Center for Market Education

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Energy Transition in Malaysia: An Ecomodernist Perspective

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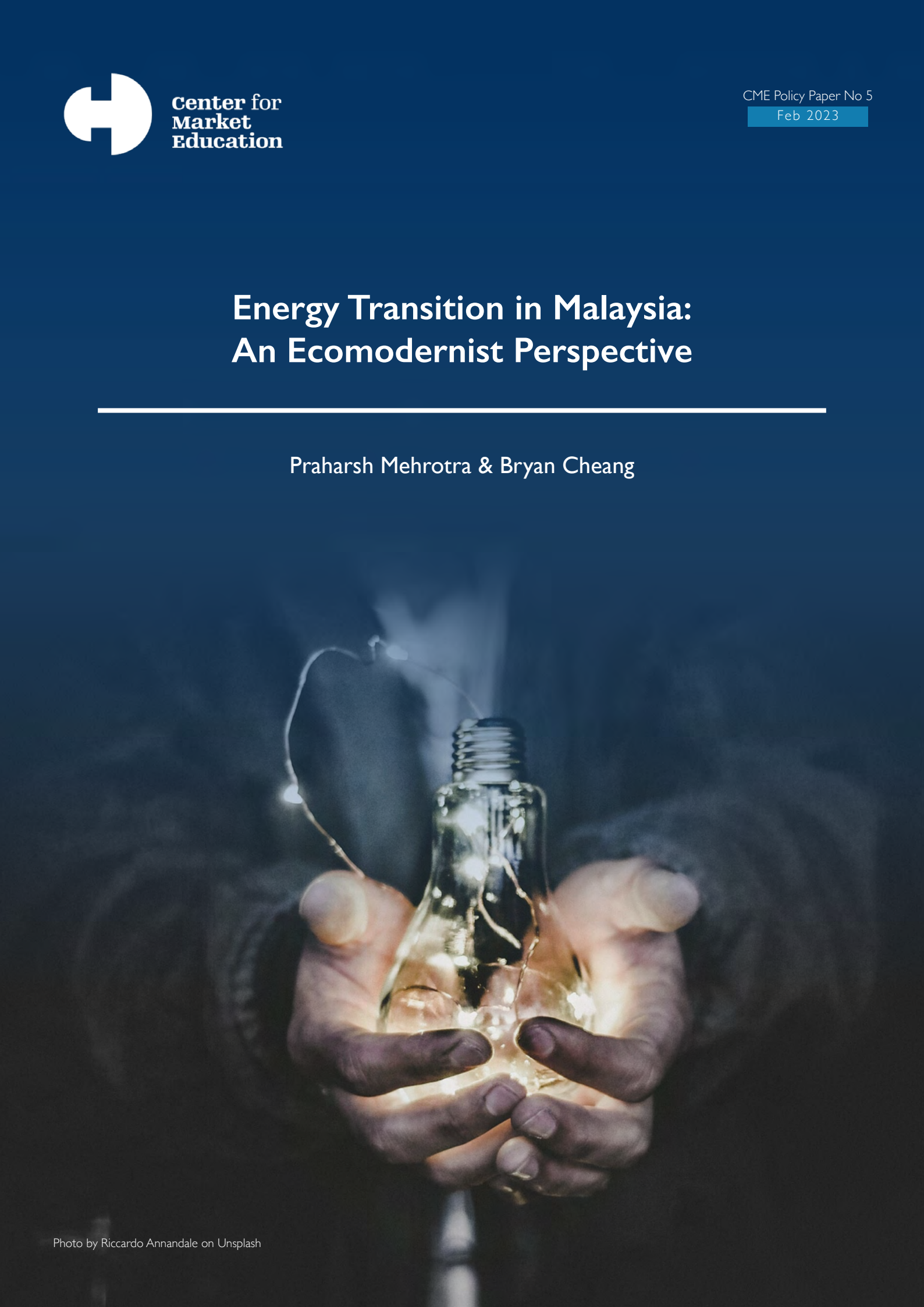

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1. Introduction

Malaysia today is at the doorstep of a great transition in energy. The country has historically been extremely dependent on oil and natural gas. Through the 1970 and 1975, oil production in Malaysia grew at an average annual rate of 40%. While in the 1980s the country decided to move away from a heavy dependence on oil, a huge amount of energy reliance shifted to coal. Coal today contributes to about 24% of Malaysia's energy production. In the long run however, the country faces major energy challenges that it must overcome. A strong energy policy will help Malaysia withstand these challenges effectively.

A strong energy policy, in our view, is one that meets the following objectives:

a) Be able to fulfil Malaysia's fast-growing energy demand;
b) Meet the country's environmental objectives;
c) Lead to an efficient allocation of energy resources with low wastage.

Keeping in mind the above objectives, our article applies the philosophy of ecomodernism to energy policy in Malaysia. Ecomodernism is a particular approach within environmental ethics that believes in the importance of human innovation, smart technologies, and governance strategies in bringing about environmental outcomes (Asafu-Adjaye et al., 2015; Symons (2019). Contrary to radical perspectives on the environment, ecomodernism believes that the inherited institutions of modernity are not to be dismantled, but rather reformed. Ecomodernism believes that the existing arrangements of capitalism and market-based growth are part of the solution, rather than a problem to be ejected. The challenge, therefore, is to craft policies and reform institutions in order to facilitate innovation, use market-based mechanisms in policy design and minimize wastage.

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Therefore, the recommendations we make here are multi-pronged, and include six recommendations which cumulatively contribute to the abovementioned three objectives. These six recommendations include making the transition to nuclear energy, phasing out inefficient subsidies, uncap FiT policy, implementing regulatory sandboxes – which are partial deregulation initiatives that can spur innovation, improve consumer support and public awareness of energy issues. These policies will help Malaysia achieve both economic growth and environmental progress at the same time, the twin benefit of an eco-modernist approach, as opposed to radical environmentalism common today that divorce both goals.

We make these recommendations based on Malaysia's current energy needs and also drawing from the experiences of other countries. We also examine existing cornerstone Malaysian policies such as the FiT, NeM policy and the electricity subsidies, and discuss how these can be tweaked or can fit in into a comprehensive energy policy for the country which can meet the above objectives.

2. Energy policy needs analysis

Much environmental discourse typically divorces the goals of economic growth and sustainability. It is said that sustainability may require slowing the pace of growth, reduce consumption and resource depletion. Such approaches may not be suitable for developing nations, and those wishing to solve long-standing issues of poverty alleviation. Malaysia still has a long way to go in achieving broad-based growth and improve standards of living for its citizens, and as such, an eco-modernist approach is suitable.

Eco-modernism achieves growth and sustainability by decoupling human development from environmental impacts. This will in turn require a growing, dynamic, and vibrant economy that produces technological innovations. Consequently, Malaysia, by adopting such a paradigm, will be able to drastically increase its energy supply to meet its future demand, and at the same time do so in a sustainable manner.

