



Scenario Based Technology Road Mapping to Transfer Renewable Energy Technologies to Sri Lanka

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Abstract As per the International Energy Agency (IEA) 2009 report, rapidly growing energy demand in developing countries is projected to double by 2030. After ending the three decades of civil war, the Sri Lankan economy has also shown a robust growth; hence the country has shown a continuous growth in energy demand. In 1995 Sri Lanka met 95% of the total electricity demand using major hydro power plants. But due to the escalating demand for electricity and government policies favouring the coal powered power plants, a completely different power mix exists today. By the end of year 2012, more than 70% of the total electrify requirements of the country was met with fossil based energy sources. Today, as responses to the threats of climate change manifest, following many other nations, Sri Lanka also considered renewable energy in their energy mix. However, the lack of technological capabilities has hindered the development of renewable energy technologies in the Country. The solution to such constrains lies with effective technology transfer and cooperation of renewable energy technologies. Technology Road-mapping and scenarios are two widely used future techniques to support strategic and long-range planning. This paper provides a combined approach of technology road mapping and scenario planning in order to foster the renewable energy technologies of Sri Lanka via effective technology transfer mechanisms. The combined approach consists with six steps, and foresight analysis tools such as literature review, expert's interviews, STEEPV analysis, and Delphi technique were used along the process. Four scenarios named 'Land of Republic', 'Green Paradise,' 'Drowning Island' and 'Black Island' were developed. Out of the four scenarios, 'Green Paradise' was considered as the most favourable scenario for Sri Lanka and technology roadmap was developed targeting this scenario. The proposed technology roadmap consists with six steps and the roadmap suggests effective technology transfer mechanism to foster the renewable energy technologies of the country.

Keywords: *renewable energy, road-mapping, scenario planning, sri lanka, technology transfer*

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1. Introduction

Energy is undoubtedly the basic need for continuity of economic development and human welfare. In modern societies, electrical energy proves to be one of the crucial forms of energy used by human beings in manufacturing products and providing service. As the human population increases, the amount of electricity usage grows as well. It is projected that the world electricity usage will reach 32,922TW-hours by 2035[1].

In 1995 Sri Lanka produced 95% of its grid electrical energy needs from conventional hydro power plants. However, expansion of household electricity consumption and the boost in the industrial sector of the country have forced the country to depend on alternative energy resources such as fossil fuels. The total amount of electricity generated during 2012 was 11,878.8 GWh out of which 70.9% was from thermal power plants (both oil and coal), while 23.0% was from major hydro and the balance 6.2% was from Non-Conventional Renewable

Energy (NCRE) which comprised of small hydro, wind power, biomass and solar [2].

1.1. Rising Demand for Local Electricity Generation

In parallel to many emerging Asian countries, Sri Lanka has been struggling to meet the rising demand for power. After ending the 30years of civil war, the country's economy has been showing robust growth, in turn accelerating the demand for power. Electricity demand growth rate in the past has most of the time revealed a direct correlation with the growth rate of the country's economy.

The Central Bank of Sri Lanka expects an average GDP growth rate of 8% in real terms in the four years from 2012 to 2015. The demand for power is expected to accelerate on the back of the expanding economy, and the current statistics show that the country's electricity demand has been growing at an average rate of 5.9% per annum [3]. The overall favourable economic prospects, increased investments in the industrial and manufacturing