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Policy Brief

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Navigating Malaysia's Energy Transition Through A Systems Dynamic Approach

Author: Jude Herijadi Kurniawan

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This policy brief is a series of research documents summarizing the knowledge of area contextualized to Southeast Asia and Malaysia, in particular from ongoing research work by the Center for Technology, Strategy & Sustainability (CTSS) at the Asia School of Business. The author of this issue is **Jude Kurniawan, Adjunct Lecturer**.

ABOUT THE AUTHOR

Dr. Jude Kurniawan is a sustainability educator and researcher with a PhD in Geography from the University of Waterloo (2020). He is currently an Adjunct Lecturer at Singapore Management University and the National University of Singapore. His research and teaching focus on sustainability transitions, urban transformation, complexity science, and strategic foresight. He works at the intersection of policy, systems thinking, and social-ecological resilience, examining how institutions, technologies, and human behavior interact in complex adaptive systems.

Contact the author at: jude.kurniawan@nus.edu.sg

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Executive Summary

Malaysia's National Energy Transition Roadmap (NETR) and Malaysia's third Nationally Determined Contribution (NDC 3.0) outline an ambitious pathway for decarbonization, with a strong emphasis on renewable energy expansion, energy efficiency, and low-carbon transport. The goal of NDC 3.0 for an absolute reduction of 15 - 30 $MtCO_2eq$ by 2035 from its peak level presents a case for why high-leverage interventions are required. However, most strategies are typically implemented through sector-specific interventions, with limited attention to how policies interact within a complex energy system.

This policy brief applies a system dynamics perspective to analyze key drivers of Malaysia's energy transition. Using systems mapping, it examines how feedback loops shape policy outcomes, revealing structural constraints that are not immediately visible in conventional policy analysis.

Two cases are presented. In energy efficiency (EE), the split-incentive problem illustrates how misaligned incentives prevent cost-effective measures from scaling. The absence of effective feedback mechanisms results in fragmented implementation, where energy savings do not translate into sustained reinvestment. The proposed Energy Service Company (ESCO) platforms, which focuses more "on supporting the government sector", can be extended to provide critical intervention in the building sector to reconnect financing, implementation, and returns.

In low-carbon transport, the analysis shows how fuel subsidies and high car dependency form a reinforcing carbon lock-in cycle. While subsidy rationalization can weaken this dynamic, it may also generate social pressures leading to policy reversal. Targeted interventions, such as Electric Two-Wheeler (E2W) incentives, can mitigate short-term impacts but may introduce competing dynamics that affect long-term modal shift.

Across both cases, the analysis highlights a broader insight: policy outcomes are shaped by interacting feedback loops, including reinforcing and balancing dynamics that can either enable or constrain transition pathways. Additionally, the analysis also reveals that demand-side dynamics are weakly represented in current system configurations, preventing feedback information from being mapped more comprehensively.

The policy brief demonstrates that effective transition strategies require moving beyond isolated policy instruments toward a systems-oriented approach that accounts for interaction, feedback, and unintended consequences.

Introduction

Malaysia's energy transition, as articulated in the National Energy Transition Roadmap (NETR) and the third Nationally Determined Contribution (NDC 3.0), sets out an ambitious pathway for decarbonization through renewable energy expansion, energy efficiency, and low-carbon transport (Ministry of Economy, 2023; NRES, 2025). Malaysia aims for an absolute reduction of 15 - 30 $MtCO_2eq$ by 2035 from its peak level; in essence, focusing on high-leverage interventions is critical (NRES, 2025). These strategies are typically framed through sector-specific interventions and technological solutions that can contribute directly to the measurable success of Malaysia's climate commitments. However, energy systems are inherently complex. Policy outcomes are shaped not only by individual instruments but also by the interactions between them as well as other factors (Wiseman, 2018).

