Charting a Sustainable Future: Advancing Aviation with Sustainable Aviation Fuel Policies in Malaysia

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ABSTRACT

The effort of Malaysia's aviation industry to achieve carbon-neutral growth by 2050 proved to be a challenge since conventional jet fuels contribute to 13% of the transportation sector's global carbon emissions. The main contributors to the difficulties are economic barriers and inadequate legal frameworks slowing the adoption of Sustainable Aviation Fuels (SAF). Adopting doctrinal research methodology, this study aims to investigate the policies governing aviation fuel standards and emissions in Malaysia and offer legal reforms to incentivise the adoption of SAF to reduce the carbon impact of aviation in Malaysia. It also explores the contribution of Malaysia's aviation sector to the global Sustainable Development Goals (SDG) efforts by aligning Malaysia's aviation sector's environmental sustainability efforts with international climate change mitigation efforts. This research highlighted the importance of policy implementation to govern aviation fuel standards and emissions for further legal reforms to incentivise the adoption of SAF. The paper suggests urgent action by the relevant parties to promote the widespread deployment of global jet fuel usage and SAF adherence.

Keywords: Aviation sector, carbon emissions, environmental sustainability, Sustainable Aviation Fuels, policy, carbon footprint.

INTRODUCTION

Despite Malaysia's commitment to the Paris Agreement and its national policies to reduce greenhouse gas emissions, the aviation sector remains a significant contributor to its carbon footprint (Toh, 2020). The reliance on conventional jet fuels exacerbates the environmental impact, leading to heightened carbon emissions (Malaysia Airlines, 2021). Despite constituting a relatively modest 2% of global greenhouse gas (GHG) emissions, aviation holds significant importance within the transportation sector, contributing 13% of its global carbon emissions (Atmowidjojo, 2021). This is particularly problematic given the region's projected air travel demand growth.

The authors of this study embark on a qualitative exploration into the legal landscape of sustainable aviation fuel (SAF) to discern the potential of SAF to reduce the carbon impact of the aviation industry. Employing doctrinal analysis, the authors meticulously examine statutes, regulations, and case law to construct a foundational understanding of the legalities surrounding SAF. This is complemented by a comparative analysis across various jurisdictions, providing a broad spectrum of international legal practices. The study aims to identify legal barriers and incentives that could influence the adoption of SAF, thereby contributing to the global effort of mitigating climate change through reduced carbon emissions in aviation. By integrating these methodologies, the authors aim to offer a comprehensive legal perspective that supports the transition to a more sustainable and environmentally responsible aviation sector.

CONCEPTUAL & THEORETICAL FRAMEWORK

The aviation sector is a major contributor to greenhouse gas emissions, particularly carbon dioxide (CO2), a primary driver of climate change. These emissions contribute to the warming of the Earth's atmosphere, leading to melting ice caps, rising sea levels, and altered weather patterns. These scenarios pose significant risks to human health, infrastructure, food security, and ecosystems (IPCC, 2018). As part of broader efforts to decarbonise the transportation sector, the aviation industry is endeavouring to align with the 2050 global objectives aimed at achieving carbon-neutral growth and slashing net CO2 emissions by 50% compared to 2005. This endeavour embodies the essence of energy efficiency, a concept conceptualised by philosophers like Plato and Aristotle. As energy efficiency based on virtue entails acting by moral principles for the greater good, energy efficiency in aviation involves optimising energy use to minimise waste and reduce environmental harm. By aligning with these principles, the aviation sector contributes to global sustainability goals and embodies virtuous conduct in its allocation of resources.

The aviation sector's sustainability efforts are strongly influenced by energy poverty, which can be defined as the inability to obtain reliable and affordable energy services, particularly in Malaysia. Although many regulatory and financial obstacles exist, using Sustainable Aviation Fuels (SAF) is essential for reducing carbon emissions (Abd Bahrin, 2023). This theoretical framework combines views from the energy justice framework and economic analysis to address these issues. The framework for energy justice emphasises the need for a fair distribution of energy resources to prevent economically disadvantaged groups from being disproportionately burdened by policies that promote renewable energy. Economic analysis shows that adopting SAF comes at a considerable cost; hence, incentives, including tax breaks, subsidies, and investments in SAF infrastructure, are required to reduce the financial burden (World Economic Forum, 2024).

The theory of justice by John Rawls emphasises fairness and equal opportunities. In the aviation context, this means ensuring equitable access to SAF. Policymakers should consider the least advantaged members of society who are economically vulnerable when designing policies (Rawls, 1971). By adopting Rawlsian principles, Malaysia can create a framework that balances economic viability with social equity.

