



IMPAK



Issue 1 / 2016

COP21: Paris Agreement

COP21: The 2015 Paris Climate Change Conference

The Paris Agreement adopted at COP21, also known as the 2015 Paris Climate Change Conference, in December 2015 reflects the collective vision of 195 countries. The signatory governments recognise that climate change causes irreparable environmental damage to communities, particularly the poorest and most vulnerable. The agreement sets out mitigation measures and action plans to reduce the impacts of climate change and keep global warming below 2°C. COP21 will come into force in 2020.



While the agreement lays out essential goals, the ability of the signatory parties to achieve these targets depends largely on the rules, guidelines and processes adopted to implement the agreement. The governments agree to track progress towards the long-term goals of the agreement through a robust transparent and accountable system which will be hammered out in months and years to come. They also agree to meet every five years to revise targets and report to each other and the public on how well they implement and achieve their targets. There are several key areas for the signatory parties to focus on including developing guidelines for the stocktake of countries' emissions, ensuring and improving transparency, accountability, and environmental integrity, and tracking and reporting public climate finance.

Why the Concern about Climate Change and Global Warming?

The UN Framework on Climate Change (UNFCCC), which now has a membership of 195 nations, was adopted at the Rio Earth Summit in 1992. The framework called for action aimed at reducing atmospheric concentrations of greenhouse gases to avoid the impacts of climate change and global warming. The Paris Agreement represents a transformational shift in political will of member nations in over 20 years of UN negotiations in fighting against climate change. Climate change has been a politically contentious issue over the last two decades. However,

the scientific evidence on human-caused global warming is clear. The Intergovernmental Panel on Climate Change (IPCC) reports that humans have caused most, and probably all of the rapid global warming over the past 60 years (IPCC, 2013). More than 90% of climate experts and peer-reviewed climate science studies agree with IPCC's assessment.

Over the past century, the average surface temperature has increased by more than half a degree Celsius (see Figure 1). Scientists around the world predict that average global temperatures are expected to rise by 1.4°C to 6.4°C over the next century (Riebeek, 2010). The atmospheric concentration of CO₂ also rose from just under 340 parts per million (ppm) in 1980 to 400ppm in 2014. A rise in the average temperature affects the climate in regions around the world in different ways. For instance, as a result of the changes in the Arctic sea ice, native communities in the Arctic region are facing challenges to their traditional ways of life while new opportunities are likely to open for shipping and natural resource extraction (Meier *et al.*, 2014). Many small island nations are also among the most vulnerable to climate change and sea-level rise. Since many of their important infrastructure and economic activities tend to be located along the coastline, the sea-level rise poses serious threats to their livelihood and well-being (Gerrard & Wannier, 2013).

In addition to deforestation and habitat destruction activities, climate change has also been cited as a major cause of the loss

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HALA TUJU JAS



Assalamualaikum wbt.
Kepada warga JAS di seluruh Negara.

Hari ini dan hari-hari mendatang, JAS akan menghadapi cabaran-cabaran yang lebih getir. Cabaran yang paling utama adalah dari segi harapan rakyat (*public expectation*) dalam penyelesaian isu alam sekitar yang semakin kompleks.

Bagi sama-sama mengharungi cabaran ini, marilah bersama-sama saya bergerak sebagai sebuah pasukan, saling bantu membantu secara muafakat dalam memenuhi agenda kerajaan

'Rakyat Didahulukan dan Pencapaian Diutamakan.'

Di sini saya menggariskan perkara-perkara seperti berikut untuk dihayati, difahami seterusnya dipraktikkan dalam amalan kerja seharian.

HALA TUJU

Sikap, pengetahuan dan kemahiran akan memastikan pematuhan undang-undang yang berterusan. *Attitude, knowledge, and skills (ASK) ensure regulatory compliance on a sustained basis*

PELAN STRATEGIK JAS

Matlamat kita

Peraturan sendiri

Pendekatan kita

- Memudahcara ke arah pematuhan
- Menyelami harapan pihak-pihak yang berkepentingan
- Konsisten
- Jalanan baik

Alat strategik kita

Mengarusperdana alam sekitar

Slogan kita

Mencapai peraturan sendiri dengan memudahcara ke arah pematuhan melalui mengarusperdana alam sekitar

PENJELASAN MENGENAI PERATURAN KENDIRI (SELF-REGULATION)

Apa itu Self Regulation?