Without accounting for these interactions, interventions may produce unintended consequences, reinforce existing dependencies, or fail to scale up as expected. Nevertheless, system dynamics approaches can be explicitly applied in analyzing Malaysia's energy transition accounting for how different factors of energy transition interact. These approaches examine the feedback structures that drive system behavior such as reinforcing carbon lock-in or misaligned incentives (Schuch et al., 2024).

Using systems mapping, this policy brief focuses on two critical areas: energy efficiency (EE) and low-carbon transport. These cases are chosen because they represent high-impact intervention domains where policy effectiveness depends strongly on system structure, uncovering hidden constraints, identifying leverage points, and providing a more integrated understanding of Malaysia's energy transition.

Understanding System Dynamics

System dynamics is a methodology for understanding systems, where a system is defined as a complex whole with numerous interconnected parts or subsystems. A key premise of this approach is that changes in one part of the system inevitably influence outcomes elsewhere, which could eventually impede the changes initiated earlier. As such, system dynamics requires a shift from linear cause-and-effect thinking to nonlinear reasoning.

One common way to analyze systems is through systems mapping, particularly using Causal Loop Diagrams (CLDs) (Barbrook-Johnson & Penn, 2021). These diagrams map variables and their causal relationships, allowing analysts to visualize how different factors (variables) interact. Central to this approach is the identification of feedback loops; these are causal circuits in which a chain of relationships cycles back to influence the original variable. These feedback structures shape the systemic behavior over time.

1.1 FEEDBACK LOOPS AND CYCLES

In systems mapping, feedback loops are broadly categorized into two types based on their effects on system behavior.

- Reinforcing loops (R-loops) amplify change. They promote either growth or decline by continuously reinforcing a particular direction of change. When reinforcing loops produce desirable outcomes, they are often described as virtuous cycles. For example, mutually reinforcing factors can sustain long-term economic growth or support positive sustainability outcomes. Conversely, reinforcing loops can also generate vicious cycles, where negative dynamics are amplified. A classic example is the poverty trap, where low income leads to limited educational opportunities, which in turn reinforces low income.
- Balancing loops (B-loops), in contrast, resist change and stabilize the system. They act as a counterforce to change, pushing the system back toward an equilibrium or its original state. As a result, interventions that target individual factors within a balancing loop may produce only temporary effects, as the system tends to revert to its prior behavior.

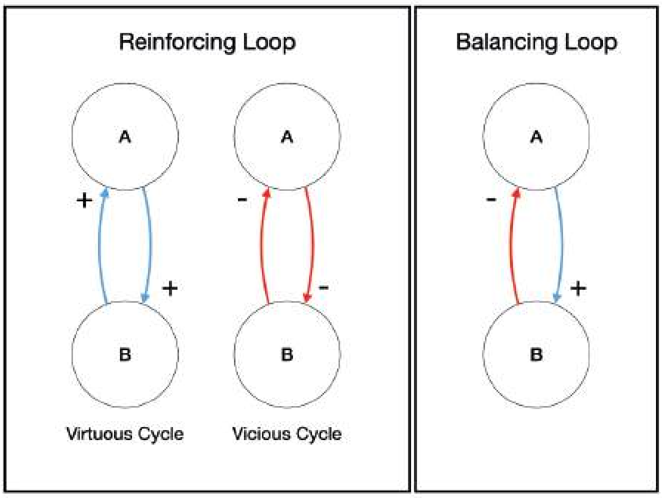

Figure 1: Different type of feedback loops in causal loop diagrams

1.2 SYSTEMIC INTERVENTION STRATEGIES

Interventions that focus only on adjusting individual factors within balancing loops are often low impact. Such actions are sometimes described as “diddling with the dials” (Kumar et al., n.d.). This means making marginal adjustments (e.g., minor subsidies or incremental resource changes) without altering the underlying system structure. These interventions typically produce limited or short-lived effects, as the system adapts and returns to its original state.

