PROTECTING THE ENVIRONMENT THROUGH GREEN ENERGY

Petrescu Florian Ion*, Petrescu Relly Victoria**

*Polytechnic University of Bucharest, Faculty of IMST, 313 Splaiul Independentei, 060042 Bucharest, Romania, e-mail: petrescuflorian@yahoo.com
** Polytechnic University of Bucharest, Faculty of Transport, 313 Splaiul Independentei, 060042 Bucharest, Romania, e-mail: petrescuvictoria@yahoo.com

Abstract

Environmental protection through the implementation of green energy has become a daily reality. In the entire planet they were introduced especially in recent years various sources of green energy. The process started hard, but finally managed to accelerate the implementation of new green energy sources, albeit major obstacles have emerged. The most difficult obstacle met in worldwide but and in our country, was the inconstant green energy products. This study proposes some solutions designed to solve this unpleasant aspect of inconstant production of green energy. The basic idea refers to the construction of hydroelectric specially designed to represent a true energy buffer. A hydroelectric old (adequately equipped) or a new one built according to this principle, can become a true buffer energetic, able to take energy generated by the turbines at full capacity (energy otherwise lost by unable to be stored or taken over by the national network) and a national system restore when green energy sources produce less.

Key words: environmental protection, green energy, wind power, solar farms, hydropower, pumped-storage

INTRODUCTION

Every day, the planet produces carbonic acid gas that's free to the earth's atmosphere and which is able to still be there in 100 years time. This augmented content of carbonic acid gas and increases the heat of our planet. One answer to heating is to exchange and retrofit current technologies with alternatives that have comparable or higher performance, however don't emit carbonic acid gas.

By 2050, minimum of one third of the global energy has to be came from stars (solar), wind, and different renewable resources. Who says that? Even "British Oil" and "Royal Dutch Shell" two of the world's largest oil corporations. Global climate changes, increment of planet population, and fuel depletion, mean that renewables ought to play an even bigger role within the future than they are doing it now (Pineda, Bock, 2016).

All new energies need to have no desagreable consequences such as for example the fossil fuels or nuclear energy. Real planetary alternative energy sources need to be renewable and are thought to be "free" energy sources. These need to have decreased carbon emissions, compared to conventional energy sources. It may be included: Biomass Energy, Wind

Energy, Solar Energy, Geothermal Energy, Hydroelectric Energy, Tidal Energy, Wave Energy, (Petrescu F.I., Petrescu R.V., 2011; 2012).

Nuclear fission energy was virtually a necessary evil. With all its risks, he managed to stop the increasing of energy crisis of humanity until the advanced technology has allowed us the transition to alternative energy.

Nuclear fusion energy will be the most powerful energy source for mankind when it will be implemented (Petrescu F.I., Petrescu R.V., 2014). Although great advances have been made in this direction, the nuclear fusion power plants did not yet built. Because it is not known when they will be operative in large quantity, should be required to equip us in advance with green energy farms.

Most that are easy to be built and used now are the wind farms and the solar ones (Ramenah, Tanougast, 2016).

Their great technical problem is to have times when they produce less, or do not produce anything.

MATERIAL AND METHOD

Our country has managed rapid introduction of wind farms to generate on average about 25-30% of Romania's energy needs. Then wind turbines construction was abruptly halted on the ground that they can have small or long periods, when they do not give energy. In these times when the wind does not blow, the amount of energy that turbines would have to provide, needs to be produced otherwise. For not were built yet and reactors 3 and 4 at Cernavoda (which could operate from small or medium capacity, and provide more energy to our country when there is no wind) was sometimes necessary to supplement the energy production with coal.

The two existing reactors in the area generate more energy when needed but can’t replace all the energy produced by the wind when necessary. This is a real problem for us, which must to be solved right now.

A solution to this problem would be the completion of reactors 3 and 4 at Cernavoda and start their operation.

Another elegant solution that would allow even further additional wind energy sources is to build a particularly energetic system in area, a symbiotic one. This paper will try to present one such system.

Hydropower was used since ancient times for many kinds of watermills or has been used as a renewable energy source to irrigation and to operate various mechanical devices (Sabău, 2015), (Sabău, Iovan, 2015).

A known method for produces energy (electric energy) for supply high energy demands is to moving and storing water between reservoirs at different elevations. This method is named pumped-storage.

At the times with low energy demand, the excess generation capacities are used to pump water into a reservoir upper positioned.

In the moments when the demand becomes greater, water is released back into a lower positioned reservoir by a turbine (Fig. 1).

