

A Review on Ancient Scientific Techniques for Solution to Energy Crisis

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Abstract— It aims at providing a new approach to technology with which humanity will be able to fight the energy crisis. This paper gives a relatively simple construction of renewable energy conversion plant and also provides reasoning with uncertainty in wind energy conversion along with integrated solar energy conversion equipment. Being a theoretical approach this paper gives a unique way to utilize the available power of nature. In addition it will put a special emphasis in the problems of understanding the intended semantics of the various renewable energy conversion system applications. This understanding will lead to ability to access the relative merits and demerits of different proposed and implemented applications. In this research, the methodology adopted is design of hybrid equipment for energy conversion, studying motion for navigation and control at many levels such as sensor interpretation, environment modeling, mechanical modeling, artificial intelligence etc. This modeling can be used in various domestic, applications and also in industries, rural areas etc.

The intended results obtained will be hybrid power generation units with relatively simple design compactness. The implications involved may be the effective controlling at adverse climate and relative power generation and maintenance.

Index Terms— hybrid power generation, increased life of wind power-generation systems, effective controlling at adverse climate, energy conversion etc.

I. INTRODUCTION

Energy generation and efficient utilization is one of the biggest problem in the world. With close observation made by author, findings are, a tremendous amount of cosmic energy is freely available in the earth, while there are other natural forces available which will easily fulfill the energy needs for present as well as future. The conventional energy sources are totally dependent on mass of fossil fuels available, on other words, due to limited quantity of these energy sources and associated side effects it is required to omit them and use other energy sources which are available in enormous amount.

We know that for creating universe, just energy and space is required. It means that there is no need of mass at all for energy needs. Or in other words highly compressed energy is the mass.

With present technology known so far, it is not possible to utilize cosmic energy, while there are technologies available for considerable use of renewable energies. We all are familiar with the difficulties in utilizing these energies.

An effort can be made to combine two or more systems of various technological backgrounds for more effective utilization of available energy of any form.

II. RENEWABLE ENERGY UTILIZATION (EARLIER SUCCESSFUL ATTEMPTS)

Examples:

According to Rig Veda, there are five elements of nature to create universe, of which *vayu* (wind / gas) and *jal* (water / liquid) is capable of generating devastating amount of force which create stars and later on planets. The *Agni* (fire) gives *taap* (heat) and *vidyut* (electricity).

Earlier attempts were made to utilize these elements for producing power, of which solar and wind energy was mainly used. According to Vaimanika Shastra (the history of Indian astronautics), principles of phase 1 propulsion as far as description were concerned, was electrical and chemical while solar energy is also involved.

For instance 'Tripura Vimana' mentioned in 'Vyaminaka Shastra' was a large aircraft operated by 'motive power generated by solar rays'.

In the Mahabharata apart from 'blazing missiles', the poem records the use of other deadly weapons. 'Indra's Dart', operated via a **circular 'reflector'**. When switched on, it produced a 'shaft of light' which, when focused on any target, immediately 'consumed it with its power'.

Purpose of mentioning example:

The only purpose to mention these examples is, even though, these natural power are allegedly diluted earlier attempts made were capable of utilizing in very effective and compact way.

III. FEASIBILITY OF GENERATING ENORMOUS AMOUNT OF POWER

There are innumerable ways man can find for generating enormous amount of power, but now limiting our discussion to wind and solar energy only.

a) Wind energy :

Problem Statement: The strongest, steadiest and most persistent winds occur in bands some 10km above the earth’s surface, known as the *Jetstream*. Wind turbines, however, are presently limited to the lowest few tens meters of the atmosphere with limited wind speed of about 25m/s [1].

Suggested solutions:

- i) It can be seen from the fig.1. That approximately at the height of 1500 meters wind velocity is nearly constant; hence it would be beneficial to have a wind turbine at such height.
- ii) Instead of having a single huge wind turbine, number of small but portable turbine can be used, it can be well explained by the formula

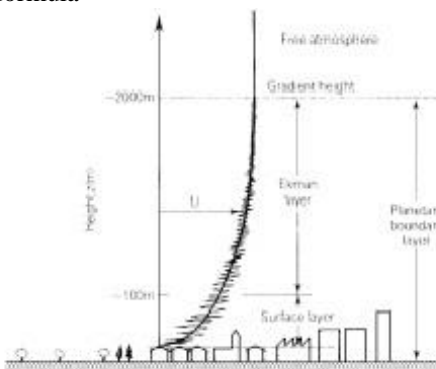


Figure 1: The atmospheric boundary layer [2]

$$\text{instantaneous power} = \frac{1}{3} \rho \cdot A \cdot [V_t]^3$$

- iii) Instead of converting the wind power instantaneously to electricity, it can be converted into mechanical form, which is be rather more weight efficient for instantaneous purposes and mechanical work.
- iv) The greatest problem involved in efficient and effective use of turbine is high wind velocity (greater than 25 m/s. (ref. 1)); hence wind turbine may continuously be used by increasing the losses at higher speeds. This can be achieved by changing the angles of blades with aid of certain mechanisms, so that the losses are increased by less wind interactions and hence, reduces the stresses on turbine.

