Reviewing Malaysia's Renewable Energy Policies: A Management Framework Perspective

Pei Y. Ong, Christina M. M. Chin, and Eng H. Yap

***Abstract*—This paper reviews current renewable energy policies in Malaysia to develop an understanding of the country's progress in achieving energy sustainability given that fossil fuel resources are facing its eventual and gradual depletion; hence the need to develop a project management framework with reference to Malaysia's renewable energy efforts. Extensive literature review was conducted and a comparative analysis were performed to further the understanding of vital modifications and inclinations historically involving the evaluation and assessment of Malaysia's renewable energy policies, its framework as well as its implementation guidelines. These reviews would contribute in developing a policy-writing management framework based upon the SWOT analysis of Malaysia's renewable energy policies. This was then developed to further improve the structural stance of current policies to ensure effective implementation of large-scale renewable energy projects in Malaysia.**

***Index Terms*—Project management, renewable energy, policy, Malaysia.**

I. Introduction

Policymakers often face the challenge of providing a consistent, inexpensive, maintainable, secure and low carbon energy supply. This is particularly true for Malaysia; with a population of 28 million whilst electricity remains unavailable to a significant proportion of the population [1], [2].

With the gradual depletion of fossil fuels, renewable energy (RE) is seen as one of the viable solution to Malaysia's energy needs. Despite the numerous RE policies implemented, there appears to be a gap prohibiting effective implementation due to factors such as insufficient knowledge and public awareness [3], [4]. Hence, this paper aims to investigate the lack of, and to identify and recommend, a suitable management framework to facilitate the implementation of RE policies in Malaysia.

II. Background and Motivation

Energy related policies have been drawn by Malaysia's policymakers since 1949 to drive the country's sustainability development. However, barriers such as unrealistic expectations, communication barriers, and a lack of public awareness and support have hindered successful implementation of these policies [5]. The objective for this project is not only to provide RE policy formulation guidance for policymakers, since the deployment of RE contributes considerably to the economy [6], but to also recommend project management (PM) methodologies in the RE industry especially during the implementation of RE policies [7].

The research methodology adopted in this paper consists of a literature review of RE policies worldwide thus comparing data between developed and developing countries, as well as developing a SWOT analysis of Malaysia's current RE policies and their implementation so that these can be integrated into a suitable project management framework.

A thorough literature review conducted revealed the following: World Summit for Sustainable Development reported that climate change, pollution and potential loss of biodiversity and other social issues are consequences of climate change which have triggered the need for RE [8]. With energy consumption exponentially increasing whereas conventional fuel supply e.g. oil and gas decreasing, the need for extraction of energy which can be derived from natural, inexhaustible resources such as sunlight, wind, rain, tides, and geothermal heat has been identified [9]. With the availability of these RE resources, this drives the potential of gearing the world's concurrent emerging economic state to a more sustainable future [6].

A review of RE policies for a number of nations was conducted with a view to distinguish efforts, barriers, and subsequently the path that each country is taking to achieve a sustainable development to further enhance the understanding of the implementation process before developing a feasible framework.

A. Developed Countries

A developed country is one which possesses a high development level according to predetermined economic criteria e.g. revenue per capita, industrialisation, and recently introduced Human Development Index (HDI) [10]. For a comparative analysis, five countries active in the development of RE were put into consideration e.g. Australia, Germany, Japan, United Kingdom, and United States.

An analysis conducted by World Bank [11], [12] indicates that these countries are making significant efforts to assimilate RE into their country's sustainable development plan. For instance, Australia's Renewable Energy Target (RET) in 2009, and Germany's Renewable Energy Sources Act in 2000 have comparable goals: to reduce dependency on

Manuscript received March 17, 2015; revised September 26, 2015.

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doi: 10.18178/jocet.2016.4.6.330

fossil fuels and consequently increase RE's fraction in the country's energy mix [13]. Similarly, the US has also incorporated strategies which were found to be diverging in terms of implementation; these have slowed down the country's RE growth compared to Germany [14].

In spite of positive economic and technological circumstances in these countries, the lack of a governing framework, financial sustenance, technical capability [15] and social approval (licensing) were found to be impeding. A governing framework is highly prioritised by these developed countries as efficient and effective management is often needed for the implementation of these policies.

