IMAGE FUSION PARAMETER ESTIMATION AND COMPARISON BETWEEN SVD AND DWT TECHNIQUE

Gagandeep Kour, Sharad P. Singh

Department of Mechanical Engineering, PVP Siddhartha Institute of Technology, Vijayawada,

Andhra Pradesh, India

ABSTRACT: Among the basic necessities of life, drinking water plays major role. The chief sources of potable water are the surface water and ground water. But water on earth moves continually through the water cycle and as a part of it, it presents as vapour in air. The vapour present in the air can be converted in to pure water by maintaining certain atmospheric conditions. In this present paper we proposed a method and machine to get pure water from atmospheric vapour using wind energy. In this process a compressor circulates a refrigerant through a condenser and then in to the evaporator coil which cools the air surrounding it. A controlled-speed fan pushes filtered air over the coils. The resulting water is the passed into a holding tank with purification and filtration system to help keep the water pure.

KEYWORDS: Water Vapour, Wind Energy, Condensation, Regeneration of water.

I. INTRODUCTION

The world has begun to recognize that potable or drinkable water is a limited commodity that therefore needs to be used conservatively. Growing populations and changing climates are intensifying the need to conserve. The chief sources of potable water are the surface water and ground water. The over-use of ground water has pushed down the water level far deeper below. Arsenic contaminated water made the problem graver. At present we couldn't be able to use water effectively because of different reasons like a home building culture that does not design to the natural conditions in local environments. When building culture accepts that the methods and aesthetic of structures must vary based on geography, significant environmental savings can occur.

It is well-known that ambient air contains humidity called as water vapour. The amount of water vapour in the air is a function of the location, season and time of day and is measured as relative humidity. Vaporized water is a gas, so it physically exists in air as other gases with respect to temperature and partial pressure. A survey says that on a hot, humid day water vapour could comprise as much as 6 percent of the air and on a cold day it could be 0.07 percent. At an average relative humidity of 64 percent in the Negev desert, about 11.5 millilitres of water could be present in a cubic meter of air.

It is clearly evident that the earth's atmosphere is huge reserve of freshwater. Many attempts have been made by several researchers to convert this vapour in to fresh water using different methods. One of the methods is condensation method. In this method the air temperature is reduced and brought to its dew point. A compressor circulates a refrigerant through a condenser and then an evaporator coil cools the air surrounding it. A controlled-speed fan pushes filtered air over the coils. The resulting water is then passed into a holding tank with purification and filtration system to help keep the water pure. This method becomes more effective as relative humidity and air temperature increase.
But the main drawback of this method is the rate at which the water can be produced depends on relative humidity, ambient air temperature and size of the compressor. If we are unable to maintain these conditions properly, it is highly impossible to convert vapour in to water. And also the cost-effectiveness of the process depends on the capacity of the machine, local humidity and temperature conditions and the cost to power the unit.
So here we have proposed a economic method and equipment to convert water vapour in to fresh water using wind energy as a source to power our equipment which is a renewable source of energy. The main goal of this project is to establish a variety of water conservative, net-zero energy homes that can be used as prototypes for new development in arid climates which is able to turn this moisture into drinking water.

