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Biofuel pathway to energy security in an uncertain world

The Edge, Malaysia



Page 1 of 2

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Recent geopolitical tensions in the Middle East have once again reminded us how fragile global energy systems can be. When conflicts disrupt key shipping routes or threaten oil production, the effects are felt almost immediately across the world. Prices spike, supply tightens and countries that depend heavily on imported fuels are left exposed.

Malaysia, despite being an oil and gas producer, is not insulated from these shocks. Our transport and energy systems still rely largely on petrol, diesel and natural gas. In fact, according to the International Energy Agency, fossil fuels still account for over 90% of Malaysia's total energy supply. This means that when global prices rise, the impact is quickly felt across the economy.

For many years, Malaysia has benefited from relatively stable energy access. There has perhaps been a quiet assumption that we are somewhat shielded from global volatility. But recent events suggest otherwise. It is precisely during such periods of relative stability that we should reflect more deeply and prepare for future uncertainties. One practical and immediate pathway lies in accelerating the development of bioenergy, particularly biodiesel, ethanol and biogas.



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BY HONG WAI ONN

Leveraging Malaysia's natural advantage

Among the available options, biodiesel is the most straightforward place to start. The experience of Indonesia provides a compelling example of what can be achieved with clear policy direction and sustained commitment. Through its B40 mandate, Indonesia has significantly reduced its dependence on imported diesel while strengthening domestic demand for palm oil and cushioning the impact of global oil price swings.

Other regional players such as Thailand and the Philippines are also moving in a similar direction, exploring higher biodiesel blending mandates to enhance energy security.

Malaysia, in contrast, has taken a more measured approach. This is partly understandable. In the past, biodiesel struggled to compete largely because diesel prices at the pump were heavily subsidised. Today, the picture is more nuanced. With improved process efficiencies and optimisation, biodiesel production costs — closely linked to crude

palm oil prices of around RM4,400 per tonne — are increasingly competitive. Current estimates suggest biodiesel can be produced at approximately RM4.20 per litre, compared to a retail diesel price of about RM4.70 per litre.

Biodiesel alone will not solve all of Malaysia's energy challenges. But it represents a practical, near-term solution that can be implemented with relatively low disruption while delivering immediate benefits.

Closing a critical gap

If biodiesel is underutilised, ethanol is largely untapped.

Malaysia currently has no nationwide ethanol blending mandate, unlike many of its regional neighbours. Countries such as Thailand and the Philippines have long incorporated ethanol into their fuel systems. More recently, Vietnam and Indonesia have also stepped up their efforts, recognising the role of ethanol in reducing gasoline imports and enhancing energy security.

Introducing even a modest ethanol mandate, such as E5 (petrol that contains 5% ethanol blended with 95% conventional gasoline), would be a meaningful first step for Malaysia. It would diversify the fuel mix, reduce exposure to global oil price fluctuations and create a domestic market for ethanol production.

High capital investment is often cited as

a barrier, particularly for second-generation plants that utilise agricultural residues. While this concern is valid, it should be viewed in context. During periods of energy price spikes, Malaysia's fuel subsidy bill can increase dramatically within a short span of time. The additional expenditure incurred in just a single month can, in fact, rival — or even exceed — the capital required to develop a first-of-its-kind second-generation ethanol facility, which is conservatively estimated at around US\$250 million (RM998 million). Redirecting even a portion of this spending towards strategic infrastructure would not only reduce long-term exposure to fuel price volatility but also lay the foundation for a domestic ethanol industry.

Unlocking what we already have

Beyond liquid biofuels, biogas presents a third and often overlooked opportunity.

Malaysia generates substantial volumes of organic waste, particularly from palm oil mills and food processing industries. Through anaerobic digestion, this waste produces methane, a valuable energy source. Over the years, many facilities have been built to capture this methane, primarily to reduce emissions. However, in many cases, the gas is simply flared rather than utilised productively. This represents a missed opportunity.



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Page 2 of 2

Captured methane can be used for electricity generation or upgraded into biomethane for injection into gas grids. The challenge, however, lies in economics and infrastructure. Many biogas plants are located in remote areas, making grid connection costly. Feed-in tariffs and biomethane pricing structures have not always been sufficiently attractive to justify large capital investments, resulting in longer payback periods.

Interestingly, regional developments are beginning to shift the landscape. In Singapore, recent biomethane initiatives have set clear demand signals, with ambitions to scale consumption significantly over the coming years. This has already begun to influence market behaviour in Malaysia. Biomethane prices, which were previously in the range of RM20 to RM30 per million British thermal units (MMBtu), have risen to around RM50 to RM55 per MMBtu within a relatively short period. This sharp adjustment reflects growing regional demand and signals that the market is starting to recognise the value of upgraded biogas as a viable energy commodity.

Malaysia is in a unique position. The feedstock is already abundant and many of the facilities required for methane capture are already in place. What is needed now is a strong push to move from capture to utilisation.

Turning vulnerability into strength

The recent energy shocks are a timely reminder that reliance on global fossil fuel markets comes with inherent risks. Malaysia has long benefited from its natural resources and relatively stable energy supply, but the world is changing. External disruptions are becoming more frequent and less predictable.

The good news is that Malaysia is not starting from zero. The country already has the resources, industry base and technical expertise needed to build a more resilient energy system. What is required now is a shift in urgency and mindset.

Accelerating biodiesel, introducing ethanol and unlocking the full potential of biogas are not just energy policies; they are strategic moves to strengthen national resilience. By acting decisively, Malaysia can reduce its exposure to global volatility, create new economic opportunities and move towards a more sustainable energy future. **E**

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