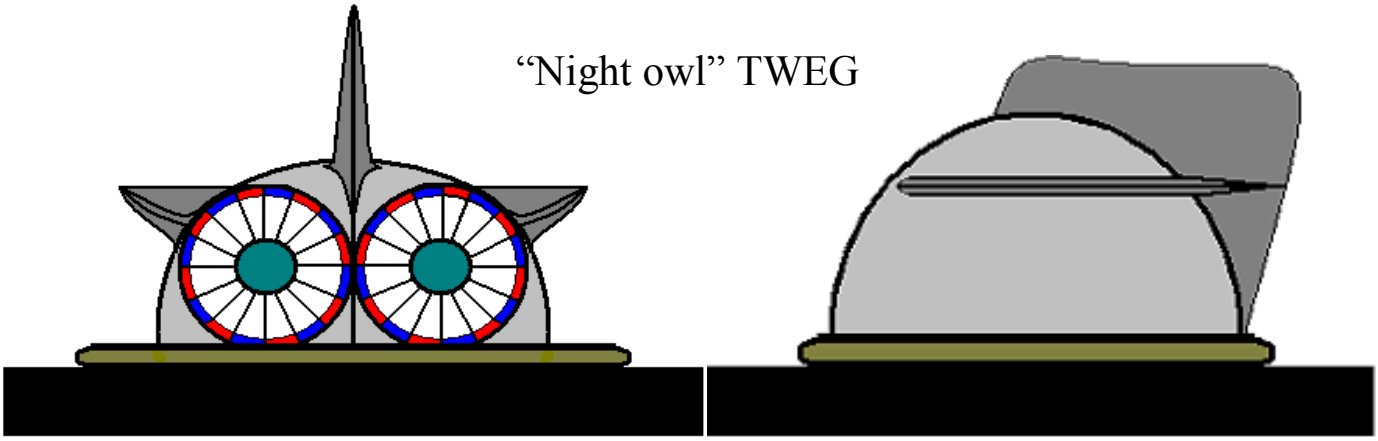
Tornado Wind Station with at least 2.0 - 3.0 kW electric power capacity can be installed on the roof of our homes, as it is schematically shown in following Figure.



At small own weight, such devices due to their aerodynamic features will only improve resistance of a building in respect to a destructive power of the blowing wind. Moreover, especially for residential houses implementation, Qualitics, Inc. has designed so called "night owl" configuration – two TWEG rotating in opposite directions installed close to each other, as it is shown in Figure below.

The aero-dynamics of this shape of TWEG provides such important quality as the ability to significantly improve stability of TWEG's supporting base in respect of wind's attempt to turn off and destroy this base. Paradoxically, ***the constructions with "night owl" TWEG-stations on top will be more stable in respect to wind's blow, than those without TWEG-stations!***

"Night owl" TWEG

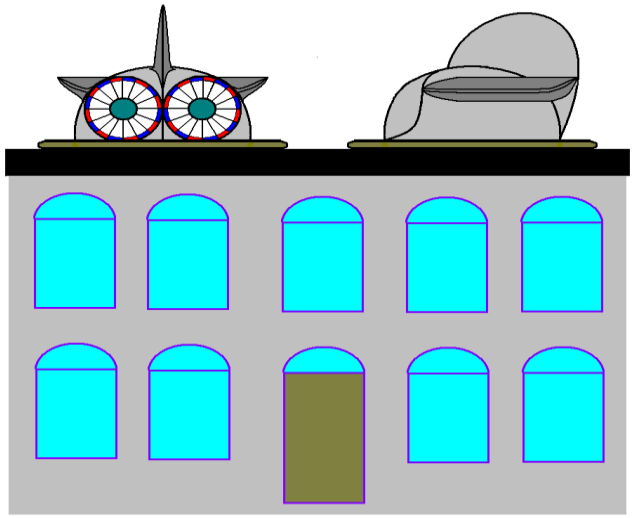


Face *Side*

Chapter 3. The Residential housing-based Project

The technical background *(cont.)*

Using "*night owl*" configuration that is shown in Figure below, it becomes possible to install twice more powerful wind stations that will provide at least 3.0 - 5.0 kW of the electric power each on the roofs of residential buildings.