More effective strategies focus on the system's structure, particularly reinforcing loops.
Three common approaches can be identified:

1. **Strengthening the loop.** This strategy applies to reinforcing loops that generate desirable outcomes (virtuous cycles). It involves amplifying positive dynamics either by reinforcing existing drivers or removing constraints so that the loop becomes more robust to internal and external disturbances.
2. **Weakening or breaking the loop.** This approach targets reinforcing loops that produce undesirable outcomes (vicious cycles). Breaking a loop involves removing key factors or causal links to disrupt the cycle entirely. However, in many real-world systems, complete removal may not be feasible. In such cases, weakening the loop can slow or dampen the cycle by introducing countervailing forces or reducing its "gain." For instance, poverty cycles cannot be eradicated completely but it can be slowed down.
3. **Completing incomplete loops.** In some cases, a potentially beneficial reinforcing loop exists but is not yet fully formed. Interventions can "complete" the loop by adding missing factors or connections, enabling it to become self-reinforcing and sustainable over time.

By identifying these feedback structures and applying appropriate intervention strategies, policymakers can locate leverage points within a system where relatively small changes can produce disproportionately large and lasting effects (Morasae et al., 2024). Focusing on these leverage points enables more effective and durable shifts in system behavior.

1.3 PARTICIPATORY VALIDATION AND REALITY TESTING

The effectiveness of any systemic intervention depends on its construct validity, ensuring that the causal relationships identified in a map reflect genuine on-the-ground mechanisms rather than mere "wishful thinking" (Kumar et al., n.d.). Because complex adaptive systems often behave in unexpected ways, policies designed through top-down linear analysis risk being operationally infeasible or overlooking critical local constraints. Participatory Systems Mapping (PSM) addresses this by engaging diverse stakeholders, including frontline staff, industry experts, and affected communities, to co-create a representation of the system dynamics (Barbrook-Johnson & Penn, 2021).

This collaborative process is essential for surfacing operational realities that generalized data may miss, such as the specific logistical burdens or technical limitations faced by those tasked with implementing energy efficiency or low-carbon mobility initiatives. By bringing together participants with on-the-ground knowledge, the process ensures the resulting map accurately reflects reality and discovers unexpected connections. Furthermore, by making individual mental models explicit and negotiating relationships collectively, PSM builds the shared understanding and stakeholder ownership necessary for the coordinated, whole-of-nation actions required by the NETR. This validation step ensures that policy recommendations are perceived as trustworthy and usable representations of the collective system perception.

Case 1: Adoption of Energy Efficiency (EE)

Energy efficiency (EE) represents one of the most cost-effective levers in Malaysia's energy transition. Unlike supply-side interventions, EE directly reduces energy consumption while lowering costs for end users, making it particularly relevant for addressing the energy trilemma of affordability, security, and sustainability. Despite its strong economic and environmental case, however, EE adoption remains limited due to structural disconnects embedded within the system.