2.1. Issues to be addressed through energy policy

While designing an energy policy, it is very important to consider various problems that an energy policy should be aimed at addressing. There are several issues that any energy policy for Malaysia today must address:

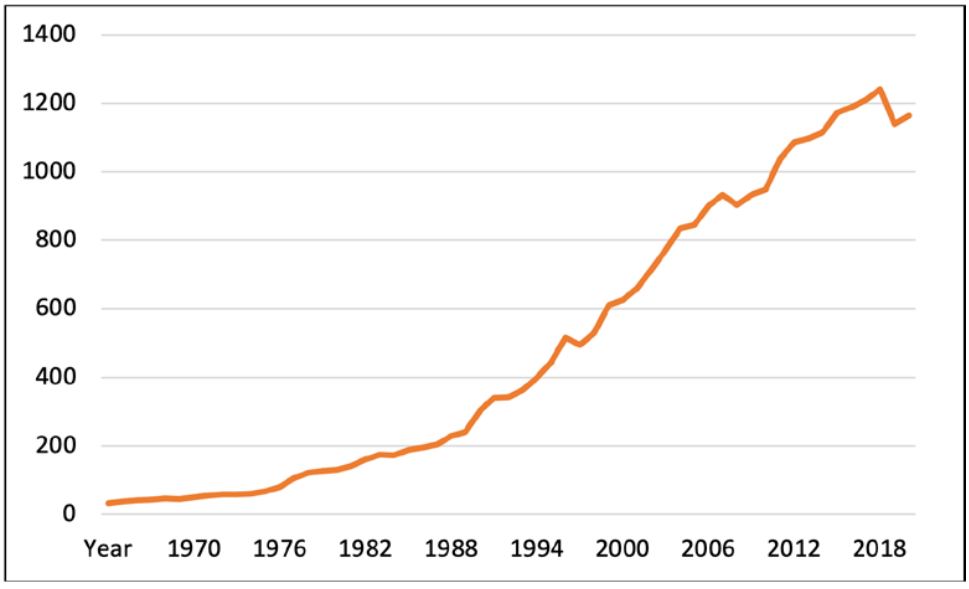
a) Ensure supply can meet growing demand

It is common knowledge that our global energy demand is continuously growing at an extremely fast rate and will continue to do so. Moreover, energy fundamentally is a basic human need for survival. It is extremely critical to ensure that any energy policy

ensures that the energy supply is constantly able to meet the growing demand for energy. This is especially so for most developing nations who require a source of cheap and abundant energy to fuel their economic development.

As countries like Malaysia continue to move up the ladder of development, the demand for energy will continue to grow. According to a paper published in 2019, total energy demand in Malaysia was about 443.07 PJ (Petajoules) in 2013 and is expected to double by 2050 (Haiges et al., 2017). Approximately half of this energy demand is expected to continue coming from industry. The projected growth in energy demand is primarily expected to be a result of expected growth in GDP per capita in Malaysia. To accommodate this heavy growth in demand Malaysianeeds an adequate energy policy to ensure supply grows too.

Figure 1: Primary Energy Consumption in Malaysia (TWh).

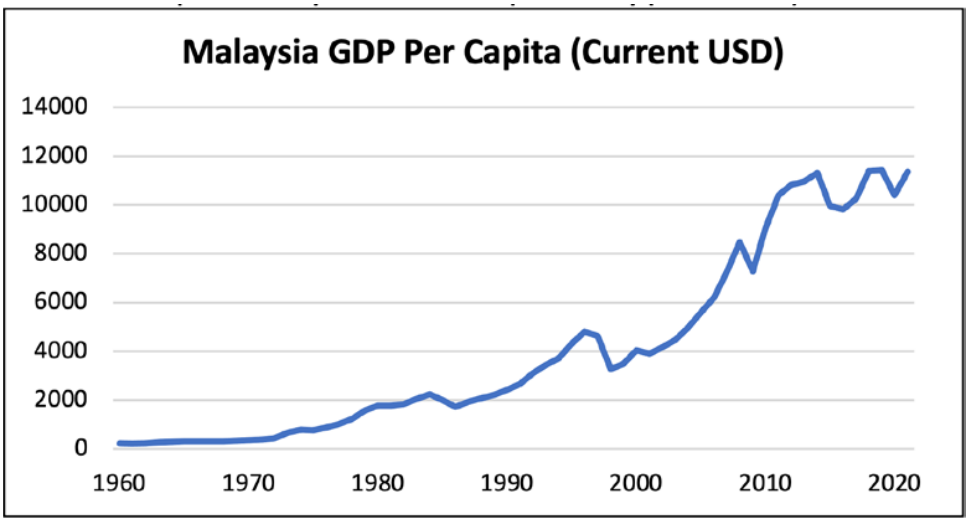


Source: Our World In Data (Primary Energy Consumption in Malaysia TWh).

A paper published in 2021 attempted to model energy demand in Malaysia as a function of energy supply. To do so, it first analysed several studies conducted before to model energy demand and determined a set of factors that determine energy demand. The study concluded that broadly the following factors were good predictors of energy demand in a country:

a) GDP Per Capita
b) Population
c) Crude Oil Supply
d) Natural Gas Supply
e) Coal And Coke Supply
f) Hydropower Supply

Figure 2: GDP Per Capita of Malaysia from 1960 to present day (Current USD).



Source: World Bank Data.

Here we can see that Malaysia's GDP per capita is on a steady rise. This implies demand for energy in the country is expected to grow. Therefore, Malaysia's energy policy needs to find a way to ensure that energy supply either through the abovementioned sources or through alternative sources can meet the growing energy demand. Failure to do so will lead to increased costs of production, which will stunt economic competitiveness. In the end, consumers are

worse off when energy costs are high, which is a problem that has plagued Europe and major Western countries at the time of this writing (Horowitz, 2022).

At the same time, one of the most crucial factors in ensuring a healthy energy supply is to ensure that a healthy mix of different energy sources is achieved. This is because every source of energy has its limits and should not be singularly relied on. Any energy policy needs to look at a diversified approach if the country wants to ensure that energy supply can keep pace with the demand. Importantly, while all energy sources should be considered, an eco-modernist paradigm is one that stresses innovation and efficiency, and understandably, the need to consider new emerging technologies that has unfortunately been resisted, such as nuclear, carbon capture and storage, green hydrogen, and the like (Zappa, 2014).

b) Environmental concerns

Environment related issues, especially climate change risk, are an extremely important factor when choosing an energy policy. In Malaysia, the climate issue is even more important because the country is very vulnerable to flooding due to a rise in water levels. Moreover, climate change could adversely affect the primary sector of the economy. According to a World Bank report, occurrence of droughts and floods early in the rice-growing season could reduce yields by up to 60%. Furthermore, drought conditions may impact the cultivation of rubber, palm oil and cocoa. This means that low-income farmers may be very severely impacted (World Bank, 2021).

In this case, consistent with an eco-modernist standpoint, climate change is a problem that merits policymakers' attention, not because the natural environment has value in and of itself, but because failing to resolve climate concerns affect human welfare. Take the example of extreme weather; while the incidence of such events has increased globally, the number of deaths have fallen in

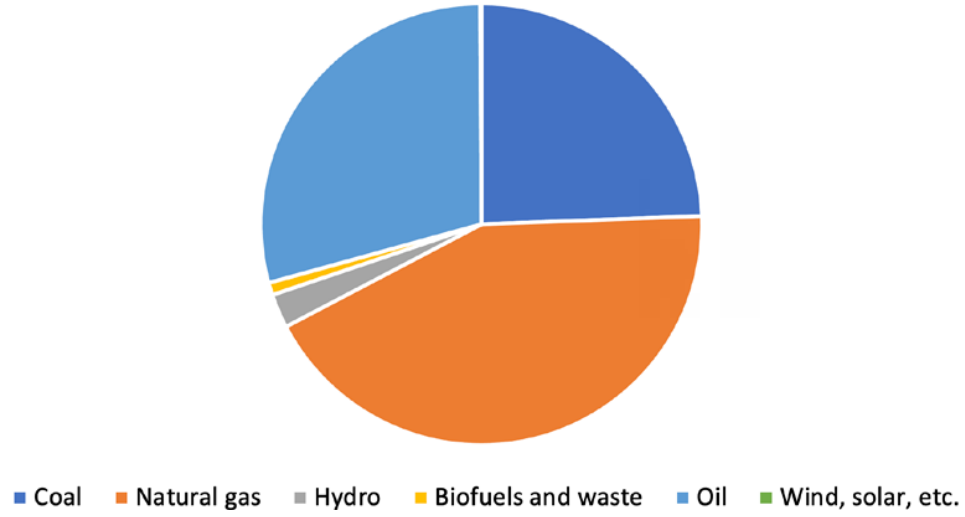
the past century, due to improved wealth, technology and resilience (Lomborg, 2020). The criteria of human welfare should motivate policymakers' attention, to improve social resilience against the adverse impacts of climate change (see Property and Environment Research Center, 2016).