II. RELATED WORK

Benjamin Franklin et al (1758) [1] conducted an experiment to explore the principle of evaporation as a means to rapidly cool an object. They concluded that evaporation of highly volatile liquids such as alcohol and ether could be used to drive down the temperature of an object past the freezing point of water. Michael Faraday (1820) [2] discovered that compressing and liquefying ammonia could chill air when the liquefied ammonia was allowed to evaporate. Dr. John Gorrie (1840) [3] proposed the idea of cooling cities to retrieve residents of “the evils of high temperatures”. He believed that cooling was the key to avoiding diseases like malaria and making patients comfortable. He experimented with the concept of artificial cooling and designed a machine that creates ice using a compressor powered by a horse, water, wind-driven sails or steam. Willis Carrier (1902) [4] proposed and designed an air conditioning system to improve manufacturing process control in a printing plant. His invention controlled not only the temperature but also humidity. He reversed the process of heating objects with steam and instead of sending air through hot coils; he sent it through cold coils where the air was cooled and thereby reducing the humidity in the room. Thomas Midgley et al., (1930) [5] synthesized chlorofluorocarbon (CFC) coolants, which became the world’s first non-flammable refrigerating fluids, substantially improving the safety of air conditioners. However, the chemicals would be linked to ozone depletion decades later and were eventually phased out by the governments across the globe after the Montreal Protocol in the 1990s. Hydro-fluorocarbons (HFC), which doesn’t destroy the ozone, gained the popularity. H. Polnder et al (2007) [6] investigated the feasibility of a 10 MW generator for a direct-drive wind turbine and compared the generator systems for pitch control and for active stall control. They designed a 10 MW permanent-magnet direct-drive generator and concluded that a considerable increase in generator system cost is necessary to enable active speed stall control. Frainhofer-Gesellschaft (2009) [7] proposed a process based on exclusively on renewable energy sources such as thermal solar collectors and photovoltaic cells, which makes this method completely energy-autonomous. The principle of the process is as follows: hygroscopic brine-saline solution which absorbs moisture-runs down a tower-shaped unit and absorbs water from the air. It is then sucked into a tank a few meters off the ground in vacuum prevail. Energy from solar collectors heats up the brine, which is diluted by the water it has absorbed. Because of the vacuum, the boiling point of the liquid is lower than it would be under normal atmospheric pressure. Ahmed M. Hamed et al (2011) [8] investigated on the application of solar energy to heat a sandy bed impregnated with calcium chloride for recovery of water from atmospheric air. They also evaluated the effects of different parameters on the productivity like design characteristics and the climatic conditions. They concluded that the solar powers desiccant system which uses sandy bed can be successfully applied to recover water from air and an average amount of 1.0 litre of fresh water can be recovered per square metre, when the solution concentration at equilibrium with the night conditions is about 30% and the season of operation of such system determines the operating concentration of the solution and therefore, it is recommended to use solution with higher concentration for dry seasons and areas. Caylee Johansson et al (2011) [9] planed to propose a design of practical windmill for residential use to harness energy and reapplied it to house and even an electric car. They decided to propose such small wind turbine so that it would be affordable to purchase and install, with a low maintenance cost, and wouldn’t be unpleasant to have in yard. They concluded that Beltz Limit must also be taken into consideration which states that “for a hypothetical ideal wind-extraction machine, the fundamental laws of conservation of mass and energy allow no more than 59.3% of kinetic energy of wind to be captured” Marc Parent (2012) [10] proposed the idea of collecting water from atmospheric moisture and successfully tested the prototype in a desert in Abu-Dhabi and collected around 1000 litres of water per day from the machine, a kind of wind turbine. He proposed the idea by using simple scientific terms, like condensation, which is a process of conversion of any matter from is gaseous state to its liquid state. This is a natural phenomenon that always happens in atmosphere, cooling down the rising water vapour forming clouds. As atmosphere is rich in water molecule if the temperature drops below dew point at the same atmospheric pressure, dew occurs. Water vapour in atmosphere is carried by the wind to very long distance and according to his machine this humid wind is sucked and water is collected through condensation process. Ben Niewenhuis et al (2012) [11] designed a prototype of an atmospheric water generator, a device which produces drinkable water from humid air. They tested and concluded that wet desiccation is not a practical process for atmospheric water generation as the prototype works and is capable of producing 0.72 litres of water per day with significant potential of 416 Watts for improvement. Temperature and humidity are key variables that influence the rate of water production and testing them in a measureable way is essential. Greg M. Peters et al (2013) [12] experimented on the air water generators (AWG) that condense and disinfect water vapour to provide chilled drinking water in the office environments. They found that the AWGs that are being marketed as environmental friendly alternatives are actually high energy consumers when compared. They concluded that without a renewable energy supply, the claim of environmental superiority is not supported by quantitative analysis in such AWGs. Aditya Nandy et al (2014) [13] proposed a method to develop a water condensation system based on thermoelectric cooler. The system consists of cooling elements, heat exchange unit and air circulation unit. A solar cell panel unit with a relevant high current output drives the cooling elements through a controlling circuit. The device uses the principle of latent heat to convert molecules of water vapour into water droplets. Applying this system in a highly humid region almost a1 litre of condensed water was produced per hour during the day light. It is also observed that the usage of such low power semiconductor devices are indicating towards more prominent evolution of cooling engineering which might alter the power consumption of refrigeration science. Angliki Koulouri et al (2014) [14] proposed a report on saving water with wind energy. Surface water is the predominant freshwater resource across Europe since it can be used in large volumes and at a reasonably low cost. Of the total water used, 81% comes from the surface water supply. All use for energy production as well as more than 75% for industry and agriculture comes from surface sources while public water supply is from groundwater resources due to higher quality standards. Electricity generation is expected to be affected by future decreased rainfalls and higher temperatures. They concluded that wind energy avoided the use of 387 mm^3 of water, equivalent to the average annual household water use. They concluded that wind energy replaces a mix of fossil fuel and nuclear generation, and it avoids consumption of more water in electricity production. D. Bergmair et al (2014)[15] experimented water vapour selective membranes for extraction water out of humid air by more than 50% to separate water vapour from other atmospheric gases. They found that due to the physical barrier the membrane imposes, fresh water generated in this manner is also cleaner and of higher quality than the water condensed directly out of the air.

