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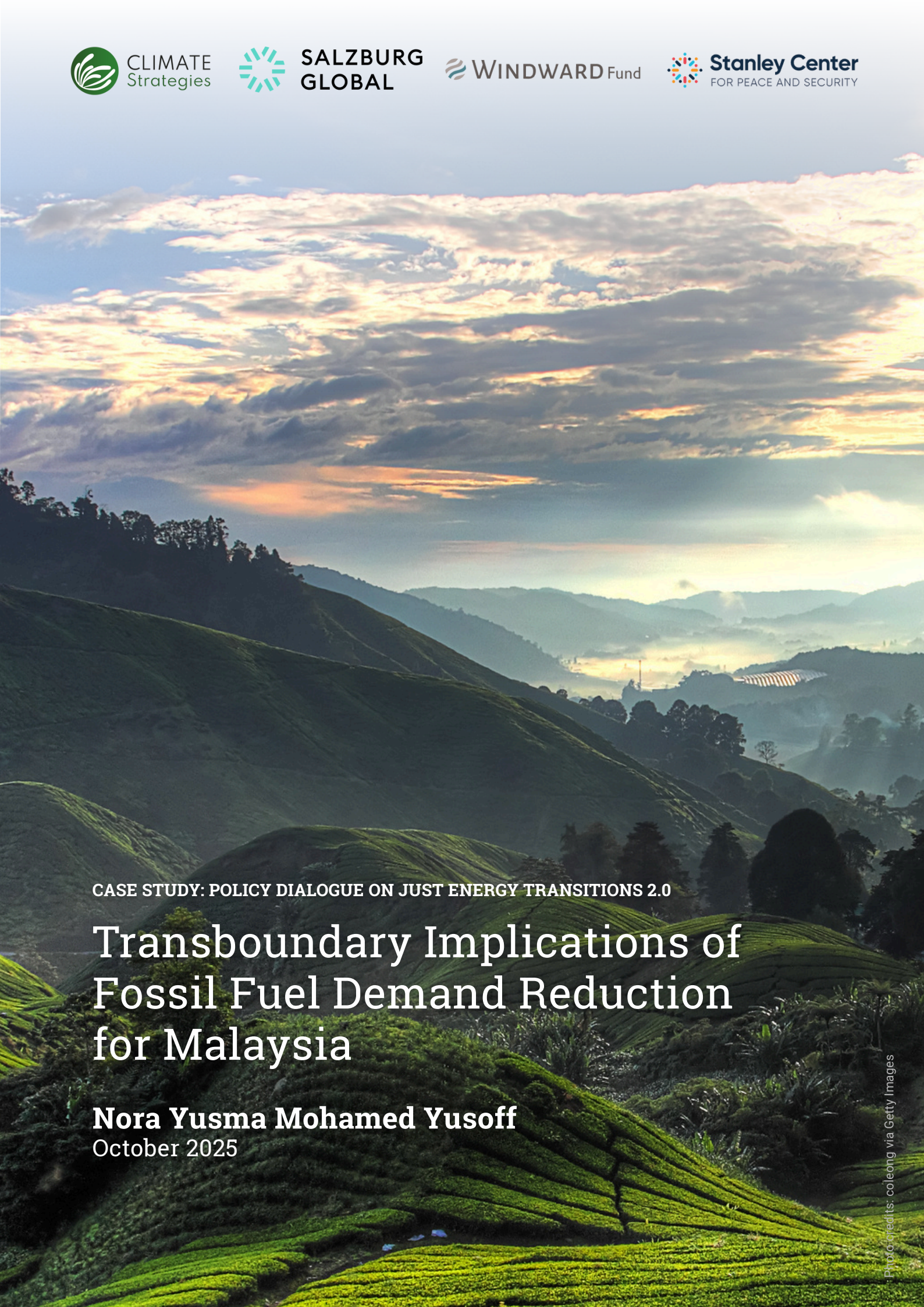

CASE STUDY: POLICY DIALOGUE ON JUST ENERGY TRANSITIONS 2.0

Transboundary Implications of Fossil Fuel Demand Reduction for Malaysia

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About the case study

This publication was commissioned by Climate Strategies to support the **Policy Dialogue on Just Energy Transitions 2.0: Identifying Pathways to Prosperity Post-Fossil Fuels** (PPFF)**.** This is a multiannual dialogue convening policymakers, researchers, and practitioners from oil and gas (O&G) producing and consuming countries to build mutual trust, explore shared interests, and address barriers to just energy transitions. The views expressed in this report do not necessarily represent those of the project partners or the dialogue participants.

