

COMPACT CONSTRUCTED WETLAND ENERGIZED BY A COMBINED SOLAR- WIND POWER STATION, EVOLUTION AND PERFORMANCES UNDER NORMAL CHARGE CONDITIONS.

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Abstract

In the constant research for a satisfying high reliability, usability and performance while having a cost effective investment and operation, Optimia medio ambiente and Epur Nature, have developed and built a wastewater treatment plant wetlands based on single-stage vertical flow, powered by solar and wind clean energy, making it a standalone installation of electric utility thus contributing to savings in investment and exploitation of such infrastructure. The system has been developed at the Centro de Nuevas Tecnologías del Agua (CENTA), to be monitored and evaluated by this public administration that ensures the accuracy of all technical and scientific process. Functional evolution and purifying performances achieved are the subject of this communication.

Introduction

Achieve an adequate purifying performance in compliance with current regulations while it is economically viable infrastructure installation and operation, is a dual commitment that must comply with any sewage treatment plant that is planned at the present. Also the implementation of clean and renewable energy systems that will not increase the global warming and contribute to a small cost-exploitation is an important condition in any current innovative project. The development presented here is based on the combination of a contrasted wastewater system as wetlands based on vertical flow with the minimum number of steps to the object of having a low power, with a combined solar-wind power station that will ensure you steadily from the energy it needs and complemented by a remote monitoring system microprocessor for operation and maintenance. All this looking to get a reliable and cost-functional 24 hours a day, 365 days a year.

Methods

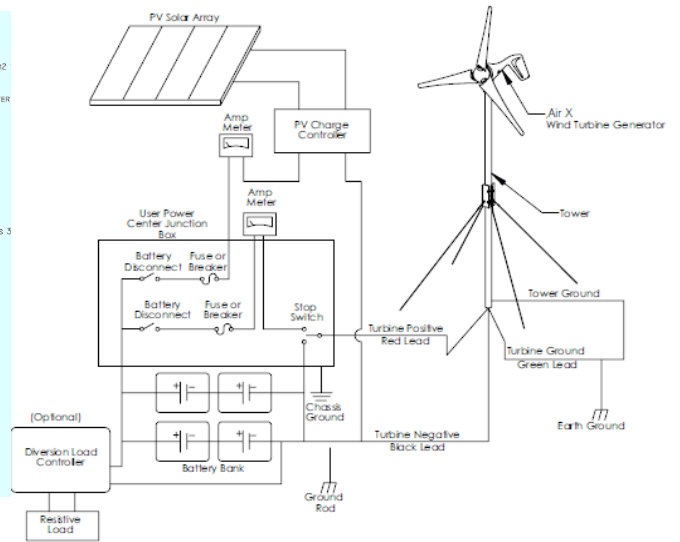
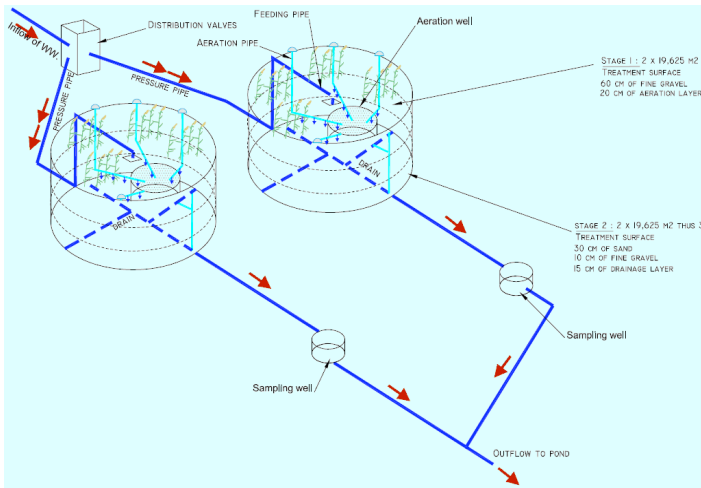
The plant designed in respect to the biological method is a constructed vertical flow wetland type in a single step, combining in the same place the first and second stage overlapping both. This system called Bi-Filter and Epur Nature patented under No. EP 04 293 129-5 carries a significant advantage especially in terms of area required for such installation. In the following table we can appreciate this distinction:

	Classical Phragmifilter® 2 m/p.e.	Bi-filter @ 1.5 m/p.e.
Filter surface of 1 st stage	1.2 m/p.e.	1.5 m/p.e.
Filter surface of 2 nd stage	0.8 m/p.e.	> 1 m/p.e.

