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Environmental Concerns



FROM COPENHAGEN TO CANCUN: A New Climate Deal Reached!

At the final hours of the United Nations (UN) Climate Conference at Cancun, a vacation city in Mexico, when all appeared lost, a climate deal has been reached, brokered by Mexico! Though not a perfect text, the deal certainly provides the basis for moving forward. A green fund has been approved for developing countries to take small but definitive steps towards addressing climate change.

But the deal was not without objections. Bolivia objected to the document on the basis that the rich nations should half their greenhouse gas emissions by 2017 from their 1990 levels, far beyond the demands of other nations. The usual practice at UN climate talks is to get a consensus for a decision but here in Cancun, given the urgency of a climate deal, it was decided that "one country (Bolivia) cannot veto the decisions of all the other 193 states." The deal at Cancun has been reached and it will set the base for all future talks!

Back to Climate Change

It has been a year now since the failure of the much talked about Copenhagen Summit in the Danish capital. In Issue 1, 2010 (Post Copenhagen: A Greener Workforce) of IMPAK, the important role that developing and developed nations need to play to prevent further climate change catastrophes was outlined.



Photo courtesy: Ng Ek Wynn

Meanwhile, climatic calamities across the globe continue to surge and leave undesired conditions for all living beings. Last year's hurricane in Mexico, this year's floods in Pakistan and fires in Russia are examples of increasing incidences of natural disasters brought about by climate change that are already affecting the poorest and most

vulnerable. Coral bleaching has been observed in every ocean and major sea in which coral occurs, from the Persian Gulf to Southeast Asia, the Central Pacific to the Caribbean. Malaysia too has had her fair share of such coral bleaching.

According to the United Nations Framework Convention on Climate Change (UNFCCC), the world's climate is changing and will continue to change at rates unprecedented in recent human history. The impacts and risks associated with these changes are real and are already happening in many systems and sectors essential for human livelihood, including water resources, food security, coastal zones and health.

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007) highlighted the following impacts:

- ☞ Worldwide, approximately 20-30% of plant and animal species are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5–2.5°C.
- ☞ Widespread melting of glaciers and snow cover will increase melt waters from major mountain ranges (e.g. Hindu Kush, Himalayas, Andes), where more than one billion people currently live.
- ☞ In 2008 alone, more than 20 million people were displaced by sudden climate-related disasters. An estimated 200 million people could be displaced as a result of climate impacts by 2050.
- ☞ Climate change currently contributes to the global burden of disease and premature deaths. Adverse health impacts will be greatest in low-income countries, including from heat stroke, malaria, dengue and diarrhoea.

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From the desk of the Director General

Environmental Concerns



Calamitous hurricanes in Mexico, forest fires on a gigantic scale in Russia, unprecedented flooding in Pakistan, deadly and devastating volcanic eruptions in Indonesia, an economically disruptive ash cloud over Europe via Iceland and a massive earthquake in Haiti. A year of epic disasters that warned us of the awesome power of Nature especially when things go wrong. Surely 2010 is a stark reminder that all of us should be concerned about all environmental issues and matters. Fortunately, this collective concern of humanity found some expression in a surprise deal at the United Nations Climate Conference at Cancun, Mexico. It was a small step but the deal had the discernable workings of a climate treaty.

The Cancun Climate Accord needs restating in brief. For a start it urges deep cuts in carbon emissions to check temperatures from rising further. It requires wealthy countries to bring down emissions by 25% to 40% by 2020. It promises to study new market mechanisms to help developing countries curb carbon emissions. The accord requires the setting up of a new international body, the Green Climate Fund to administer financial contributions from wealthy nations to overcome climate induced effects in worst affected countries. Concurrently, a Climate Technology Centre and a Network will be set up to help transfer technical know-how to developing nations to contain carbon emissions and help adapt to climate changes. There is a clear intent to reduce the destruction of forests. It calls for respect of the rights of indigenous people. It urges a renewed round of emission cuts post-expiry of the Kyoto Protocol in 2012. And just as important, a new found political will was displayed throughout the negotiating sessions. This bodes well for multi-lateralism. A spirit of compromise, co-operation and transparency pervaded the various plenary meetings. We believe also that the science underpinning the negotiations is sound and universally acceptable. Using Cancun as the basis, how can Malaysia play its part in this evolving environmental drama of human civilisation on Earth?

In Malaysia, over 40% of our fossil fuel resources are utilised in the transportation sector. This does not compare well with Japan, Singapore, Europe and the USA. The reasons for this high proportion are simply threefold - poor motor vehicle engine efficiency, road system efficiency and lastly, public transportation underdevelopment. The last reason includes poorly developed Integrated Transportation Systems (ITS). A new and economically viable transportation model needs to be urgently worked out to sustain the public transportation sector. The model derived must of course be also environmentally friendly. We must target a public transportation usage level of about 80% to see a significant reduction in carbon dioxide emissions as well as energy usage. Clearly there is much yet to be done in this area.

We can also blaze a new trail in the use of solar power. We are blessed with all year around sunlight. Clearly the development of a successful solar power generation sector will result in cleaner energy while also arresting the depletion of our fossil fuel resources. Significantly, it can help prevent energy pricing from spinning out of control. It is indeed gratifying to know that we are the third largest producer of solar components after China and Germany. Couple this to the fact that the National Renewable Energy Policy aims to increase the renewable energy component portion from 1% to 5.5% of electricity supplied by 2015. The Cabinet has recently approved the introduction of the Renewable Energy Act and the Act for a Feed-in Tariff Implementing Agency. Producers of solar power who are also consumers of the power grid can sell excess electricity generated by installed solar panels back into the grid. This is not in the realm of science fiction as it is now widely practised in USA.

Thirdly, we can and we must harness the power of Generation Y (those born between 1978 and 1994). It is the generation that grew up in a world of the handphone and the Internet. It is they who are raising the bar on global sustainability issues. They are well-informed, market savvy and persistent. They ask questions most of the time! On account of this they are also called Generation Why? In Malaysia, they form some 40% of the population. They love companies and products that go out of their way to help and support good causes and the environment. Many are eco-warriors. But they are not blind followers of all things 'green'. They make purchasing decisions that are based on both economic sense and sustainability. They can be a bedrock of volunteerism on an enormous scale. Undoubtedly they will change the dynamics of the way we do things in the future. Tap this energy and we in Malaysia can surely move environmental issues, matters and concerns to the next level if not centre stage!

We have indeed ended the year on an optimistic note thanks to Cancun. We all have big challenges ahead of us in the new year. At least now there is the proverbial light at the end of the tunnel. Happy New Year!

A handwritten signature in black ink, reading "Rosnani Ibarahim".

Dato' Hajah Rosnani Ibarahim
Director General
Department of Environment, Malaysia

By 2050, there will be more than nine billion people on earth (NST, 2010). Are we aware of the impact of the surge in population on sustainability of the environment? The bottom line is we have no choice but to complete the transition to a low carbon global economy.

Discussion Tracks at Cancun

Tasked with making solid progress towards a post-2012 climate treaty after the near-disaster of the December 2009 Copenhagen summit, the talks at Cancun took place under the banner of the UN Framework Convention of Climate Change (UNFCCC) (2010b), with a gathering of 194 parties. The two main tracks discussed include (*The Star*, 2010):

1. Action beyond 2010

- Launching a new financial vehicle (Green Fund) to help poor countries cope with the impact of climate change.
- Setting financial encouragement to tropical countries so that they preserve their forests rather than cut them down.
- Encouraging the transfer of clean technology from rich countries to poor economies.
- Agreeing on ways to measure and monitor countries' actions, including emission curbs.

2. Future of the Kyoto Protocol

- Kyoto commitments beyond 2012.

The Cancun Accord: What Does it Provide For

Though an overriding accord to commit developed nations to slash their carbon emissions and to inscribe their post-2012 commitments under the Kyoto Protocol have been deferred, the new agreement has provided for the creation of building blocks for a new global pact and recognises the goal of reducing carbon emissions by industrial countries by 25 to 40% from the 1990 levels within the next 10 years. It is certainly beyond what had been expected. For the record, the Kyoto Protocol, negotiated in 1997 in the western Japanese city (UNEP, 2005), aims for developed nations to cut emissions by an average of 5% by the end of 2012 compared with 1990 levels.