By implementing the above mentioned solutions, **the life cycle of wind power generating systems will be increased considerably.**

Feasibility:

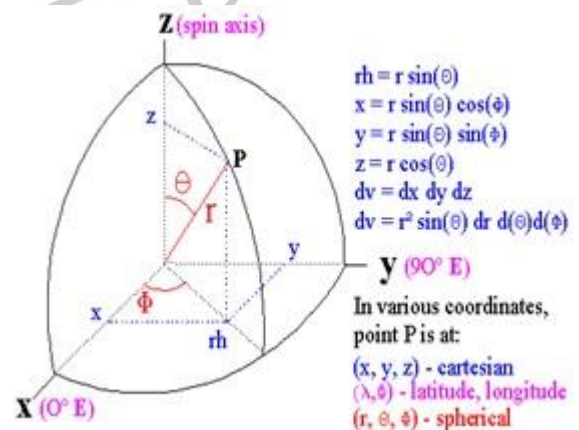
For power of wind *Rigveda* says the following.

भराय सु भरत भागमृत्वियं प्र वायवे शुचिपे क्रन्ददिष्टये ।
 सौरस्य यः पर्यसः पीतिमान्श आ सर्वतात्तिमदिति वृणीमहे २

Which means, hey wise peoples, the God who makes *vayu* (Wind) the most powerful and mobile force in nature is always with us. He is at the base of everything and gives shine to the Sun, which creates the life. Sun and Wind together make us powerful to perform our *karma*.

Now, concentrating the on the feasibility of solutions. Except solution (i), rest ones are feasible with small aids. The actual problem is implementing the solution (i). It is achieved by suspending the turbine in air for required period of power generation.

Figure 2: Spherical co-ordinate system



For suspending wind turbine at such a height, hot-gas balloons can be used, either aircrafts may also be used, if turbine performs better and show reasonable effects. While another solution for feasibility is to aid the wind turbine with other power sources like solar.

b) Aid of Solar Power to wind power:

From above discussions, it is concluded that solution (i) is one of the best solution for effective power generation from wind, but it is somewhat difficult to implement. Here are some keys to implement it.

- 1) Utilizing the solar power to heat the gas in the balloon with integrated systems for artificial heating and heat energy storage.
- 2) To use portable aircrafts based on solar systems.

Solar aircraft is not known for majority of peoples till now, in modern world. But it is possible with certain sets of conditions.

Problem Statement: solar energy is very dilute and relative weight efficiency is very less per unit area. Hence it requires a very large and precise power generator to produce power for lifting an aircraft.

Solutions:

A) A collector having large surface area with considerably less volume. According to 3-d geometry spherical body is best suited for the purpose.

- i) For effective utilization of solar energy the immediate use point may be shifted nearby but below the collector.
- ii) With reference to Pythagoras theorem, the equation of sphere having origin at center can be written as $x^2 + y^2 + z^2 = r^2$ where r is radius
- iii) Instead of mirrors, convex lenses with effectively high focal length should be used. The system design may look like two concentric sphere, viz., outer one is made of chromium coated steel frame having sufficient blocks to fix lenses.
- iv) The inner sphere is to be made the complex structure of light transmitting cable or more exactly say optical fibers. Radius of this sphere is dependent on the focal length of lenses and carrying capacity of optical fiber. The point of importance is, all the lenses must have same focal length, and else it may lead to inefficiency and system problems. A precise manufacturing technique is needed in this.
- v) Fourier's law for heat transfer is given as $Q = U \cdot a \cdot \Delta T$ from the given equation considering a theoretical example with ideal conditions. Let us consider a spherical frame (as discussed above) with negligible surface area contributed by steel frame, and approximately 100% area is covered by lenses. Let radius of sphere is 'r' and considering it as 0.5m. The surface area of sphere is given by: $4\pi r^2 = 3.141m^2$. Considering the solar motion, only half of the surface area is effective for operation. Now, let us consider that there is no convective media, and all the radiations is to concentrated at $5cm \times 5cm = 25cm^2$ area. Also reducing all the convective and radiative coefficients to zero, assuming these concentrated radiations are focused at copper surface with average thermal conductivity of $400 W/mk$. Hence now $U=400$.