300,000 houses, being equipped with such wind stations, will generate the same amount of electricity as entire London Array!

And all this electricity will be obtained just where it is needed!

No costly transportation of electricity, no "pick-load" effects and other drawbacks.

Produced electricity will supplement household usage when there is a need, and at absence of such need it will go directly in the general electric grid as a commodity which is sold to others consumers. Especially it concerns the "night hours", when household is using a lot less electricity, but installed WEG continues generation of electricity. House owners will become the sellers of electricity!

Households that are equipped with accumulator – the set of batteries – can save some portion of produced electricity for usage during "pick-load" hours. WEG will recharge accumulator during day-night work…

With development of the Residential housing-based Project, the architecture of houses, and especially the roofs, will be more and more accommodative to the ability to support "night owl" type of TWEG because of the advantages and benefits such WEG provide…

Chapter 3. The Residential housing-based Project

The economical background *(cont.)*

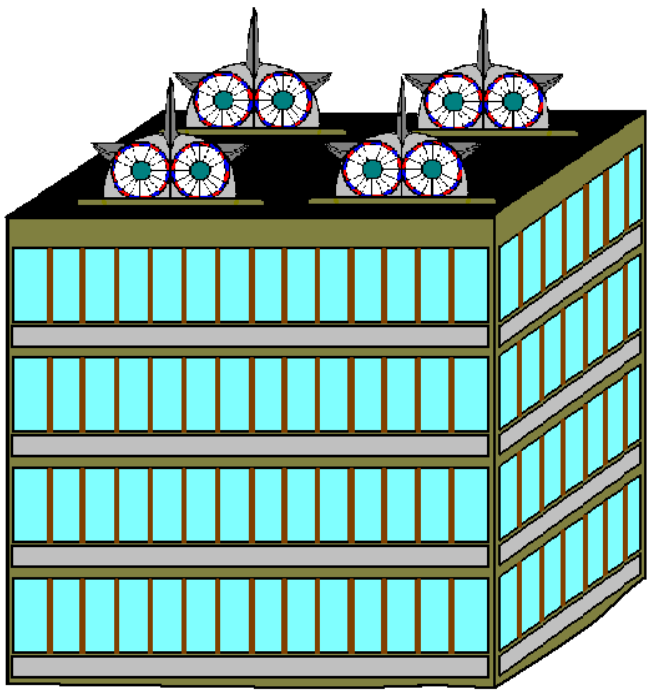
At current market price of $0.1 for 1kW-h of electricity, each Residential House-based "night owl" TWEG with only 1.5kW capacity will produce annually a commodity – the electric energy - of $1,310.

Even if the price of each such WEG attached to the roof of the house will be $6,500.00, this WEG will self-repay within 6 years.

It is important to mention that there is a huge base for of the implementation of large enough "night owl"-TWEG – the roofs of apartment buildings…

There are more than 100,000 large apartment buildings with flat roofs in USA right now.

Each of them could carry at least 4 "night owl"-configuration TWEG with 10-20kW each, i. e. 40-80kW…