The Accord provides for a multibillion dollar annual Green Climate Fund to provide assistance to poor developing countries to cope with climate change but does not outline how it will be raised or who will contribute and how much. The Accord does talk about transfer of climate-friendly technologies to developing economies. It also outlines rules for internationally funded forest conservation.

The Accord is seen as a skillful compromise between the United States and China, two major economies that have been at loggerheads over

methods for monitoring and verifying actions to curtail greenhouse gases. While the United States is of the opinion that the Accord provides the basis for moving forward, China adds that future negotiations will continue to be difficult. But if these two major economies continue to drag their feet, the European Union (EU) would be ready to spearhead this important decision.

Europe's successful Emission Trading System that shows carbon market mechanisms reduce the cost of cutting emissions, can drive investment in innovative low-carbon technologies and can be an important source of funding for future climate action. Hence, developed countries need to deliver on their pledges by assisting the developing world fight climate change that they contributed to in the first place.

The Deal is Done; What Now?

Countries that came to Cancun, showed the world that the multilateral process can deliver as long as a spirit of compromise, cooperation and transparency prevails. As reported by Connie Hedegaard, the European Commissioner for climate actions, "Transparency is how countries deliver on their emission pledges, and how developed countries will provide long-term funding to help the developing world tackle climate change. Hence, stronger monitoring, reporting and verification rules are needed."

The Copenhagen summit failed for only a simple reason: the lack of political will to understand, recognise and accept the scientific evidence on the worldwide daily havoc that is testimony

of the reality of climate change. Only with political will can these mega initiatives succeed. Transparency is essential for building trust.

Indeed the long-term benefits of conservation will outweigh the short-term gains of development. Hence, Cancun will, therefore, not be the end of the road. Having said that, with political will and the strong backing from Europe, the Cancun Accord should succeed. Science underpinning the negotiations at Cancun is correct, and adds further weight to realise the globally negotiated and accepted deal on carbon emissions.

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The Cancun Climate Accord

1. Curbing Climate Change

- Urges deep cuts in carbon emissions to maintain temperatures from rising to no more than 2°C above pre-industrial levels. Calls for a study to strengthen this goal to 1.5°C.
- Requires wealthy countries to bring down emissions by 25 to 40% by 2020 compared with 1990 levels (Note: as this section is under the Kyoto Protocol which was rejected by the US, it does not involve the United States)
- Agrees to study new market mechanisms to help developing countries curb carbon emissions. These proposals are to be refined at the climate meeting in South Africa, next year.

2. Help for Poor Countries

- Set up a new international body, the Green Climate Fund, to administer money from wealthy nations for worst-affected countries. The United States, European Union and Japan have given pledges of USD100 billion a year starting in 2020 with USD30 billion in immediate assistance.
- Invite the World Bank to serve as the interim trustee of the Fund for three years
- Set up a 24-member board to steer the Green Climate Fund with equal representation from developed and developing countries together with representation from small island states.
- Set up a Climate Technology Centre and Network to help transfer technical know-how to developing nations to contain carbon emissions and adapt to climate change.

3. Reducing Deforestation

- Expresses broad support towards efforts to reduce the destruction of forests, a leading cause of climate change. Seeks the assistance of developed nations to draft anti-deforestation plans but does not include calls for a market role in this move.
- Urges all nations to respect the rights of indigenous people

4. Future of Kyoto Protocol

- Calls for wealthy nations to discuss a new round of emission cuts under the Kyoto Protocol which expires in 2012. Does not require nations for now to inscribe their post 2012 commitments under the Protocol.

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Solar Power for Cleaner Energy

Solar power is a clean and renewable resource, and it is one of the most important energy sources of the future. Photovoltaic cells or solar cells are thin shaped pieces of semi-conductor material, most often silicon, that work by generating a small amount of electricity when the sun's rays hit the material.

A variety of consumer products can be built to include small solar cells such as pocket calculators and clocks. This is a clear indication that solar power is extremely versatile and a good alternative to battery replacement. When linked together in bigger modules, they become useful in powering cars, water heaters, and homes. Even satellites rely on solar panels to convert the sun's rays to provide power to the equipment on board when it is remotely located in space.



Benefits of Solar Power

The energy source for solar energy generation comes from the sun rays, and it is totally free and renewable. The solar panels can be built and solar power harnessed at any location that can receive sunlight. This is useful to the communities, be it in the city, on the mountain, rural areas and in the forest, when such remote places may face economic and geographical concerns if conventional power line distributions are constructed.

Harnessing the sun's rays and converting to electricity using solar cells is non-polluting, and does not emit any greenhouse gases. In most countries, fossil-fuel power plants are the primary source of greenhouse gas (CO₂) emissions, and boosting the use of renewable energy helps to curb global warming.

Compared with conventional power plants, solar modules reduce greenhouse gas and heavy metal emissions by at least 80%.

The energy harnessed from solar power can help to reduce the country's dependence on fossil fuels such as coal and gas in power generation. It also reduces demand on the nation's strained electricity grid and decreases the need to build new power plants that could be harmful to ecosystems. This means that solar power helps in reducing toxic emissions such as sulfur dioxide, nitric oxides, volatile organic compounds (VOCs), and toxic metals besides saving the green areas and useful lands from being converted into power plants. According to a US Department of Energy report, the current electricity needs in the United States can be met by just installing solar modules in 7% of the 140 million acres of land area that its cities and buildings sit on.

Using fossil fuel such oil and gas is an expensive option and the cost of using them will continuously increase in the years to come from the fact that oil and gas reserves around the world are being depleted. The solar power option may be an expensive investment at the initial stage especially for the installation of solar panels, inverters and to some extent, battery, but in the long run, the savings obtained from being self-sustaining and 'off-the-grid' will be visible. Moreover, solar cells require little maintenance during their working lifetime as there is less wear and tear concerns once the installation is completed.

Innovations in Solar Cells

New technologies are bringing more possibilities for sun ray collection, besides the rectangular flat panels we normally see on rooftops. Scientists in the United States have produced a new type of self-assembling transparent thin film material to be applied on windows as clean electricity generators. Solar window is made with semi-transparent solar cells, laminated between glass panels.

Innovative solar panels for the roof, known as solar shingles, are designed with space constraint and aesthetics in mind. When installed on roofs, these shingles easily blend in with other roofing materials which make them unnoticeable, but much more appealing than traditional roof solar panels.

There is ongoing research in the United States to create solar panels that can be embedded in roads for sun ray harnessing. The idea came



from the fact that there is a lack of space available to place solar panels on a large scale and putting solar panels on rooftops will only be able to generate a low percentage of total electricity needed. The solar road panel prototype consists of 1,024 modules, where each module contains a solar cell and a light-emitting diode (LED) for signaling. However, the main challenge to this plan is to create solar panels strong enough to withstand the load of traffic passing over them.



Malaysia's Role in Solar Power Application

Malaysia is blessed with all-year round sunlight, and moving into solar power harnessing should start anytime soon because of the comprehensive advantages of solar power. Solar power is among the sectors that Malaysia has identified to push the country forward towards a high income nation. Further, solar power is seen as a new growth sector to meet the increasing demand for cleaner energy, and countering the rising costs and depleting reserves of fossil fuel.

Malaysia is the third largest producer of solar components after China and Germany, and holds 11% of the global market share. Currently, some of the biggest global solar companies such as First Solar, Q-Cells and SunPower have their plants in Malaysia. The removal of import duty and sales tax on solar photovoltaic system equipment, and sales tax on locally manufactured solar heating system

equipment announced during the 2009 Budget was a good step forward in enhancing the adoption of solar power.