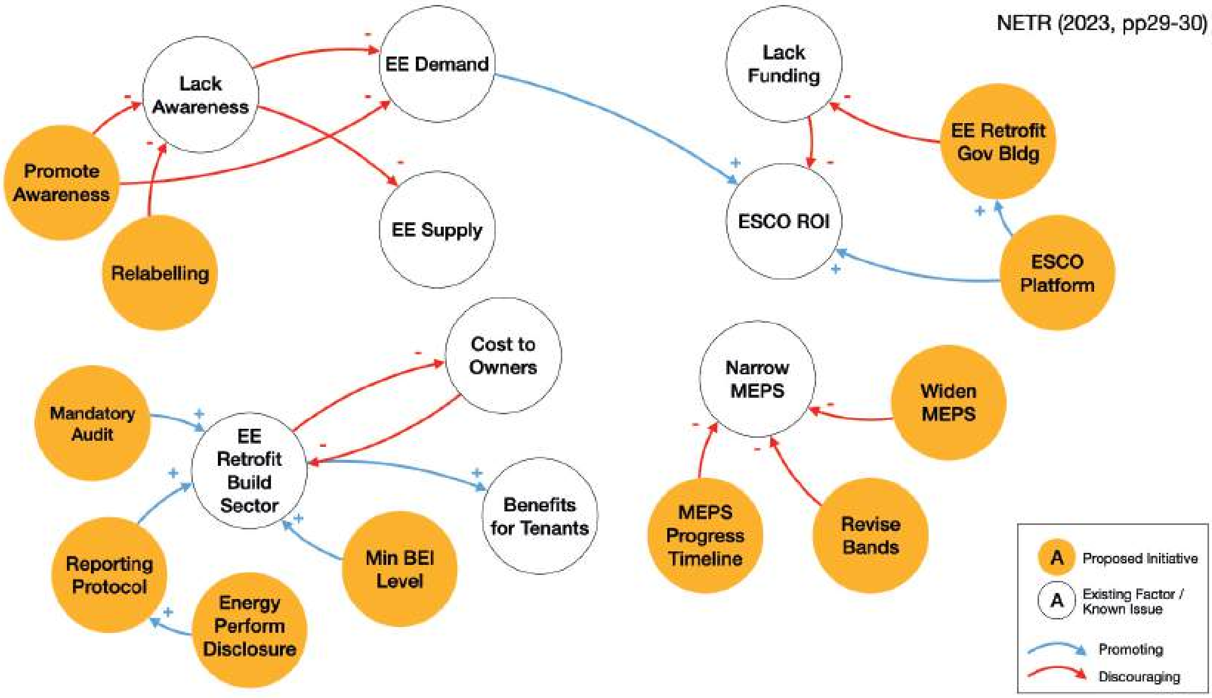

Figure 2: System map for energy efficiency

2.1 THE SPLIT-INCENTIVE PROBLEM AS AN INCOMPLETE LOOP

A central barrier to EE adoption is the well-documented split-incentive problem, particularly in the building sector. In this case, building owners bear the upfront capital expenditure required for energy efficiency retrofits, while tenants capture the financial benefits through reduced energy bills.

From a systems perspective, this represents an incomplete reinforcing loop. The potential virtuous cycle where energy savings justify upfront investments and stimulate further upgrades exists in principle but fails to materialize in practice. Because cost and benefit are distributed across different actors in which the cost is borne by the owner and the benefit is reaped by the tenants, the feedback signal necessary to drive reinvestment is effectively broken.

In its current form, this dynamic functions as a vicious cycle. The misalignment of incentives discourages building owners from investing in efficiency improvements, leading to continued energy inefficiency and foregone savings. Over time, this reinforces underinvestment in EE, preventing the system from reaching its cost-effective potential.

2.2 COMPLETING THE INCOMPLETE ESCO LOOP

A high-leverage intervention lies in completing this incomplete loop. The establishment of an Energy Service Company (ESCO) platform can serve as a critical intermediary to realign incentives and restore feedback within the system. For instance, by providing financing mechanisms like revolving funds and by coordinating retrofit projects across public and private sectors, ESCOs enable the upfront costs of efficiency improvements to be recovered through realized energy savings. It is also important to note that the National Energy Transition Facility (NETF), with its initial seed fund of RM 2 billion (Ministry of Economy, 2023), can provide the catalytic blended finance needed to de-risk the nascent ESCO market and provide the revolving fund. Here, investment decisions are tied to performance outcomes, allowing savings to flow back into the system to finance subsequent retrofits.

Once established, this mechanism can generate a self-reinforcing virtuous cycle where successful retrofits demonstrate financial viability, attract further participation, and expand the pool of investable projects. Over time, this reduces transaction costs, builds market confidence, and accelerates the diffusion of EE measures.

2.3 CREATING SELF-REINFORCING EE LOOPS

The challenge in scaling EE is not only technical feasibility but also structural misalignment. Current efforts to drive EE adoption remain fragmented. Financing, implementation, and benefits are distributed across different actors with weak coordination. As a result, savings generated from efficiency improvements do not reliably translate into new investments.