A comprehensive legal analysis identifies inadequacies in Malaysia's regulatory system and highlights the necessity for reforms that require SAF combinations. With this holistic strategy, the aviation industry's environmental goals will be accomplished, and the impact of energy poverty will be mitigated.

LITERATURE REVIEW

Sustainable Aviation Fuel

Several literature have referred to the definition of SAF. According to Andres Gonzalez-Garay et al.(2022), SAF has comparable chemical compositions to traditional jet fuel but is derived from renewable sources. As a result, they hold promise in decreasing the overall emissions produced throughout their lifecycle (Made, 2022). Stephen Kramer et al. have referred to SAF as fuels meeting stringent sustainability criteria established by aviation stakeholders and regulatory bodies such as the International Civil Aviation Organization (ICAO), mainly through initiatives like the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) (Kramer, 2022). These criteria encompass evaluations of production methods, feedstock sourcing, land use, social impacts, and the overall life-cycle carbon footprint that SAF in ensuring that they adhere to sustainability requirements, ensuring that environmental, social, and economic considerations are integral to their production and use. Literature provides evidence that SAF, derived from renewable biomass and waste resources, offer the potential to match the performance of petroleum-based jet fuel while significantly reducing carbon emissions. Studies indicate that SAF could decrease carbon emissions by up to 65%, as the International Air Transport Association estimated, compared to traditional jet fuel.

Furthermore, SAF policies encompass regulatory and legislative measures designed to address the complexities and challenges of adopting SAF in the aviation sector. According to David Chiaramonti, given

the imperative to reduce the carbon impact of the aviation industry to combat climate change, SAF policies aim to incentivise the transition to cleaner aviation fuels while mitigating barriers such as the significant cost differential between SAF and conventional aviation fuels (CAF), particularly fossil-based fuels. Additionally, the literature highlights that SAF policies strive to navigate the economic disparity between bio-based and fossil-based aviation fuels, which presents a considerable obstacle to widespread adoption and seek to address the unique taxation dynamics of aviation fuels, which are typically exempt from taxes, unlike road fuels, thereby intensifying the competition between CAF and SAF. The literature further provides that the overarching goal of SAF policies is to create a conducive regulatory environment that fosters investment, innovation, and market development to accelerate the uptake of renewable and low-carbon jet fuels, thereby advancing the decarbonisation agenda in the aviation industry.

Policy in Malaysia

Currently, the literature highlights the existence of numerous biofuel-related policies in Malaysia. According to literature, Malaysia's policies, such as the 8th Malaysian Plan (2001-2005) and the National Renewable Energy (RE) Policy and Action Plan (2009), reflect its dedication to incorporating renewable energy into its energy mix and reducing carbon emissions. The country's ratification of the Kyoto Protocol in 2002 further underscores its commitment to curbing greenhouse gas emissions, especially in electricity generation and transportation. By implementing the new RE Policy, Malaysia aims to lead in renewable energy and green technology, utilising domestic resources while preserving the environment. Aside from that, the National Biofuel Policy (NBP) was introduced to utilise environmentally friendly, sustainable, and viable energy sources to reduce reliance on dwindling fossil fuels and to enhance the prosperity and well-being of stakeholders in agriculture and commodity-based industries by ensuring stable and rewarding prices (Abdul-Manan, 2015). Subsequently, the Malaysian parliament ratified the Malaysian Biofuel Industry Act of 2007 (Act 666) to regulate and provide a framework for implementing the NBP. However, Abdul-Manan extends that despite the enactment of Act 666, the legislation does not specify minimum sustainability criteria that biofuels must meet to ensure their sustainability. This lack of clarity poses a significant risk of encouraging the substitution of fossil fuels with alternatives that may have inadequate sustainability performances, thus undermining the attainment of policy goals.

However, the absence of specific policies tailored to the national SAF industry is striking, considering Malaysia's overall vision for sustainability and its commitment to biofuels. Presently, the Economic Master Plan (EMP) framework, proposed by the Malaysian Aviation Commission (MAVCOM), is the sole policy guiding the economic aspects of Malaysia's civil aviation sector. However, it primarily focuses on maximising air connectivity without addressing technical considerations, fuel options, or sustainability, leaving a significant gap in SAF development. For sustained social and economic progress, well-established government policies are crucial. The government is a key stakeholder in promoting biofuel adoption and utilisation and creating suitable platforms for biofuel transactions (Rahmat, 2017). Rahmat Mohsin *et al*. further clarify that government policies include subsidy schemes, tax relief, financial aid, information dissemination, investment facilitation, authorisation, and standardisation of biofuel blends. In another literature, it is highlighted that the support provided by these policies directly influences the readiness level of fuel and technology development in the biofuel sector. However, when these policies are disregarded or not implemented effectively, challenges in fully harnessing the potential of biofuels emerge. Therefore, a robust and consistent policy framework is essential to realise the benefits of biofuel utilisation and advance sustainable development goals.