The government announced the National Renewable Energy Policy and Action Plan on 10 June 2010 with the aim of increasing renewable energy from 1% to 5.5% of electricity supply by 2015. This will be carried out through the proposed feed-in tariffs for solar photovoltaics (PV), biomass, biogas, and minihydro. The Cabinet has recently approved the introduction of the Renewable Energy Act and the Act for a Feed-in Tariff Implementing Agency, and it is expected that the programme will be passed into law and implemented by mid-2011. The feed-in tariff is expected to be managed by the newly established Sustainable Energy Development Authority (SEDA). When the Feed-in Tariff for renewable energy is in place by year 2011, it is anticipated that more solar panels will be installed because consumers can sell the excess electricity generated by their units back to the grid, and in turn get to enjoy better electricity rates. This concept is common in the United States.

The Malaysia Building Integrated Photovoltaic (MBIPV) programme, named SURIA 1000 is established to give the residential and commercial sector direct opportunities to be involved in renewable energy initiatives and environmental protection. Every year starting from 2007, a limited number of grid-connected solar PV systems will be offered to the public on a bidding concept. At the moment, the cost of a 5kWp BIPV system is estimated to cost RM135,000, roughly RM27,000/kWp. The system is able to produce approximately 6,000kWh of energy per annum. The project aims to make BIPV system prices equivalent to Europe and Japan with higher participation from general and industry consumers.

Worldwide Efforts in Solar Power Adoption

Sonnenschiff solar city in Freiburg, Germany, claims to be a 'net positive' city, as it is able to produce up to four times the amount of energy it consumes from a series of large rooftop solar arrays. The buildings were planned with smart solar design, and energy-efficient elements that make the most of natural resources for energy and water. Each of the buildings is equipped with rooftop solar panels that are oriented to the direction of maximum sun rays.



Some other successful examples of a good combination of major infrastructure and solar power harnessing can be seen in two other road projects in Italy. In Sicily, solar panels for a total of 368 kWp (kilowatt peak) were installed on the Messina-Palermo motorway and this provided electricity for all the buildings located along the 183 km motorway. In another motorway at northern Italy, the electricity from solar panels installed on the 1km long soundproofing barrier along a residential area produced 680,000 kWh per year, easily sustaining 20% of the needs of local communities.

Italy will soon be opening the first fully solar-powered motorway on the Catania-Siracusa motorway on 1 January 2011. The electricity needed to run the lights, tunnel fans, road signs, emergency telephones and all the services and street furniture installed will be 100% supplied by the 80,000 units of solar panels installed along the 30 km motorway.

The annual solar electricity production of this highway is estimated at about 12 million kWh, which will save an equivalent of around 31,000 tonnes of oil and 10 thousand tonnes worth of CO₂ emissions every year!

Meanwhile, Morocco is embarking on a project to build five solar power farms across the country with the aim of achieving 38% of the power generation from the sun by 2020. It is an important step for them, as they are one of the countries that do not have oil reserves, and they are getting strong support from Germany in their quest to harness solar power.

In the United States, some solar companies such as SolarCity lease solar panels to consumer for a monthly fee without installation and upfront charges. The system that San Diego city uses is to do net-metering, and the bill is paid once a year relative to the amount generated and used by a household. Besides, the owner of the system gets state and federal rebates in terms of price reduction and tax deduction. This move clearly aims to encourage more home users to adopt the 'off-the-grid' lifestyle.

As a means to further support the quest to go green in transportation, several companies have sought a novel approach to build charging

stations for electric and plug-in hybrid vehicles that are powered by solar energy. Various kinds of charging stations can be found in Europe and United States, ranging from a carport that features a solar panel roof that generates solar



energy for electric vehicles parked underneath to a stand-alone solar 'fuel' station that provides free battery charging for small-scale electric vehicles including Velotaxis, Segways, electric bikes and scooters.

Conclusion

Although solar cells are not cheap in terms of manufacturing and investments to home users, it is likely to see a price drop to an affordable level with intense strong research and development surrounding the photovoltaic technologies, and the concerted effort from many nations in harnessing the advantages derived from this renewal energy source. The use of solar electricity is still a feasible option in helping to reduce energy bills over the period of the solar panel operation.

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Public Transport Development: Solution towards Energy Efficiency

Over 40% of our fossil fuel resources are utilised in the transportation sector. This includes private vehicles, public transport and other modes of transportation services. In comparison to Japan, Singapore, Europe and United States, we in Malaysia are wasting too much fossil fuel on the transportation sector.

Sources of Fuel Wastage

Fuel wastage arises from several sources. Firstly, motor vehicle engine efficiency is still far lagging. There is a need to draw up regulations on vehicle engine efficiency and not just the fuel type. The energy efficient labeling for cars and other types of vehicles will assist consumers to make a wise and economic choice in purchasing a product. Such labeling is widely used in Europe. In addition, very old vehicles which are not energy efficient as well as high in emission are still on the road. These vehicles should be replaced with newer models through an effective End of Life Vehicle scheme. Such schemes have been successfully implemented in Japan, United States and Europe. The scheme also assists consumers to own new efficient vehicles easily.

Secondly, our road system efficiency is poor. A poor road system causes traffic congestion and subsequently results in fuel wastage as well as an increase in CO₂ emission. A frequently heard complaint of Malaysian drivers is that they spend far too much time in traffic congestion situations. The road design in terms of turns, 'U' turns, junctions as well as roundabouts needs a revisiting. Effectively, efficiency in fuel consumption can be enhanced through good road design which results in smooth flowing traffic.

Thirdly, lack of public transportation development is seen as a major cause of high usage of private vehicles. Less and less Malaysians opt to take public transport as prevailing public transport services are 'sardine packed'. Well networked, efficient and reasonably priced public transport service is still high on the wish list of the people. Let us revisit some public transportation issues.

Factors that Deter Public Use of Public Transport:

Comfortability of Public Transport Vehicles and Services

A consumer would like to experience a comfortable environment while travelling to the required destination. A comfort feeling is

seen as a pull factor. In its absence, it becomes a push factor immediately. Comfortability must be accorded the highest priority in the public transportation industry. Systems that are constantly over-crowded or 'sardine packed' imply inadequacy and insufficiency of services and should be monitored and improved. The public transport operators should also anticipate growth in users.

Ergonomics must be put in place in the design of vehicle as well as stations that play a role in shaping the industry. Such a system must also be elderly and disabled consumers friendly.

Service Outreach to Limited Locations

The outreach of public transport is still limited. The outreach of the transport system must be able to cater to both urban and rural areas equally. This is to ensure a standard service to all. Outreach also promotes the usage of public transport and eventually brings balance to the industry.

Efficiency of Services

Public transportation service starts at the ticket counters as well as in some cases the bus driver cum ticket seller. Fast service, good information, booking facilities, options of route, and punctuality in reaching destinations become sub-indicators that ensure continued use of the service by the consumer.

So very often, even Light Rail Transport (LRT) travel does not allow for reaching destinations on time. As a fast moving public transport system, such inadequacy deters people from using the service. During peak hours, services are not increased resulting in huge jam-packed stations which deter consumers from depending on this mode of public transport. Inefficiency forces consumers to use their own transport as it is much more reliable.

Maintenance and Upgrading Technology

A culture of regular maintenance needs to be developed in Malaysia and this has been cited as a major setback. Scheduled maintenance, preventive maintenance and repairs are part of the operational management of the service provider. This requires thorough planning along with vehicle safety inspection for safety and reliability as well.

As there is an increase in consumer demand, improving or upgrading the technology becomes another vital point. Correct technology must be selected to ensure that the technology is able to cater to future demand.

National Automotive Policy

This policy has been cited as one of the causes of extensive private vehicle use as it has made it easier for individuals to own a car with readily available loans. This has encouraged more Malaysians to own a car. Eventually a huge increase in the number of cars on the roads has resulted in massive congestion in several parts of the road system. However, the fact that consumers choose to be stuck in traffic congestion rather than take public transport is a serious issue.