Well-structured ESCO platforms can address this fragmentation. By linking financing, project delivery, and performance-based returns, they reconnect parts of the system that currently operate in isolation. If designed effectively, such platforms can ensure that realized savings are captured and reinvested, rather than distributed across actors who have little stakes in energy retrofitting. In this way, energy efficiency shifts from a series of one-off interventions to a more continuous and scalable process.

In this sense, the strategic issue is not the promotion of additional EE measures, but the creation of institutional arrangements that allow existing interventions and/or initiatives to align and support one another over time.

Case 2: Towards Equitable Low-Carbon Mobility

NETR stated that road transport accounts for 55 Mt CO_2eq, which is approximately 85% of total transport emissions in Malaysia. Further, road transport emissions are driven largely by high levels of private vehicle ownership (Ministry of Economy, 2023). From a systems perspective, the mobility sector is characterized by a reinforcing carbon lock-in cycle.

At the core of this dynamic is the long-standing system of blanket fuel subsidies for internal combustion engine (ICE) vehicles. By lowering fuel costs, subsidies encourage higher vehicle usage and ownership. This, in turn, increases national fuel demand and pressures political actors to maintain subsidies. The result is a vicious self-reinforcing loop: cheap fuel promotes car dependency, which then entrenches the very policies that sustain it.

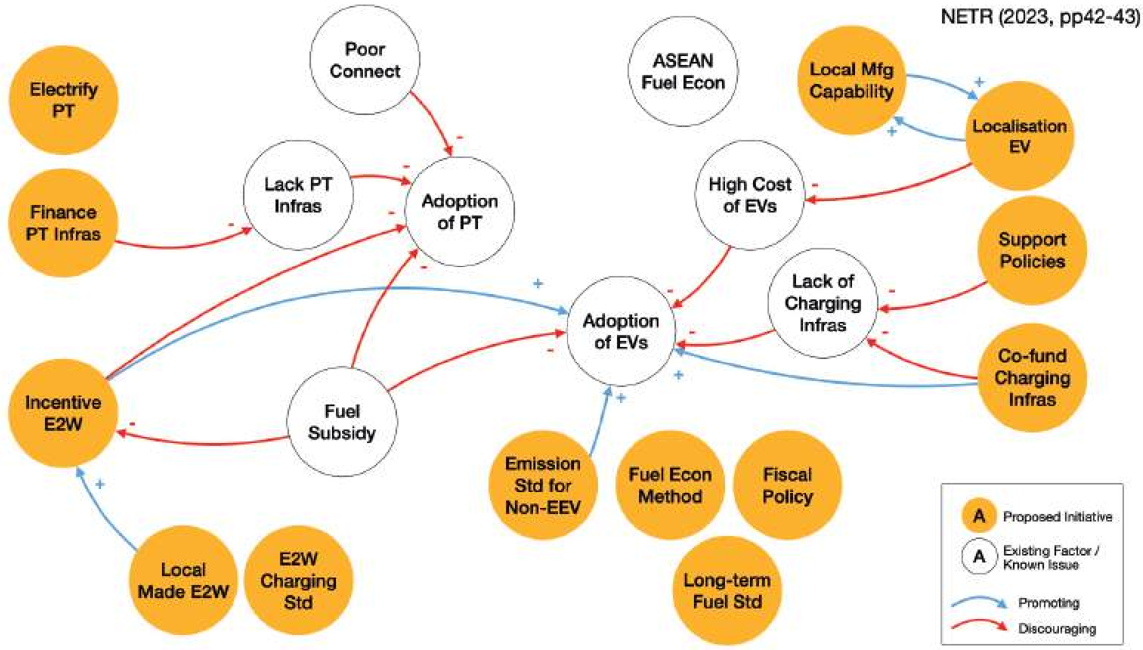

Figure 3: System map for low carbon transport

3.1 THE COMPLEXITY OF CARBON LOCK-IN LOOPS

This carbon lock-in dynamic can also undermine otherwise well-intended policy interventions. For example, stringent fuel economy standards (GM-LV2) or emissions standards for non-EEVs (GM-LV3) aim to improve efficiency and reduce emissions (Ministry of Economy, 2023); however, if fuel subsidies remain in place, consumers are shielded from the true cost of energy, weakening the incentive to shift toward cleaner technologies.
In this sense, the effectiveness of technical standards is structurally constrained by existing policy feedback.