There is a need for Malaysia to diversify its energy mix towards renewables to improve citizen welfare. Globally, the energy sector is the source of around 89% of total emissions on Earth (IEA, 2022). In Malaysia, coal fired plants alone contribute to about 43% of total CO2 emissions in the country (Ritchie et al., 2020). Accordingly, one of the biggest problems addressed by an energy policy must be to ensure that energy production is environment friendly and emissions from energy sources are drastically reduced. To ensure this, Malaysia's energy policy should be designed so that more industries can smoothly shift towards renewable and green sources of energy. While energy policy should ultimately be industry-neutral (not favouring or picking winners), special attention can be given to nuclear, given its high output but greener outcomes.

However, this does not mean that companies will be able to switch to alternative sources of energy at the drop of a hat. Such a transition also needs to be embedded in practicality and ensure that economic production goes on without much disruption. Energy policy needs to be designed to ensure a practically feasible, gradual, and sustainable shift towards alternative sources of energy. Any alternative source of energy needs to be cost-effective and reliable. Else, any forced transitions will not be successful or sustainable and will do more harm than good to Malaysia's economic health. From the eco-modernist standpoint of social resilience, the economic harms of impractical energy policies is counterproductive.

One of the biggest issues with Malaysia currently is the heavy dependence on coal- and gas-based reserves. Here is the data on energy production by source:

Figure 3: Energy mix in Malaysia.



Source: World Energy Statistics and Balances, International Energy Agency.

Based on this, it is very clear that Malaysia has a very heavy dependence on natural gas, oil, and coal. All of these are non-renewable resources. Looking at these figures, the need for Malaysia to have a well-defined energy policy which allows it to switch to renewable sources of energy becomes very clear.

2.2. Malaysia's current policy plan and situation

Malaysia's first major energy policy came in 1974 when Petronas was established as the national oil company and made responsible for producing and distributing petroleum-based products. In 1975, the first National Petroleum Policy was formulated to ensure optimal and efficient utilization of petroleum resources. From the very beginning, oil became an extremely important energy resource and fundamental to all energy policy. Between 1970 and 1975, oil production grew at an average annual rate of 40.5% (Syed and Bodger, 2009).

The first overall and broad energy policy in Malaysia was formulated in 1979 and was called the National Energy Policy. The policy aimed at 3 broad objectives:

1. Ensuring adequate, secure, quality, and cost-effective supply of energy
2. Promoting an efficient utilization of energy
3. Ensuring that factors pertaining to environment protection are taken into consideration in the production and utilization of energy.

The national energy policy 1979 is still the guiding principle and the main policy for all subsequent policies in Malaysia. The National Depletion Policy was then formulated in 1980 to safeguard the exploitation of oil-based resources and diversify and ensure adequate supply of oil, gas, hydropower, and coal (Syed and Bodger, 2009). Subsequently, in 2000, Malaysia launched the first ever main policy on renewable energy which was the Five Fuel Policy in Malaysia. This policy specifically aimed at bringing 5% of total energy capacity from renewable sources by 2005. However, this policy failed drastically and even as of 2015, the target was not reached (Kardooni et al., 2015). Moreover, in 2021, Malaysia's Energy Minister Takiyuddin Hassan announced a revised target of achieving 31% of RE mix in the country's installed capacity by 2025. Currently, the installed renewable capacity stands at 23% and, thus, this appears to be an extremely challenging target to achieve (MIDA, 2021).

2.3. Energy policies

This section briefly reviews the existing policies in Malaysia towards energy. While these policies were well-intentioned at the time of their design, they are no longer fit for purpose, largely because they are too dependent on subsidies and are too constrained. As this section will show, there needs to be further relaxation of the policy-induced constraints that are limiting energy supply and production,

a) **FiT Policy:** The FiT policy was designed to incentivize energy producers to sell renewable energy to distribution companies. The FiT policy allows certain companies to become a Feed-in Approval Holder (FIAH) and to be eligible to sell renewable energy to Distribution Licensees (companies) at the FiT rate for a fixed duration of time. This FiT rate usually is a premium rate. Moreover, the FiT policy in Malaysia is capped based on a quota for the number of licenses for new Feed-in approvals. Although many countries have implemented an uncapped FiT policy to promote the expansion of RE, Malaysia has stuck to a capped policy to allow distribution companies and subsequently domestic electricity consumers to be able to pay for the RE energy. Concurrently, Malaysia also introduced a RE Fund to allow distribution companies to pay for RE. This fund is primarily funded by domestic consumers who pay a surcharge on their electricity bills. The capping is done to prevent overcharging domestic consumers. One major problem with this policy, however, is that the capping slows down RE energy expansion but has become necessary due to funding concerns of the policy (Tam, 2013).

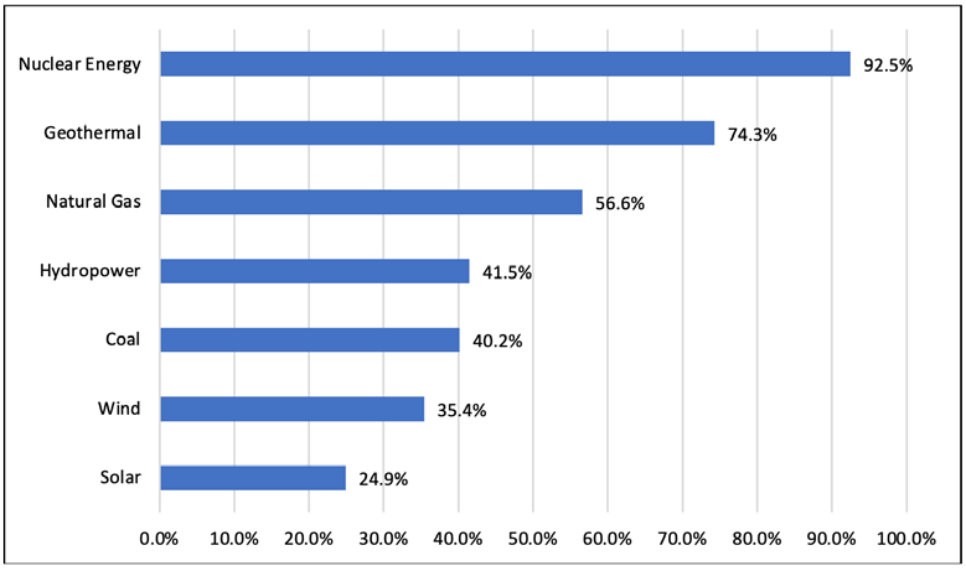
b) **NEM Policy:** The NEM 3.0 policy was designed to increase consumption of renewable energy and to increase adoption among consumers. This policy is focused on the demand side of energy policy. Through this policy, solar energy consumers in Malaysia can use excess RE energy remaining out of the total generation capacity to offset part of their electricity bill and reduce their bill (NEM 3.0). However, NEM too still has a limitation. The main limitation for NEM is that consumers still have to install the solar panels themselves. This is extremely painful for domestic consumers because solar energy efficiency is still very low and so, despite the offset, it may take time before the solar energy investments start to yield good returns. According to a paper from the Clean Energy journal in 2022, experts within the Malaysian government believe that, if an individual's monthly electricity bill is less than 300 RM, then financially it is not viable to install a solar panel. As such, NEM mostly caters to high-end electricity consumers (Lau et al., 2022).

c) **Electricity Subsidies:** In Malaysia, the government provides heavy electricity fuel subsidies to domestic consumers. In 2021, Malaysian government spent about 11 billion Ringgit in oil subsidies alone (Nikkei Asia, 2022). While such a high level of subsidies in the country may be good if targeted to a specific income group, it is instead detrimental to the overall growth of the energy market. This is one of the biggest barriers to Malaysia's Renewable Energy market growth. These subsidies discourage consumers from adopting RE energy. This problem however is well recognized by the Malaysian government who is currently working towards resolving this issue and adopting a more targeted approach to energy subsidies (Shukry and Man, 2022).

d) **Malaysian Policy on Nuclear Energy:** Another concerning aspect of Malaysia's energy policy is the focus on less efficient sources of energy such as moving towards solar and natural gas. While these sources of energy are extremely important for the country's shift to renewable energy, their energy efficiency is still relatively low. Relying on only natural gas, petroleum and solar will make it harder for the country to continue meeting the rising energy demand.