Overcoming these Problems: Some Suggestions

National Transportation Policy

An integrated policy must be drawn up to outline the future of the transportation sector. This policy should cross-check on all available policies and integrate them to ensure smooth implementation. The development process should include all stakeholder participation to ensure representation from all levels. There should be one organisation overseeing all transportation issues.

Integrated Transportation System (ITS)

Having an ITS will offer a better solution to public transportation issues. There should be one system for all transportation modes but with a few operators in the system rather than a monopoly. Consumers should be given a choice to choose the transport company based on service satisfaction. Diagram 1 below shows the flow of an integrated system. The dotted lines indicate freedom of choice for consumers.

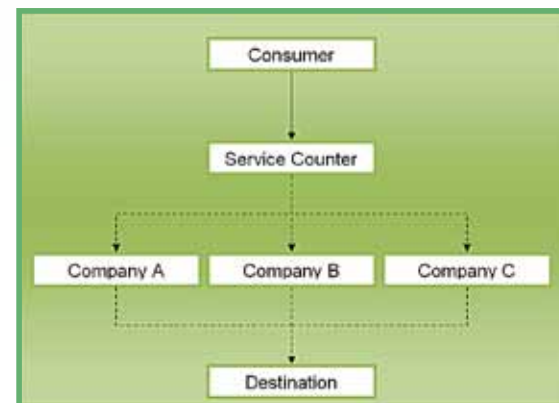


Diagram 1: Integrated Transportation System (Phase 1)

The clustering of transportation also plays a role. This encourages outreach and smooth flow of the crowd. This can also be done effectively with a proper frequency study of the passengers-traffic, timing, festivals, and other activities that may influence consumer behaviour.

Diagram 2 indicates how Phase 1 can be supplemented. Phase 2 ensures outreach as well as an easy flow. Station A is the main consumer meeting point and has to be connected through bus services. Station B offers a choice of bus service as well as train service. Station B must have Cross-over to allow for cross-travelling. The Main Station will be networked to the main frame of the national transportation network. Levels between Station A, Station B and Main Station can be added to ensure a better outreach.

Approximately 4% of CO₂ is contributed by the airline industry worldwide. It is advisable to study the Japanese and Singaporean transportation models so as to develop a good integrated model for the nation.

Trains will ensure fast travelling and cross-over in heavily congested areas. There should also be no vehicle areas, but instead free public transport such as a slow moving open commuter (in some US cities) to ensure a smooth transportation system is in force.

operators should not wait for the system or vehicle to breakdown to start repairing. Scheduled and preventive maintenance plays an important and vital role in sustaining an ITS.

Upgrading systems as well as introducing new systems can be done more cost effectively by systematically maintaining the basic structure. For instance, in France, the bullet trains use the same railway but the bullet train has a better system to tackle safety issues.

Environmentally Friendly Approach

The public transport system must opt for environmentally friendly approaches. It also must reflect the commitment of the government to reduce pollutant emission levels. Examples set by this industry will encourage people to change their habits slowly but surely and bring mutual benefit to all. Sustainability of the industry is ensured as well. There is a need to reiterate here that the National Green Technology Policy has also outlined transportation as one of its major thrust areas.

Conclusion

There should be an economic model to sustain the public transportation sector. Research and development to understand growing consumer needs must be undertaken on a regular basis. There should be a long term solution to cater to a shift from the current 20% users to 80% users in the future.

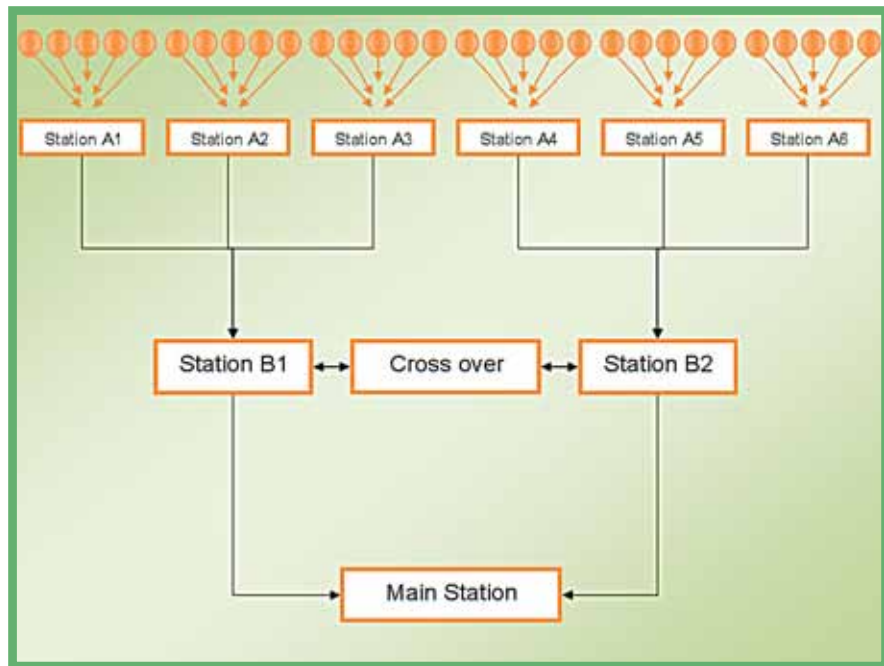


Diagram 2: Integrated Transportation System (Phase 2)

The proposed system ensures that the ITS is a network that enjoys good connectivity. An ITS with such appealing features will ease consumer difficulties and ensure increased use of public transportation. The ITS must not encourage monopolies and must be based on healthy competition.

Enforcement of Service Quality as Well as Vehicle Safety

Enforcement is the backbone for continued implementation of such a system. Enforcement should look into service quality and safety aspects. Services that do not comply or have high complaints or do not comply with standards drawn up should have their licence revoked.

Proper Selection of Technology

The Main Stations shown in Diagram 2 can have 'bullet trains' or fast moving trains to accommodate large volumes of passengers as an option. Being a fast moving transport, it ensures that communities from outlying areas are able to travel to major cities for work. It also reduces the use of air services which has a high impact on climate change.

There should be more lanes for public transport vehicles to ensure consumers of these services reach their destination more quickly than single vehicle users. This will further encourage people to use public transport.

Maintenance and Upgrade

Maintenance, a vital part of every industry, must be based on standards and done on a regular basis to ensure a proper ITS. The

I believe that through these measures, we can make the shift towards an efficient public transport system and greater use of that system by the public. Detailed planning must be put in place to ensure no derailment of the plans along the development period. If Malaysia could target 80% public transportation usage, we could achieve a significant reduction in CO₂ generation as well as energy usage.



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Enforcement of Solid Waste and Public Cleansing Management Act (Act 672) – Are You Ready?

Introduction

Solid waste management is traditionally under the jurisdiction of the local authorities in Malaysia. The waste generators pay for solid waste management services indirectly through the payment of assessment tax, which also covers other miscellaneous expenses such as expenses for general cleanliness and infrastructure at the local level.

The Solid Waste and Public Cleansing Management Act 2007 (Act 672) was gazetted in August 2007, which stipulates 112 sections (clauses) under a total of 12 parts (sub-titles). This Act was enacted to allow for centralised and coordinated management of solid waste by the Federal Government of Malaysia. In other words, the power of managing the solid waste including the public cleansing (road sweeping, drain cleaning and grass cutting etc.) will be taken over by the Federal Government of Malaysia from the Local Authorities throughout the country (except for Sabah and Sarawak). In addition to this, privatisation of certain solid waste management services such as waste collection will also be implemented with three concessionaire companies being awarded a long term contract to carry out their services at three different zones in the country.



High quality waste management services are expected under the new Federalisation model

Prior to the enactment of the Act, the National Solid Waste Management Department (JSPSN) was established under the Ministry of Housing and Local Government (MHLG) in June 2006, which plays an important role to ensure that the JSPSN at the Federal level can focus its energy, effort and human resources on the formulation of policies, strategies, plan of action as well as legislation. The day-to-day operation of solid waste and public cleansing falls under the Solid Waste and Public Cleansing Management Corporation (PPSPPA), which is a body set up

under the MHLG to take over the role of the local authorities with legal power to enforce the law and carry out the monitoring activities.

