Energy from Salt Gradient Solar Pond: Waterlogging and Salinity

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IN

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RESEARCH COMPLETION CERTIFICATE

Certified that the research work contained in this thesis titled, **"ENERGY OBTAINED FROM SALT GRADIENT SOLAR POND: Waterlogging and salinity"** has been carried out and completed by **Qaisar Abbas, ID: 14003139004**. The quantum and the quality of the work contained in this thesis is adequate for the award of Degree of MS/M.Phil.

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DECLARATION

I **Qaisar Abbas s**/o RiazHussain ID: **14003139004,** Session 2014-2016 hereby declare that the matter printed in the thesis titled "**ENERGY OBTAINED FROM SALT GRADIENT SOLAR POND: WATERLOGGING AND SALINITY** "is my own work and has not been printed, published and submitted as research work, thesis or publication in any form in any University, Research institution etc. in Pakistan or Abroad**.**

Dated: _____ _____

(Qaisar Abbas)

DEDICATION

Dedicated to

My Parents, Teachers, Wife and all others close to me.

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This research is a result of the Blessings showered and endowed by Almighty Allah, most Beneficent and Merciful for which I offer my gratitude to Allah. May the Holy Prophet Muhammad (PBUH)be praised who enabled us to recognize our creator.

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Author

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CHAPTER 3

Abstract

For the useful conversion of solar energy solar ponds are probably one of the simplest technologies available. Solar ponds have been used for many applications like conversion of solar energy into thermal and electrical energy. These conversions are economically viable and technically feasible particularly in Pakistan. Pakistan is an agricultural country and swirly facing waterlogging and salinity problem, which is a drag to economy. Almost 43% of the area in Indus Basin Irrigation System (IBIS) is classified as waterlogged having depth to water table less than 3m.To demonstrate the technical and economic feasibility of solar pond in Pakistan water samples are taken from the villages near Hudiara drain Lahore. Then quality of water samples is tested and found highly saline. It is proposed to construct salt gradient solar ponds in villages near Hudiara drain Lahore by using saline water from the underground of the water logged area. By utilization of energy obtained from salt gradient solar pond, we can pump out the underground saline water and use that water for next solar pond, whose energy can be used again to repeat the same cycle. This may be continued till all the logged water is drained out. This way the logged and saline land can be turned into the land suitable for agriculture purpose.

Keywords: solar energy, solar pond, types and applications of solar pond, efficiency, Waterlogging and salinity.

CHAPTER 1

Introduction

A country's prosperity is measured by the consumption of energy in that country because energy is basic need for industrial and technological development. Pakistan is an energy deficient country facing worst energy crises in history. Reason of crises is increasing demand of energy, poor economy and depletion of energy sources. Pakistan is an agricultural country. Area of Pakistan is about 79. 6 million hectares (Mha) and only 23 Mha is cultivated area and round about 25 % of the total cultivated area is nominated for rain fed agriculture and remaining 75% is irrigated area[1] .The productivity and sustainability of the IBIS is a major challenge faced by the country because the economic loss due to the water logging and salinity. However, inappropriate and inefficient irrigation has raised the water table in the IBIS. Twin menace of salinity and waterlogging are reducing the productivity of agricultural lands. Canal irrigation without adequate drainage in arid environments of the IBIS (flat topography, lack of natural drainage, porous soils, and arid climate with higher soil evaporation) certainly leads to rising problems of salinity and waterlogging.