According to the National Energy Policy 2022, Malaysia's move towards renewable energy is mainly focused on expanding the supply of sources such as solar, hydropower and bioenergy. However, these sources of energy are nowhere as efficient as nuclear energy. Energy reliability is measured with a variable called the capacity factor (NEP, 2022). Capacity factor is defined as the percentage of times a given source of energy will produce energy at its maximum capacity. According to the US Office of Nuclear Energy, these are the capacity factors of various energy sources:

Figure 4: Comparison of capacity factor of different types of energy.



Source: Office of Nuclear Energy US.

Based on this graph, thus, solar power has the lowest capacity factor out of all major renewable/non-renewable sources of energy (Mueller, 2021). Moreover, nuclear energy has by far the highest capacity factor out of all energy sources. Nuclear power is a promising solution to many of Malaysia's energy issues and should be the way forward.

3. Experiences from different countries

3.1. Lessons on FiT policy from various countries

FiT policy is a very commonly deployed policy tool throughout the world and has been highly successful in several developed countries in the Europe. The policy was first implemented by Germany in early 2000s with the advent of the Renewable Energy Act (EEG) of 2000 which established the FiT system in the country (Böhringer et al., 2012). Subsequently, the policy was also introduced in Spain and became a major success in both the countries.

The policy allowed Germany to increase its renewable energy quota in its electricity consumption from 6% in 2000 to 15% in 2008. Moreover, it also led to a significant rise in employment in the renewable energy sector in Germany. This was estimated to be about 280,000 jobs in 2008 alone and most of these jobs were developed in the wind sector. The policy and regulation also led to a reduction of about 57 million tons of CO2 emissions and the expansion of renewable energy also allowed for significant cost reductions.

Similarly, in Spain the increase in the renewable energy industry between 2005-08 was valued as 55% of the total GDP. The emissions of CO2 have been reduced of around 23.6 million tons over the period 2005-2010. The creation of employment can be sized at almost 120,722 jobs until 2008 (around 62% of them are direct jobs).

There are very clear positive impacts produced by the FiT policy. After this, about 50 more countries implemented the FiT policy albeit not all of them were as successful at it. It is thus clear that copying the FiT policy from Germany alone is not sufficient. There are certain important conditions which are necessary for the success of the policy.

In both Germany and Spain favourable economic institutions had a huge role to play in the success of the policy. For example, in Germany the expansion of wind energy through the FiT policy was characterized by the cooperation between enterprises, institutes of research and development and universities and advances in technology and in the operation of wind turbines. Moreover, the German education system even focused on the 'know-how' of such modern technologies to ensure a competitive market for the technology.

In Spain too this policy led to the creation of several competitive companies which are still active in the international market (García-Alvarez and Mariz-Pérez, 2012).

An example in the opposite direction is the implementation of the FiT policy in Indonesia, where the FIT policy, quite successful in developed countries, was duplicated without careful considerations of the existing socio-political and institutional conditions. The policy has failed to increase deployment of renewable energy in the country. While investments in renewable energy have soared, data through field reports shows that about 90% of scheduled deployments of renewable energy power plants are delayed. This is because of several reasons. Although the FiT price in the country is satisfactory, obstacles relating to successful implementation of the policy include incoherent regulations between different government bodies, complex requirement to obtain permits for renewable energy production and difficulties related to land acquisition (including conflicts with the community) (Yuliani, 2017). Therefore, the FIT policy, when applied in developing countries such as Indonesia or Malaysia, must take into account the relevant institutional framework and therefore it should be accompanied with the effort to strengthen and ease implementation.

3.2. Lessons on electricity subsidies

Malaysia's electricity market today is heavily reliant on electricity subsidies for domestic consumers for traditional sources of energy. Although the government from 2014 onwards, had started to phase out fuel and electricity subsidies, heavy subsidization of domestic electricity consumption remains in place. In 2021, it was found that the government, between 2000 and 2021, spent over 485 billion RM in subsidies, with an average of 22 billion RM per year. The biggest chunk of these subsidies was on fuel related subsidies (45%). In 2022, the government announced a 5.8 billion RM subsidy cost to shield consumers from rising inflation (Adilla, 2022). While this short-term subsidy may be feasible to counter the temporary inflation situation, in the long run electricity subsidies must be phased out. This is because generally, subsidies are inefficient and distort market price signals. More importantly, heavy subsidisation means that the market will be slow to respond to new emerging energy technologies and the efforts of new players to entice consumer demand. This prevents Malaysia from realising the full benefits of ecomodernism, which envisions the discovery of new technological solutions.

A UNEP study published in 2002 analysed the impacts of energy subsidies in various countries and the importance of reforming such subsidies. The study demonstrates how production and consumption subsidies on fuel production can be bad for the environment, assuming that the supply and/or use of the fuel results in some form of air pollution or climate destabilizing emissions. The introduction of a per-unit subsidy on fuel production shifts the supply curve down causing the price to drop and the quantity of the fuel sold to rise. This equates to an increase in environmental damage. A per-unit consumption subsidy shifts the demand curve up. This results in a drop in the net price paid by consumers, an increase in the quantity consumed and an increase in environmental damage.

A study by OECD also showed how global CO2 emissions would

have reduced by more than 6% and real income increased by 0.1% globally if all subsidies on fossil fuels were removed everywhere in the world (UNEP, 2022).

Table 1: Impact of the removal of energy consumption subsidies in selected countries.

The impact of the removal of energy consumption subsidies in selected countries				
Country	Average Rate of Subsidy (% of market price)	Average Economic efficiency Gain (% of GDP)	Reduction in Energy Consumption (%)	Reduction in CO_2 emmisions
China	10.9	0.4	9.4	13.4
Russia	32.5	1.5	18.0	17.1
India	14.2	0.3	7.2	14.1
Indonesia	27.5	0.2	7.1	11.0
Iran	80.4	2.2	47.5	49.4
South Africa	6.4	0.1	6.3	8.1
Venezuela	57.6	1.2	24.9	26.1
Kazakhstan	18.2	1.0	19.2	22.8
Total Sample	21.1	0.7	12.8	16.0
Total World	n.a	n.a	3.5	4.6

Source: International Energy Agency, World Energy Outlook 2001 Insights.

The report on World Energy Outlook 2001 demonstrated how removal of energy consumption related subsidies in various countries would lead to an economic efficiency gain and also reduce energy consumption as well as CO2 emissions. Moreover, different kinds of subsidies have different impacts on the energy market. In Malaysia, the main kind of energy subsidies are consumption related subsidies given directly to domestic consumers.

Subsidies to consumption and/or production, by lowering end-use prices, lead to higher energy use and reduced incentives to conserve or use energy more efficiently. An extreme example is the disregard for energy efficiency in housing blocks in Russia and other transition economies during the Soviet era, which resulted from a failure to price heating services properly—in some cases, not at all. The situation has improved in the past decade. In Hungary, for instance, spending on energy efficiency jumped from $5–10 million to $80 million per year after consumer price subsidies were removed in 1997.

It is clear that such electricity subsides have harmful effects on the energy markets and lead to extreme economic inefficiency. This does not align well with the initially discussed objective of efficient allocation of energy resources with low wastage (IEA, 2021).