B. Developing Countries

Developing countries namely the BRIC constituents: Brazil, Russia, India, and China were considered in this paper in a comparative analysis. Similarly, they have also realised the need for RE. Brazil is known to be rich in resources such as solar, wind, hydro, ethanol, and biodiesel [16]. Efforts to promote biomass as a viable form of energy were carried out to boost growth in ethanol and biodiesels e.g. Brazil Ethanol Program and Production and Use of Biodiesel [17]. Alternative Sources Incentive Program (PROINF) in 2002, and Ten Year Energy Expansion Plan (PDE), which were developed around the Brazilian Clean Energy Scenario, has also been employed to diversify its energy supplies and to reduce its energy imports [16], [18].

Since the accident which have caused the destruction of Russia's Sayano-Shushenkaya hydropower plant in 2009, there was an urgent need for significant energy development in the country. Common support policies and capacity-based support schemes share a similar objective, which is to increase the number of electricity production investors [19]. Since the establishment of the federal law on energy efficiency, there have been a number of policies built around it e.g. Energy Strategy to 2030 and Federal Energy Efficiency Program [19].

Energy policies such as Energy Conservation Law in 2001, Electricity Act 2003, Integrated Energy Policy in 2006, and recently the National Action Policy on Climate Change have been implemented by India to highlight the importance of diversifying energy supply. It is aimed that India's energy mix should comprise of 15% from RE sources by 2020 [20].

China has taken a significant step since mid-1980s to mitigate climate change and to diversify its depleting fossil energy resources with the enactment of Renewable Energy Law. That was the beginning of an energy revolution in the country [21]. There have been several policies outlining the continual need for RE, which targeted a usage of 10% of RE by 2010, and then 16% by 2020. However, these initiatives were found to be lacking long-term goals, social acceptance, sufficient financing schemes, and investment for extensive R&D [21].

C. Renewable Energy Policies in Malaysia

According to Rakob, Malaysia is heavily dependent upon oil, natural gas, hydropower, and coal for its electricity generation sector [22]. However, the National Energy Policy in 1979 has triggered a progress for Malaysia where other major energy policies complying to Malaysia Plans e.g. the National Depletion Policy (1980), Four-fuel Diversification Policy (1981), Renewable Energy as the Fifth Fuel Policy (2000) and Small Renewable Energy Programme (SREP) (2001) (shown in Table I). These policies were primarily developed based upon the National Energy Policy [23], [24]. In 2001, Malaysia started the implementation of small scale Feed-in Tariff (FiT) mechanism in SREP, confirming definite access to the utility distribution grid, 21-year contracts from the time of commissioning and cost-based acquisition fees [25].

D. Project Management Body of Knowledge (PMBOK)

The Project Management Institute (PMI) explains that in order to accomplish a set of goals and visions, there is a range of actions that can be utilised to plan, organise, direct, control, motivate, and evaluate roles by highlighting ten bodies of project management (PM) knowledge specifically integration, scope, time, cost, quality, human resource, communications, risk, procurement, and stakeholders [26].

TABLE I: MAJOR ENERGY POLICIES IN MALAYSIA FROM 1949–2013 [5]

Major Energy Policies/Events in Malaysia from 1949-2013		
Year	**Policy/Event**	**Main Agenda**
1949	Central Electricity Board	Authoritative board in integrating electricity production, transmission, and supply
1974	Petroleum Development Act	The conferring of all petroleum-related resources to Petroleum National Berhad (PETRONAS), a wholly owned governmental body
1975	National Petroleum Policy	To deliver appropriate regulatory guidelines for Malaysia's oil and gas industry in attaining pre-set economic goals and objectives
1979	National Energy Policy	To assist as a pivot policy which focuses on three ideas: supply, utilisation, and environmental
1980	National Depletion Policy	To assure an effective and safe utilisation of natural reserves, especially oil
1981	Four-Fuel Diversification Policy	To avoid over-reliance on oil whilst confirming dependability of oil, gas, hydro and coal in Malaysia energy mix
1990	Electricity Supply Act	To function as a governing organisation in the electricity supply industry, ensuring sensible energy prices, permitting and monitoring of electrical installations, and encouraging competent electricity usage
2001	Five-Fuel Diversification Policy	To introduce RE as the fifth source in the energy mix
2001	Small Renewable Energy Power (SREP) Programme	To endorse rigorous practice of RE in small scale projects, sustained by the enactment of Special Committee on Renewable Energy (SCORE)
2001	Energy Commission Act	To control commercial and monetary performance and supervision of the energy industry in Malaysia (based on Electricity Supply Act and its subsidiary policies)
2006	National Biofuels Policy	To lessen needs for fossil fuels, promoting use of palm oil and stabilising its price in the energy market countrywide and worldwide
2009	National Green Technology Policy	To increase the development of green technology in Malaysia whilst keeping adequate competitiveness internationally, and building cognisance for prospective generations
2011	New Energy Policy	To begin initiating a secure and managed energy supply by stimulating RE usage, consolidating governance, and embracing market-based energy pricing