As part of the dialogue, Climate Strategies commissioned a lead report as well as five case studies exploring the implications of demand decline for O&G exporter countries, and providing policy recommendations to support domestic just energy transitions across Brazil, Canada, Malaysia, Namibia, and Nigeria. Find out more here.

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Windward Fund is a 501(c)3 non-profit that incubates and host projects and helps leaders pursue bold solutions to the climate crisis and other pressing environmental challenges.

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1. Introduction

1.1 Context of the domestic oil and gas sector

Malaysia remains highly dependent on the oil and gas (O&G) sector, which contributed 3.2% to GDP and nearly 20% of federal government revenue in 2024[1].The sector directly employs over 59,000 workers and sustains more than 4,000 vendor companies in the O&G Services and Equipment (OGSE) ecosystem[2]. PETRONAS – the Malaysian state-owned company – alone supplied RM40 billion to the federal treasury in 2023, underscoring the fiscal reliance on fossil fuel rents[3]. Yet this reliance is increasingly precarious.

Malaysia's liquefied natural gas (LNG) exports – 29.3 million tonnes per year from Bintulu, the world's largest single-site LNG complex – are concentrated by over 91.7% in Japan, South Korea, and China[3]. All three markets are tightening their climate policies: Japan has committed to net zero by 2050 and is scaling hydrogen and ammonia co-firing; South Korea is targeting 30.6% renewables by 2036[4]; and China's decarbonisation drive is capping long-term fossil imports. These shifts directly threaten Malaysia's LNG export volumes, which declined by approximately 7% in 2023 even as Malaysia retained its position as a major exporter with 26.75 Mt of LNG in 2023 (~7% of global LNG trade)[5].

Domestically, energy security vulnerabilities are also growing. Malaysia imported RM15.1 billion of crude oil in Q4 2024, while exporting only RM6.0 billion, creating a net trade deficit of RM9.1 billion[6]. At the same time, offshore production is maturing in key fields such as Kikeh, Kinabalu, and Gumusut-Kakap in Sabah; Tapis and Dulang, in Peninsular Malaysia, are also nearing or past peak output. PETRONAS forecasts declining domestic gas supply beyond 2030 if no major new discoveries are made, raising risks for electricity generation and industrial feedstock[7]. Taken together, Malaysia faces a dual exposure: external shocks from demand contraction in key LNG markets, and internal constraints from depleting domestic reserves and rising import dependence. These dynamics narrow trade margins, heighten fiscal fragility, and expose Malaysia to transboundary risks, including the Carbon Border Adjustment Mechanism (CBAM) in the EU and stricter sustainability criteria in Asian markets. Without structural diversification, Malaysia risks being caught between falling export revenues and rising import bills, with implications for fiscal stability, energy security, and regional competitiveness.

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1.2 Status of the domestic energy transition

Malaysia's energy demand is shaped by its dual role as both a producer and consumer, with a substantial share of oil and gas output dedicated to export markets while domestic consumption remains heavily dependent on fossil fuels. However, the government has set clear policy directions for the energy transition, comprised under the National Energy Transition Roadmap (NETR) and the National Energy Policy 2022–2040 (NEP). The NETR outlines a pathway to achieve 70% installed renewable energy (RE) capacity by 2050, supported by an estimated RM1.2–1.3 trillion in cumulative investments. Flagship initiatives such as the Kasawari CCS project (3.3 $MtCO_2$/year, RM4 billion)[8], Sarawak's hydrogen development corridor, and the Lao PDR–Thailand–Malaysia–Singapore Power Integration Project (LTMS-PIP) signal a deliberate pivot away from fossil fuel dominance.

Nonetheless, structural challenges persist. The Malaysian government still relies on petroleum-related revenue, and this dependence is reinforced by energy security considerations, as fossil fuels are still perceived as critical for ensuring reliable and affordable supply. This reliance constrains fiscal space and political will to introduce reforms like carbon pricing or fuel subsidy rationalisation, despite their long-term benefits. Although the NETR provides a strategic vision, it lacks legal force and binding implementation mandates. Without statutory backing, many of its targets risk being sidelined amid political shifts or administrative turnover. Furthermore, institutional fragmentation, grid constraints, and the continued absence of a robust carbon pricing mechanism undermine progress. Critically, the lack of a centralised authority to coordinate energy and climate actions across federal and state levels hampers cohesive implementation of Malaysia's energy transition agenda.