The enforcement of the Act 672 is yet to materialise, although it is now 3 years and 4 months since the Act was enacted. The enforcement date of the Act was announced and then postponed for not less than 5 times by the MHLG. To date, following the latest announcement made by the Minister of Housing and Local Government, the Act will be enforced on 1 January 2011. Several parties, especially solid waste management stakeholders are looking forward eagerly to witness the long waited enforcement of the Act. Will the enforcement date remain fluid? Are all stakeholders ready for it? This paper presents some concerns regarding the enforcement of the Act, particularly the implications on various relevant entities including households.

The Basics of Act 672

The Act 672 was enacted mainly to allow centralised and coordinated management of solid waste by the Federal Government of Malaysia. In the long run, the Act also empowers the possibility of mandatory segregation of wastes at source; implementing deposit refund systems; as well as direct billing of solid waste management and public cleansing services to the users or waste generators.

Definitions of Solid Waste

According to the new Act, solid waste is legally defined as:

- 1** Any scrap material or other unwanted surplus substance or rejected products arising from the application of any process;
- 2** Any substance required to be disposed off as being broken, worn out, contaminated or otherwise spoiled; or
- 3** Any other material that according to the Act or any other written law is required by the authority to be disposed off.

There are 8 categories of solid wastes which are defined as 'Controlled Solid Waste' under the new Act as shown in Table 1.

In addition, the new Act also defines 'solid waste management facilities' as any land, fixed or mobile plant and systems incorporating structures, equipment used or intended to be used for the handling, storage, separation, transport, transfer, processing, recycling, treatment and disposal of controlled solid waste and includes transfer stations, disposal sites, sanitary landfill, incinerators and other thermal treatment plants, recycling plants and composting plants.

Table 1: Definitions of controlled solid waste.

Household solid waste	Any solid waste generated from a household, or any premise when occupied as a dwelling house
Commercial solid waste	Any solid waste generated from any commercial activity such as shop-lots, shopping malls etc.
Construction solid waste	Any solid waste generated from any construction or demolition activity, including improvement, preparatory, repair or alteration works.
Institutional solid waste	Any solid waste generated from institutional establishments, such as government office, hospital, clinic, school, university, college, and mosque etc.
Industrial solid waste	Any solid waste generated from any industrial activity (except hazardous scheduled wastes).
Public solid waste	Any solid waste generated from public places, which are under the supervision or control of any local authority, such as recreational park and bus station etc.
Imported solid waste	Any solid waste generated in other countries and imported into Malaysia for processing or disposal.
Special solid waste	Any kind of controlled solid waste as may be prescribed which is or may be dangerous to public health; or is difficult to treat, keep or dispose off, for which special provisions are required to deal with it.

Institutional and SWM System Setup

A National Solid Waste Management Department (JPSPN) was established under the new Act, headed by a Director General, who oversees the overall policies, plans and strategies; sets standards, specifications and code of practices related to any aspect of solid waste management; exercises regulatory functions and grants approvals and licenses as stipulated under the Act.

On the other hand, in order to undertake the tasks in a professional and competent manner, the Solid Waste and Public Cleansing Management Corporation Act 2007 (Act 673) was also enacted by Parliament in 2007 to establish the Solid Waste Management and Public Cleansing Corporation (PPSPPA). The corporation is to manage all operational issues at the Federal, State and Local level, including the legal power to enforce the law and carry out the monitoring and enforcement activities. PPSPPA is headed by a Chief Executive Officer (CEO) operating from a headquarters office as well as regional offices throughout the country.

The PPSPPA offices at regional level play a role to monitor and supervise the solid waste and public cleansing activities, which will be carried out by concessionaire companies, as well as other licensed or approved players in solid waste management.

Three companies will be awarded concessionaire agreements under this federalisation model, namely:

- 1 Alam Flora Sdn Bhd** – Central Region (Selangor, Federal Territory of Kuala Lumpur and Putrajaya, Pahang, Kelantan and Terengganu)
- 2 SWM Environment Sdn Bhd** – Southern Region (Negeri Sembilan, Melaka and Johor)
- 3 E-Idaman Sdn Bhd** – Northern Region (Perlis, Perak, Pulau Pinang and Kedah)

However, the services of the concessionaire companies are most likely to be limited to collection of waste from households and probably public cleansing, meaning that the services for other non-household premises such as commercial, industries and institutions will still be open to other waste management companies to participate. Public cleansing works to be carried out include grass cutting, drain cleaning, road sweeping, cleaning of beaches, public toilets, public places etc.

In a nutshell from the aspect of institutional setup, the JPSPN deals with policy matters at the Federal Government, while working closely with the PPSPPA to ensure effective implementation of the daily tasks on all aspects of solid waste management and public cleansing. On the other hand, the concessionaire and other waste companies or operators will be practically carrying out the services as working arms under the supervision of PPSPPA.

Approval and Licensing

Under the new Act, a total of 9 solid waste facilities have been identified as prescribed facilities, which require approval for building and alteration from the JPSPN. These prescribed facilities are:

1. Biogas facility
2. Communal or commercial composting facility
3. Material recovery facility
4. Refuse derived fuel facility
5. Thermal treatment plant
6. Transfer station
7. Sanitary landfill
8. Inert landfill
9. Other disposal sites

In addition to these approvals, a license to operate the facility is required. However, the licensing is not limited to only the operators of these prescribed facilities, but all service providers, whether collectors, storage and trading agents, recyclers, transfer and transport or treatment or disposal facilities. The license requirement ensures that only entities considered fit and proper for the purpose may venture into the waste business. The Director General of the JPSPN is empowered under the Act to be the person who grants the approvals and licenses.

Solid Waste Management Schemes

The solid waste management provisions traditionally under the Local Government Act (1976) will be abolished with the coming into operation of the Act 672. Therefore, similar provisions have been included in the Act 672 which is termed as 'Solid Waste Management (SWM) Schemes'.

In the scheme regulation, the government determines the duties and obligations of licensee and waste generators, the geographical area, the type of controlled solid waste and the services to be provided. The SWM Scheme will be prepared not only for household solid wastes, but also other controlled solid wastes under the Act 672. In general, scheme regulations will determine:

- 1** Duties of waste generators (household, commercial, industrial etc.)
- 2** Duties of waste collectors (concessionaire as well as private collectors)
- 3** Duties of licensee for solid waste management facilities
- 4** Duties of licensee for solid waste management players

Compacted plastic bottles in plastic recycling industry

Compacted cardboards in paper recycling industry



Other Instruments

Other than the above described powers, the Act 672 also includes a wide bunch of instruments to supplement the traditional regulatory tools, including powers to establish take-back systems, deposit-refund systems, powers to require manufacturers to use recycled materials, restrict the use of certain materials, to reduce waste generation etc.

In the long run, it is the aim of the Government to go for direct billing of solid waste management services to the waste generators, in which direct payment particularly by the households to the concessionaire companies is enabled under the Act 672. However, this power is not expected to be utilised immediately after the enforcement of the Act as emphasised by the Ministry in several public revelations.

The Implications

Households

In the long run, the major implications for the households is to receive a separate solid waste management bill in their mailbox in addition to the other utility bills such as electricity and water bills. Although JPSPN mentioned that direct billing to the households will not be implemented in the near future, it is, however, expected that the bill will come along with the materialisation of 'world-class' high quality and standardised solid waste and public cleansing management services.



Scavenging activities at the landfill site will no longer be allowed

Prior to that, it is inevitable that each household will be given a standardised waste bin to ease the collection service. All other waste bins currently used, whether concrete, metal, or any other than the standardised bins, will be abolished. In addition, all households as the waste generators, are of course subjected to the Household Scheme Regulation upon enforcement of the Act 672, in which every household has to comply with some rules in relation to their responsibilities, such as where to place the bins for collection, what to be put into which bins, how to handle the waste before putting into the bins, and schedule of collection of different kinds of wastes etc. When mandatory source separation is enforced, households, in particular have to segregate the wastes according to the waste types instructed for separate collections.