Walaupun terdapat pelbagai pemahaman mengenai *self-regulation* atau Peraturan Kendiri, ia bermaksud punca-punca pencemaran terutamanya sektor industri akan bertanggungjawab sepenuhnya mengawal pencemaran yang dihasilkan dan memonitor pematuhan. Jadi bagi maksud mengarusperdana pengurusan alam sekitar maka halatuju Jabatan dalam pemantauan dan penguatkuasaan Akta Kualiti Alam Sekeliling, 1974 adalah berobjektifkan *Guided Self Regulation (GSR)*.

JAS mengimplementasi versi *self-regulation* yang dinamakan *Guided Self-Regulation (GSR)*. GSR bermaksud komuniti yang dikawal [*regulated communities (RC)*] dibimbing ke arah mencapai pematuhan undang-undang sepenuhnya. Bukan setakat pematuhan undang-undang, GSR boleh mendorong *regulated communities* mengambil inisiatif yang lebih dalam pengurusan alam sekitar di sektor masing-masing.

JAS berhasrat mencapai objektif-objektif berikut di kalangan *regulated communities* melalui amalan GSR:

- Menanam sifat pemunyaan (*sense of ownership*)
- Menanam rasa kebertanggungjawaban di pelbagai peringkat
- Pematuhan sepenuhnya oleh semua punca pada setiap masa
- Mengurangkan penguatkuasaan melalui pemeriksaan yang menghasilkan maklumat yang bersifat *snapshot*
- Mengurangkan kos penguatkuasaan yang ditanggung Kerajaan
- Meningkatkan pematuhan undang-undang

Amalan GSR di pelbagai sektor termasuk industri perkilangan, pengangkutan, pertanian, dan lain-lain dalam jangkamasa panjang akan menghasilkan kecemerlangan dalam pengurusan alam sekitar dan pematuhan undang-undang di pelbagai sektor di Malaysia. Pelbagai sektor akan berbangga dengan pencapaian alam sekitar masing-masing (*pride of environmental excellence*). *Self-regulation* adalah matlamat terakhir (*goal*) yang ingin dicapai.

Bagi merealisasikan matlamat pelaksanaan GSR maka elemen-elemen pengukuran yang perlu digunapakai sebagai *Environmental Mainstreaming Tools (EMI)* oleh *stakeholders* atau komuniti adalah merangkumi:

- ✓ Polisi Alam Sekitar
- ✓ Orang Berwibawa (competent person) atau Pegawai Berkelayakan
- ✓ Jawatankuasa Pengurusan Alam Sekitar dan membuat ketetapan
- ✓ Kemudahan Peralatan Pencapaian Prestasi
- ✓ Penyimpan rekod
- ✓ Analisa data dan interpretasi
- ✓ Pelaporan dan Komunikasi
- ✓ Penambahbaikan (Future Improvement)

Bagaimana Komuniti yang Dikawal Dapat Mengamal Sepenuhnya *Self-regulation* ?

Salah satu alat ampuh untuk mencapai *self-regulation status* ialah mengarusperdana alam sekitar [*environmental mainstreaming (EM)*]. EM bermaksud kepentingan alam sekitar diserap, diterap, dan diintegrasikan dalam semua peringkat pengurusan dan implementasi sesuatu projek, program, atau aktiviti perkilangan. Apabila ini berlaku, aspek alam sekitar tidak akan diketepikan lagi, malah akan diambil kira di dalam setiap keputusan dan tindakan yang akan diambil di dalam sesebuah organisasi, premis atau projek. Di dalam organisasi tersebut, bukan saja aspek alam sekitar diberi keutamaan peringkat polisi, malah ianya akan diterjemahkan di dalam peringkat pengurusan dan amalan seharian. *Environmental mainstreaming* adalah alat strategik untuk menuju ke arah dan mencapai keadaan komuniti yang mengawal sendiri tindak-tanduk mereka (*self-regulation*).

Memudah Cara dan Membimbing Ke arah Pematuhan Undang-undang

Peringkat pertama sebelum *environmental mainstreaming* dapat difahami, dihayati dan dilaksanakan, maka *regulated communities (RC)* mestilah mengambil inisiatif dan tindakan serta merta yang berkesan untuk mematuhi undang-undang. Untuk tujuan ini, JAS akan membimbing RC supaya dapat mencapai pematuhan dengan segera dan pada setiap masa. Bimbingan ini adalah dalam pelbagai bentuk seperti kursus persijilan untuk melahirkan tenaga kerja yang berkompeten dalam bidang pengoperasian alat kawalan pencemaran (*pollution control equipment*) dan pengurusan bahan buangan. Pelbagai dokumen panduan industri terus disediakan. Melalui kursus persijilan juga, RC akan diberi pemahaman yang jelas mengenai undang-undang yang perlu dipatuhi. Tenaga mahir dalam bidang alam sekitar yang diiktiraf oleh Kerajaan akan memberi khidmat yang baik kepada RC dan menjamin pematuhan undang-undang pada setiap masa.