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2. Demand Reduction: Implications and Opportunities

2.1 Exposure to Global Demand Decline

Malaysia's heavy reliance on fossil fuel exports and revenues leaves it highly vulnerable to structural shifts in global energy markets. As major economies accelerate decarbonisation, the risks extend beyond trade balances to also affect fiscal stability, stranded asset risks, and long-term energy security.

- Europe provides a cautionary signal. Eurostat (2025) reports that in 2024 the EU cut fossil fuel imports sharply, with reductions of 4.7% in petroleum, 39.1% in LNG, and 30.2% in pipeline gas[9]. These figures highlight how rapidly advanced economies can pivot away from fossil imports under climate policy pressure. For Malaysia, such trends underscore the urgency of diversifying both export markets and product offerings.
- Over 91.3% of Malaysia's LNG exports are shipped to just three markets: Japan, South Korea, and China. This over-reliance creates acute exposure to external shocks. Shell's LNG Outlook 2025 notes that global LNG import volumes have already declined by 12–15%, even as petroleum import values rose by 6–8%[10]. Malaysia's narrow market base means even moderate demand shifts in these economies can reverberate across its fiscal and trade accounts.
- According to DOSM (2023), 88% of Malaysia's mining output is fossil-based, dominated by crude oil, condensate, natural gas, and coal[11]. This structure leaves the sector highly exposed to stranded asset risks, where investments may lose value before their expected economic life ends. Unless managed through transition strategies, the economic cost of these stranded assets could weigh heavily on fiscal accounts and employment in resource-dependent states. In Q4 2024, Malaysia recorded RM15.1 billion in crude oil imports against only RM6.0 billion in exports, resulting in a net trade deficit of RM9.1 billion in crude[12,13]. This reversal of Malaysia's historical net-exporter position signals an emerging energy security vulnerability: while exports remain central to revenue, growing import dependence undermines resilience and erodes the fiscal buffer provided by oil and gas.

2.2 Domestic Implications of Declining Fossil Fuel Demand and Exports

Malaysia's economic and fiscal structures remain closely tied to hydrocarbons. Petroleum-related revenues, though declining as a share of government income, still provide a critical fiscal anchor, while LNG and crude oil exports sustain foreign exchange earnings. As global demand weakens, Malaysia confronts a dual challenge: shrinking export revenues and increasing import dependence. This twin vulnerability magnifies fiscal pressures, exposes PETRONAS to volatile external markets, and raises broader concerns over energy security, stranded assets, and long-term resilience.

- **Economics and Fiscal:** Despite a fall in petroleum's contribution to government revenue from 41.3% in 2009 to 20.1% in 2024[14], dependence remains entrenched. PETRONAS exemplifies this exposure: in 2023, more than 70% of its revenue was generated from exports and international operations[15], while it paid RM40 billion in dividends to the federal government, plus RM2 billion to the National Trust Fund[16]. Such reliance amplifies volatility. By way of illustration, petroleum-related revenue was projected at RM62.0 billion in 2025[17] – a 25% drop in fossil exports would therefore imply a shortfall of about RM15.5 billion annually. Past fiscal stress reinforced this dependence: in 2020, PETRONAS paid RM54 billion in dividends (RM24 billion ordinary + RM30 billion special) to the federal government, highlighting how extraordinary payouts were used to stabilise public finances[18,19].
- **Social**: Declining upstream activity threatens employment, particularly in resource-dependent states such as Sabah and Sarawak. Industry reports point to fewer exploration projects and softer rig demand, leaving local contractors most exposed. DOSM and MPRC census data show that the OGSE sector employed about 123,000 workers nationally in 2022–2023, including roughly 6,600 in Sabah and 18,000 in Sarawak, underscoring regional reliance on upstream services[20,21]. At the same time, PETRONAS projects around 50 plant turnarounds and shutdowns between 2025 and 2027, requiring as many as 25,000 skilled workers at peak[22,23,24]. Yet analysts stress this represents cyclical, short-term demand rather than durable job creation, highlighting long-term risks of workforce dislocation in oil and gas-dependent regions[25].
- **Equity:** Sabah and Sarawak control a disproportionate share of Malaysia's hydrocarbon base – around 61% of national reserves are in Sarawak alone[26], highlighting how fossil dependence maps onto regional disparities. Poverty remains elevated in East Malaysia, with Sabah at 19.7% and Sarawak at 10.8% versus 6.2% nationally[27]. Petroleum revenues anchor state budgets: Sarawak's petroleum sales tax has been substantial, with RM4.82 billion collected in 2020 and about RM6.06 billion in 2023[28], while Sabah recorded RM7.36 billion as of early 2025[29]. Institutions like PETROS reinforce Sarawak's control over domestic value chains[30], but as fossil demand weakens, fiscal vulnerability could widen socio-economic gaps without reforms in revenue-sharing and diversification.
- **Environmental Risk**: Malaysia faces mounting decommissioning liabilities with more than 380 offshore platforms and thousands of kilometres of pipelines in service. Regional costs are projected at USD 30–100 billion, with Malaysia and Indonesia carrying the largest burden[31,32.] Between 2018 and 2022 alone, Malaysia was flagged as potentially spending USD25 billion on abandonment[33,] and over 1,500 platforms and 7,000 wells may require decommissioning by 2030[34]. Without stronger regulatory frameworks – such as dedicated abandonment funds, bonding requirements, and liability assignment – these costs risk being shifted to taxpayers[35,36.]The implications are profound: fiscal risk, as RM75 billion in potential liabilities could divert resources away from social and green investment; away from social and green investment; environmental risk also arises if aging assets are left idle or improperly

