Sustainable Energy for Malaysia: An Exciting Journey Awaits

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Sustainable energy has taken centre stage in recent years, especially with the urgency of the climate change agenda and energy security issues. At the 21st Conference of Parties (COP21) in November 2016, Malaysia ratified the Paris Climate Agreement along with the deposition of instrument with the UN Headquarters.

The following year, during the 22nd Conference of the Parties (COP22) to the UN Framework Convention on Climate Change (UNFCCC), 47 developing countries pledged to transit to 100% renewable energy (RE). Even private companies have pledged for 100% RE (RE100.org) by a certain period.

Our Nationally Determined Contribution (NDC) is to reduce our Greenhouse Gas (GHG) emissions intensity of GDP by 45% by 2030, relative to the emissions intensity of GDP in 2005. This consists of 35% on an unconditional basis and a further 10% on condition upon receipt of support from developed countries.

ENERGY TRANSITION MEGATREND

Globally, we have acknowledged a new megatrend on the energy horizon. Pioneered originally by the Germans, many countries are now in the process of undergoing energy transition, i.e. transitioning from fossil-based energy to cleaner and more sustainable RE.

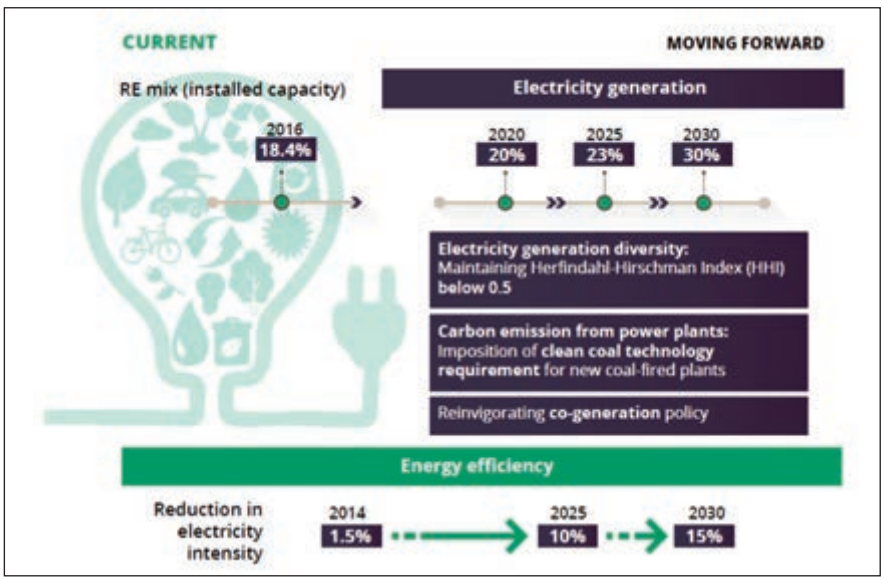
The growth for RE in 2017 has been impressive. According to the Renewables 2018 Global Status Report by REN21, global RE generation capacity increased by 178 GW in 2017, making it the strongest year ever for new capacity additions and bringing the global total capacity to 2,195 GW. Asia is the fastest growing region in RE and this is mooted by the steep learning curve of variable RE technologies such as solar PhotoVoltaic (PV) and wind.

While hydropower remains a significant portion of global RE, other new RE sources with zero marginal cost, such as solar and wind, have gained significant traction in the last decade. In 2017, for a record 2-year in a row, solar PV overtook wind in new installed capacity. Solar PV saw a record of 98 GW whereas wind was at 52 GW. 2016 saw a new record low of solar PV tariff offered at US$0.0242 per kWh in Abu Dhabi, and the record was broken again later in Mexico, Chile and Saudi Arabia where the tariff went below US$0.02 per kWh. In this respect, in some countries RE has reach grid, or at least, socket parity with conventional thermal energy.

RENEWABLE ENERGY TARGETS

Under the ASEAN Plan of Action for Energy Cooperation (APAEC), the target for RE is 23% of the total primary energy supply by 2025. For the power sector in Malaysia, it does follow the ASEAN definition of RE which includes electricity generated from large hydroelectric power. At present, RE constitutes approximately 22.5% of the country's total electricity generating capacity.