Physical implementation of the plant has been made using fiberglass tank cylinder 5 meters in diameter, 1 meter high were modified by increasing the height of 70 inches to set up two parallel filters conveniently brew vertical. The system operates in discontinuous alternating cycle, supporting each of the purification filters for 3.5 days per week. The water processed daily is 2.9 m³ and gross just being devastated by a grid of 3 mm thick.

With regard to the power station and monitoring designed for the occasion, has designed a combined solar-wind system with overload capacity for starting pumps and managed by a microprocessor device that automates the operation of the plant while allows us to remotely monitor the installation.

For more details and understanding, then we can see an outline of the plant built and the energy system:



Results and discussion

The results obtained during three years of operation of the plant are very positive given that the system has worked continuously with very high levels of performance and the only maintenance during this period the annual cutting of the reeds. Remarkable is the quick start up which took the floor with purifying levels of 60% during the first week, reaching stable values over 95% after the first month. For more details and information are attached to various analytical tables for 52 weeks have been conducted by the Centro de Nuevas Tecnologías del Agua (CENTA), where you can appreciate the reliability and features that have been tested at this facility.

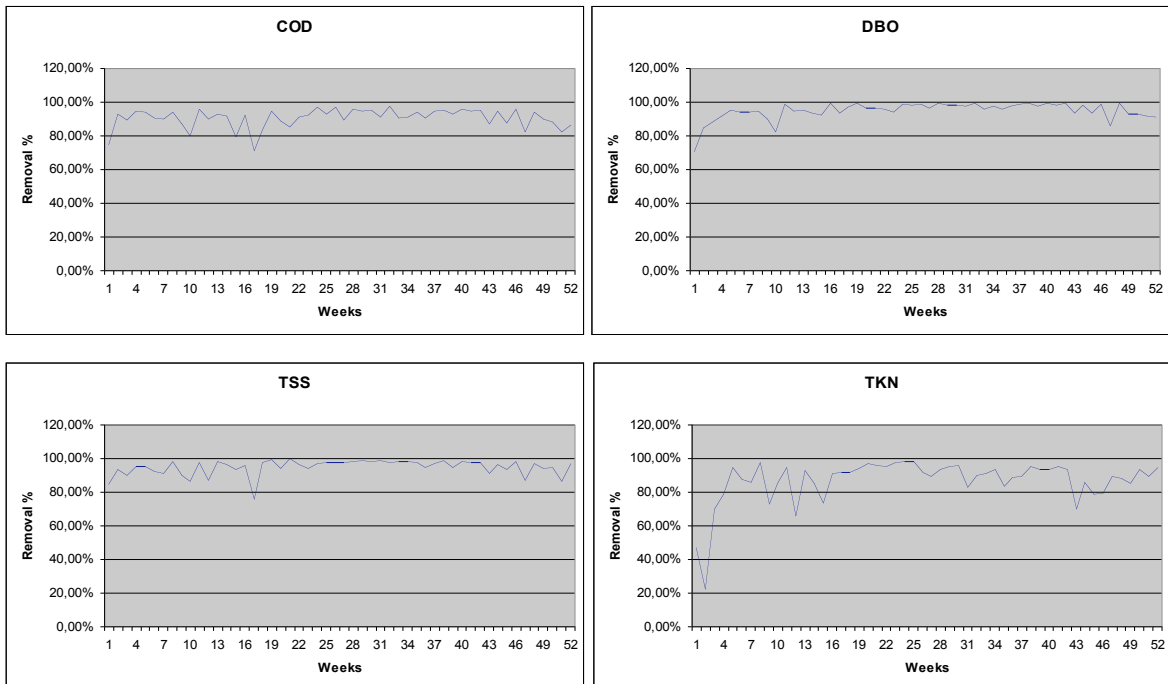


Table 1. Periodic analytical results

Conclusions

The operation of this plant is stable and reliable with a noteworthy performance in the most important parameters, maintenance is low and the relationship between the area needed and the population equivalent of less than classic constructed wetlands implanted to date. Also applies to the connection and remote control is very useful for monitoring such facilities.

References

IWA Specialist Group "Use of Macrophytes in Water Pollution Control".- Constructed wetlands for pollution control: processes, performance, design and operation. IWA publishing, 2000.

COOPER P F, GD JOB, GREEN M B, SHUTES R B E.- Reed beds and constructed wetlands for wastewater treatment. 1996 UK

EPA Manual. Constructed wetlands treatment of municipal wastewater. EPA/625/R-99/010. September 2000.