dismantled, increasing spill and leakage hazards; and intergenerational equity risk emerges if future Malaysians inherit the financial and ecological burden. In short, unmanaged decommissioning threatens not only environmental integrity but also fiscal stability and social justice, underscoring the urgency of proactive policy design.

2.3 Opportunities Beyond the Fossil Dependence – Headline Diversification Pathways

While global fossil demand decline exposes Malaysia to fiscal, trade, and energy security vulnerabilities, it also opens a window to reposition the economy beyond fossil dependence. Leveraging its industrial base, natural resources, and regional integration opportunities, Malaysia can capture new growth in green manufacturing, cross-border electricity trade, hydrogen & carbon services, and the bioeconomy. These shifts would not only cushion the impact of declining O&G exports but also strengthen long-term competitiveness and resilience.

- **Green manufacturing & advanced industries**: Between 2018 and early 2023, 58 projects worth RM26.2 billion in EV and related component ecosystems were approved[37]. More recently, INV New Material broke ground on a RM3.2 billion lithium-ion separator facility in Penang, anchoring Malaysia's EV battery supply chain [38,39].


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- **Regional power trade:** The LTMS-PIP pilot interconnection already transmits 100 MW of renewable hydropower and is positioned as a foundational pillar in ASEAN's grid integration[40]. Ember's Wired for Profit report affirms that LTMS-PIP demonstrates the commercial and technical viability of cross-border trade in ASEAN[41].
- **Hydrogen & CCUS hub**: Sarawak has launched a Hydrogen Economy Roadmap 2035 and announced large-scale projects such as H2ornbill and H2biscus, alongside regulatory frameworks to institutionalise hydrogen trade [42,43]. The Kasawari CCS project will capture up to 3.3 $MtCO_2$ annually, making it one of the largest CCS facilities in Southeast Asia [44, 45].
- **Bioeconomy & agri-tech**: Growth in biomass pellets, advanced palm oil derivatives, and biorefinery projects like Pengerang (Petronas–Eni–Euglena) can feed new green export streams, supporting structural transformation outside energy [46].
- **Solar PV manufacturing & RE technology development**: Malaysia is already the world's third-largest producer of solar PV modules, supplying about 2.8% of global output, with strong manufacturing clusters in Penang, Kulim, and Selangor. By moving further up the value chain into inverters, battery storage systems, and grid technologies, Malaysia could reduce dependence on imported technologies and build its own renewable energy industrial ecosystem, supporting both domestic deployment and exports [47, 48].