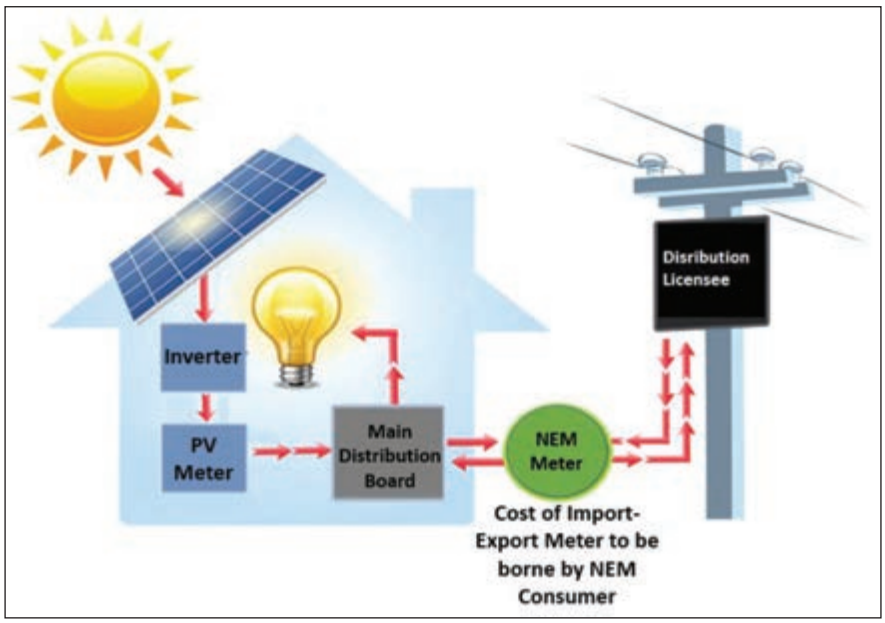
Other than the above, the nation's Green Technology Master Plan (GTMP) has also set a target of achieving 30% RE capacity mix by 2030. The manifesto of the newly-elected Malaysian government is even bolder and has stated a goal of achieving 20% RE mix (excluding large hydropower capacity) by 2025.



Targets for energy sector under Green Technology Master Plan (GTMP)

RENEWABLE RESOURCE	PROJECTS APPROVED			PROJECTS ACHIEVING COMMERCIAL OPERATION		
	No. of Applications	Capacity (MW)	% of total	No. of Installations	Capacity (MW)	% of total
Biogas	129	225.12	13.6%	33	63.03	11.4%
Biomass	44	396.44	23.9%	8	87.90	15.8%
Geothermal	1	37.00	2.2%	-	-	-
Small Hydro	63	555.48	33.5%	6	30.30	5.5%
Solar PV	12,282	442.42	26.7%	9,746	373.66	67.3%
TOTAL	**12,519**	**1,656.45**	**100.0%**	**9,793**	**554.89**	**100%**

Status of FiT programme (May 2018)



Concept of the Net Energy Metering (NEM) scheme

FEED-IN TARIFF (FIT) MECHANISM

Our country is well-endowed with renewable resources such as hydro, solar and bioenergy. In order to catalyse the growth of the RE sector, Malaysia introduced the RE Act in 011 to enforce the Feed-in Tariff (FiT) mechanism and established the Sustainable Energy Development Authority (SEDA) Malaysia the same year to ensure its successful application.

As of May 2018, SEDA has approved a total 12,519 FiT applications, with a cumulative RE capacity of 1,656.45 MW. In the same period, a total of 9,793 installations with a cumulative installed RE capacity of 554.89 MW has achieved commercial operation.

One of the key outcomes of the FiT scheme is that we have observed solar PV to have the highest take-up rate compared to other RE sources. Currently, solar PV represents 67% of the total capacity commissioned under FiT, that is 373 MW out of the 555 MW commissioned under the FiT scheme, way beyond the initial 9% target of solar PV from the total installed capacity of RE.