Policies in Other Countries

Singapore

According to the World Economic Forum through the First Movers Coalition, Singapore's SAF Policies has taken significant steps towards transforming into a key SAF hub (World Economic Forum, 2017). The Ministry of Transport and the Civil Aviation Authority of Singapore (CAAS) have been focusing on initiatives

such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and using SAF in partnership with Singapore Airlines and Temasek Singapore Airlines.

The aim is to use SAF for 5% of their total fuel consumption by 2030. This capacity roughly doubles domestic demand from Changi Airport, resulting in substantial exports. Moreover, Singapore is investing in SAF with a planned capacity to make it the largest SAF hub in Southeast Asia, with 1.4 Mtpa by 2025. Developing Singapore's SAF hub will require strong demand signals and offtake to ramp up production effectively. However, securing affordable and high-quality SAF supply presents a strategic advantage for Changi Airport as a significant regional hub. It can be seen when Neste and Shell plan to add up to 1.4 incremental Mtpa of capacity by 2025. This requires off-takers to scale at this rate. Furthermore, Singapore intends to impose a new green jet fuel charge on departing passengers beginning in 2026, as planes from the city-state must use SAF, provided by the Synergia Foundation on Sustainable Aviation Fuel (Synergia Foundation, 2024).

Singapore is ideally positioned to assume the regional leadership in SAF commercialisation efforts. The First Movers Coalition, led by the World Economic Forum, recently conducted a workshop on "Accelerating the Supply of SAF in Singapore", highlighting the importance of collaboration. It sought to forge relationships and seed business agreements to produce high carbon intensity (CI) reduction SAF in the near to medium term. As specified by Laia Barbara, around $500 billion in investment will be required in Southeast Asia over the next 27 years (Laia, 2023). The workshop engaged financial institutions in this opportunity while discussing with policymakers the vital role of their interventions in managing the SAF scale-up. Regulatory frameworks, feedstock availability, technological innovation, and financing pose obstacles, but initiatives like the First Movers Coalition for Aviation offer a pathway forward.

This initiative signifies a significant step towards a more sustainable future in aviation, with Singapore leading the way. It highlights the importance of collaboration, strategic investment, and the role of policymakers in this endeavour. Despite the challenges, the region's commitment to environmental sustainability and the global fight against climate change remains steadfast.

Despite the inherent challenges, such as technological constraints, high costs, and the need for large-scale production, the region's unwavering commitment to environmental sustainability is commendable. This commitment is reflected in the ambitious goals and persistent efforts to combat climate change. Despite the obstacles, the steadfast dedication to this cause sends a strong message globally about the region's determination to reduce carbon emissions and contribute to the global fight against climate change.

Furthermore, this initiative is a beacon for other countries and regions, demonstrating that strategic planning, investment, and collaboration can significantly reduce the aviation industry's carbon footprint. It sets a precedent, showing that environmental sustainability and economic growth can go hand in hand. This initiative by Singapore, therefore, is not just a step towards a more sustainable aviation sector but a giant leap for humanity towards a more sustainable future.

India

Considering India's position as one of the world's fastest-growing aviation markets, it aims to use Sustainable Aviation Fuels (SAFs). It is on the journey to producing and deploying SAFs at scale (Amit, 2021). According to the report provided by McKinsey & Company, the nation is projected to go from its current position as the world's eighth-largest aviation market to third place by 2025. The Clean Skies for Tomorrow Coalition's community in India has also set the goal of flying 100 million passengers on SAFs at a 10 per cent rate by 2030. India generates abundant agricultural residues (farming byproducts, such as husks and chaff), cooking oil, and other solid waste feedstocks that can produce SAFs. Furthermore, India enjoys the availability of low-cost renewable energy sources and the technology to scale up the deployment of SAFs. Leadership, commitment, and coordination from a broad range of stakeholders are key to converting roughly 166 million tons of feedstocks produced in India annually into 22 to 24 million tons of SAF.