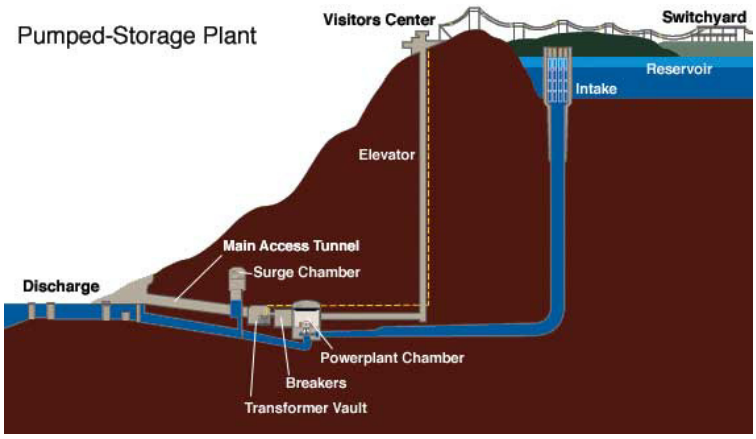

Fig. 1 Diagram of the TVA pumped storage facility
at Raccoon Mountain Pumped-Storage Plant
Source: https://en.wikipedia.org/wiki/Pumped-storage_hydroelectricity#/media/File:Pumpstor_racoon_mtn.jpg

Such systems can be positioned everywhere in our country, in any great existing hydropower. But the need for symbiosis with existing windmills requires the construction of such a system even in Dobrogea area.

It can build such a hydropower plant in that area with the great advantage to be constantly supplied with water pumped even further by the surplus electricity generated by wind (that otherwise would be lost in vain).

For a better understanding of the ideas, we will present below, very briefly, special technical characteristics of a windmill (Dubău, 2015).

Electric power generated by wind is proportional to the cube of the wind speed.

A windmill is set to function optimally for a small or medium wind speed. If the speed of wind in the area increases 10 times for example, one single windmill will produce wind power such as a normal production given from the 1000 windmills (El-Naggar, Erlich, 2016).

Obviously, this surplus energy cannot be picked up by any electric network and is lost. There is thus a large amount of energy produced but not used. If this energy could be used to act the pumps which lift water to a storage energy system, it would solve two problems simultaneously.

Once, it would use the extra energy produced, which is lost otherwise. Second would store energy, that is then used in periods of high consumption, or when the wind stops beating.

RESULTS AND DISCUSSIONS

On September 4, 2013, in Romania has surpassed the psychological threshold of 2 GW of renewable energy produced by wind, solar and biomass. Thus, given that the total energy production was 7 GW, result that the proportion of green energy sources in our country is about one third.

As it knows, the wind sector produces the largest amount of renewable energy, with a daily average of 1,900 MW, followed by photovoltaics branch, only 100 MW. On the other hand, the biomass sector came to a halt, the production being constant, only 34 MW.

Data released by Transelectrica shows that on 4 September 2013 the wind energy production, representing 27% of the total, has been leading in the ranking of energy sources, followed by energy from coal, nuclear, hydro and the one based on hydrocarbons.

According to the legal provisions in force, the energy from renewable sources is received with priority in the network, and a such as energy production as big as the one recorded in September 4 2013, would have caused difficulties in the national energy system. As such, National Power Control stops delivering networked energy in hydro and coal sector when green energy production is high and population demand is low.

In other words, when wind energy is very high (when strong wind) energy production on coal and hydro are limited and even stopped temporarily. But the inverse problem (when not too windy and the demand is high from population and industry) is more difficult to solve.

Usually in such situations are utilized at maximum capacity all hydro and coal plants.

A more viable solution would be to introduce into the national power grid yet two nuclear fission reactors.

But another important solution would be the introduction of hydro energy storage systems, as it has already been described previously.

It is estimated that in the Romanian energy system would require investments of several billion Euros to ensure confidence in the system takeovers of a significant amount of intermittent energy.

The system described in presented article it would cost much less our country. Another advantage of proposed system is that it would use only additional green energy (otherwise lost) as buffer energy, through water temporarily stored at a certain height. No oil, no coal (no hydrocarbons) in use, no pollution!

Compensation schemes currently in use are polluting, difficult to handle, and fail to compensate for green energy fluctuations of more than 2 GW (installed power).

The new proposed scheme has the advantage of being able to operate on a longer period (longer periods when the wind does not blow). More, the amount of stored water is higher, or the height of the lifted water is higher, such a system could work for a longer period of time without being refueled. If it want such a system to replace total green energy wind for a much longer period, it will be necessary to build more such schemes.

As a lifeline if it would like to remain driven pumps and on windless period, it is possible, but this time they must to be powered from another source. This source of electrical power could come from existing nuclear plants (which would work then at full capacity) from photovoltaic panels, from a solar farm complementary, or by burning hydrogen extracted from water (through modern methods, with nano cells, to not have big yield losses), (Muthumeenal et al., 2016).