On the other hand, total capacity for bioenergy (which includes biomass and biogas) represents 27% of total capacity commissioned. The issues with bioenergy are not unique to Malaysia; many countries are also facing the same challenges of ability to secure long-term feedstock at reasonable price and grid access.

NET ENERGY METERING (NEM) AND LARGE SCALE SOLAR (LSS) PROGRAMMES

The FiT mechanism has successfully spawned RE market and created an equally strong RE industry. In Malaysia, an exit strategy has begun for solar PV under FiT. Post 2017, solar PV was no longer available under FiT. In 2016, the government initiated the net energy metering (NEM) and large scale solar (LSS) programmes, administered by SEDA and the Energy Commission (ST) respectively.

Under NEM, the total solar PV quota allocated is 500 MW and for LSS, it is 1,000 MW. The difference between the NEM and FiT is that NEM is only applicable (so far) to solar PV, where it is based on the concept of self-consumption. Any excess solar PV electricity generated is sold to the grid at prevailing displaced cost, using the net billing calculation method.

The credits earned under net billing shall be allowed to roll over for a maximum of 24 months. Any unused credit beyond this period will be forfeited. Compare that to the FiT, where 100% of electricity generated is sold at some predefined premium tariff for a fixed tenure. Therefore, from the financial standpoint, the yield from FiT investment would be more attractive than NEM. NEM thrives in an environment where electricity tariff is unsubsidised and at market rate, hence there is considerable savings from self-consumption. NEM is largely viewed as 'cost saving' measures; at macro level, the widespread applications of NEM will reduce demand on grid electricity.

Until end of 2017, 958 MW of solar PV capacity had been awarded through two rounds of tender/ auction under the LSS programme. The government received a lot of applications from RE developers to participate in the programme. The condition set by the Energy Commission which required all bidders to provide Performance Bond to undertake the project, guaranteed a more serious commitment from the private sector.

IMPACTS OF SOLAR PV TO ELECTRICITY NETWORK

Solar PV has the capability to do peak shaving as the electricity generation from solar PV coincides nicely with peak demand. The reduction in peak demand reduced the need to invest in more peaking plants which are not cost efficient to run as they generate electricity for only a few hours daily to meet the extra peak-hour demand.

Within any electricity grid system, there is a limit to the amount of intermittent or variable RE (i.e. solar PV in our case) that the grid can accommodate. For the time being, the amount of variable RE injection to the grid in Malaysia is still modest, and RE projects above a certain threshold capacity are already required by distribution licensees to conduct a power systems study.

Globally there is a move towards greater decentralised RE generation or distributed energy generation. Initiatives such as FiT, NEM and LSS are exemplary of a gradual shift towards adoption of decentralised clean power generation. Such adoptions lead to greater growth of electricity consumers concurrently becoming producers of electricity, a concept known as 'prosumerism'.

HYDROPOWER AS BALANCING SYSTEM

Hydropower plants play a key role in providing a balance to the electricity market as more variable RE is injected into the grid. Cheap electricity like hydropower has zero marginal cost and, in Sarawak, there is an abundance of HEP resources with the technical potential of around 20,000 MW. Sarawak has huge hydro potential which can help in providing flexibility to resources that are more intermittent in nature.

The issues with drawing Sarawak's hydro power are no longer technical in nature, but rather in terms of commercial viability, with regards to the investment cost of the submarine cable and the associated converters stations. As the cable will run through Indonesian waters, there is also a need to address the international and legal ramifications, as well as the geopolitical consensus. Nevertheless, Sarawak's hydro power is important for the future of the energy system in the country. Any country that has large hydro potential, serves as a natural energy storage provider for itself as well as its neighbouring countries.

FUTURE OF RE

In Malaysia, we have sufficient RE technical potential to meet our electricity needs. On a macro level, there is a need to change the electricity system market from baseload to a combined energy and balancing markets. A whole new paradigm of the electricity system is required. For this reason, the energy transition is so-named

Small hydro-electric is a very matured technology that has great potential to be further developed in Malaysia

because such a transformation cannot happen overnight, but through years of planning and commitment.