There are three main priority areas: collection systems for feedstock, production systems according to four pathways, and an approved mix of production technologies and feedstocks that need to be set up. Harvesting agricultural residues and other waste products would require implementing new mechanisms at the farm level and end-to-end segregation infrastructure. However, India has not yet achieved full competency; thus, it must accelerate its progress in delinking economic growth and environmental degradation (World Economic Forum, 2021).

India's strategic shift towards SAF signifies a monumental step in the global fight against climate change. The country's abundant resources, technological prowess and commitment to sustainability position it uniquely to revolutionise the aviation industry. The potential to convert millions of tons of waste feedstocks into SAF presents a viable solution to waste management and contributes to significant reductions in carbon emissions.

Furthermore, creating new collection and production systems could stimulate economic growth and job creation, fostering a green economy. The ambitious goal of flying 100 million passengers on SAF by 2030 also sets a precedent for other nations, highlighting the feasibility and benefits of transitioning to SAF. Therefore, India's journey towards SAF deployment underscores the critical role of innovative and sustainable solutions in achieving environmental, economic, and social progress.

Norway

Concerning Norway's position, it has been working with the aviation industry to reduce carbon emissions for over a decade. It is written in the International Airport Review that Norway is looking at different ways to power planes (Arvid, 2022). In the future, short flights might be powered by batteries or hydrogen. However, for now, they are focusing on Sustainable Aviation Fuels (SAFs), special fuels that are better for the environment. SAF Use in Norway SAFs have been certified in civil aviation since 2009. They can be used on all flights and mixed with regular fuel. However, SAF is still expensive and not made in large amounts. To increase the use of SAF, Norway has ruled that 0.5 per cent of all aviation fuel sold in Norway must be advanced biofuels. Norway is also working on many things to increase the use of SAF. This includes more research, new policies, and preparing for SAF production. They are also looking at how airports can help improve the use of SAF.

The transition to SAF is a technological and environmental imperative and a socio-legal challenge that intersects with the principle of energy justice. The authors' review of the extant literature reveals a burgeoning interest in SAF to reduce the aviation industry's carbon footprint. This body of work encompasses a range of perspectives, from technical analyses of SAF's potential to mitigate climate change to policy-oriented discussions on the regulatory frameworks governing its adoption. Notably, the principle of energy justice provides a normative framework to evaluate the distributional equity and ethical dimensions of SAF. It demands that the benefits of SAF, such as reduced emissions and enhanced energy security, do not accrue at the expense of social equity. The authors find that while the literature robustly addresses the environmental benefits of SAF, there is a noticeable gap in exploring how energy justice principles are applied or neglected in the legal and regulatory contexts. This gap signifies an opportunity for the authors to contribute a nuanced understanding of how SAF can be implemented in a manner that upholds the tenets of energy justice, ensuring that the pursuit of environmental sustainability is harmoniously balanced.

Norway's proactive approach towards reducing carbon emissions in the aviation industry through SAF is a significant stride towards environmental sustainability. Despite their high costs and limited production, the country's focus on SAF demonstrates a commitment to long-term ecological responsibility. The mandate that 0.5 per cent of all aviation fuel sold in Norway must be advanced biofuels further underscores this commitment. However, the transition to SAF is not merely a technological challenge but also a socio-legal one, intersecting with the principle of energy justice. While the environmental benefits of SAF are well-documented, there is a need for a more comprehensive exploration of how energy justice principles are applied in the legal and regulatory contexts of SAF adoption. This gap presents an opportunity to ensure that the benefits of SAFs, such as reduced emissions and enhanced energy security, are not realised at the expense of

social equity. Thus, Norway's journey towards SAF deployment is a model for balancing environmental sustainability with recognition, distribution, and procedural justice principles.

METHODOLOGY

This study adopts the doctrinal research methodology to analyse and interpret existing laws, regulations and policies. The methodology critically examines the Malaysian legal and regulatory framework governing aviation fuel standards and emissions. Relevant legal documents, statutes, and secondary materials such as academic journals, policy reports, and international conventions are analysed to identify gaps in the Malaysian approach to SAF. The study also evaluates the effectiveness of initiatives, such as the Sustainable Aviation Energy Task Force established by the Ministry of Trade and Industry (MITI), in promoting SAF adoption.