III METHODOLOGY

In the present paper, a method has been proposed to extract atmospheric water using the wind turbine. In this method air is taken in through vents in the nose cone of the turbine and then heated by a generator to make steam. The steam goes through a cooling compressor that creates moisture which is then condensed and collected. The water produced is sent through pipes down to stainless steel storage tanks where it's filtered and purified. A refrigerant is desired to be used to reduce the temperature and improve the yield.
All the conversion processes basically includes the following steps:

1. Power generation:

To create electricity from wind, the shaft of the turbine must be connected to a generator. The generator uses the turning motion of the shaft to rotate a rotor which has oppositely charge magnets and is surrounded by the copper wire loops. Electromagnetic induction is created by the rotor spinning around inside of the core, generating electricity. This power enables the entire water generating system to function.

2. Ambient air intake:

The atmospheric air is then sucked into the turbine through the nose of the turbine via device known as air blower. All the air trapped during this procedure is then directed through an electric cooling compressor situated behind the propellers.

3. Humid air condensation:

The air which is trapped and directed towards the cooling compressor is condensed at the cooling compressor. This contraption extracts humidity from the air, creating moisture which is condensed and collected.

4. Water collection:

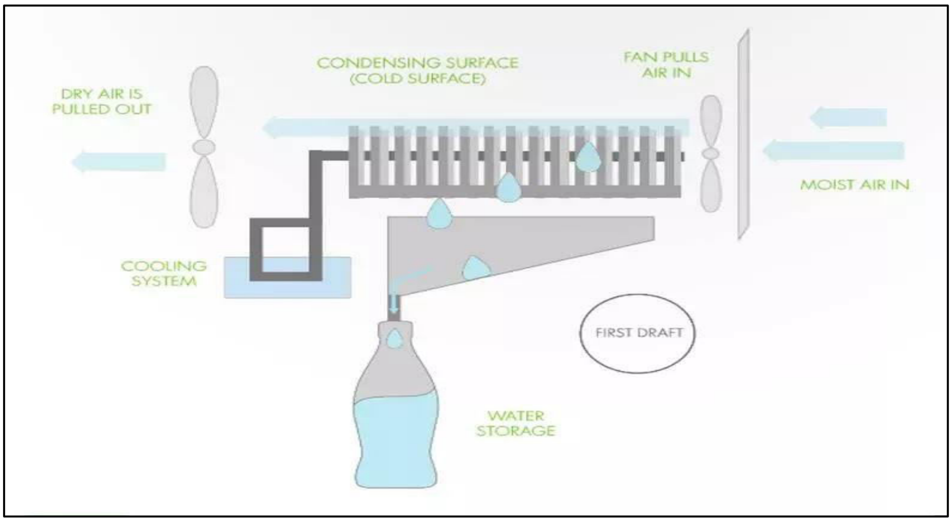
The water gathered at this stage is then transferred down a series of stainless steel pipes, which have been specially modified to aid the water production process, to storage tank in the base of the turbine.