In return, on the other hand, upon enforcement of the Act 672, households or public should expect to enjoy 'world class' waste collection services, in which the collection truck should arrive at your door on time as scheduled, with trained collection workers who will perform the collection professionally. Collection will be done with least disturbance in terms of traffic, foul odour, spillage etc.

Industries, Commercials and Institutions

All the industries, commercials and institutions have no choice but to appoint only licensed waste contractors. The licensed contractors are those who are deemed fit and able to perform the waste collection services and comply with all the licensing requirements. Therefore, a higher fee is expected for the waste collection services for the industries, commercials and institutions. This will probably eliminate cheap contractors who resort to illegal dumping of wastes. All waste collected have to be delivered to approved

facilities whether for treatment or disposal. Industries, commercials and institutions may, upon inspection by the PPSPPA, be required to show proof of hiring such licensed contractors, and of course the proof of receipts issued by the approved facilities. Besides, the concept of mandatory source separation may also be imposed on industrial, commercial and institutional premises.

On the other aspects, for manufacturing industries in particular, the concept of 'Deposit Refund System' and/or 'Take Back System' may be imposed for certain products, emphasising the 'producer pays principle'. Although these instruments are stipulated in the Act, there is however, no clear indication as to how these instruments will be used and what products will be subjected to these systems.

Waste Management Players

As regulated by the Licensing Regulations, all solid waste management players are expected to apply for a license to operate, regardless of the scale of business whether as a recyclable collector, waste treatment company, recyclable exporter, or a recycling industry. However, some exemptions are expected for certain categories of players with the power of exemption given to the Director General of JPSPN; these exemptions would probably be for charity organisations, non-governmental organisations etc. In other words, all players have to fulfil the qualifications specified in the licensing requirement in order to obtain a license to operate. A simple example is that no more open waste trucks will be allowed on the roads in the future. All waste collectors or waste collection companies must comply with minimum requirements of proper collection trucks before a license is obtained.

Moreover, as in the case of waste management facilities, both approval and license are required before the facility is deemed fit to be in operation. The approval in particular is a requirement to ensure that any waste management facility to be constructed is in line with the overall waste management plan of the JPSPN. This requirement is in addition to other approvals required such as the Environmental Impact Assessment (EIA), which is under the power of the Department of Environment (DOE).

In short, the solid waste management players not only have to improve or upgrade themselves in order to be deemed fit to perform any solid waste management services in the future, they will also be restricted on several fronts: "what to collect", "where to collect" and "where to deliver". In relation to this, it is also a good probability that the players have to comply with the requirements to submit data on a mandatory basis, which means that periodical reporting to the relevant authority, either JPSPN or PPSPPA, will be required.

Nevertheless, it is anticipated that all the requirements will be implemented in stages, with the players being given a 'grace period', as preparation towards both the licensing and approval requirements. Therefore, upon enforcement of the Act 672, some sort of registration of players will probably take place during the 'grace period'.

Conclusion

It is no doubt a big challenge for Malaysia to change to a more sophisticated solid waste management system from one which is deep-rooted and inefficient. However, as reported by the MHLG, the unique situation at the local authority level in Malaysia indicates a need to federalise the solid waste and public cleansing services of the country, both from the aspects of finance as well as service quality.

The path ahead will undoubtedly be challenging and it will be a long way before the relevant stakeholders and players in solid waste management are ready and accept the Government's move towards federalisation of solid waste management. However, all the challenges and obstacles have to be taken positively. It is hoped that the federalisation model will achieve its goal of ensuring that all Malaysians enjoy high quality and cost effective solid waste management and public cleansing services in the long run.

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Solid Waste & Public Cleansing Management Act (Act 672)

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Malaysia Environment Week (Minggu Alam Sekitar Malaysia, MASM)

Malaysia Environment Week (MASM) is one of the premier events in the diary of the Department of Environment (DOE). The event was first mooted in 1991, as a follow up to the Langkawi Declaration on The Environment that was signed by the heads of government during the Commonwealth Heads of Government Meeting (CHOGM) in 1989. It is commemorated every year at the national and state level for a period of 1 week, usually from 21 to 27 October with the aim of instilling environmental awareness among Malaysians.



This year's MASM, the 19th edition, was held from 21 to 23 October 2010 at Precinct 4, Putrajaya with the theme "Environmental Conservation, Our Shared Responsibility". YB Dato Sri Douglas Uggah Embas, the Minister of Natural Resources and Environment and the guest of honour, officiated the launch of MASM 2010. Several activities were organised to further expose the public to knowledge on environmental-related matters.

Exhibition on Environment

Environmental exhibitions have been the mainstay of MASM. Various government and private sector institutions, non-government organisations (NGO), local authorities and industries are invited to participate. The aim is to make the MASM exhibition a one-stop centre for school children and the general public to enhance their knowledge on environmental matters. The exhibition also allows private institutions and NGOs to showcase their current programmes and expertise in the field of environmental management.

E-waste Management Awareness Campaign

One of the highlights of MASM 2010 was the electrical and electronic waste (E-waste) management awareness campaign that was held. This event saw the public disposing off their e-waste products such as mobile phones, chargers and batteries to relevant exhibitors such as Nokia, HP and Dell for subsequent recycling, treatment and disposal of the waste. Talks were also organised on the hazards of e-waste disposal into the landfill.

Choral Speaking and Musical Performance

School children were also involved and their participation came in the form of a choral speaking performance titled "The Ugly Truth" by 30 students from Sekolah Sultan Alam Shah, Putrajaya. Another batch of 14 students from SMK Bukit Jelutong, Selangor gave an entertaining musical performance using recycled materials as their props and gears.



Choral speaking performance by students of Sekolah Sultan Alam Shah, Putrajaya.



Musical performance by students of SMK Bukit Jelutong, Selangor.

Sustainable City (Bandar Lestari) – Environment Award 2009/2010

The Sustainable City–Environment Award 2009/2010, launched on 27 January 2005, is accorded to the Local Authority that has successfully incorporated environmental aspects in the planning, administration and implementation of its policies, programmes and activities. Assessment criteria are based on physical environment, ecological initiatives, environmental services, environmental governance, and education and awareness.

This event is organised in collaboration with the Ministry of Housing and Local Government with technical support from the Institute for Development and Environment (LESTARI) of Universiti Kebangsaan Malaysia. This year, of the 34 local authorities from three different categories that vied for the award, North Kuching City Hall in the Capital Cities Category and Subang Jaya Municipal Council in the Municipal/Town Councils Category won the 2009/2010 award. Meanwhile three other cities received the Special Mention Awards. They were Melaka Historic City Council, Petaling Jaya City Council, and Miri City Council to acknowledge their commendable efforts in



Exhibition on Environment

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Generation Y, Generation Green, Generation Why?

Let's begin with a trivia question... members of Generation Y (or Gen Y in short) are eco-warriors who champion environmental issues – True or False?

The initial answer to this question is true. Born between 1978 and 1994, Gen Y are also sometimes known as Generation Waking Up. This is because it was felt that Gen Y are raising the bar on global sustainability and change. Research has shown that Gen Y love companies that help good causes and that they expect some environmental ideals from the companies they spend their money on. This is probably the reason why we suddenly see an outburst of eco-friendly initiatives, be they genuine or otherwise.

Gen Y and Eco Image

However, there is more to the answer and companies as well as governmental departments advocating environmental issues should take note. The other name Gen Y goes by is Gen Why? This label is self-explanatory – Gen Y members question everything. This is to say, they do not take everything at face value as they are the most marketing savvy generation in history. Therefore, organisations who want to convince Gen Y of their eco deeds need to be transparent about what they do.