3.3. Lessons on *net energy metering* (NEM)

Net Energy metering has been an extremely successful policy applied in various parts of the world. In the US, NEM has been applied to more than 30 states and the overall results are quite successful. In 2014, a study by the Nevada public utility commission found that NEM provided benefits of up to $36 million. The study also estimated a net benefit of about $166 million over the lifetime of solar systems installed through 2016. Similar studies conducted by different US states also showed a net benefit (MEI, 2015).

Accordingly, the net energy metering policy can be extremely important in driving consumer adoption of solar energy. However, in Malaysia, the problem it has faced is the high cost of solar grid installation which may end up making the NEM unprofitable for the domestic consumers. In order to make NEM work successfully, the government must aim to subsidize the cost for solar grid installation for at least small domestic energy consumers below a certain investment level (Lau et al., 2022). This is to ensure that NEM is also profitable to small energy consumers and is easy to adopt for them. At the same time, it is important to ensure that the government does not overly subsidize solar energy use to ensure that the solar energy market remains efficient.

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4. Policy recommendations

So far, we have looked at Malaysia's current energy policy and situation and evaluated certain key policies that Malaysia is currently operating. The energy needs of Malaysia and most of the world are tremendous, and requires a radically new approach, one that is based on the relaxation of constraints on human innovation, new technology growth and market-based development. This will allow Malaysia to more quickly diversify its energy mix, and meet energy demand in an efficient way. An eco-modernist approach, if successful, will also allow Malaysia to develop a vibrant energy section which will serve as a model for other neighbours.

To recap, we began our paper with three main objectives that any energy policy must fulfil:

1. Be able to fulfil Malaysia's fast growing energy demand
2. Meet the country's environmental objectives
3. Lead to an efficient allocation of energy resources with low wastage.

We will now structure our recommendations to ensure that each of them satisfies one or more of the above objectives.

Recommendation 1: Favouring the transition to nuclear energy

Our first recommendation for Malaysia's energy policy is to favour the transition into nuclear energy. The country did have plans to move into nuclear energy; in fact, in 2016, the Malaysian Nuclear Agency director-general, Dr Muhamad Lebai Juri pointed out that one advantage of nuclear energy was that the authorities would be able to keep the power tariff low unlike using power from gas, coal or fossil fuel although the initial investment to set up a nuclear plant is costly. Moreover, he felt that to transition into nuclear energy

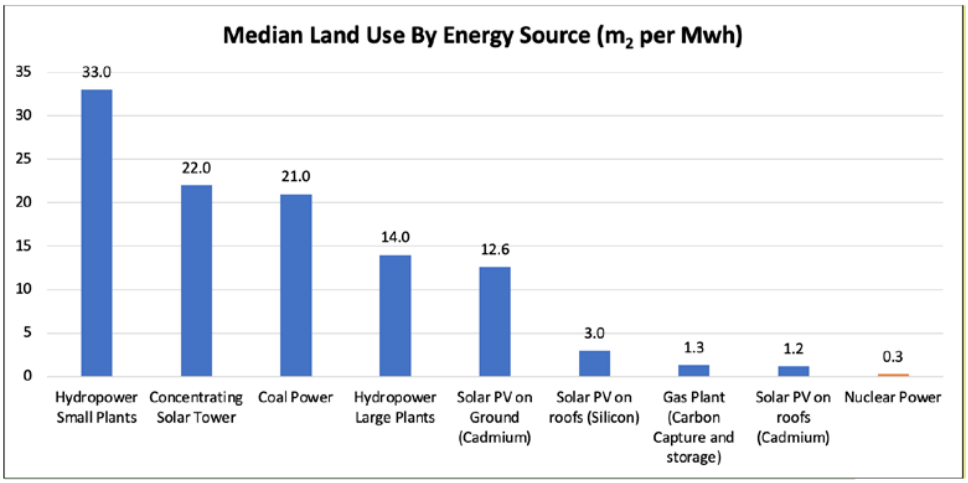
was also important to educate the public regarding nuclear safety as well as ensure that the public supports nuclear power, especially after the Fukushima incident in 2011 (Musa, 2016).

Malaysia initially had plans to commission its first and second nuclear plants in 2021 and 2022 respectively. However, due to the Fukushima incident, the plans have now been postponed to a re-evaluation after 2030.

The biggest advantage of nuclear energy is the energy efficiency it provides. Nuclear energy has by far the highest energy output of all alternatives. For comparison, a single pellet of uranium weighing six grams contains the same amount of energy as 17,000 cubic feet of natural gas, 149 pounds of oil or one ton of coal. Nuclear has a much higher energy output compared to its fuel intake.

A great way to compare efficiency is to compare land use per Mwh of energy generation. Based on the graph below it is very clear that nuclear energy requires the least amount of land per Mwh of power generation (Ritchie, 2022).

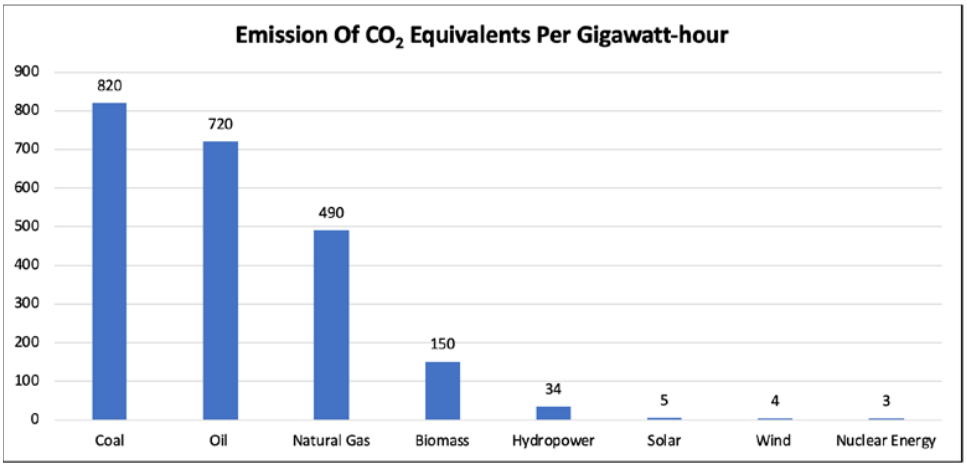
Figure 5: Median land use by energy source.



Source: Our World in Data (This data includes land for energy generation but also land use for mining of materials used for its construction, fuel inputs, decommissioning and the handling of waste).

At the same time, nuclear energy is one of the cleanest forms of energy in terms of emissions produced. When compared to other sources of energy, CO2 emissions per gigawatt/hour produced from nuclear energy are the lowest. This is an important point, because it illustrates the central feature of eco-modernism: the use of technology to decouple human development from its environmental impacts (Lynas, 2013). Nuclear is a highly promising option in this regard, especially considering the latest progress made on fusion (Greshko, 2022).

Figure 6: CO2 emissions from various energy sources.



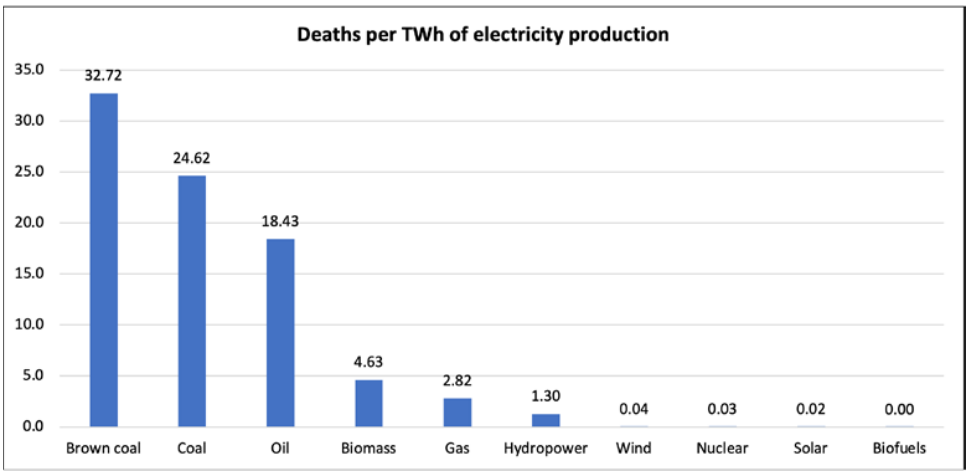
Source: Our World in Data.

