International Journal of Engineering & Technology, 7 (4.13) (2018) 225-228

SPC

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET
doi:
Research paper



Sustainable Biofuel: Policy View for Commercial Aviation in Malaysia

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Abstract

The depletion of fossil fuel and the fuel price have urged the world to discover alternative ways of replacing existing fuel with renewable energy for sustainability, hence benefitting the environment. A series of test and scheduled flights have been carried out over the years. This paper views the biofuel policy available in Malaysia, as well as in other developing countries with regards to commercial aviation. To understand and emphasize the importance of having a biofuel policy, the aviation industries need to work in line with the government by reviewing the related policies of biofuel and the authority's concern related to the environment. In future, Malaysia will need to abide by the European Emissions Trading Scheme (EU ETS), thus creating the urgency in utilising the alternative energy. By viewing the various incentives available from the United States and EU, that can be a benchmark towards the recommendable policy that might be carried out in Malaysia.

Keywords: *biofuel; policy; commercial aviation; Malaysia.*

1. Introduction

Air transportation has rapidly grown as one of the vital transports in the world. Over the years, the demand for air transport services has steadily increased about 45% and it has been doubled since the mid-1980s [1]. With the increasing numbers of air traffic growth rates, there are concerns about greenhouse gas emissions (GHG). If the global economic growth continues, it has been suggested by recent studies that aviation carbon dioxide (CO_2) emissions are likely to experience significant three-fold increase between years 2000 and 2050 [2]. By 2030, carbon emissions from the transport sector and the energy requirement have been expected to increase up to 80% [3].

To reduce the emission and provide a better greener way, sustainable alternative fuel has been discovered. The alternative fuels for transportation have received a considerable attention as a means of diversifying the energy supplies and also mitigating the transportation's impact on the environment [4]. Alternative fuels produced from renewable sources are capable of reducing the effect of aviation towards global climate change. According to the guidelines by International Organization for Standardization (ISO), "*the life cycle Green House Gas (GHG) emissions inventory should include a full accounting of the GHG emissions that result from the creation of all materials, energy, and activities that are related to the fuel production; not only those within the processes of the primary chains, but also those supporting necessary input to the primary production chain. The system boundary, therefore, needs to be defined such that it captures all of the processes used in jet fuel creation*" [5-8].

Albeit research on alternative fuel has been carried out for years, the introduction of biofuels for the commercial market in Malaysia and the world still cannot be done widely. While Malaysia is the second largest palm oil producer in the world, biofuel from palm oil cannot be included as sustainable due to its life cycle analysis (LCA) [9-11]. The commercial market for the high production and distribution cost of biofuel has limited the competition with fossil fuel. Until concerns surrounding the aspects of cost, sustainability and policy support have been fully addressed, it is believed that aviation biofuel is unable to capture a significant share of the aviation fuel market [12].

European Union (EU) member states have made various biofuel support policies [13], covering command and control instruments like standard and quotas, over economic and fiscal measures including tax exemptions, up to information diffusion and addressing the different stages of the biofuel chain. Under the National Biofuel Policy released on March 21, 2006 by the Government of Malaysia's (GOM), the main objectives are to reduce dependency on fossil fuels and stabilise and boost the palm oil price by using environmental-friendly and sustainable energy sources [14]. As the critical stakeholder in implementing biofuel blends for transportation sector, the government is responsible to provide an appropriate platform or medium for other stakeholders like industry players, non-governmental organisations (NGO), research institutes and private investors to contribute in developing biofuel blends. The policies made by the government are essential in many areas including subsidisation scheme, tax relief, financial assistance, information dissemination, investment environment, authorisation and standards of biofuel blends [15].

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2. Sustainable aviation biofuel: Malaysian policy

This research is to generate a view of policy for sustainable aviation biofuel for commercial aviation in Malaysia. More sources of renewable energy will be required by Malaysia with the depletion of fossil fuel for sustainable development. As an alternative energy source, biofuel plays a notable role for its sustainable character and security in the energy sector.

For long term economic and social development, there is a need to establish and emphasize the policies made by the government as critical stakeholders. Responsibility to contribute towards development of biofuel in Malaysia need to be done by stakeholders such as industry players, NGOs, research institutions and also private investors. Therefore, exploring and discovering the policy made by the government and others policy organisations about the aviation biofuel is highly influential in several areas such as subsidisation scheme, information dissemination investment environment, financial assistance, tax relief, authorisation and standards of biofuel blends. The readiness level regarding the fuel and technology can be directly pursued by the support of the governing policy [9,10].

2.1. Fifth fuel policy - 8th Malaysian Plan

There is no direct policy for sustainable aviation biofuel made for commercial aviation in Malaysia. However, under the 8Th Malaysian Plan (2001-2005) the fifth fuel policy has been introduced. It shows that Malaysia is working towards integrating renewable energy as part of its energy fuel mix. As in year 2000, energy demand by transportation sector had used about 41% of the total energy demand (29.7Mtoe) [16]. Therefore, decisive action needs to be taken to use biofuel for commercial aviation based on the policy stated by the government, aviation organisations and the manufacturer.