To provide a well-rounded perspective, the study employs a comparative analysis to benchmark Malaysia's SAF policies against those of progressive jurisdictions such as Singapore, India and Norway. By examining these international examples, the research identifies best practices that could be adapted to Malaysia's aviation sector, including regulatory incentives, public-private partnerships, and financial support mechanisms. This dual approach ensures a comprehensive understanding of the domestic and global context of SAF policymaking, forming the basis for proposing targeted legal reforms to reduce aviation's carbon footprint in Malaysia.

FINDINGS

A thorough analysis of Malaysia's existing aviation fuel regulations and emissions policy highlights various key features. Malaysia has created regulations through the Malaysian Aviation Commission (MAVCOM) and the Department of Civil Aviation (DCA) to monitor aviation operations and safety. However, there are still few and limited specific policies to reduce aviation's carbon emissions, especially with the use of SAF.

Although there has been progress in Malaysia's promotion of SAF, the policies continue to suffer shortcomings. A significant issue is the lack of a thorough regulatory framework designed especially for SAF. This is a relatively new concept, and more work needs to be done to make SAF a regular part of flights by 2025, even though Malaysia Airlines operated its first flight using SAF in collaboration with PETRONAS Dagangan Berhad (PDB) and Neste (PETRONAS, 2021). The Ministry of International Trade and Industry (MITI) established the Sustainable Aviation Energy Task Force, an optimistic approach to address this gap (Ministry of International Trade and Industry, 2022). To reduce the carbon footprint in the aviation sector, including the production of SAF in Malaysia, the task force intends to coordinate the implementation of national projects and initiatives and propose policies. However, to establish a sustainable SAF supply chain in Malaysia, additional work is required, and this can only be done with a coordinated strategy and the cooperation of important stakeholders. Policies that mitigate risks associated with investments in partnerships between the public and private sectors for the production and supply of SAF are also required (International Air Transport Association, 2023).

The other visible shortcoming is the cost and commercial feasibility. According to current statistics, the cost of producing SAF is two to four times more than that of producing fossil jet fuel. Because of this, SAF is not as financially viable as conventional jet fuel. This is due to the high costs associated with the feedstock (the raw materials) and the processing technology used in SAF production. Without financial incentives or a substantial reduction in production costs, Malaysia's adoption of SAF may be gradual (LOKEN, 2023). For the production of SAF, obtaining raw materials or feedstock is a significant obstacle. Production prices can rise due to the high cost and scarcity of feedstocks like recycled cooking and algae oils. While they might be less expensive, other feedstocks like crop leftovers and municipal solid waste might need more processing steps to turn them into SAF (Singh, 2022). Therefore, the widespread adoption of SAF within Malaysia's aviation industry is severely constrained by financial obstacles, especially its price point compared to conventional jet fuels. Reducing carbon emissions in aviation continues to be constrained by the lack of

comprehensive legal frameworks that require or encourage the use of SAF, as Malaysia aims to expand at a carbon-neutral rate by 2050 (Povera, 2021).

Several green-minded countries are setting the standard for this worldwide movement by utilising creative solutions and effective tactics to transition to SAF. This part analyses the global landscape of SAF adoption to gain insight into the policies and activities that various countries have implemented. Implementing SAF and reducing the aviation sector's carbon footprint have been made possible by multiple measures, including cooperation, funding, policy development, and public awareness campaigns. Malaysia and other countries going forward with their transition to sustainable aviation may find excellent guidance from the lessons gained from these worldwide scenarios.

To minimise the price difference between SAF and conventional jet fuel for airlines, several airports have implemented the SAF Incentive Fund (Ullrich, 2023). The airport authority typically establishes the fund, frequently working with stakeholders or partners in the business. Airlines can apply for incentives from the SAF Incentive Fund if they decide to refuel at the airport using SAF. Compared to conventional jet fuel, SAF is now more economically viable for the airline due to this financial help, which also lowers its net cost. Well-known airports have already acted by creating SAF Incentive Funds, including Schiphol, Swedavia, Heathrow, Dusseldorf, and Milan.

For the implementation of SAF to proceed more rapidly, government regulations and incentives are vital. For example, the United States launched the SAF Grand Challenge to generate at least 3 billion gallons annually by 2030 (Topsoe, 2024). Policies are in place that mandate a decrease in carbon intensity and allow aircraft to accept incentives for ground transportation (International Air Transport Association, 2023). A feedstock subsidy or support mechanism, capital assistance, energy multiplier, loan guarantees, tax relief measures, and tax exemptions are examples of regulatory incentives in the European Union (International Air Transport Association, 2023).