Self-regulation Memupuk Integriti

Amalan *self-regulation* memerlukan seseorang memahami tanggungjawab terhadap alam sekitar, negara dan generasi akan datang. Rasa prihatin kepada alam sekitar dan tanggungjawab yang tinggi mendorongnya melakukan yang terbaik. Jauh sekali terlintas di hatinya untuk melakukan sesuatu yang salah di sisi undang-undang yang boleh juga menghasilkan pencemaran. *Self-regulation* tidak dapat dicapai tanpa integriti. Integriti perlu besar-besaran bukan saja di hati seorang pengarah industri tetapi juga di hati pegawai JAS yang memberi bimbingan kepada industri. Akhir kata, GSR adalah peralatan yang akan komplimen kepada prinsip *Command and Control (CAC)*.

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KERJAYA

16.6.1983 - 15.1.1993

16.1.1993 - 31.12.1994

1.1.1995 - 14.4.2005

15.4.2005 - 30.10.2009

1.11.2009 - 10.5.2012

11.5.2012 - 27.12.2015

28.12.2015 - Sekarang

JAWATAN

Pegawai Kawalan Alam Sekitar di Ibu Pejabat Jabatan Alam Sekitar

Timbalan Pengarah Jabatan Alam Sekitar Negeri Sarawak

Pengarah Jabatan Alam Sekitar Negeri Melaka

Pengarah Jabatan Alam Sekitar Negeri P. Pinang

Pengarah, Jabatan Alam Sekitar Negeri Pahang

Timbalan Ketua Pengarah (Pembangunan)

Ketua Pengarah, Alam Sekitar

KURNIAAN

Bintang Cemerlang Melaka (B.C.M), 1997

Bintang Cemerlang Negeri(B.C.N.), Pulau Pinang, 2009

Darjah Indera Mahkota Pahang (D.I.M.P). Pahang, 2011

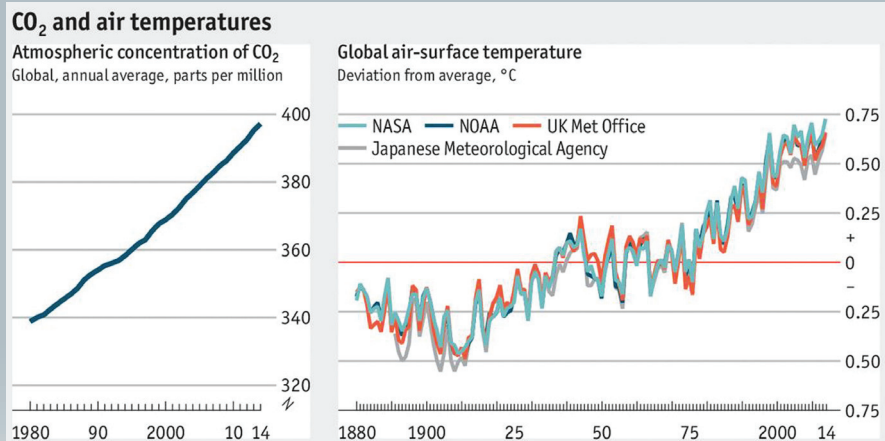


Figure 1. Atmospheric concentration of CO₂ (1980-2014) and global air-surface temperature (1880-2014)
 Source: Economist.com (<http://www.economist.com/node/21678634>)