Kraft Foods understands this really well and executed a great campaign. Using the power of social media (which obviously is the media to go for when targeting Gen Y), Kraft invited consumers to help give away 20 million meals. Every time consumers 'like' Kraft Foods on Facebook, upload photos, watch YouTube videos, send tweets on Twitter, etc, they get coupons which equate to the donation of at least one meal. The best part about this campaign that appealed to Gen Y is Kraft Food's online maps that revealed state-by-state progress of the number of meals donated. Although Kraft's cause is not directly related to the environment, the ethics and practice by which they carried out the campaign is to be emulated. When a company says every RM1

of the sale of a product goes to saving the environment, Gen Y consumers want to know the total amount that the company donated, to whom the donation went to, and the evidence that the money was used for the cause.



In my article in the first issue of IMPAK, I asserted that the average consumer decides to buy a green product not because it is branded as green but because it satisfies his or her needs. Gen Y is no different. In fact, another label Gen Y is tagged with is Gen Now. This refers to their impatience with delayed gratification. This means that Gen Y not only cares about satisfying their needs but those needs must be fulfilled immediately. Recent research by Michigan State University (MSU) in collaboration with Deloitte LLP supports this and contends that any attempt to involve Gen Y in environmental matters must carry with it some economic benefit. Based on a scientific survey of 18 to 30-year-olds, researchers from MSU found that Gen Y consumers will not pay a premium price for an automobile simply because it is environmentally friendly. Instead, the determining factor is without a doubt, fuel efficiency (Michigan State University, 2010). On that note, Charles Hotel in Cambridge, Massachusetts, USA has been observed to have satisfied Gen Y's needs for economic advantage and mass customisation by linking their offerings to helping Mother Nature. The hotel has a free charging station for drivers of electric and hybrid vehicles, as well as free bicycle parking for those who tour on two wheels. Besides using energy efficient lighting, the hotel's parking lot utilises a detection system that measures the size of incoming vehicles and amends the parking rate accordingly. Environmentally friendly vehicles are assessed a lower rate as an incentive to the driver for using a vehicle that has a lesser consequence on the environment. The

hotel goes even further by having a tyre inflation station that lets visitors fill their tyres for best fuel efficiency and providing guests with free bicycles on loan, complete with handlebar-mounted basket, helmet, lock and a map to local bike trails.

This kind of integrated and full-service approach is highly likely to make an impression on Gen Y.

The Internet and Gen Y

Finally, needless to say that Gen Y is the Internet generation as few, if any, of its members know of life before cell phones and websites. To this end, any effort to involve Gen Y in championing environmental concerns must utilise modern mobile technology. Some initiatives outside Malaysia could be useful reference for starting our own. Montre Verte is a mobile device aimed at recruiting young French citizens to help monitor the air quality in Paris (see www.lamontreverte.org) while the Urban Forest Map is a collaboration between government, non profit organisations, businesses and the general public to map every tree in San Francisco (see www.urbanforestmap.org).

More recently, an iPhone application known as Creek Watch will soon enable Gen Y eco-warriors to help monitor the health of their local streams. Developed in collaboration with the California State Water Control Board, the Creek Watch application allows anyone who is passing by a stream to take a picture and report a few facts about what they see, including how much trash is evident, how much water is there and how fast it is flowing. Creek Watch will compile the cumulative data and share it with water control boards to help them monitor pollution, supervise water resources and design environmental programmes. A map on the Creek Watch site will show the data that is already being contributed.

These international examples illustrate that any effort to rope Gen Y members in to be responsible

for Mother Earth must first connect and appeal to them. This is simply because the products and causes Gen Y support are important forms of self-expression that communicate to peers exactly how they define themselves as well as how they want others to view them. It is this appeal that will drive Gen Y's customer loyalty. It is this appeal that will motivate them to want to share and participate in environmental agendas.



Gen Y and Environmental Matters

In Malaysia itself, it is estimated that Gen Y form more than 40% of the population. In any country around the world, Gen Y is a significant segment of the population. Needless, to say, marketers have been (and still are) paying attention to them – so should everyone who is interested in getting Gen Y members involved in championing eco and

environmental matters. Generation Y is a generation that is already starting to change the dynamics of the way people do things in Malaysia and everywhere else in the world. More specifically, they will change the way people are recruited for voluntary work, and they will change the methods and strategies businesses, non-profit organisations and government sectors use to convince Gen Y consumers of their eco deeds.

Reference

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river management, services for people with special needs and recycling programme respectively.



Sustainable City – Environment Award 2009/2010

Environmental Hero Award

The Environmental Hero Award was first launched by the DOE in collaboration with the Ministry of Education Malaysia and Malaysian Nature Society on 5 June 1998 in conjunction with the World Environment Day. The programme is designed to enhance existing environmental education in schools with the knowledge conveyed to the students through school and community based activities.

To emerge as a Environmental Hero, a student is required to complete three levels

of activities, ranging from participating in awareness, attitude and individual actions programmes to community involvement, resource consumption, and research programmes. This year, 18 students from SMK Bukit Jelutong, Selangor and SMK Bukit Indah, Selangor successfully passed Level 3, and were rewarded with the Environmental Hero Award.



Environmental Hero Award Winners

Conclusion

DOE will continue to promote environmental education and awareness to all levels of society ranging from schoolchildren, university students, homemakers, workers and communities. To achieve this objective, DOE welcomes opinions, input, support and active participation from the private sector and NGOs in all its events.

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The Volcano: 'Vulcan God of Fire'

What is a Volcano?

The word 'volcano' originates from Vulcan, the god of fire in Roman mythology. A volcano is an opening in the earth's crust, where volcanic ash, gases, and hot magma can escape from below to the surface. Generally, volcanoes are found where tectonic plates converge or diverge. The Pacific Ring of Fire has examples of volcanoes caused by convergent tectonic plates coming together; whereas, the Mid-Atlantic Ridge has examples of volcanoes caused by diverging tectonic plates pulling apart. Volcanoes usually are not created where two tectonic plates slide past one another but they can also form where there is stretching and thinning in the Earth's crust.



Figure 1: World map of major volcanoes (www.mapsofworld.com)

Classification of Volcanoes

The popular general classification of volcanoes is active, extinct, and dormant. A volcano that erupts regularly is called an active volcano. Those that have not erupted for a long period of time (historical times) are called extinct and those that have erupted in historical times but are now quiet are called dormant. These popular classifications - extinct in particular - are however practically meaningless to scientists because some volcanoes, thought to be extinct, have suddenly erupted!



Four-peaked volcano in Alaska belching smoke in September 2007. This volcano was thought to be extinct for it had not erupted for well over 10,000 years.¹

Process of a Volcanic Eruption

Deep within the Earth, it is extremely hot. This causes some rocks to slowly melt and become a thick flowing substance called magma. Magma is lighter than the solid rock around it causing it to rise and collect as magma chambers. Eventually some of the magma pushes through fissures (vents) in the Earth's surface. When a volcano erupts, the erupting magma is called lava. Volcanic eruptions can be classified as explosive or not explosive. Also, how explosive an eruption is depends on how sticky or runny the magma is. If the magma is runny and thin, gases can escape easily from it. When this type of magma erupts, it flows out of the volcano. The moving lava is generally slow enough for people to get out of harm's way, so it rarely kills people. However, the flow can cause considerable destruction along its path. If the magma is sticky and thick, gases cannot escape easily. This causes pressure to build up until the gases escape violently and explode. In this type of eruption, the magma breaks apart into pieces and blasts into the air. The blasting material can range in size from house-size boulders to tiny particles of ash. Explosive volcanic eruptions can be deadly and dangerous. They can blast out clouds of hot materials from the top or side of a volcano,

which then race down its sides destroying almost everything in their path. Ash erupted into the sky falls back to the Earth. If the blanket of ash is thick enough, it can suffocate humans, animals and plants. Hot volcanic materials when mixed with water from melted snow, ice as well as streams, can form mudflows, which in turn can bury entire communities located near the erupting volcano.