There is a strong need for Malaysia to reinvest in nuclear energy and aim to have at least 10% of its total energy supplied by nuclear sources by 2035. This is an ambitious policy recommendation but very much possible if there is proactive effort made in this direction.

The biggest barriers to nuclear energy, especially after the Fukushima accident in 2011, are safety concerns and public sentiments against the production of energy using nuclear plants. After the Fukushima accident in 2011, many southeast Asian countries, including Malaysia and Indonesia, abandoned their plans to pursue nuclear power and decommissioned nuclear plants. This was also followed by a huge tide of public sentiment against nuclear power.

However, the actual data on safety of nuclear energy suggests that this was an over exaggeration.

Figure 7: Deaths per TWh of electricity production from various energy sources.



Source: Our World In Data (Death rates are measured based on deaths from accidents and air pollution per terawatt-hour (TWh) of electricity).

The above graph shows death rates from different sources of energy globally. It is very clear that fossil fuels and biomasses kill many more people than nuclear and modern renewables per unit of electricity. Our perceptions of safety with regard to nuclear energy are strongly influenced by two accidents: Chernobyl in Ukraine in 1986 and Fukushima in Japan in 2011. These were tragic events. However, compared to the millions of people that die from fossil fuels every year, the final death tolls were very low (Ritchie, 2020).

Therefore, despite all the advantages it brings forward, the biggest challenge to nuclear energy remains negative public perception. According to a study by NTU Singapore, based on 1000 surveyed respondents across Singapore, Malaysia, Indonesia, Vietnam, and Thailand, the support for nuclear energy was extremely low. The level of public support for nuclear in these countries ranged from 3 per cent to 39 per cent (NTU, 2021).

An intermediate action for the Malaysian government should be to work to change this perception. At this regard, we recommend the following:

1. Running education initiatives from an early age in schools and public awareness campaigns to educate people about nuclear energy and especially on how concerns regarding safety are over-exaggerated. Moreover, the public also needs to be educated about its benefits and which steps are undertaken to ensure safety within a nuclear plant.
2. Recommissioning nuclear plants from 2025 and aiming to have 10% of the country's energy being supplied by nuclear power in 10 years.
3. Enhanced and streamlined rules for new nuclear-based firms and tax incentives for energy companies engaging in nuclear-intensive R&D

Recommendation 2: Phase out electricity and fuel subsidies

As we saw above, subsidies for electricity consumption and/or production, by lowering end-use prices, lead to higher energy use and reduce incentives to conserve or use energy more efficiently. This is because the rationing function of the market is circumvented by such interventions. Malaysia spent about RM 5.8 billion in 2022 on electricity subsidies. Moreover, between 2000 and 2021, the government has spent over RM 485 billion in subsidies, with an average of RM 22 billion per year.

More importantly, if existing subsidies are unchanged, it constitutes an inertia that prevents the adjustment to new energy sources. Scaling back subsidisation mean that new entrants to the energy market will have lower barriers to entry. Once again, eco-modernism relies on the dynamic adjustments of market innovations, rather than the discretion of bureaucrats (Anderson, 2020).

Based on our discussion, we recommend that Malaysia should bring down the subsidy costs to RM 1 billion per year and eventually dismantling electricity subsidies for the role of fossil fuels by reducing such subsidies by 10% year on year from 2025. This will allow to accomplish the following:

1. Allowing consumers and electricity companies to switch to renewable sources of energy at a faster pace.
2. Reducing wastage of electricity and ensuring a more efficient allocation of energy resources.
3. Allowing the Malaysian government to save money which can be used to support the initial cost of uptake of cleaner sources of energy and to remove any barriers to entry both for consumers and producers.

Recommendation 3: Uncap FiT Policy to ensure greater energy supply

The FiT policy in Malaysia is a great initiative, and it has proven to be extremely successful in several other countries. As we discussed earlier, the initiative has successfully helped both Germany and Spain to increase the share of their renewable energy sector and at the same time, increased employment, and GDP in both countries.

In Malaysia, too, the FiT policy has a great potential. However, the success of the policy depends on 2 factors:

1. The policy is currently capped to allow the premium rate to be funded by domestic consumers. While this ensures that the policy remains viable, it also restricts growth of the FiT policy. This barrier needs to be overcome.
2. The government needs to ensure that the socio-economic ecosystem supports this policy, which means that both the legal and political situation should support it.

Based on this, we have the following recommendations:

1. Increase cap limit of FiT policy by 5% every year. This will ensure that the FiT policy continues growing and more distribution companies across the country are able to join the policy. The extra funding for the policy, however, can be initially supported by a government subsidy which could be used for the RE fund. If the government frees up existing subsidies, out of the RM 4.8 billion RM freed up every year, the government can spend about RM 1.2 billion every year to support the RE fund and FiT policy expansion. The eventual goal should be to have a capless FiT policy.

2. Ensure that the policy requirements and details are very clearly spelt out by the government. The government can take measures to ensure that the process of joining the programme and obtaining a permit is simplified. Moreover, the government can also assign designated areas to support the policy where distribution companies can acquire land easily and set up power plants. This allows distribution companies to avoid community related conflict on land acquisition and makes the policy more inclusive

Recommendation 4: A regulatory sandbox for innovative energy suppliers

The idea of a regulatory sandbox is extremely new in public policy. According to the World Bank, these are frameworks set up by regulators that allow fintech start-ups to conduct live experiments in a controlled environment under a regulator's supervision (Appaya and Haji, 2020). They are a form of partial, constrained deregulation. The first regulatory sandboxes were created in 2016 for Fintech. While many countries such as Singapore, UK, etc. have adopted regulatory sandboxes to promote innovation in clean energy, there aren't many studies available on its effectiveness on clean energy growth.

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Regulatory sandboxes are attempts at partial deregulation, where firms or specific sectors, within pre-defined limits, can enjoy a relaxation of rules, regulations, and compliance requirements. Such sandboxes therefore aim to catalyse innovation in a controlled fashion, and this option should be considered by Malaysia in new clean energy technologies. The relaxation of regulations is in turn part of a larger package of market reforms that help in achieving environmental goals in an efficient way (Anderson, 2020). Elsewhere, countries that adopt such a light touch on regulation have made progress in their energy production, for example by capturing the gains from the shale revolution (Murtazashvili & Piano, 2018). It is important that Malaysia does not fall behind.

Several studies have been conducted on the effectiveness of regulatory sandboxes in the Fintech sector. The most famous was the *Global Experiences from Regulatory Sandboxes* study conducted by the World Bank. The research covers the challenges and lessons learned from the implementation of 73 unique fintech sandboxes in 57 countries. More than half of them were created between 2018 and 2019, and a fifth were set up in the first half of 2020 alone.

The research found that sandboxes can:

1. **Serve as evidence base for regulation:** They help strengthen regulations in countries where regulatory requirements are unclear or missing, or where they create barriers to entry that are disproportionate to risks.
2. **Facilitate market entry of firms:** Some fintech firms attribute the ability to access markets to their participation in a sandbox, but evidence is mixed. More commonly, sandboxes provide firms a better understanding of regulatory hurdles.
3. **Develop partnerships:** Sandboxes can help the development of partnerships between existing firms, either directly—through links to accelerator-type initiatives or requirements that companies must partner with licensed firms to be eligible to join the sandbox—or indirectly, through external recognition of the association with the sandbox.
4. **Strengthen competition:** Policymakers have reported mixed results when assessing if a sandbox has led to an increase in competition in their respective markets. A sandbox can help to create room for competition, but on the flip side it raises questions of an unlevel playing field between firms in the sandbox and those outside. Regulators have tried to address this issue by increasing transparency in their operations and decision-making processes.
5. **Enable market development:** Sandboxes are a valuable tool for enabling fintech by providing empirical evidence and operating within a broader strategy or set of initiatives.
6. **Build capacity within regulatory institutions:** Sandboxes can help build regulator knowledge on trends and innovations while providing a structured process to strengthen dialogue and interaction with the industry.