Within a complex system, isolated interventions are expected to offset by system responses in theory, but, in reality, reinforcing loops in different parts of the system can contradict each other, pushing the system back to its original state. In this context, adjusting one policy parameter without addressing the broader system can result in what is often described as "diddling with the dials."

3.2 WEAKENING THE CARBON LOCK-IN LOOP

A high-leverage strategy is not to immediately break this reinforcing loop, but to reduce its strength. Fuel subsidy rationalization such as floating diesel prices can weaken the loop by reducing the financial incentives associated with fossil-fuel dependence. By exposing consumers to more accurate price signals, such reforms slow the growth of ICE vehicle use and create space for alternative mobility options.

In parallel, reducing car dependency through improvements in public transport can generate system-wide effects. Even modest gains in reliability and accessibility can disproportionately increase ridership, supporting national targets of a 60% public transport modal share. While breaking carbon lock-in entirely is difficult, weakening this reinforcing loop is more feasible and strategically more effective.

However, interventions to weaken carbon lock-in may generate unintended consequences elsewhere in the system. Stringent vehicle standards, for instance, often increase upfront vehicle costs due to improved technologies, while also raising maintenance costs for older, non-compliant vehicles. If these cost increases occur alongside fuel subsidy reform, households, particularly those in the B40 income group, may experience significant financial pressure. This creates a balancing feedback loop in which rising social stress generates political demand for relief, leading the government to reinstate subsidies to maintain affordability.

3.3 WEAKENING COMBINING WEAKENING AND STRENGTHENING STRATEGIES

To avoid diddling with the dials, policy interventions must be coordinated across multiple domains rather than implemented in isolation. Fuel subsidy rationalization plays a critical role in weakening the carbon lock-in loop, but it must be complemented by measures that support transition and mitigate social impacts.

Targeted interventions are particularly important for addressing distributional effects. For example, incentives for Electric Two-Wheelers (E2W) can help B40 households achieve total cost of ownership parity without relying on blanket fuel subsidies. Such measures can relieve immediate financial pressure while supporting a shift toward lower-carbon mobility options. However, these targeted interventions are not inherently self-sustaining. If subsidies for E2W adoption are withdrawn prematurely, affordability constraints may re-emerge, potentially triggering renewed demand for fuel subsidies.

3.4 COMPLETING THE INCOMPLETE LOOPS: BUILDING SELF-SUSTAINING LOOPS

For low-carbon mobility transitions to sustain, new reinforcing loops must be established. In the case of E2Ws, this requires reducing E2W costs through local manufacturing, technological innovation, and economies of scale (Meckling & Nahm, 2019). Strengthening domestic production capacity can help ensure that affordability is maintained without continued reliance on subsidies.

Similarly, achieving the NETR target of 80% electrified vehicle (xEV) adoption by 2050 depends on the development of a reinforcing loop between charging infrastructure and EV uptake. Greater infrastructure availability increases user confidence, which drives adoption and further justifies infrastructure expansion.

Public transport remains a critical component of this transition. Improvements in reliability and service quality can generate significant increases in ridership, producing positive spillover effects that reduce overall car dependency. However, interactions between policies must be carefully managed. For instance, strong incentives for private electric mobility (e.g., E2Ws) may inadvertently compete with efforts to increase public transport ridership.

3.5 COMPETING FEEDBACK LOOPS AND POLICY TRADE-OFFS

From a system dynamic's perspective, Malaysia's mobility transition is shaped by competing feedback loops. On the one hand, policies such as fuel subsidy reform and public transport improvements aim to reduce car dependency. On the other hand, targeted support for alternative private mobility solutions, such as E2Ws and Shared Mobility, may reinforce different forms of dependency (Marletto, 2014). This creates a policy tension. While E2Ws improve accessibility and equity in the short term, they may weaken incentives for public transport adoption in the long term. Strengthening one loop may eventually undermine another.