III. SWOT Analysis of Malaysia's Renewable Energy Policies

TABLE II: SWOT Analysis of Malaysia's RE Policies

Strengths	Weaknesses
• Acknowledges Malaysia's necessity for sustainability [6] • Offers a method of governance [12] • Determines objectives to be attained [36] • Encourages worldwide collaboration [39]	• Lack of regulatory framework [7] • Inadequate cost and knowledge [7] • Inadequate research [7] • Lack of public support [9] • Lack of RE statistics [5] • Incapable of meeting policy aims [5]
Opportunities	**Threats**
• Increases RE contribution globally [39] • Increases employment rate [9] • Decreases dependency on conventional fuels [3] • Energy efficiency [39] • Avenue for improved governance [34]	• Continual shifting of international RE policies and standards [6] • New RE technology [37] • Stakeholders losing motivation [38] • Public disapproval [5] • Political conflicts [37] • Economic inflation [26]

After reviewing Malaysia's RE policies, a SWOT analysis (shown in Table II) was created to facilitate the development of the framework which will be addressed in the next section. The need to identify alternative energy sources was determined since Malaysia's Sixth Malaysia Plan in 1991, thus distinguishing it as one of the strengths attributed in the analysis. These strengths and opportunities include increased RE participation worldwide whilst boosting employment rate in the country [9] further encourage the deployment of RE in Malaysia. A lack of regulatory framework and public support [24] are examples of significant weaknesses and threats identified during the reviewing process which will serve as a form of leverage in designing the framework.

IV. Comparative Analysis of RE Policies Worldwide and Malaysia

The literature review conducted shows a trend in both developed and developing countries where there were continuous effort to increase the share of RE in their countries. For example, Germany and US have less difficulties in implementing RE compared to Malaysia because their governments provide strong enforcements and support [27], [28]. Despite the differences in HDI, these countries including Malaysia face similar challenges as seen in aforementioned SWOT analysis, and these will be used as the basis to design the management framework for Malaysia.

V. Development of a Project Management Framework

According to Bloom's taxonomy, knowledge, comprehension, application, analysis, synthesis, evaluation, and creation are important to effectively carry out a project thus making it relevant to understand the association between policy-making and project management [29]. In order to meet the aim of this research, the development of a PM framework for RE policies implementation in Malaysia is imperative. The developed framework aims to achieve the following criteria: clear, transparent, effective, consistent, and compliant [30] as the purpose of a framework in this case, is to be a conceptual structure which serves as a support or guide.

A. Integration of Project Management and Renewable Energy Policy Implementation

There are disadvantages to relating RE with PM such as incompetency in terms of technological understanding, e.g. in the palm oil industry; a majority of people would be expected to only have partial understanding in advanced boiler technology [5]. Past involvements in countries such as Germany and China highlighted that in spite of the application of standard PM methodology in Germany, subsequent result was found to be non-satisfactory [28]. The difficulty to penetrate each relevant RE element as well as a generic methodology were found to be obstructing. Moreover, feasibility studies are often expensive, causing lost in motivation for most developers and investors to continue pursuing RE projects [30]. Overall non-compliance of RE conception and projects in Malaysia were majorly caused by institutional flaws such as capacity capping and ineffectively formulated national policy frameworks [6]. Thus this project realises the essentiality to develop a suitable PM framework that aims to overcome these difficulties by assisting the policy-writing and implementation process of RE policies in the country.