A large hydropower with pumped-storage built somewhere on Danube or on the Danube-Black Sea channel, near the wind farms, could store and give energy for a long period of time (for a week or maybe two) without wind alimentation. For possible windless periods longer than a month would be needed three or four such centers. It would be possible to build such a central solution in floors, with several levels of water lift and storage. Today appeared very large windmills that have an installed power very much improved compared to conventional models.

Instead of a wind national park with 1000-2000 windmills, we may build today a modern wind park with the same power having only 100 windmills, each with an installed capacity much higher than the older models. Wind energy is practically inexhaustible. We use the wind! Capture its energy and transform into electricity, use, or store it. Installing wind farms is obvious only in areas where winds are often and hard.

CONCLUSIONS

1-The wind farms are reliable, economical, sustainable, friendly and affordable.

2- Installing wind farms is obvious only in areas where winds are often and hard.

3-Even in these areas there may be sometimes shorter or longer break, without wind. That does not mean to give up the use of wind energy. Obviously in these moments the energy must be supplied by other sources. One can use more wind farms built in totally different areas, so if one of them is no longer in the wind, in exchange for the other to have continuous activity. It can use in the same area, wind energy parks combined with solar farms. We still can use the fission nuclear power, accepting it as a necessary evil.

4- But a smart way to build green energy areas is to put a wind farm together with a storage hydropower.

REFERENCES

1. Dubău C., 2015, Vertical Axis Wind Turbine Power Rating, Analele Universităţii Oradea, Fascicula Protecţia Mediului, 24:313-316; Retrieved from: http://protmed.uoradea.ro/facultate/publicatii/protectia_mediului/2015A/silv/05.%20Dubau%20Calin.pdf
2. El-Naggar A., Erlich I., 2016, Analysis of fault current contribution of Doubly-Fed Induction Generator Wind Turbines during unbalanced grid faults, Renewable Energy, 91:137-146; Retrieved from: http://www.sciencedirect.com/science/article/pii/S0960148116300453
3. Muthumeenal A., Pethaiah S.S., Nagendran A., 2016, Investigation of SPES as PEM for hydrogen production through electrochemical reforming of aqueous methanol, Renewable Energy, 91:75-82; Retrieved from: http://www.sciencedirect.com/science/article/pii/S0960148116300428
4. Petrescu F. I., Petrescu R.V., 2011, Perspective energetice globale (Romanian Edition) – December 26, 2011, 80 pages, Publisher: CreateSpace Independent Publishing Platform, ISBN-10: 146813082X, ISBN-13: 978-1468130829; Retrieved from: http://www.amazon.com/Perspective-energetice-globale-Romanian-Petrescu/dp/146813082X
5. Petrescu F. I., Petrescu R.V., 2012, Green Energy, Paperback – November 5, 2012, Books On Demand, 118 pages, ISBN-13: 978-3848223633; Retrieved from: http://www.amazon.com/Green-Energy-Florian-Tiberiu-Petrescu/dp/3848223635/ref=la_B006T2UHJM_1_25?s=books&ie=UTF8&qid=1432305411&sr=1-25
6. Petrescu F. I., Petrescu, R.V., 2014, Nuclear Green Energy, IJAP, 10(1):3-14; Retrieved from: http://www.iasj.net/iasj?func=fulltext&aId=88317
7. Pineda S., Bock A., 2016, Renewable-based generation expansion under a green certificate market, Renewable Energy, 91:53-63; Retrieved from: http://www.sciencedirect.com/science/article/pii/S0960148115305656
8. Ramenah H., Tanougast C., 2016, Reliably model of microwind power energy output under real conditions in France suburban area, Renewable Energy, 91:1-10; Retrieved from: http://www.sciencedirect.com/science/article/pii/S0960148115304377
9. Sabău N. C., 2015, Energy Production in Hydropowers and Electric Thermal Power Plants from the Perspective of European Community Legislation, Analele Universităţii Oradea, Fascicula Protecţia Mediului, 24:235-248; Retrieved from: http://protmed.uoradea.ro/facultate/publicatii/protectia_mediului/2015A/im/15.%20Sabau%20Nicu%20Cornel.pdf
10. Sabău N. C., Iovan I. C., 2015, Some Aspects of Determination Galbena Valley Hydropower Characteristics, Using Method for Determining the Flow from the Possible Locations of Small Hydropower (MHC), Analele Universităţii Oradea, Fascicula Protecţia Mediului, 25:267-278; Retrieved from: http://protmed.uoradea.ro/facultate/publicatii/protectia_mediului/2015B/im/18.%20Sabau%20Nicu%20Cornel%202.pdf