Energy Policy 67 (2014) 618–625

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

Communication

Progress of feed-in tariff in Malaysia: A year after

Firdaus Muhammad-Sukki [a,b,*], Siti Hawa Abu-Bakar [a,c], Abu Bakar Munir [d,e], Siti Hajar Mohd Yasin [f], Roberto Ramirez-Iniguez [a], Scott G McMeekin [a], Brian G Stewart [a], Ruzairi Abdul Rahim [g]

[a] School of Engineering & Built Environment, Glasgow Caledonian University, 70 Cowcaddens Road, Glasgow, G4 0BA Scotland, United Kingdom
[b] Faculty of Engineering, Multimedia University, Persiaran Multimedia, 63100 Cyberjaya, Selangor, Malaysia
[c] Universiti Kuala Lumpur British Malaysian Institute, Batu 8, Jalan Sungai Pusu, 53100 Gombak, Selangor, Malaysia
[d] Faculty of Law, University of Malaya, 50603 Kuala Lumpur, Malaysia
[e] University of Malaya Malaysian Centre of Regulatory Studies (UMCoRS), University of Malaya, 59990 Jalan Pantai Baru, Kuala Lumpur, Malaysia
[f] Faculty of Law, Universiti Teknologi MARA, 40450 Shah Alam, Malaysia
[g] Faculty of Electrical Engineering, Universiti Teknologi Malaysia, 81300 UTM Skudai, Johor, Malaysia

HIGHLIGHTS

- Malaysia launched the feed-in tariff (FiT) scheme in December 2011.
- The one year progress is evaluated in terms of installation and economical aspects.
- The uptake for renewable energy installations has been extremely high.
- Investment related to renewable sectors has increased significantly.
- More 'green' jobs have been created in the country.

ARTICLE INFO

Article history:
Received 28 October 2013
Received in revised form
10 December 2013
Accepted 21 December 2013
Available online 15 January 2014

Keywords:
Feed-in tariff
Renewable energy
Solar photovoltaic

ABSTRACT

Malaysia enacted the Renewable Energy Act in April 2011. One of its important components is the feed-in tariff (FiT) scheme—launched in December 2011. The scheme is managed and administered by the Sustainable Energy Development Authority (SEDA) of Malaysia. This paper analyses the impact of the FiT mechanism in Malaysia a year after its implementation; particularly on the installation and economical aspects. First, the history of the scheme is presented before summarising the application process for the scheme. Next, a detailed evaluation on the implication of the scheme is discussed. Some of the key findings from the analysis include: (i) the uptake for renewable energy installations has been extremely high, particularly for solar photovoltaic installation; (ii) the foreign and domestic direct investment related to renewable sectors have increased significantly; (iii) more 'green' jobs have been created, particularly in the manufacturing and installation sectors, and (iv) there are plans to include wind and thermal energy in the FiT scheme. It can be concluded that the FiT scheme in Malaysia has produced significant impact during the first year of its implementation. With a proper monitoring by SEDA and more awareness among the people, renewable energy will most likely flourish in Malaysia.

1. Introduction

Energy is essential in our daily life. It is needed not only to meet social and economic development, but also to improve human health and welfare (IPCC, 2011). According to a recent report by the Energy Information Administration (EIA), the world's energy consumption is projected to rise to 865 EJ in 2040, a significant growth of 56% when compared to the energy need in 2010 (EIA, 2013). The rising trend of energy consumption contributes directly to increasing greenhouse gas (GHG) emission which is mainly due to the fact that the largest proportion of energy supply comes from fossil fuels. The GHG emission prevents the reflection of heat back into outer space, and as a result, has increased the average earthly temperature by 0.7 °C since the pre-industrialization period (IPCC, 2011). This small increment of temperature has been considered to have resulted in climate change and causing a major change to the ecosystem of the world.

* Corresponding author. Tel.: +44 141 331 8938; fax: +44 141 331 3690.
E-mail addresses: firdaus.muhammadsukki@gcu.ac.uk, firdaus.sukki@gmail.com (F. Muhammad-Sukki).

0301-4215/$ - see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.enpol.2013.12.044

A study published in Nature in 2011, indicates that climate change is responsible for creating massive floods in England and Wales during autumn 2000 (Pall et al., 2011), which cost the UK government approximately £3.5 billion (Carrington, 2011). The study also suggested such floods are two to three times more likely to happen due to climate change. Another study published by the same journal in 2011 points out that climate change has contributed to the rise in extreme rain, snow and hail specifically in the northern hemisphere (Min et al., 2011). Not only that, climate change also increases the rate of the melting of Artic ice, which is reported to be occurring at an 'amazing size and speed' (Shukman, 2012). This raises the sea level and in the long run could submerge substantial coastal areas around the globe (Lau et al., 2012).

To mitigate GHG emission while satisfying energy needs, one of the options suggested by the Intergovernmental Panel on Climate Change (IPCC) is the deployment of renewable energy (RE) technologies (IPCC, 2011). Currently, energy is supplied from three major classifications; fossil fuels (78.2%), renewable sources (19.0%) and nuclear power (2.8%) (REN21, 2013).