Adopting Regulatory sandboxes for renewable energy adoption can be extremely beneficial and foster innovation and grow the market for renewable energy further. However, there are 2 important considerations for any such sandbox:

1. **Thematic Sandboxes:** Evidence has shown that well-defined, thematic sandboxes can be effective in encouraging specific technologies or products to come to market.
2. **Design Considerations:** No definitive relationship exists between the legal system and the efficacy of a regulatory sandbox, but feasibility assessments are a critical first step that policymakers must undertake before setting up any sandbox initiative—and, where possible, at periodic intervals afterward.

Based on this, we recommend that the government of Malaysia can set up a 10-year regulatory sandbox for renewable energy growth in the country. However, the sandbox must have some very specific criteria:

1. The sandbox must be specific to renewable energy sources. The government can prioritize sandboxes for solar and hydropower growth.
2. The sandbox must be for technologies and products that are innovative and new within the thematic sectors.
3. The sandbox must only apply to technologies that have a clearly defined test scenario for the technologies and desirable outcomes.
4. The regulatory authorities must ensure that all foreseeable risks have been properly assessed and mitigated before a firm is allowed to enter a sandbox
5. Any firm entering a sandbox must have a well-defined entry or transition strategy concerning the new technologies they are innovating with.
6. The sandbox can also be supported by a research grant of 10 billion RM which is awarded over a period of 10 years to exceptional innovations within the sandbox.

We believe that this sandbox will help foster more innovation within the solar and hydro sectors and further the development of these sectors in the country. In the end, the benefit of a sandbox approach is that within the general rules constructed by the government, flexibility is given to market participants to experiment with various new technologies in a process of creative destruction.

It is important to note that the recommendation of a regulatory sandbox is part of a larger need to introduce greater competition into markets, especially the Malaysian energy sector, which is state dominated. A recent paper has in fact written that: "Malaysia's RE (renewable energy) policies have so far failed to deliver the gains in installed capacities seen in other countries, largely because too much consideration has been given to the interests of state-owned utility companies and to safeguarding their profitability" (Hermann et al., 2022). As such, facilitating competition and lowering barriers to entry in energy markets remains an important policy initiative in this aspect.

Recommendation 5: Consumer Support to ensure higher access to NEM policy

As discussed earlier, we found that the NEM policy can be extremely useful in driving consumer adoption of solar energy. However, in Malaysia, the key issue with the policy is the high cost of solar grid installation which may end up making the NEM unprofitable for the domestic consumers. Thus, to make the NEM policy financially viable, we recommend that the government use the money saved by reducing subsidies and can maintain a fund of RM 2.4 billion to subsidize the installation cost of solar panels for low usage and small domestic consumers.

The government must set a maximum energy consumption criterion for any customer to be eligible for this subsidy. This will help to expand the NEM program and solar energy adoption to even small domestic households.

Recommendation 6: Public awareness on renewable energy

A big part of the problem in adopting renewable energy is the lack of awareness in Malaysia. A study conducted on Public Awareness Analysis on Renewable Energy in Malaysia showed that while most people in the country agree that renewable energy adoption is beneficial (98.8% respondents), most people were completely unaware about government initiatives to boost renewable energy adoption. Most of the respondents (50.6%) did not know about the government's effort to enhance the implementation of renewable energy. Only 49.4% of the respondents knew about the government initiative. Most of the people who knew about the initiative were those who worked for the government or the private sector with exposure to the latest government news and projects. As for the respondents who did not know about the initiative, the reason could be either they were less exposed or not concerned.

The paper also suggests that the government should act aggressively in enhancing public awareness through social media as it is easily accessible by the people especially teenagers. Meanwhile, the government can include the benefits and importance of renewable energy through advertisements and campaigns. Events and programmes on the application of the latest RE technology and how it can save cost and the environment can be organised for the public including through demonstrations (Zakaria et al., 2019).

Public awareness is extremely important, because it will help to combat misinformation, extremism and apocalyptic narratives that are too common in popular climate discourse. Such narratives hurt constructive solutions, and the necessary cost-benefit analyses in ensuring that only the most efficient policies are pursued (Schellenberger, 2020). These narratives mean that sustainability is often pitted against economic growth, which need not be true. Accordingly, the Malaysian government can pursue environmental education that recognise the themes of trade-offs, economic efficiency, and human innovation.

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To run awareness campaigns, the government can devote a budget of RM 1 billion to run awareness campaigns to encourage the adoption of more renewable energy. In order to ensure a semblance of efficiency in these campaigns, the funds can be earmarked to specific environmental NGOs with a good track record in environmental education, so that these local actors can use them for green campaigns.

5. Conclusion

In this paper, we started with understanding the importance and the need to have an energy policy. Furthermore, we highlighted several key pain points that Malaysia's energy sector needs to tackle and emphasized how a policy is needed to address these. We adopt the perspective of eco-modernism in addressing these issues, which emphasises market-based solutions, human innovation, and the discovery of new technological solutions. Environmental policy, as mentioned, should also be evaluated from a human welfare perspective, which means that the economic costs should be managed as well.

We discussed how any energy policy for the country needs to address the problems of ensuring supply meets demand, ensuring optimal allocation of energy resources and reduce wastage and address the country's environmental concerns. We further took a deep dive into the country's current energy policies, analysed their effectiveness, and highlighted key lessons based on these policies being implemented in other countries. Then finally, we took a step back to our key energy policy objectives and listed out six key recommendations that the government of Malaysia can focus on as its national energy policy. These include phasing out traditional energy sources to favour promising new options, namely nuclear, improving public awareness on renewables, phasing out subsidisation in favour of regulatory sandboxes.

The world's energy crisis today, and the challenges of transition in individual countries, do not have to doom societies if smartly designed policies are used. The philosophy of ecomodernism is a forward-looking, progressive approach to understanding environmental policy, one that embraces the need for growth, the potential for human innovation and competition and the concern for environmental progress.

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References

Adilla, F. (2022), *Targeted subsidies to optimise government's financial resources: Economic Outlook 2023,* «New Strait Times», 10 October, https://www.nst.com.my/business/2022/10/839036/targeted-subsidies-optimise-governments-financial-resources-economic-outlook.

Anderson, T.L. (2020), *Free Market Environmentalism*, London and New York, Routledge.

Appaya, S. and Haji, M. (2020), *Global Experiences from Regulatory Sandboxes*, Washington, DC, The World Bank, https://documents1.worldbank.org/curated/en/912001605241080935/pdf/Global-Experiences-from-Regulatory-Sandboxes.pdf.

Asafu-Adjaye, J., Blumqvist, L. and Brand, S. (2015), *Ecomodernist Manifesto,* www.ecomodernism.org/manifesto-english.

Ayodele, B.V., Mustapa, S.I., Mohammad, N. and Shakeri, M. (2021), *Long-term energy demand in Malaysia as a function of energy supply: A comparative analysis of Non-Linear Autoregressive Exogenous Neural Networks and Multiple Non-Linear Regression Models,* «Energy Strategy Reviews», 38, 38, 100750. https://doi.org/10.1016/j.esr.2021.100750.

Böhringer, C., Cuntz, A.N., Harhoff, D. and Asane-Otoo, E. (2012), *The Impacts of Feed-In Tariffs on Innovation: Empirical Evidence from Germany,* «SSRN Electronic Journal», 65, https://doi.org/10.2139/ssrn.2419859.