5. Water filtration and usage:

Once the water reaches the storage tank, it sent for purification before using for the drinking purpose.

| ISSN: 2394-2975 | www.ijarety.in| A Bi-Monthly, Double-Blind Peer Reviewed & Referred Journal |

|| Volume 8, Issue 4, July 2021 ||



PROPOSED EXPERIMENTAL SETUP

IV. CONCLUSION

Water conservation has become really important in recent times looking at the global climatic change and the scarcity of water that it is causing. We need to save and if possible regenerate water for our future generations and for a healthy survival of our planet. The regeneration method we chose here is from atmospheric vapour. The proposed method and machine yield good results but becomes more effective with the increase in relative humidity and air temperature. The cost-effectiveness of machine depends on the capacity of the machine, local humidity and temperature conditions and the cost to power the unit. So we have used wind energy as a source to power our equipment which is a renewable source of energy making method more economic

REFERENCES

[1] D. Bergmair, Sybrand J. Metz, H.C. De Lange and A.A. van Steenhoven, "System analysis of membrane facilitated water generation from air humidity" Article in Desalination 339(1):26–33 · April 2014, DOI: 10.1016/j.desal.2014.02.007

[2] Perters Greg, Blackburn, Naomi, Armedion and MICHAEL, "Environmental assessment of air to water machines-triangulation to manage scope uncertainty"The international Journal of life cycle assessment-springer journal June 1, 2013, DOI: 10.1007/s11367-013-0568-2

[3] Control H. Polinder, D. , R.P.J.O.M. van Rooij, and A.S. McDonald, M.A., "10 MW Wind Turbine Direct-Drive Generator Design with Pitch or Active Speed Stall" , 1-4244-0743-5/07/ 2007 IEEE

[4] Caylee Johanson, Zach Hallowell, Greg Rolph and Rob Sutton , "A Proposal to Design a Wind Turbine for Residential Use"

[5] Angeliki Koulouri and Jacopo Moccia (EWEA), "Saving water with wind energy" A report by the European Wind Energy Association - June 2014, ISBN: 978-2-930670-05-8

[6] Chris Shepperly, Ryan Van Beek, Eric Van Kooten and : Ben Niewenhuis, "ATMOSPHERIC WATER GENERATOR WATER FROM AIR", 9 May 2012

[7] Aditya Nandy, Sharmi Saha, Souradeep Ganguly and Sharmistha Chattopadhyay, "A Project on Atmospheric Water Generator with the Concept of Peltier Effect "International Journal of Advanced Computer Research (ISSN (print): 2249-7277 ISSN (online): 2277-7970) Volume-4 Number-2 Issue-15 June-2014

[8] Ahmed M. Hamed, Ayman A. Aly and El-Shafei B. Zeidan, "Application of Solar Energy for Recovery of Water from Atmospheric Air in Climatic Zones of Saudi Arabia ", Natural Resources, 2011, 2, 8-17 doi:10.4236/nr.2011.21002 Published Online March 2011 (http://www.scirp.org/journal/nr)

[9] Fraunhofer-Gesellschaft,"Drinking Water From Air Humidity" -- Science DailyJune 8, 2009

[10] https://en.wikipedia.org/wiki/Benjamin_Franklin

[11] https://en.wikipedia.org/wiki/Air_conditioning

[12] https://en.wikipedia.org/wiki/Michael_Faraday

[13] https://en.wikipedia.org/wiki/Michael_Faraday