As an average, the International Civil Aviation Organization (ICAO) defines an international standard atmosphere (ISA) with a temperature lapse rate of $6.49 K (^{\circ}C)/1,000 m$ ($3.56 ^{\circ}F$ or $1.98 K (^{\circ}C)/1,000 Ft$) from sea level to 11 kilometers (ref.3.). Hence considering temperature of say $15^{\circ}C$. Considering average solar radiation as $1000 \frac{W}{m^2}$.

$$\frac{3.141}{2} \times 1000 = 400 \times 25 \times 10^{-4} \times (T_1 - 15^{\circ}C)$$

$$\therefore T_1 = 1585.79^{\circ}C$$

From theoretical result it is clear that sufficiently higher temperature can be generated hence, can be used effectively even after heating the air. As the density of air is comparatively less, a higher volume can be heated with less heat and hence used accordingly. Furthermore these hot gases (air) can also be used to run gas turbine operating on Brayton cycle. The main criteria for turbine must be power generation to immediate consumption ratio. This ratio depends upon day length, effective temperature etc.

$$A = \frac{P_g}{P_i} \geq 2$$

For 12hr. day with perpendicular solar radiation all the time

Where, A is abbreviation for ration of P_g is power generated in unit time & P_i is power utilized in same time

For 12hrs day with perpendicular solar radiation the minimum factor is 2, because the same power is to be utilized during night time. However concentrating on day length as well as associated losses, it is subtle to calculate the system for minimum possible day length for direct solar radiations with associated maximum system losses. This analysis can give very high life cycle for a this type of power-plant

B) Use an aircraft running on solar as well as other power systems

The main drawback of solar aircraft is limited period of solar radiation make it useful for very shorter duration of time. However with certain historical facts and manuscripts it is clear that peoples of Aryan civilization were aware of aircrafts and sill now on the Rig Veda texts (ranging from the 1st-10th Manadal) reference the aerial flying machines as Ratha. Converging discussion to solar aircraft, 'Tripura Vimana' (fig.3.) is one of the keys. The 'Tripura Vimana' mentioned in 'Vymanika Shastra' was a large craft operated by 'motive power generated by solar rays.' This Vimana (aircraft) is supposed to move on air, water as well as on land. Power is said to

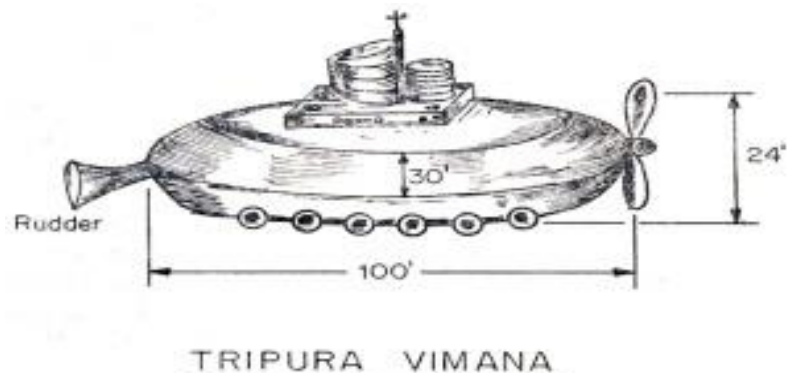


Figure 3: Tripura Vimana [4]

be generated at the top using sun's rays and certain chemicals. During Vedic period mercury was designated as 'Rasraj' and about half of the chemistry was mercury based. Hence it can be considered as the chemicals may be mercury based acids. A large number of verses have been devoted to the metallurgical and material aspects but is in the language whose technical terms are not well known now. However from certain texts it is clear that, for lifting in air other power sources (heat engine) was used while, after attaining certain height it is solely based on solar power. The heat engine for this are considered as large heating blocks of iron, made mercury to heat/boil and give power to whole system.

Efforts can be made to remake this or a similar aircraft which will be beneficial for humanity.

