

RENEWABLE ENERGY POTENTIAL FROM MICRO HYDRO FOR TECHNO-ECONOMIC UPLIFT – A BRIEF REVIEW

Tian Chuan Min¹, Mohammad Iskandar Jobli¹, Abu Saleh Ahmed¹, Robert Malong¹, Masri Zaini¹,
Mohammad Omar Abdullah^{1,*}, Mohd Narzam Jaffar² & Mohamad Abdullah Ali²

¹Faculty of Engineering, Universiti Malaysia Sarawak (UNIMAS), 94300 Kota Samarahan, Sarawak, Malaysia

²Sjinkat Power Corporation Sendirian Berhad (SPC), Kuching, Sarawak, Malaysia.

ABSTRACT

Modern world requires energy more than ever. As the global population and modernization exhibit seemingly ever upward trends, it is certain that the crave for energy will continue to rise. However, conventional energy is depleting at an alarming pace, though renewable energy seems to prospect a promising alternative. Being one of the more established and successful renewable energy technologies, the authors attempt to review the micro hydro as well as its potential in providing sustainable energy to the mankind.

Keywords: renewable energy, micro hydro, sustainable energy

1. INTRODUCTION

The industrial revolution that occurred about a couple of centuries ago has drastically transformed each and every aspect of human activities [1]. Since then, various products, tools and devices are created and perfected to facilitate human activities and improve livelihoods. Nowadays in these modern societies, cars, phones, air-conditioners, lifts and lightings are some of the good examples that have become inevitable necessities to human. More so, numerous types of sophisticated machines and robots have been invented to perform tasks otherwise impossible or too dangerous to be carried out by human alone. Though these inventions provide great conveniences and possibilities to mankind, they all need energy to function – be it in the form of fuel, electricity or battery.

It is not exaggerating to claim that modern world as we are in now will not move without energy. Literally every aspect of human activities such as industries, agricultures, constructions, trasportations and communications require energy to perform or operate. All will come to a complete halt with the absence of energy [2]. Therefore, it is of prime importance for every modern society and nation to secure a sufficient, accessible and reliable energy provision [3].

As the human population and activities are progressively developing, it is most certain that the demand for energy worldwide is increasing as well – and this trend is most likely to continue in the future [3, 1]. As of now, conventional energy such as fossil fuels, firewood and nuclear power are still the primary energy sources consumed by the human [4, 5, 6]. According to America's Department of Energy (DOE), fossil fuels provide more than 85% of all the energy used in the United States, while more than 99% of the automobiles use oil as fuels [5, 7]. As for Malaysia, the total electricity generated in 2003 is around 79 billion kWh, for which 87% is thermal and remaining 13% is hydroelectric [8].

2. CONVENTIONAL AND RENEWABLE ENERGY

Conventional energy sources include fossil fuels, firewood and nuclear power. Fossil fuels refer to coal, oil and natural gas, which is the type of conventional energy sources that all modern societies consume the most. Conventional energy sources are comparatively inexpensive and require developed and established technologies that can produce sufficient and reliable energy to major cities around the clock [5, 6]. However, all types of conventional energy sources – fossil fuels, firewood and nuclear power included – have some grim drawbacks. The pollutants release by burning fossil fuels and firewoods and the radioactive residue of nuclear power generation are hazardous to all lifeforms. Moreover, conventional energy sources are diminishing rapidly – since the total capacity of fossil fuels, firewood and nuclear power on earth are finite. The exhaustion of conventional energy sources and the rising demand have compelled the planners and policy makers to look for alternative resouces [2].

Through various efforts, it seems that renewable energy is the best answer for the energy crisis. Unlike conventional energy sources, renewable energy sources are abundant in nature and easily accessible to mankind around the world. They are and will always present on earth whether being harnessed or not [2]. In addition, renewable energy is available in wide range, which includes but not limited to solar, hydro, wind, wave and ocean thermal energy [5, 9]. All these sources of energy are renewable; they replenish themselves and are virtually inexhaustible [2]. However, most renewable energy technologies are relatively new and still undergoing development. Moreover, unlike