García-Alvarez, M.T. and Mariz-Pérez, R.M. (2012), *Analysis of the Success of Feed-in Tariff for Renewable Energy Promotion Mechanism in the EU: Lessons from Germany and Spain*, «Procedia – Social and Behavioral Sciences», 65, pp. 52-57. https://doi.org/10.1016/j.sbspro.2012.11.090.

Greshko, M. (2022), *Scientists achieve a breakthrough in nuclear fusion. Here's what it means*, «National Geographic», 13 December, https://www.nationalgeographic.com/science/article/scientists-achieve-breakthrough-nuclear-fusion.

Haiges, R., Wang, Y.D., Ghoshray, A. and Roskilly, A.P. (2017), *Optimization of Malaysia's power generation mix to meet the electricity demand by 2050,* «Energy Procedia», 142, pp. 2844-2851. https://doi.org/10.1016/j.egypro.2017.12.431.

Hermann, J., Apergi, M., Eicke, L., Goldthau, A., Kurniawan, J., Lima-de-Oliveira, R., Schuch, E. and Weko, S. (2022), *Unlocking a Low Carbon Future for Malaysia,* IASS Policy Brief, Potsdam, DOI: 10.48481/ iass.2022.041.

Horowitz, J. (2022), *Europe will still be fighting an energy crisis in 2023 | CNN Business,* «CNN», 12 December, https://edition.cnn.com/2022/12/12/energy/europe-energy-2023-iea/index.html.

IEA (2001), *World Energy Outlook 2001*, Paris, International Energy Agency, https://www.iea.org/reports/world-energy-outlook-2001, License: CC BY 4.0.

IEA (2022), *Global Energy Review: CO2 Emissions in 2021*, Paris, International Energy Agency, https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-2, License: CC BY 4.0.

Kardooni, R., Yusoff, S.B. and Kari, F.B. (2015), *Barriers to renewable energy development: Five fuel policy in Malaysia,* «Energy & Environment», 26, 8, pp. 1353–1361. https://www.jstor.org/stable/90006544.

Lau, L.-S., Choong, Y.-O., Ching, S.-L., Wei, C.-Y., Senadjki, A., Choong, C.-K. and Seow, A.-N. (2022), *Expert insights on Malaysia's residential solar-energy policies: shortcomings and recommendations,* «Clean Energy», 6, 4, pp. 619-631, https://doi.org/10.1093/ce/zkac043.

Lomborg, B. (2020), *Welfare in the 21st century: Increasing development, reducing inequality, the impact of climate change, and the cost of climate policies*, «Technological Forecasting and Social Change», 156, 119981, https://doi.org/10.1016/j.techfore.2020.119981.

Lynas, M. (2013), *Nuclear 2.0 : why a green future needs nuclear power*, Cambridge, Uit Cambridge Ltd.

MEI (2015), *Net Metering in Missouri: Benefits & Costs*, Missouri Energy Initiative, https://www.tfaforms.com/4991963.

MIDA (2021), *Malaysia aims 31% RE capacity by 2025*, Kuala Lumpur, Malaysian Investment Development Authority, June 23, https://www.mida.gov.my/mida-news/malaysia-aims-31-re-capacity-by-2025/.

Mueller, M. (2021), *Nuclear Power Is the Most Reliable Energy Source and It's Not Even Close*, Energy.gov; Office of Nuclear Energy, 24 March, https://www.energy.gov/ne/articles/nuclear-power-most-reliable-energy-source-and-its-not-even-close.

Murtazashvili, I. and Piano, E. (2018), *The Political Economy of Fracking*, London and New York, Routledge.

Musa, Z. (2016), *Malaysia needs to go for nuclear energy*, «The Star», 30 November, https://www.thestar.com.my/business/business-news/2016/11/30/malaysia-needs-to-go-for-nuclear-energy/.

NEM 3.0 (n.d.), *Renewable Energy Malaysia*, SEDA, https://www.seda.gov.my/reportal/nem/.

NEP (2022), *National Energy Policy, 2022-2040*, Putrajaya, Economic Policy Unit, https://www.epu.gov.my/sites/default/files/2022-09/National%20Energy%20Policy_2022_2040.pdf.

Nikkei Asia (2022), *Malaysia oil subsidies could more than double in 2022: finance chief*, «Nikkei Asia», 10 March, https://asia.nikkei.com/Economy/Malaysia-oil-subsidies-could-more-than-double-in-2022-finance-chief.

NTU (2021), *Public support for nuclear energy in Southeast Asia generally low*, Singapore, Nanyang Technology University, https://www.ntu.edu.sg/news/detail/public-support-for-nuclear-energy-in-southeast-asia-generally-low.

Property Environment and Research Center (2016), *Environmental Policy in the Anthropocene*. Property Environment and Research Center, 20 October, https://www.perc.org/2016/10/20/environmental-policy-in-the-anthropocene/.

Ritchie, H. (2020), *What Are the Safest Sources of energy*?, «OurWorldInData.org», https://ourworldindata.org/safest-sources-of-energy.

Ritchie, H. (2022), *How does the land use of different electricity sources compare*?, «OurWorldInData.org», https://ourworldindata.org/land-use-per-energy-source.

Ritchie, H., Roser, M. and Rosado P. (2020), *CO^2 and Greenhouse Gas Emissions*, «OurWorldInData.org», https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions.

Shellenberger, M. (2020), *Apocalypse never: why environmental alarmism hurts us all*, New York, Harper.

Shukry, A. and Man, Y. (2022), *Malaysia Says Fuel, Cooking Oil Targeted Subsidies in the Works*, «Bloomberg.com», 7 June, https://www.bloomberg.com/news/articles/2022-06-07/malaysia-says-fuel-cooking-oil-targeted-subsidies-in-the-works?leadSource=uverify%20wall.

Syed, T. and Bodger, P. (2009), *National Energy Policies and the Electricity Sector in Malaysia*, Proceedings of ICEE 2009 3rd International Conference on Energy and Environment, 7-8 December 2009, Malacca, Malaysia https://core.ac.uk/download/pdf/35463299.pdf.

Symons, J. (2019), *Ecomodernism: technology, politics and the climate crisis*, Cambridge, UK, Polity Press.

Tam, A. (2013), *Feed-in tariff and renewable energy fund*, Kuala Lumpur, Parliament of Malaysia, https://www.parlimen.gov.my/images/webuser/artikel/ro/amy/FiT%20and%20RE%20Fund.pdf.

UNEP (2022*), Reforming Energy Subsidies,* Washington, DC, United Nations Environment Programme Division of Technology, Industry and Economics International Energy Agency, world-nuclear.org/getmedia/195aca20-55b0-4431-9c2a-73fb00b579de/UNEP_EnergySubsidiesReform.pdf.aspx.

World Bank (2021), *Malaysia climate risk country profile*, World Bank Group, https://climateknowledgeportal.worldbank.org/sites/default/files/2021-08/15868-WB_Malaysia%20Country%20Profile-WEB.pdf.

Yuliani, D. (2017), *Is Feed-In-Tariff Policy Effective for Increasing Deployment of Renewable Energy in Indonesia?*, in Oxford Scholarship Online, Oxford, Oxford University Press, https://doi.org/10.1093/oso/9780198802242.003.0008.

Zakaria, S.U., Basri, S., Kamarudin, S. and Majid, N. (2019), *Public Awareness Analysis on Renewable Energy in Malaysia*, «IOP Conference Series: Earth and Environmental Science», 268, 012105, https://iopscience.iop.org/article/10.1088/1755-1315/268/1/012105/pdf.

Zappa, M. (2014), *17 Emerging Energy Technologies That Will Change The World*, «Business Insider», 24 April, https://www.businessinsider.com/17-emerging-energy-technologies-2014-4.

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The Center for Market Education (CME) is a boutique think-tank based in Kuala Lumpur, Malaysia, and in Jakarta, Indonesia.

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