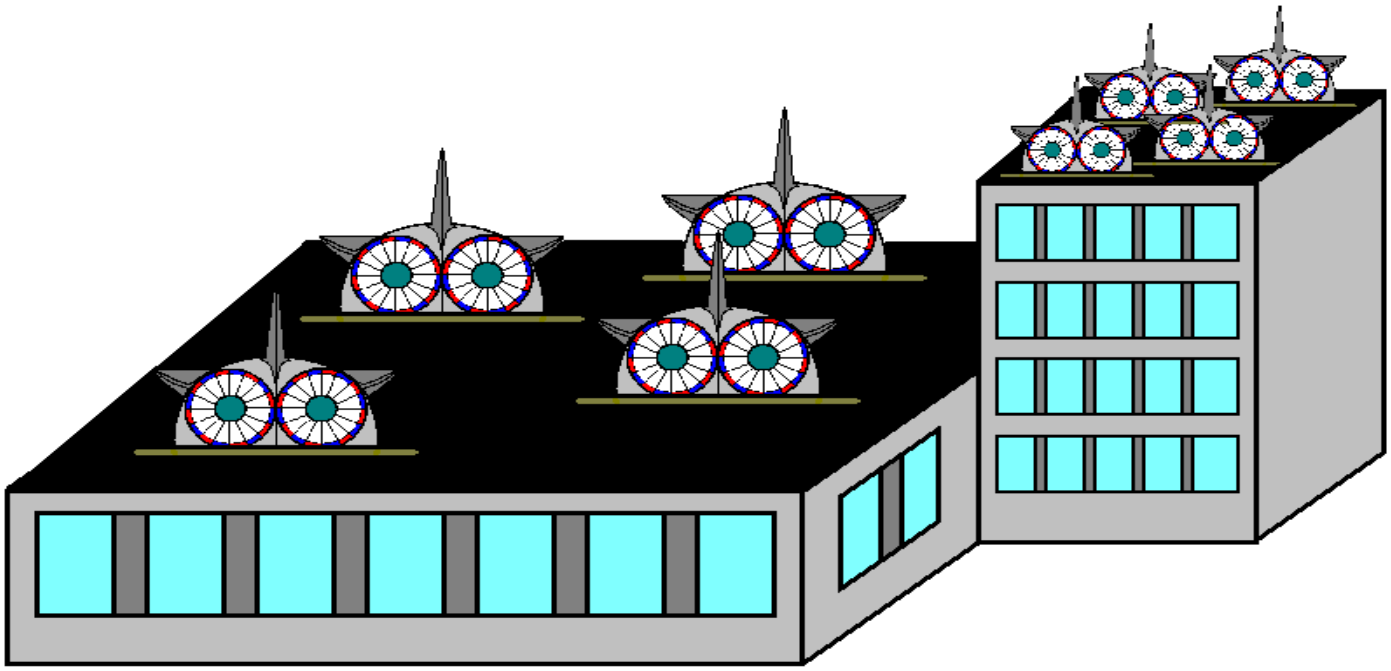
CONCLUSION:

Suggested Residential housing-based Project is cheaper to implement and self-repaying faster than the London Array (gigantic Wind Farm) approach!

Chapter 4. The Commercial and State Buildings-based Project

The technical background

Another ground of the implementation of WEGI is based upon installation of Wind Power Stations on the roofs of the Commercial and State buildings as it is schematically shown in following Figure.



Each of commercial "night-owl"-TWEG can easily be of **30-40 kW** capacity, and will be capable to produce **300 MW-h** electrical energy in the amount of **$30,000 annually**.

Considering the fact that today there are at least **1 Million** commercial and State buildings in USA, which could carry at least **4** said TWEG each, one should expect a potential possibility of generation of at least **120-160 GW** of electricity!

Therefore, **the question is not "*if*", but "*when*" our Energy Industry starts exploration of this huge natural reservoir of wind energy...**

Chapter 5. Summary of Proposal

Starting Point

The presented Proposal is based on the recognition that:

- The nature of winds all over the United States of America allows satisfaction of all current and near future needs of our country in electricity trough transformation of this energy into electricity

- The transformation of the wind energy into electricity is the most clean and environmentally friendly way of the production of electricity

- The current low level of the usage of the energy of wind as a source of electricity is explained by two major obstacles:
    - A high cost of the contemporary models of the Wind Electro Generators at a low efficiency of transformation of the wind energy into an electricity
    - The wrong stereotype that huge wind turbines gathered in Wind Farms is a most preferable way of the producing of electricity from the wind

- Both of those obstacles can be and have to be prevailed over due to two following alternatives:
    - Developing and manufacturing highly efficient Tornado-type Wind Electro Generators
    - Implementation of the Disperse but Dense Distribution of the small and medium Tornado-type Wind Electro Generators all over the USA

Chapter 5. Summary of Proposal

Wind Electro Generators Industry.

The logical action that should follow the formulated Starting Point is creation of the Wind Electro Generators Industry, or WEGI.

Said means that there should be established a new Industry in the entire meaning of this social-economical phenomenon, which:

- Employs hundreds of thousands of scientists, engineers, administrators, technicians, workers, etc
- Operates hundreds manufacturing and storage units with invested capital of tens billions of dollars
- Manufactures millions units of Wind Electro Generators annually, installs and maintains them
- Produces dozen hundreds TW-h of electric energy
- Consumes of the production of other Industries for several billions of dollars

In contrast with hydro- and coal electric Electro Generators Industry, WEGI has to comprise ability of permanent manufacturing of Wind Electro Generators, because the demand for many hundreds of millions of such stations is expected.