2.2. National renewable energy (RE) policy and action plan (2009)

The Kyoto Protocol, a plan and a move to demonstrate the authority earnestness and responsibility in reducing the carbon impressions through enabling green innovation applications in all divisions of the economy, was ratified by Malaysia in 2002. Therefore, effective alleviation means and measures to decrease the GHG must be taken with the emphasis on the essential area transmitting GHG, which are electricity generation and transport [17].

To transform Malaysia to be a leader and a pioneer in the renewable energy (RE) and green technology implementations and applications, the new policy of RE is built and developed. It is to ensure that the green technology development of Malaysia satisfies and fulfils its energy needs from domestic RE resources and able to preserve the environment such that the future generation will be saved. Simultaneously, the sustainable RE industry provides lesser greenhouse gas emission because of decrease in amount of petroleum derivative usage, thus giving another monetary activity to the nation. The new RE Policy is predicted to have the capacity to put Malaysia in line with the other ASEAN countries in securing more sustainable future for the nation by aggressively seeking the green technology [18].

The proposed vision statement, set of objectives and also strategic thrust of a forward-looking RE Policy are all presented in Figure 1.

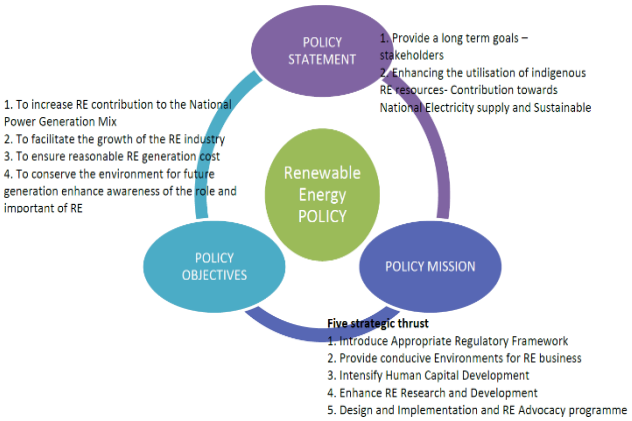


Fig. 1: Proposed vision statement and the set of objectives and its strategic thrust of a forward-looking RE Policy

(Source: National Renewable Energy Policy and Action Plan – Malaysia)

2.3. National Green Technology Policy

In the national budget of 2014, the Government has announced announcing the exemption for income tax through green technology services assest purchased by company as means of reinforce the development of green technology (GT) [19]. The national green technology has been launched by the federal government to initiate the spur of green technology development sector in Malaysia. It has a strategic role that more than just accomplishing energy usage and combating environmental change, as it is currently the drivers for developing of monetary development[18]. Green technology has been envisioned by the government to be the choice of most countries and this plays a key role in the mapping of the country's low carbon economy. Apart from reducing the emission of GHG for the mitigation measure to cope with the issues of climate change, the government is also committed to have green technology as one of the drivers for economic growth of the nation. The four pillars of National Green Technology Policy are shown in Figure 2.



Fig. 2: Four pillars of the National Green Technology Policy [15]

3. International Civil Aviation Organization (ICAO) Environmental Protection-Annex 16

Annex 16 Volume II contains provisions related to aircraft engine emissions. ICAO has also developed several guidance manuals on emissions. ICAO Annex 16, Part III. Emissions Certification [20] has outlined the requirements for engine emissions by aircraft as presented in Table 1.

In 2004, there are three key for environmental goals being adopted by ICAO, which is to limit or lessen the amount of people affected by aircraft noise, impact of aviation emissions on local air quality

and greenhouse gas emissions by aviation sector on the global climate. ICAO and others United Nation (UN) policy-making organization maintains their relations as they have shown an interest with the civil aviation sector, as can be observed with the Conference of the Parties to the United Nations Framework Convention on Climate Change. ICAO's main focus is around those issues of environmental field that will benefit the most from a worldwide joint effort such as aircraft noise and emission. Every three years, the ICAO will revise and update the council on the statement of proceeding with this practices policies. The latest version, "Assembly Resolution A39-2: Consolidated statement of continuing ICAO policies and practices related to environmental protection climate change", is adopted in October 2016. Improving environmental performance is considered as important challenges for ICAO. In satisfying its obligations, the association has built up a scope of gauges, strategies and also direction materials for utilization of integrated measures to deal with aircraft noise and emissions, including innovation upgrades, working methods and air traffic organisation.