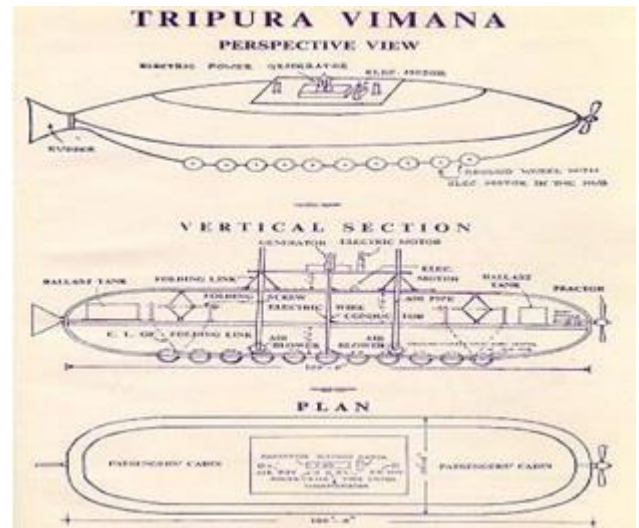


Figure 4: Tripura Vimana [5]

IV. ADVANTAGES

The above discussions if implemented totally in practice following results are expected:

- a) Worldwide free power generation
- b) Effective and enhanced use of renewable energy resources
- c) Beginning of new era in field of aeronautics and related science
- d) Heavy and highly complex structure of wind towers will be omitted
- e) Almost steady wind flow will be obtained at above stated height and its east to design a wind turbine.
- f) Power generation will be enhanced
- g) Land requirement will be considerably reduced (negligible) in such type of power-plants.
- h) If power is stored in mechanical form (by help of various types of springs), it reduces the weight of system comparatively, with batteries
- i) Associated problems with present wind technology like excessively large diameter and huge plant size, threat to aerial life (birds), excessive noise etc. will be completely omitted.
- j) Solar radiation will be utilized to a great extent which will motivate for maximum utilization of solar energy.
- k) Life cycle of this type of power plant will be considerably increased and hence is relatively cheaper when installed fully.
- l) Gigantic solar collectors will be reduced to similarly effective but smaller units
- m) If the explained 'Vimana' is made successfully then it will reduce the fuel requirement to a great extent.

If all the 32 secrets of Vimanas along with related semantics are known and followed, then it will lead to cheaper but highly effective (and deadly) aircraft for various commercial and other applications.

Expected Problems:

- a) Position controlling will be difficult unless aided by modern wireless controlling.
- b) For reducing effective volume and weight, the system may become more and more complex.
- c) Dropping the energy packets frequently to the ground makes an extra effort to collect them.

V. OVERALL CONSIDERATION AND OPTIMAL DESIGN

A. Aircraft way

This seems very complicated but promising design with respect to construction and output. Here total power output is dependent upon the amount of fuel required for a particular aircraft at any given condition. Hence with simple illustrations and simulations it is very complicated to build as well to operate but the advantages is taken in terms of controlling and positioning the system.

In other words, if priority is to control the system irrespective of other things then it is desirable to have this kind of system.

B. Parachute way

This is very simple in construction but at the same time is very complicated in controlling. Output power can be more because of comparatively simple mechanisms and less moving parts along with weight efficiency.

This type of systems is useful when optimal power is required irrespective of other conditions.

Controlling is the biggest problem here hence it is require to have some controlling equipments or else avoid this type of system.

VI. CONCLUSION

This research provides a very innovative approach in field of energy generation. Starting with simple mechanisms and problem statements it is projected to a very complicated but promising power generator hence it can be experimented and used.

Expected output gives a new dimension if field of renewable energy as well as in aerodynamics.

Exploring from a very ancient but developed system this research primarily gives a crude idea about hybrid technology which can be used in future.

REFERENCES

- [1] John Twidell and Tony Wier, 'Renewable energy sources', Second edition.
- [2] Postgraduate Distance Learning Series in Renewable Energy Systems Technology
Wind Power Unit 1. © CREST 2000
- [3] <http://en.wikipedia.org/wiki/Altitude>
- [4] A critical study of the work "Vymanika Shasta" by H.S. Mukunda, S.M. Deshpande, H.R. Nagendra, A. Prabhu, and S.P. Govindaraju , Indian Institute of Science, Bangalore-560012 (Karnataka)
- [5] Vimanas- Ancient Flying Saucers of Atlantis and Lemuria "Facts do not cease to exist because they are ignored." - Aldous Huxley (1894-1963). Mary Sutherland 2010
- [6] "RigVedSanhitaBhashaBhashya-jaydevSharmaVol71936." Arya Sahitya Mandala, Ajmer.
- [7] R. K. Rajput, (2009) 'heat and mass transfer in si units'
- [8] Dr. R. K. Bansal (2005) "A TEXTBOOK OF FLUID MECHANICS AND HYDRAULLIC DYNAMICS" published by "Laxmi publication pvt. Ltd. New Delhi".
- [9] Dr. R. K. Bansal (1989) "A TEXTBOOK OF STRENGTH OF MATERIALS" published by "Laxmi publication pvt. Ltd. New Delhi."
- [10] Prof. B. S. Raghuvanshi (2010) "A COURSE IN WORKSHOP TECHNOLOGY VOL II" published by "Dhanpat Rai and Co. publications".