3. Strategic Pathways and Sectoral Readiness Amidst Energy Market Shifts

- As global fossil fuel demand trends evolve, Malaysia faces pivotal choices in shaping its energy and economic future. The options before the country involve a trade-off between maintaining the status quo and embracing proactive transition measures. Pursuing a proactive transition, such as that outlined in the National Energy Transition Roadmap (NETR), would enable Malaysia to diversify its economy, open new export pathways, and build resilience against future shocks. By contrast, clinging to the status quo might provide short-term stability, but it would expose the economy to significant risks, including revenue volatility, stranded assets, and heightened energy insecurity as global demand contracts.
- Malaysia's O&G sector is well-positioned in some respects, yet vulnerable in others. The sector's key strengths include a well-developed LNG export capacity, advanced infrastructure, and Malaysia's strategic geographic position within ASEAN, which affords a natural leadership role in regional energy cooperation. Sarawak's abundant hydro and renewable energy resources also strengthen the country's long-term transition potential. At the same time, structural weaknesses persist: Malaysia remains highly dependent on crude oil imports and faces refinery capacity constraints, while fiscal reliance on PETRONAS and petroleum revenues continues to limit policy flexibility. The absence of carbon pricing and enabling legislation further constrain efforts to align domestic markets with global decarbonisation trends.
- Emerging opportunities could help Malaysia pivot strategically. Rising demand for hydrogen and other green fuels in Northeast Asia provides potential new export markets, while the ASEAN Power Grid offers a platform for greater regional electricity trade. Transition financing for the O&G Services and Equipment (OGSE) industry, combined with just transition programmes, could create a pathway for workers and firms to shift into clean energy and related sectors. However, these opportunities are matched by significant threats. Global fossil demand is projected to decline over time, increasing the risk of stranded assets and revenue losses. Geopolitical tensions with trading partners and delays in domestic reforms could further undermine investor confidence, leaving Malaysia exposed at a critical juncture.
- Malaysia's readiness will depend on its ability to act decisively. Strengthening policy implementation, accelerating subsidy reforms, and advancing enabling frameworks such as carbon pricing will be crucial for positioning the country to capture new opportunities while safeguarding against risks. The energy transition is not only a technological shift, but also a test of institutional resilience and strategic foresight. Malaysia's ability to navigate this moment will shape its economic and energy security trajectory for decades to come.

4. Domestic Policy Priorities and Recommendations

- It is imperative for Malaysia to recalibrate its domestic energy and fiscal strategies to mitigate the adverse effects of fossil fuel decline, while maximising emerging opportunities in green sectors. Although petroleum-related revenues still account for around one-fifth of total government income, the long-term viability of O&G investments is increasingly uncertain due to declining reserves, volatile prices, and the global transition away from fossil fuels.
- The government has already committed substantial investments in O&G production, but future allocations could be strategically redirected to new growth areas such as renewable energy, hydrogen, and advanced manufacturing. This reallocation would reduce exposure to stranded asset risks while building a more resilient economic base. A key policy priority is the diversification of production and exports beyond O&G into solid minerals, agriculture, clean and green industries, and services. Leveraging resources from the gradual phase-out of fossil fuel subsidies – currently exceeding RM81 billion annually – together with targeted green financing, would create fiscal space to accelerate these transitions.
- Malaysia's structural reforms can build on the NETR and ongoing subsidy rationalisation to strengthen fiscal sustainability. At the same time, the country should capitalise on its role in regional initiatives. Through the ASEAN Power Grid, Malaysia is already exporting 100 MW of clean electricity and could scale this to 5 GW, generating RM2–3 billion annually. Parallel to these shifts, Gentari is targeting 30–40 GW of renewable capacity by 2030 and up to 1.2 Mtpa of clean hydrogen[49], [50] while Sarawak's Hydrogen Economy Roadmap, launched in 2025, commits to scaling hydrogen exports through flagship projects in its Hydrogen Hub (e.g., H2ornbill, H2biscus) supported by USD 4.2 billion in partnerships and strengthened regulatory frameworks [51, 52 and 53].
- The decline in fossil fuel demand will also have significant labour market implications. Reduced O&G activity is likely to result in job losses across petroleum and allied industries. To cushion these effects, the government should launch comprehensive social protection and re-skilling programmes that channel displaced workers into clean energy, CCS, and advanced manufacturing sectors. Malaysia can also mobilise the capital and expertise of its O&G companies, such as PETRONAS, to invest directly in clean technologies and accelerate the adoption of CCS, renewables, and energy storage. The Kasawari CCS project, with a 3.3 $MtCO_2$/year capacity, already

demonstrates Malaysia's potential to anchor a regional carbon management market that is forecast to exceed 200 $MtCO_2$/year by 2050.

- Over the longer term, Malaysia will need stronger governance and dedicated financing mechanisms. Establishing a Malaysia Sustainable Energy Transition Fund (MSETF), capitalised at RM100 billion by 2040, would ensure stable funding for grid expansion, green industry development, and worker transition programmes. In parallel, a Just Transition Commission should be created to oversee inclusive planning and reskilling efforts, ensuring that the benefits of the transition are widely shared across states and communities.
- Through these measures, Malaysia can transform its reliance on fossil fuels into a foundation for sustainable, diversified growth. By harnessing regional integration, hydrogen exports, CCS services, and green industrial ecosystems, the country can strengthen its fiscal resilience while positioning itself as a clean energy leader in ASEAN.


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