Table 1: Environmental Protection –Annex 16 Volume II (Source: Environmental Protection (Volume II: Aircraft Engine Emissions))

1.1 The provisions of 1.2 to 1.4 shall apply to all engines included in the classifications defined for emission certification purposes in Chapters 2 and three where such engines are fitted to aircraft engaged in international air navigation.
1.2 Emissions certification shall be granted by the certificating authority by satisfactory evidence that the engine complies with requirements which are at least equal to the stringency of the provisions of Volume II of this Annex. Compliance with the emissions levels of Chapters 2 and three shall be demonstrated using the procedure described in Appendix 6. Note: The document attesting emissions certification may take the form of a separate emissions certificate or a suitable statement contained in another document approved by the certificating authority.
1.3 The document attesting emissions certification for each engine shall include at least the following information which applies to the engine type: a) Name of certificating authority b) Manufacturer's type and model designation c) Statement of any additional modifications incorporated for compliance with the applicable emissions certification requirements d) Rated thrust e) Reference pressure ratio f) A statement indicating compliance with Smoke Number requirements g) A statement indicating compliance with gaseous pollutant requirements.
1.4 Contracting States shall recognise as valid emissions certification granted by the certificating authority of another Contracting State provided that the requirements under which such certification was granted not be less stringent than the provisions of Volume II of this Annex.
1.5 The Contracting States shall recognise as valid engine exemptions for an engine production cut-off requirement granted by a certificating authority of another Contracting State provided that the exemptions are granted by the process and criteria defined in the Environmental Technical Manual (Doc 9501), Volume II — Procedures for the Emissions Certification of Aircraft Engines

3.1. EU ETS and ICAO flight policy for environment

Almost 11,500 industrial installations that contributed to nearly half of the total EU CO_2 emissions have been covered by the EU Emissions Trading Scheme (ETS), which is started on 1st January 2005. It is later expanded to the aviation sector whereby the market is imposed with a total emissions cap. The allocated emission allowances for aircraft operators give them an incentive to reduce their climate impact, and they can buy or sell the emissions allowances whenever necessary [21]. From the discussion on Annex 16 Volume II, the commission considers the scheme should apply to every carrier regardless of nationality: "*the 1944 Chicago Convention on civil aviation provides the laws and regulations relating to international flights shall be applied to aircraft without distinction as to nationality and that all aircraft must comply with such rules*". Malaysia, as one of the airlines operators that operates from airports in the EU, has also to comply in similar manner as the EU airlines [22].

4. Current incentives availability

The primary motivations for the development of biofuel in EU are energy security, sustainable development, reduction of greenhouse gas emissions and promotion of rural/agriculture development. To guide a clean energy development, the government can set renewable energy goals, support the industry, subsidize taxes, and fund notable R&D and demonstration projects [23]. In United States, some legislative actions have been made to launch alternative energy production. Among others, these include 2005 Energy Policy Act and 2007 Energy Independence and Security Act, where transportation fuels produced from plants and other organic materials are of interest [24]. In the meantime, EU has focused on the environmental effects of bioenergy development since 1990s and their concern on the environmental issues has been further emphasized through the signing of the Kyoto Protocol and the release of white paper in 1997 [25].

The legal framework for the fiscal measures is EU Energy Taxation Directive 2003/96/EC that allows exempting all types of bio-fuels from taxes if:
• the tax exemption or reduction does not exceed the amount of tax payable on the volume of renewables used;
• changes in the feedstocks prices are accounted for to avoid overcompensation;
• the exemption or reduction authorized may not be applied for more than six consecutive years and renewable [26].

In national budget 2014, investment tax allowance for purchases of green technology assets and income tax exemption for use of green technology services and system has been announced by the government to further strengthen the development of green technology (GT). Among the objectives of the incentives are listed in Table 2.

Table 2: Objectives of green technology incentives from Budget 2014 (Source: Malaysian Investment Development Authority - MIDA)

1. Encouraging investments in green technology industries on a project basis either for business purpose or own consumption and the adoption of green technology by selected services/system providers;
2. Encouraging companies to acquire/purchase assets that have been verified as green technology assets by the Malaysian Green Technology Corporation (MGTC) and these assets are listed under MyHijau Directory;
3. Facilitating the transition of expiring existing tax incentives relating to renewable energy (RE) and energy efficiency (EE) projects.
4. Widening the coverage across various priority green technology industries such as energy, transportation, building and waste management and supporting services activities.

4. Conclusion

The ETS mandate can create significant impact on environmental concern among the airlines. Participation of Malaysia in this matter will make the path of the usage of the new renewable sources and create sustainable energy for aviation industries. Such policy can enrich the process and lead to the start up. Malaysia will be forced to use renewable sources to maintain its sustainability for development with the depletion of its fossil fuels. By using renewable energy such as biofuel, the country needs to incorporate with national biofuel supply. Hence new demands in the import and export market will be created from the use of biofuel. The projection on renewable energy readiness level towards commercial aviation in Malaysia is aligned with worldwide efforts to cut the greenhouse gas emissions and this underlines the involvement of Malaysia to this global goal.

Acknowledgement

The research was conducted using the funding from Ministry of Higher Education (MOHE) under Fundamental Research Grant Scheme FRGS/1/2015/TK10/UNIKL/03/1.

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