In future, many countries will go for 100% renewables. Globally, we have exceeded 60% of our carbon budget. How much more should we continue to inject carbon into the atmosphere before tipping the 2 degrees Celsius? At current NDC pledges, the collective country pledges can only reduce the global average temperature by 2.7 degrees Celsius.

Hence, the big question is always when will countries finally decarbonise? Some countries have pledged to adopt 100% RE, while others have reached the mark. A mega trend on the horizon has been created by leading corporations (such as Google, Apple, IKEA, BMW, Philips, Citibank, Nestle) as they pledged 100% RE by a certain year. They have made the initiative rather than wait for the Government to trump the renewable energy drive. The expectation from the market is more environmental responsibility, as demonstrated by these corporations.

Rooftop solar PV is one of the most promising RE sectors that we need to focus on

ENERGY EFFICIENCY (EE) – THE OTHER COMPONENT OF SUSTAINABLE ENERGY

As the sustainable energy equation comprises both RE and EE, the country is also actively promoting decarbonisation through energy demand management. Energy demand management includes energy conservation, energy efficiency and renewable energy. As energy efficiency and conservation are an important element of demand side management and must be rigorously pursued, the government has approved the introduction of the National Energy Efficiency Action Plan in 2015 to manage energy demand effectively.

The Action Plan aims to reduce energy consumption by 52,233 GWh over the plan period of 10 years by strengthening institutional frameworks, developing skilled capacity, establishing sustainable funding mechanism, promoting investment and integrating energy efficient initiatives.

Over the years, many initiatives have been introduced to promote EE in the country. We have also received a lot of support from international bodies such as United Nations Development Programme (UNDP), Japan External Trade Organisation (JETRO), Energy Conservation Centre Japan (EECJ) and the Danish International Development Agency (DANIDA). Some of the key projects and initiatives undertaken in the past were:

a) Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP)
b) Sustainability Achieved via Energy Efficiency (SAVE) programme
c) Building Sector Energy Efficiency Project (BSEEP)
d) Industrial Energy Efficiency for the Malaysian Manufacturing Sector (IEEMMS)
e) Energy Performance Contracting (EPC)
f) Green Technology Financing Scheme (GTFS)

These initiatives have led to capacity building in various aspects of EE and increased awareness of EE among stakeholders, the private sector and energy user at large. The initiatives also paved the way for the formulation of regulatory instruments for selected segments of the EE sector.

Currently, the government has also started drafting the all-important Energy Efficiency & Conservation Act which will provide a holistic regulatory framework for the development and promotion of EE for Malaysia.

ENERGY AUDIT CONDITIONAL GRANT (EACG)

Under the 11th Malaysia Plan, the government has also initiated the Energy Audit Conditional Grant (EACG) with an allocation of RM54.4 million for a period of three years. This grant is applicable to the commercial and industrial sectors, for them to conduct energy audit for their buildings/facilities. Buildings with electricity usage of more than 100,000 kWh per month are qualified for the grant. After the energy audit, building owners are required to implement energy saving measures identified from the audit analysis where the investment amount must at least match the amount of the audit grant.

Conducting an energy audit is an important first step towards implementing energy efficiency initiatives

The programme is meant to encourage commercial and industrial building owners to adopt the use of efficient technologies and effectively cutting down on carbon emissions while saving operational costs. One of the major efforts of EACG is retrofitting government buildings, especially hospitals, to make them energy-efficient and able to save on utility bills.

As part of the initiative, a capacity building training course is also provided in order to create awareness and build up technical competency of the among the building owners personnel.

CONCLUSION

Malaysia needs to move forward in its sustainable energy agenda and to establish itself as ASEAN's green technology hub, with collaboration from all parties, as well as among ministries, agencies, private corporations, NGOs and concerted willpower from its citizens.

A mindset change is what's needed for us to forge ahead in the green sphere. Will Malaysia be able to move towards a change in mindset in order to embrace the new

energy paradigm, and additionally discard the present baseload electricity market and move to one that is made up of liberalised energy and balancing markets? Will Malaysia also be able to show its commitment to pursue the EE agenda with full conviction? Only time will tell but we must remain optimistic and have faith in our country. ■

Author's Biodata

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