B. Developed Framework and Justifications

According to PMBOK, PM is an integrative endeavor where an action, or failure to take action, would normally affect other areas [26]. There are necessary stages to be taken before implementation. For example, the finalised policy has to be submitted to the authoritative board and stakeholders for approval before it could be implemented fully, otherwise corrective action has to be taken again to further improve the policy [31]. In each of the lower level processes, there are tools and techniques recommended by PMI to transform inputs into outputs [26]. The framework, as shown in Fig. 1, comprises of five stages: identifying the goals, planning the policy-writing, writing the policy, monitoring and controlling the policy, and submitting the policy.

VI. Conclusion and Further Works

This paper proposed a framework integrating the policy-writing process and its implementation using project management methodology, taking through the literature review on some selected nations', and Malaysia's, RE policies. A comparative analysis yielded a SWOT analysis of Malaysia's own RE policies. This study highlighted the importance of understanding the policy development process before a management framework could be designed as a tool to provide information and to serve as a guide to RE policy-makers. The proposed framework could be used as a guide to RE policy implementation as it can ensure management consistency. However, it is imperative to take into view that such a framework could be problematic when only a superficial top level perspective, e.g. ministerial level,

is considered. Therefore, expansion, or more importantly, substantiation, of the framework into its downstream constituents has to be considered. These should comprise of work inputs/outputs, tools and techniques which could be utilised; a continuous improvement mind-set to adapt to various scope, managerial, and legislative factors alongside with vigorous and practical testing of the framework by relevant parties.

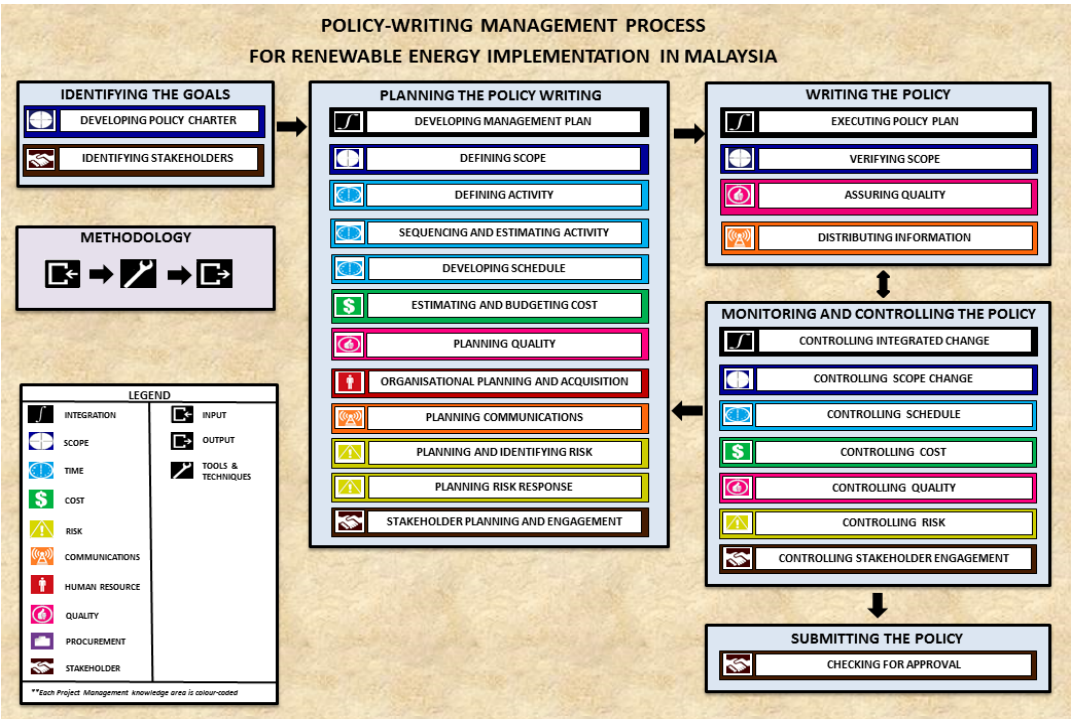

Fig. 1. Developed framework for RE policy-writing processes in Malaysia.

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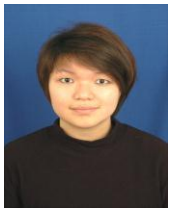

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