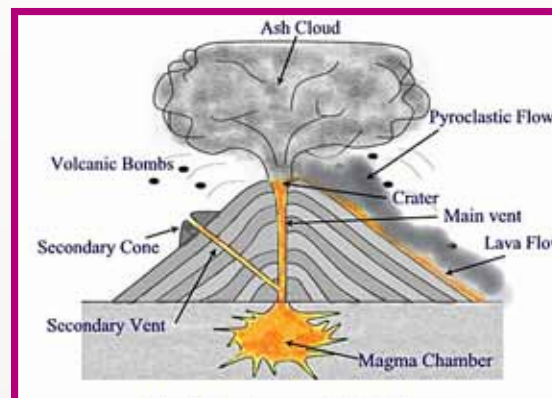


Figure 2: How a volcanic eruption takes place. Source: catastrophemonitor.com

How Dangerous is a Volcanic Eruption

A volcanic eruption is among the Earth's most powerful and destructive forces.



Fire, dust, gas and smoke from Mt. Merapi in Indonesia October 2010. *News and photo courtesy: National Geographic and theboldcorsicanflame.wordpress.com*

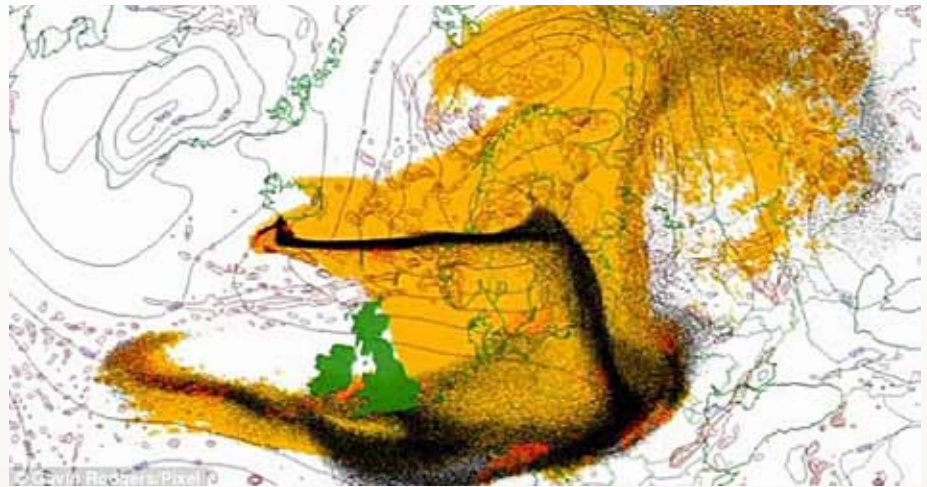
Living up to its name, Mount Merapi - 'the fire mountain' in Javanese - erupted in October 2010, killing 320 people and in 1930, it killed 1300 people through a violent eruption. On Merapi's home island of Java, there are more than 30 volcanoes looming over 120 million people, causing more than 140,000 deaths in the last 500 years. Not too far away, on Sumbawa, another of Indonesia's 17,500 islands, is Mount Tambora which alone killed 92,000 people in 1815. In nearby Philippines, there are 37 volcanoes, 18 of which are still active.



Volcanic ash and a cascading line of glowing lava wind its way down Mount Mayon, Philippines in December 2009, forcing thousands of residents to be evacuated. *News and photo courtesy: National Geographic and the Christian Science Monitor.*

In April 2010, the eruption of an Iceland volcano (Eyjafjallajökull at Eyjafjöll), although relatively small for volcanic eruptions, spread ash cloud across the skies of Western and Northern Europe, grounding hundreds of flights and stranding thousand of commuters for several weeks. Samples of volcanic ash collected near the eruption showed a high silica and water-soluble fluoride concentration.² Farmers near the volcano were warned not to let their livestock drink from contaminated streams and water sources as high fluoride concentration could have deadly effects, particularly in sheep.²

Volcanic ash is a major hazard to aircraft. Smoke and ash from eruptions reduce visibility for visual navigation. Microscopic debris in the ash can sandblast windscreens and melt in the heat of aircraft turbine engines, damaging engines and making them shut down.³

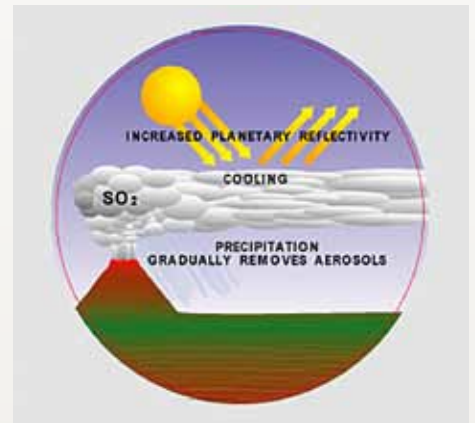


Norwegian Met Office sequence showing the spread of the volcanic ash over UK and Northern Europe from Mt. Eyjafjallajökull. *Source: Norwegian Meteorological Office*



Ash cloud belching from Mt. Eyjafjallajökull. *Source: Christian Science Monitor*

Global climate also might be influenced by big volcanic eruptions. They have the effect of lowering temperatures, reducing the amount of solar radiation reaching the Earth's surface, and changing atmospheric circulation patterns. The extent to which this occurs, however, is an ongoing debate.⁴



Impact of a big volcanic eruption on global climate⁵

Is a Volcano All that Bad?

Despite the destructive nature of a volcano, it can also be beneficial to man. Living near an active volcano can offer the following benefits:

- Tourism - More tourists mean more tourism jobs will be available. This will bring more money into the local economy through tourist guides, hotels, restaurants, transportation, etc.
- More people will come to see the beautiful landscape created by the pyroclastic (molten rocks) and mudflows, which harden over time and make a gorgeous landscape for sightseeing. Volcanoes are important land-forming natural devices.
- Though the ash from a volcano shadows the crops and villages and destroys them, volcanic ash provides nutrients for soil. This is good for agriculture.

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Event Highlights

Department of Environment, Malaysia

October 2010

Eco Hunt on Bicycle and AI-Kuliah Programme

With the aim of promoting environmental education and awareness to every level of society, the Department of Environment, in collaboration with Putrajaya Corporation, organised the 'Eco Hunt on Bicycle' on 23 October 2010 at Precinct 3, Putrajaya. Held in conjunction with the Malaysia Environment Week 2010, the Eco Hunt was flagged off by Y.Bhg. Dato' Hajah Rosnani Ibarahim, Director General of the Department of Environment.

The event was divided into two categories:

1 Fun Ride: Open to Individuals. Participants rode for a distance of approximately 20 km, starting at Wisma Sumber Asli and heading to Taman Putra Perdana and back to Wisma Sumber Asli.

2 Eco Hunt: Open to Families. This cycling competition came with additional environmental quizzes. The track distance was approximately 5 km, starting at Wisma Sumber Asli and heading to Dataran Putra and back to Wisma Sumber Asli.

About 160 cyclists from various cycling associations took part in the Fun Ride category and 12 families participated in the Eco Hunt category. Generally, there was good response from the general public because the event allowed them to enjoy the scenic sights of Putrajaya while cycling.

Besides the Eco Hunt, an environmental talk with the theme, *Kasihanihah Bumi Kita* was aired on the AI-Kuliah programme in TV3 on 28 October 2010. The talk was aimed at protecting and conserving the environment among the public.



November 2010

The 9th Malaysia - Singapore Joint Committee on the Environment (MSJCE) Working Group Meeting

The 9th Malaysia - Singapore Joint Committee on the Environment (MSJCE) Working Group Meeting (WG of MSJCE) was held in Singapore on 22 - 23 November 2010. The Meeting was co-chaired by Y. Bhg. Dato' Hajah Rosnani Ibarahim, Director General of the Department of Environment, Malaysia and Mr Andrew Tan, Chief Executive Officer, National Environment Agency, Singapore.

The Malaysian delegates to this meeting were senior officers of the Department of Environment and representatives from the High Commission of Malaysia, Singapore and Economic Planning Unit (Johor State). Several environmental issues between both countries such as the vehicular emissions control, water quality in the Straits of Johor, chemical and oil spills along the Straits of Johor, and inter-country environmental-related training programmes were discussed at the meeting.



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