The challenge for policymakers is not to prioritize a single intervention, but to manage these interactions in a way that aligns short-term equity goals with long-term system transformation. Improving public transport remains essential, but its effectiveness depends on ensuring that other policies do not dilute its impact.

4 BRINGING DEMAND BACK

Current energy transition strategies, including the NETR and NDC 3.0, are largely oriented toward supply-side interventions and efficiency improvements. These include expanding renewable energy capacity, improving technological performance, and optimizing infrastructure systems. While necessary, such approaches tend to treat energy demand as given, typically projected from historical trends rather than actively investigated. From a systems perspective, this represents a partial view of the transition. By focusing primarily on supply and efficiency, existing frameworks risk overlooking the underlying drivers of demand and, in so doing, may reproduce or worse, reinforce existing consumption patterns rather than transform them.

4.1 DEMAND AS A MISSING DIMENSION IN ENERGY SYSTEM

One limitation of current policy design is that demand-side dynamics are often weakly represented or entirely absent in system models. When demand is treated as an exogenous input, the feedback structures that generate and sustain consumption remain unexamined.

Demand can instead be explicitly incorporated into the system analysis. This involves shifting the unit of analysis toward individuals and households, where required energy consumption is determined. At this level, demand is shaped by daily practices, built environment conditions, access to services, and socioeconomic constraints.

Mapping these relationships reveals feedback loops that are not visible in supply-centric models. For example, urban form influences mobility needs; mobility needs shape transport demand; and transport demand reinforces infrastructure investment decisions. Without incorporating such loops, policy interventions risk addressing symptoms rather than structural drivers.

4.2 SHIFTING FROM EFFICIENCY TO SUFFICIENCY

Reframing demand in this way also enables a shift from efficiency to sufficiency. Current policy approaches emphasize efficiency, reducing the amount of energy required per unit of activity. While important, efficiency alone does not question the scale or necessity of the activity itself. A sufficiency-oriented perspective, by contrast, focuses on reducing the need for energy-intensive activities in the first place. Rather than asking how to make systems more efficient, it asks how systems can be reorganized so that fewer resources are required (Muhoza & Johnson, 2018). For instance, reducing the need for long-distance commuting through urban design can have a more structural impact than improving vehicle efficiency alone.

Sufficiency can be understood as the creation of new reinforcing loops that stabilize lower levels of demand. Once established, these loops can reduce pressure on energy supply. For example, in the context of the B40 segment, policies that prioritize access to reliable and affordable public transport (as opposed to continued reliance on fuel subsidies or even subsidized E2Ws) can reduce the need for private vehicle ownership altogether. If households can meet their mobility needs through accessible and well-integrated transport systems, the demand for fuel and private mobility diminishes structurally. In contrast, while E2W incentives may provide short-term affordability, they risk reinforcing a different form of vehicle dependence, particularly if supported alongside fuel subsidies. A sufficiency-oriented approach would instead focus on reshaping mobility needs, creating a reinforcing loop in which reduced dependence on private transport lowers overall energy demand while maintaining accessibility and equity.

Conclusion

Both NETR and NDC 3.0 reflect a strong commitment to decarbonization. Also, the National Committee on Energy Transition, spearheaded by the Minister of Economy, is responsible for monitoring the implementation of these complex, cross-sectoral loops to ensure they do not produce unintended consequences. However, the transition is not merely a matter of scaling supply or improving efficiency. Energy transition is fundamentally a systemic transformation problem, shaped by interacting feedback loops across technological, institutional, and behavioral domains.

The analysis of energy efficiency highlights how even the most cost-effective interventions can fail to scale when underlying system structures are incomplete. The split-incentive problem demonstrates that without aligned feedback mechanisms, potential virtuous cycles remain unrealized. Interventions such as ESCO platforms illustrate how completing these loops can transform fragmented efforts to be more self-sustaining.

