DETERMINING FACTORS LEADING TO SUCCESSFUL UTILIZATION OF BIOMASS FOR POWER GENERATION IN SRI LANKA

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INTRODUCTION

During the past decade, many Sri Lankan energy-providing companies have invested in renewable energy projects to generate electricity. Solar, wind, and mini-hydro projects are the main focus of these investors. However, biomass energy generation which is highly successful in many other Asian countries has not received due attention in Sri Lanka. Even though there were a few bio-mass energy-generating projects commenced in Sri Lanka with a total capacity of 50 MW [1], most of them proved to be unsuccessful in a short period. Sri Lanka is an agricultural country that has several varieties of plantations. Plantations such as paddy, rubber, and coconut are densely distributed in Sri Lanka. Agricultural waste that is produced in the harvesting and processing of crops on these plantations is also a good source of biomass for power generation. According to the Biomass Resource Atlas of Sri Lanka produced by Sri Lanka Sustainable Energy Authority, the share of Agro-residues produced by Rubber, Paddy, Sugarcane, Coconut, Cashew, and Cinnamond plantations are 53 %, 34%, 7%,4%,1%, and 1 % respectively [2]. Sri Lanka has a total paddy production of 3,061,394 MT. The three districts which produce the highest amount of paddy are, Anuradhapura (460,585 MT), Polonnaruwa (307,190 MT), and Ampara (365,123 MT). The rice straws and rice husk are good sources of biomass with a higher calorific value [2].

This study inquires about the reasons that lead to the failure of biomass energy generation in Sri Lanka by analyzing relevant information and making an attempt to ascertain the favorable factors.

METHODOLOGY

The methodology adopted involved collecting relevant information from various sources, analyzing it and finally making suitable recommendations. A summary of the methodology utilized has been given below.

- Carrying out a literature survey of relevant case studies, environmental reports, policies, and legislation including court orders.
- Conducting interviews with some experts from the industry.
- Analyzing information collected in the literature survey to ascertain reasons for the lack of success in bio-mass energy generation.
- Making recommendations for improving bio-mass energy generation,

RESULTS AND DISCUSSION

Analysis of information collected through the literature survey and discussions carried out with the experts indicates that a multitude of reasons including policy, technical, legal, and administrative, have led to the failure of biomass-based electricity generation in Sri Lanka.

Policy: The national energy policy in general values and encourages power generation using renewable energy [3]. It has explicitly mentioned the importance of hydro, solar, and wind as sources of power generation. However, when it comes to Biomass, the policy focuses more on its usage for household cooking purposes and industrial thermal energy supply. Failure to explicitly include biomass as a viable source for electrical power generation may hurt its future development. The policy has only seen and emphasized the traditional use of Biomass, but not as a viable source of electrical power generation. This deficiency may permeate down to the investor level, discouraging them from investing in biomass power generation projects and may even lead to the reluctance of funding institutes such as banks to provide loan facilities as opposed to hydro, mini-hydro, solar, and wind projects.

Further, the policy document has failed to emphasize salient features of biomass generation of power, such as possible environmental cleansing by large-scale plantations providing the source material, paving the way for earning foreign exchange through the Carbon Credit Scheme. Unlike the producers of other forms of renewable energy, biomass energy producers have to face additional problems due to the necessity of producing the source material for power generation. The policy has been completely ignored by policymakers as well as administrators. According to Mokan et al. [3], the critical factors behind the success of renewable projects are the economy, environment, Society, technology, government, organization, and management. Maqbool et al. [4] have attributed the success of such projects to communication factors, team factors, technical factors, organizational factors and environmental factors. Therefore, policy makers should prepare policies that are friendlier for the development of biomass power generation.

Legislations: The present legislation (Electricity (Amend) Act No. 31 of 2013) requires every power project to come under competitive bidding to ensure spending the least cost on procuring power. Very often, biomass projects are very small ones that do not exceed 10 MW of power generation. Further, biomass power plants have to bear the additional burden of establishing a viable supply chain for raw materials. Therefore, sustainable energy projects such as biomass power generation projects need to be given a special feeding tariff. This was the practice in the past which was taken away by the present act discouraging many small-time biomass power producers.

Use of Outdated Technology: It was observed that most of the failed bio-mass power plants in Sri Lanka had commissioned used machinery that utilizes outdated technology. Further, most biomass developers do not have the technical capabilities of planning, commissioning, maintaining, and operating biomass plants. In addition to the low output and frequent breakdowns of the plant, outdated technologies coupled with a lack of expertise have created many environmental issues. From the JICA report, it can be observed that a Biomass power plant can create a high amount of impact on social and natural resources. There is a probability of leaking waste from the biomass power plant and contaminating soil and water. Vibration and noise created by machinery and vehicles can create sound pollution. It is also possible to have destruction or rapid changes in the ecosystem due to the planting of a single tree species in a large area. Changes in the animal ecosystem may also lead due to the planting of a single tree specimen in a large area [5]. The use of new technology with expert advice will have a very good chance of avoiding such problems. This is evident in India and collection, processing, low-end-use efficiency of conventional devices and insufficient maturity of present biomass energy technologies are major barriers to utilizing the available bioresources more efficiently and on a sustainable basis in India [6].

Administrative: In Sri Lanka, energy developers, including those involved in the generation of biomass energy must go through a time-consuming application process to obtain an energy permit and the proposed centrally coordinated approval process is still in a dormant state.
It was also reported that no assistance has been quoted for biomass power developers in obtaining carbon credit facilities involving elaborate procedures.

Monitor: Most banks only consider the economic return on granting loan facilities for power generation. Non-quantifiable social gains in biomass power generation are not due consideration and show reluctance to provide loan facilities.

CONCLUSIONS/RECOMMENDATIONS

1. Recognize biomass electricity generation on the same footing as other renewables such as wind and solar in Sri Lankan energy policy enhancing the confidence of developers to go for biomass power generation.
2. Value the special advantages of biomass energy generation due to its capability of securing carbon credit and other advantages which cannot be expressed and quantified in economic

terms in the national energy policy of Sri Lanka encouraging developers to pursue biomass electricity generation.

3. Remove the barriers imposed by the electricity (amend) act no. 31 of 2013 on giving special consideration to purchasing renewable energy, including biomass energy by the CEB.
4. Expedite the energy permit granting process for the developers and avoids discouragements by properly activating the presently dormant centrally coordinated approval process.
5. Provide advice and assistance to the biomass electricity plant developers to obtain the advantages of the carbon credit scheme.
6. Provide technical support to the biomass electricity developers in selecting proper machinery, designing the plant, installation of machinery, operation, and maintenance, if necessary, providing facilities to get expert advice from experienced foreign consultants.
7. Give special consideration to biomass electricity plant developers, taking into account difficulties confronted by them due to the necessity of developing or purchasing the source material as opposed to other renewable sources which are available free of cost and time taken for the establishment of a supply chain.
8. Considering the other social benefits such as the provision of employment on a large scale, make arrangements to provide special types of bank loans.
9. Provide technical support to the biomass electricity developers in selecting proper machinery, designing the plant, installation of machinery, operation and maintenance, if necessary, and providing facilities to get expert advice from experienced foreign consultants.
10. Give special consideration to biomass electricity plant developers taking difficulties confronted by them into account due to the necessity of developing or purchasing the source material as opposed to other renewable sources which are available free of cost and time taken to establish a reliable supply chain.
11. Considering the other social benefits such as the provision of employment on a large scale, make arrangements to provide special types of bank loans.

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