Those in charge must move quickly to support the broad implementation of SAF in Malaysia's aviation industry. The aviation sector is a significant source of carbon emissions globally, and SAF offers a workable way to lessen this effect. Nevertheless, switching to SAF is not a simple or automatic procedure, as it calls for coordinated work, thoughtful preparation, and prompt action.

There is no denying the growing severity of the consequences of climate change. As a result, the chance to significantly reduce carbon emissions is quickly closing. Every second that passes before adopting SAF results in wasted opportunities to reduce carbon emissions and protect the environment.

DISCUSSION

Based on our findings, Malaysia should emulate the proactive approach of other countries in implementing SAF policies to mitigate the carbon impact of its aviation sector effectively. Countries like Singapore have set clear mandates for SAF blending, starting with modest percentages and scaling up over time, providing a structured pathway for industry compliance and investment certainty (Segal, 2024). This regulatory framework signals Malaysia's commitment to sustainability and incentivises the development of SAF production capabilities and infrastructure. Moreover, Singapore's comprehensive SAF ecosystem development, including measures to facilitate SAF procurement, promote local production, and engage in international partnerships, demonstrates effective strategies Malaysia can adopt to overcome current challenges of SAF availability and cost competitiveness. By leveraging international collaboration, implementing supportive policy enablers, and fostering a balanced approach that considers industry impacts and environmental benefits, Malaysia can accelerate its transition towards sustainable aviation practices, aligning with global efforts to reduce carbon emissions in the aviation sector.

Moreover, the efforts put forward in India in the implementation of SAF policies to effectively mitigate the carbon impact of its aviation sector should also be followed by Malaysia. India's commitment to mandating

SAF blending targets, starting with 1% for domestic flights by 2025 and scaling up to 5% by 2030, provides a clear roadmap for Malaysia to follow (Majumder, 2024). These targets create regulatory certainty and stimulate investment in SAF production infrastructure, fostering innovation and competitiveness in the renewable energy sector. India's holistic approach to ecosystem development, including investments in SAF production facilities and collaboration across the aviation supply chain, offers valuable insights for Malaysia to build a robust SAF ecosystem (Reuters, 2023). By leveraging its agricultural resources and promoting partnerships with industry stakeholders, Malaysia can address challenges related to SAF availability and cost, paving the way for a sustainable and resilient aviation industry. Aligning SAF policies with ambitious environmental goals and fostering international cooperation will be crucial for Malaysia to accelerate its transition towards sustainable aviation practices, contributing to global efforts to combat climate change effectively.

Furthermore, Malaysia can draw valuable lessons from Norway's pioneering efforts in SAF implementation. Norway's early adoption of SAF, starting with Oslo Airport in 2016 and mandating 1% SAF blending in 2019 with a target of 30% by 2030, exemplifies a gradual yet ambitious approach towards decarbonising aviation (Norway, 2023). Norway's collaborative ecosystem involving airlines, airport operators, and industry associations has driven SAF uptake and infrastructure development (International Airport Review, 2022). The country's emphasis on sustainable biomass for SAF production, avoiding conflicts with food production, underscores a strategic approach that balances environmental and economic interests. Additionally, Norway's commitment to becoming fossil-free in aviation by 2050, supported by initiatives like the Aviation Sustainability Programme and strategic partnerships for SAF production, showcases a robust policy framework Malaysia can emulate to achieve similar sustainability goals.

By learning from the experiences of Singapore, India, and Norway, Malaysia can develop a robust SAF policy framework that addresses current challenges and positions the country as a leader in sustainable aviation. Aligning SAF policies with ambitious environmental targets and fostering international cooperation will be pivotal in Malaysia's journey towards reducing carbon emissions in the aviation sector and contributing to global efforts to combat climate change effectively.

CONCLUSION

Finally, it should be noted that implementing new policies and legislation is crucial to minimising Malaysian aviation's carbon footprint. An essential element in reaching this objective is the switch to SAF. This shift calls for more than just advanced technology; strong laws, supportive policies, and regulatory frameworks that promote and ease the adoption of SAF are all essential.

Despite significant advancements in the current regulatory landscape, shortcomings and gaps must be addressed. Comparative studies with environmentally developing countries reveal successful approaches and incentives that Malaysia can implement.

There is a definite and urgent need for action. Considering the growing challenges climate change poses, there is barely any time to be wasted. It is not only recommended but necessary that Malaysia's aviation industry make swift and coordinated efforts to implement SAF. It is a message to all stakeholders to show accountability and take prompt action to protect the environment and the next generation. Although the road to sustainable aviation may be difficult, we can achieve our objectives if we work together and are determined.

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