Similarly, the case of low-carbon transport reveals the persistence of carbon lock-in through reinforcing feedback loops, particularly those associated with fuel subsidies and car dependency. While policy measures such as fuel subsidy rationalization can weaken these dynamics, they also generate countervailing pressures of social equity. The interaction of reinforcing and balancing loops uncovered the risks of policy resistance and the need for coordinated multi-dimensional interventions.

Beyond these sectoral insights, this policy brief has argued that current frameworks remain largely supply- and efficiency-oriented, with demand treated as an exogenous variable. By bringing demand explicitly into system analysis particularly at the level of households and everyday practices, a more complete understanding of transition dynamics could emerge.

This enables a shift from improving efficiency to addressing sufficiency, where the focus is not only on how energy is used, but also on how demand itself can be shaped and reduced.

References

Barbrook-Johnson, P., & Penn, A. (2021). Participatory systems mapping for complex energy policy evaluation. Evaluation, 27(1), 57–79. https://doi.org/10.1177/1356389020976153

Kumar, S., Chan, C., Cheong, A., Hamakawa, T., Lima, R. D. O., Oi, J. J., Ong, A., Pande, R., Pramatatya, Y., & Kurniawan, J. H. (n.d.). Mapping Complexity: A guide to systems mapping for urban planning [Under Review]. International Journal for Smart and Sustainable Cities.

Marletto, G. (2014). Car and the city: Socio-technical transition pathways to 2030. Technological Forecasting and Social Change, 87, 164–178. https://doi.org/10.1016/j.techfore.2013.12.013

Meckling, J., & Nahm, J. (2019). The politics of technology bans: Industrial policy competition and green goals for the auto industry. Energy Policy, 126, 470–479. https://doi.org/10.1016/j.enpol.2018.11.031

Ministry of Economy. (2023). National Energy Transition Roadmap: Energising the Nation, Powering Our Future. Ministry of Economy. https://ekonomi.gov.my/sites/default/files/2023-08/National%20Energy%20Transition%20Roadmap.pdf

Morasae, E. K., Botterell, Z. L. R., Andrews, S. H. V., Beaumont, N., Boisseaux, P., Chadwick, H., Cherrington, R., Cole, M., Coppock, R. L., Deakin, K., Duncan, E. M., Flor, D., Galloway, T. S., Garrard, S. L., Godley, B. J., Harley-Nyang, D., Lewis, C., Lindeque, P. K., McCutchion, P., … Nelms, S. E. (2024). Using systems mapping to understand the constraints and enablers of solutions to plastic pollution. Journal of Environmental Management, 371, 122994. https://doi.org/10.1016/j.jenvman.2024.122994

Muhoza, C., & Johnson, O. W. (2018). Exploring household energy transitions in rural Zambia from the user perspective. Energy Policy, 121, 25–34. https://doi.org/10.1016/j.enpol.2018.06.005

NRES. (2025). Malaysia NDC 3.0 to UNFCCC 2025 final. Ministry of Natural Resources and Environmental Sustainability (NRES). https://unfccc.int/sites/default/files/2025-10/Malaysia%20NDC%203.0%20to%20UNFCCC%202025%20final.pdf

References

Schuch, E., Apergi, M., Chow, D. Y. K., Eicke, L., Goldthau, A., Kurniawan, J. H., Lima-de-Oliveira, R., Tan, Z. G., & Weko, S. (2024). Breaking the carbon lock-in: Identifying pathways for Malaysia towards a low-carbon future. Technological Forecasting and Social Change, 202, 123331. https://doi.org/10.1016/j.techfore.2024.123331

Wiseman, J. (2018). The great energy transition of the 21st century: The 2050 Zero-Carbon World Oration. Energy Research & Social Science, Energy and the Future, 35, 227–232. https://doi.org/10.1016/j.erss.2017.10.011

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