In contrast with hydro- and coal electric Electro Generators Industry, WEGI has no need for an electricity distribution grid for Implementation of the Disperse but Dense Distribution of the small and medium Tornado-type Wind Electro Generators all over the USA. Because already existing electric grid is totally capable of distribution and delivery to consumers of all electric energy that will be produced by WEGI for several decades ahead.

Usage of the existing electric grid creates a good natural motivation for very tight collaboration of WEGI with owners of this grid to modernize and develop it.

Chapter 5. Summary of Proposal

Three Ways of Implementation

Implementation of the Disperse but Dense Distribution of the small and medium Tornado-type Wind Electro Generators all over the USA, or DDD-approach, can be and should be developed in all three following directions:

- **Pole-based Project**
- **Residential Housing-based Project**
- **Commercial and State Building-based Project**

because poles, residential houses, commercial and State buildings can be and should be used as a natural, already existing, and reliable base for installation of hundred millions of small and medium Wind Electro Generators.

Pole-based Project is capable to accumulate 150,000,000 small Tornado Wind Electro Generators of 250 W capacity each, or up to 37.5 GW combined, and produce up to 328.5 TW-h of electric energy annually (around 11% of current total usage of electricity in the USA), which is worth of $32,85 Billion per year (Based on current rate $0.10 per kW-h).

Residential Housing-based Project is capable to accumulate at least 60,000,000 small Tornado Wind Electro Generators of 1.5 kW capacity each, or up to 90 GW combined, and produce up to 778.4 TW-h of electric energy annually (around 24% of current total usage of electricity in the USA), which is worth of $77,84 Billion per year.

Commercial and State Building-based Project is capable to accumulate 4,000,000 medium Tornado Wind Electro Generators of 30.0 kW capacity each, or up to 120 GW combined, and produce up to 1,051.2 TW-h of electric energy annually (around 32% of current total usage of electricity in the USA), which is worth of $105.12 Billion per year.

Therefore, DDD-approach to the implementation of TWEGs is capable to accumulate up to 120 GW combined, and produce up to 1,051.2 TW-h of

electric energy annually (around 67% of current total usage of electricity in the USA), which is worth of $105.12 Billion per year.

The common benefit of all three Projects is that all produced electricity goes immediately into a general electric grid exactly in the location where it was produced.

Chapter 5. Summary of Proposal

Tornado-type Wind Electro Generator

Proposed DDD-approach (the disperse but dense distribution of the small and medium wind Electro Generators all over the USA) will be more effective, cheaper and reliable than Wind Farm approach no matter what model of wind machine is employed. However, the ultimate efficiency, reliability, and profitability will come with the use of Tornado-type Wind Electro Generators, or TWEG that were designed by Qualitics, Inc.

TWEG have a unique air-dynamical design, which allows laminar streamlining by nuclei of wind of the external surface of device, as well as its rotary disk.

TWEG feature surfaces that are covered with triangular pattern of smooth dimples which provides minimal turbulization of the boundary layer of the streamlining air.

The blades of the rotary wheel of TWEG have shapes that provide formation of a laminar rotating discharge flow of air, which is passing through rotary disk. Together with laminar streamlining by the nuclei of wind and minimal turbulization of the boundary layer, it provides extremely low total aero-resistance of TWEG

TWEG have special wings that provide pressing of device down to its base as stronger as velocity of wind increases.

The rotary wheel of TWEG can freely rotate around vertical axis of device.

TWEG have special tail-wing that provides fast and stable orientation of device right by normal to wind's direction.

These and other unique features of TWEG provide an ultimate efficiency of the transformation of the available wind power into electricity – **up to 95%.**

Chapter 5. Summary of Proposal

Tornado-type Wind Electro generator (*cont.*)

Small and medium (up to 50 kW) TWEG are provided together with an original Electro-generator that is producing AC current, which is electronically kept within range of frequencies that are acceptable by the general electric grid.

TWEG practically have no “start-up” limitation for the wind’s velocity – they work at any, even the slowest wind.

TWEG are light devices (the only metallic parts they contain are wires, permanent magnets, and bearings, all other parts are made of plastic, mostly - fiberplastic).