Malaysia is one of the countries in South East Asia that is experiencing a strong economic growth with a steady increase in energy demand. After five decades of independence, the country is still heavily relying on fossil fuels to support its energy requirement. During the United Nations Climate Change Conference 2009 in Copenhagen, the Prime Minister of Malaysia pledged to reduce the country's GHG emission by up to 40% by the year 2020 compared to the 2005 levels, subject to aid and support from developed countries (Gee, 2012). To curb the GHG emission, as well as to ensure the country's economy is resilient and sustainable in the long term, the Government of Malaysia (GoM) has started to elevate the usage of RE in meeting its energy needs.

1.1. Abbreviations and nomenclatures

EIA	Energy Information Administration
EPIA	European Photovoltaic Industry Association
FiA	Feed-in approval
FiT	Feed-in tariff
GHG	Greenhouse gas
GoM	Government of Malaysia
GPA	Green Prospects Asia
GTFS	Green Technology Financing Scheme
IPCC	Intergovernmental Panel on Climate Change
ISP	Institute for Sustainable Power
MEGTW	Ministry of Energy, Green Technology and Water
MIDA	Malaysia Investment Development Authority
MYR	Malaysian Ringgit
PHP	Perak Hi-tech Park
PV	Photovoltaic
RE	Renewable Energy
REN21	Renewable Energy Policy Network for the 21st Century
RT	Refrigeration ton
SAVE	Sustainability Achieved via Energy Efficiency
SEDA	Sustainable Energy Development Authority
SHRDC	Selangor Human Resource Development Centre
SREP	Small Renewable Energy Power
UiTM	Universiti Teknologi MARA

2. Materials and methodology

In order to evaluate the development of the RE in Malaysia (specifically after one year of implementing the feed-in tariff (FiT) policy), extensive literature review has been carried out. The history of how the FiT is introduced and the overview of its structure are presented to help the readers understand the FiT concept in Malaysia. Afterwards, the analysis of the progress of RE is presented, particularly on the installation and economical aspects. The statistics for the analysis is obtained from various journals, technical reports (from government and private sectors) as well as the mass media.

3. Feed-in tariff (FiT) in Malaysia

3.1. History of FiT

The journey towards RE usage in Malaysia has been discussed in detail in a number of literature (Economic Planning Unit, 2006; Chua and Oh, 2010; Ahmad et al., 2011; Jaffar, 2009; Oh et al., 2010; Chua and Oh, 2011; Muhammad-Sukki et al., 2011). For the past 30 years, the GoM has introduced a number of policies which help to accelerate RE penetration in Malaysia. Prior to 1980, oil was the primary source of electricity. In 1981, Malaysia introduced the Four Fuel Diversification Policy—highlighting hydro as one of the contributors to the nation's energy mix (Chua and Oh, 2010). This policy has been successful in greatly reducing the dependency on oil, from about 90% in 1980 to only 4.2% in 2000. However, despite the fact that large scale hydro managed to supply around 10% of the electricity requirement in Malaysia, another 90% of the supply was still dominated by other non-renewable sources, i.e. coal and natural gas (Chua and Oh, 2011). In 2001, the Fifth Fuel Policy was introduced which identified the potential in biomass, biogas, municipal waste, solar and mini hydro as sources of electricity generation. Unfortunately, this policy failed to increase the contribution of RE in terms of electricity generation in Malaysia. At the end of 2005, it was reported that only 0.3% of electricity being generated by RE[1] (Economic Planning Unit, 2006).

Due to that, the Ministry of Energy, Green Technology and Water (MEGTW) decided to establish a more comprehensive RE Policy and Action Plan, aiming to push the uptake of RE technologies in the country. The policy was established in 2009 and incorporated the proposal to introduce an FiT scheme (SEDA, 2012). In 2010, the proposed FiT scheme was included in the Tenth Malaysia Plan and subsequently received a national budget for its implementation in 2011 (SEDA, 2012). At the end of 2010, the Renewable Energy Bill and Sustainable Energy Development Authority (SEDA) Bill were tabled in the Parliament to introduce and regulate the FiT in Malaysia (SEDA, 2012).

Both Bills were passed in the Parliament in April 2011 and subsequently received the royal assent in June 2011 (SEDA, 2012). The FiT scheme is aimed at achieving 5.5% of the country's electricity generated from the RE sources by the end of 2015 (Economic Planning Unit, 2010).

3.2. Overview of FiT in Malaysia

The FiT scheme means the RE producers will be paid a set rate (tariff) for each unit of electricity fed into the grid, and generally obliges the power companies to purchase all the electricity from the eligible producers in their service area over a long period of time—usually 15 to 20 years (Muhammad-Sukki et al., 2012). From a study conducted by the MEGTW, it has been concluded that "FiT is the most effective RE policy mechanism in promoting and sustaining renewable energy growth" (MEGTW, 2011). To date, there are more than 80 countries which have adopted an FiT scheme (REN21, 2013), mainly because (SEDA, 2012): (i) it is

[1] This figure takes into account the contribution of mini hydro. The contribution of large scale hydro is omitted from the estimation.