

**A. Bakar Jaafar ENERGY MIX WITH RENEWABLES**

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But not on dependency, but over dependency on fossil fuels, the like of coal, oil, and gas, would not help much for Malaysia to realise the potential of promoting and developing its renewable energy resources, namely, ocean thermal energy, solar energy, small hydroelectric, biomass, waste-to-energy, ocean & tidal currents, wind and wave.

By the latest report, as Malaysia Energy Statistics Handbook 2017, the total energy consumption in 2015 was 51,806 ktoe: Petroleum Products 55.4%, Electricity 22.0%, Natural Gas 18.5%, Coal & Coke 3.4%, & Biodiesel 0.7%. The 22.0% in electricity, or higher, 156,003 GWh consumed in 2016, it was generated from 86.7% of fossil fuels: Gas 43.5%, Coal 42.5%, 4 Diesel 0.4% 5, & Oil 0.3%, and only 13.3% renewables: Hydro 13.0% plus Others 0.3%. The Transport Sector was the largest user of energy by 45.2%; Industrial, 27.0%; Residential and Commercial, 14.6%; Non-Energy Use, 11.5%; and Agriculture, 1.7%.



*Transport sector is the largest energy user in Malaysia*

Oh et al (2018) listed in his Table 4, “Thrusts of energy policies and initiatives in Malaysia:

Year Policy Thrust/Objective” as follows:

1975 National Petroleum Policy: Ensure optimal use of petroleum resources via regulation of ownership and management of the industry including related economic, social and environment safeguards

1979 National Energy Policy: Achieve supply and utilization of energy resources with environmental considerations

1980 National Depletion Policy: Guard against over-exploitation and hence dependency on crude oil and natural gas

1981 Four-Fuel Diversification Policy: Strategize generation mix as based on oil, gas, coal and hydro

1998 National Mineral Policy: Utilize locally sourced coal

2001 Five-Fuel Diversification Policy: Recognize renewables as fifth fuel in generation mix

2001 Small Renewable Energy Power (SREP)

Programme: Encourage small private power generation projects using renewables

2009 National Green Technology Policy: Use green technologies and promote cogeneration and renewables in power generation

2010 New Energy Policy: Enhance energy security to include economic, environment and social considerations

2011 Renewable Energy Act: Enforce feed-in-tariff (FiT) scheme for RE

2011 National Biomass Strategy 2020: Recognize use of biomass waste for biofuels

But none of the said Policy instruments, or laws, focusses on the transport sector, the largest energy user. Much of the policies were diverted to the generation and consumption of electricity, in less consuming-energy sectors, namely, residential and commercial. These policies would not be that effective nor would make much a difference, since the electricity tariffs in Malaysia are so low that would not trigger a shift toward other forms of energy carrier, the like of hydrogen fuel.

Furthermore, the use of fossil fuels in transport is also subsidised. “Under the 2019 Budget, owners of cars and motorcycles with 1,500 cc and 125cc engines will receive subsidies for RON95 petrol at 30sen per litre. The subsidy for car owners will be limited to 100 litres of petrol monthly, while motorcycle owners will get 40 litres monthly. Some RM2bil had been allocated to the new initiative, which is expected to benefit more than four million car owners and 2.6 million motorcycle owners.” (Rahimy et al, 2019).

Even without the said subsidy, the transport sector would gain significant savings in fuel, should there be an option for the transport owners to switch their petrol-driven (ICE) to that of hydrogen fuel-cell vehicles (H2FCVs). Since the pricing of energy does not discriminate nor differentiate the different forms of energy, one gallon of petrol, for instance, could pay for one-kilogramme of hydrogen fuel. Thus, a petrol-driven car would travel the most, 40 kilometres, but the same car, driven by hydrogen fuel-cell engine, would go 100 kilometres away. So, which car one would drive or buy? Certainly, H2FCVs!



*H2FCV powered vehicle is much more energy efficient compared to ICE*

Practically, every car manufacturer in the world, except Proton, has its own H2FCV version: Toyota with its Lexus 250 or Mirai; Honda, Clarity; Hyundai, 4WD-Tucson etc. They are ever ready to roll in Malaysia, provided that there is a Policy to promote as much hydrogen fuel vehicles as the required investments for the generation, distribution, and reticulation of hydrogen fuel.

One possible source of funding for the required investments is through “carbon tax”, if not through “carbon trading”. Based on 3228 kg of CO<sub>2</sub> equivalent emission per tonne of oil equivalent burned over its 2015 consumption of 51,806 ktoe, Malaysia would have emitted 167,230,000 tonnes of CO<sub>2</sub>eq. Should RM10 of carbon tax per tonne of CO<sub>2</sub> eq be introduced, Malaysia would generate at least RM 1.7 billion per year to stimulate the growth of renewables as a significant portion in its energy mix.



*The introduction of carbon tax on transport sector is an option.*

Hydrogen fuel could be generated as much from the renewables as from the power-surplus, by utilising the generated or unused electricity by water electrolysis.

In short, Malaysia should consider favourably to introduce “carbon tax” and to focus on the energy required for its transport sector in order to increase its expected share of renewable energy in its energy mix. “In the Pakatan Harapan manifesto, the coalition pledged to increase renewable energy from the current 2% to 20% by 2025.” [<https://www.eumcci.com/calendar-events-inner.php?id=38>. Accessed 21 May 2019]

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