These and other features of TWEG provide additional stability to the base that supports TWEG, because they eliminate or minimize the turning torque (in respect to the supporting base), which is created by the wind. The construction with TWEG on the top will be more stabilized in respect to wind’s blows, than those without TWEG.

When in mass production, totally automatic manufacturing will keep self-cost of TWEG much lower than of any other model of wind station that is available on the today’s market.

This brake-through design of TWEG allows providing a long lifetime of these devices (30-40 years) without the need for any significant maintenance.

Chapter 5. Summary of Proposal

How to begin?

Building of WEGI contains different specifics depending on which proposed three directions – either Pole-based Project, or Residential Housing-based Project, or Commercial and State Building-based Project – is implemented.

The most straight forward direction is Commercial and State Building-based Project: there is well-defined consumer, there is already base for installation of TWEG – flat roofs of the commercial and governmental buildings – with well-defined ownership, there are well-known mechanisms of establishing either “buyer-seller”, or rental, or financing relations.

Hence, implementation of Commercial and State Building-based Project is the most preferable start for WEGI.

Residential Housing-based Project is the second in the raw for implementation, but in cases when and where the residential homes with flat roofs are present in significant proportion.

Of course, installation of TWEG on the roof of home will increase the value of home, so that Mortgage Loans Companies would be directly interested in financing such improvement of property.

Due to advantages and benefits that TWEG provide, the architecture of houses, and especially of their roofs, will be more and more accommodative to the ability to support TWRS and the next generation residential houses will be TWRS-friendly.

It is important to note that owners of homes with installed TWEG could not only be suppliers of their own cheap electricity for the current household needs, but also producers of supplemental income, by way of selling of excess electricity to the nationwide grid.

Hence, implementation of Residential Housing-based Project in regard of houses with flat roofs can be considered as an immediately available market of TWEG.

Chapter 5. Summary of Proposal

How to begin? *(cont.)*

The Pole-based Project seems most atypical and indeed comprises several rare features.

The national electric distribution system – *the common grid* – is very complex and complicated phenomenon. It plays very important role in life of Society and in running of Economics. Thus, any intervention in it has to be very carefully analyzed and examined.

That is the main reasoning for the proposition that can be recommended as a beginning of implementation of the Pole-based Project.

The entity, which will be responsible for the implementation of the Pole-based Project, has to have the right to install appropriate TWEG on the top of each new installed pole and each pole that replaces the old one. This right should be accompanied with a liability to compensate any and all damage that should be caused by the specifics of installed poles with TWEG.

In this case, said entity will have an opportunity to design a new, wood saving poles, that will be much more aesthetic, strong, ecologically clean, functional and longer living than contemporary ugly, fulfilled with a creosote, wood poles.

Within couple of decades (and may be even in several years) all current wood poles could be substituted with the new fiberplastic poles that will carry wires of common grid in much more reliable manner (no insulators, no solid attachment of wires to the pole, much less air-resistance to wind, elastic response on wind's blows, etc.) and will support a small or even medium TWEG on top.

The new fiberplastic poles are not exposed to erosion, or corrosion; and there is not any problem for the environmentally friendly recycling of them. The lifetime of such poles easily can be a century and more…

Chapter 5. Summary of Proposal

New ways of financing

The implementation on TWEG simultaneously with invention of new fiberplastic poles creates a great opportunity to solve two independent problems: how to boost overdue necessity of invention of new type of the fiberplastic poles and save hundreds of millions of the best trees, and where take the money for this huge project from?

The long-living TWEG and fiberglass poles and interminable need of electricity are creating unique opportunity for a new source of money for Pole-based Project – the establishing of a new Nationwide Retirement Plan.

According to this approach, peoples of USA will obtain a possibility to buy any number of TWEG-s that are implemented in the frame of Pole-based Project (without any Sales Tax!) and become owners of these TWEG-s. All profit from sales of the production of electricity due to said TWEG-s would go directly on the personal Retirement accounts of owners of said TWEG-s.

When the retirement time comes, each of those people will have not only the cost of the owned TWEG-s (which, most probably, will significantly increase!), i. e. initially invested capital, but entire balance on their personal Retirement account together with all interest from Bank that was handled this account during all long years before retirement.