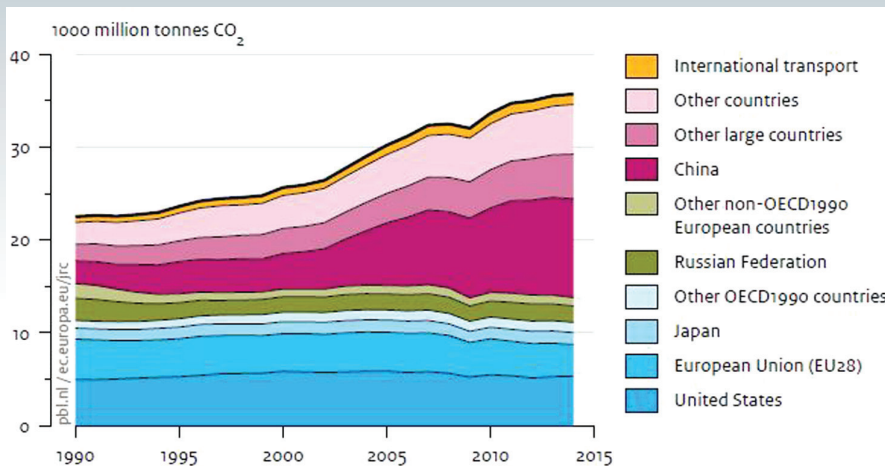


Figure 2. Global CO₂ emissions per region from fossil-fuel use and cement production
 Source: EDGAR 4.3 (JRC/PBL, 2015) (1970-2012; notably IEA 2014 and NBS 2015); EDGAR 4.3FT2014 (2013-2014); BP 2015; GGFR 2015; USGS 2015; WSA 2015)

of biodiversity. The ability of species to respond to climate change depends largely on their ability to adapt to new environmental conditions through migrating to a new territory or modifying their physiology and seasonal behaviours (Thuiller, 2007). Biodiversity has a significant impact on most ecosystem functions. The roles that individual species and the ecosystems they are part of, play in providing organic food, clean air and fresh water, and naturally regulate infectious diseases are critical to our health and survival. Thus, reduced biodiversity lowers the quality of resources to human beings and destabilises the physical and biotic environment of affected species (Chapin *et al.*, 2000).

According to the study by the PBL Netherlands Environmental Assessment Agency, research group Ecofys and the European Commission's Joint Research Centre, developing nations accounted for about 48% of cumulative emissions from 1850 to 2010 and the emission trends are rising fast and it is predicted that their share of emissions is likely to reach more than 50% by 2020. The largest decreases occurred in European countries whereas some emerging economies such as China, India, Indonesia, and Thailand recorded substantial increases in their total emissions. The increase in the emissions has been due to high economic growth rates in these emerging economies led by both China and India. Although the increase in coal consumption essentially stalled in China in 2014 due to its economic slowdown, the consumption of oil products and natural gas continues to increase by 3.3% and 8.6%, respectively. As shown in

Figure 2, China appears to be the largest emitter of CO₂ associated with fossil-fuel combustion and cement production.

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A SEQUEL TO COP 21- Signing Ceremony on 22 April 2016

The Paris Agreement was adopted by all 196 Parties to the United Nations Framework Convention on Climate Change (UNFCCC) at COP21 in Paris in December 2015. The Agreement sets out a global action plan to keep global temperature rise this century well below 2°C and to drive efforts to limit the increase even further to 1.5°C above pre-industrial levels. To keep the global spotlight focused on the climate change threats and build strong political commitment from all parties, the United Nations held a signing ceremony on 22 April 2016, which coincided with 2016 International Earth Day, at the United Nations Headquarters, New York. A record 175 countries, including Malaysia, signed the Paris Agreement, the largest number of countries ever, to sign a multilateral agreement on the day on which it opened for signing. The overwhelming support indicates a strong commitment by almost every country to collectively address the adverse effects of climate change sooner rather than later.

What does signing the agreement mean? Signing shows a country's intent to formally join the agreement while they work their domestic process. The countries will adopt the agreement within their own legal systems, through ratification, acceptance, approval or accession. Once a country joins the agreement, the country is legally a "party" to the agreement. For an international agreement such as the Paris Agreement to "enter into force", 55 countries representing 55% of the world's emissions must formally join the agreement. On 22 April 2016, countries accounting for 50% of the world's emissions have now either formally joined or signified that they will take that step in 2016. Nations which were not at the ceremony will have one year to sign the accord; then they will be given extra time to get the agreement ratified and approved by their governments. The United States and China, which together account for nearly 40% of global emissions, both signed the agreement and indicated that they intend to formally join the agreement in 2016. Fifteen countries have formally joined the agreement on 22 April 2016. The deadline for countries to sign the Paris Agreement is April 21, 2017. By 2018 countries will report on how they plan to cut emissions. Countries will reconvene every five years, starting in 2020, with updated plans that would tighten their emissions cuts.

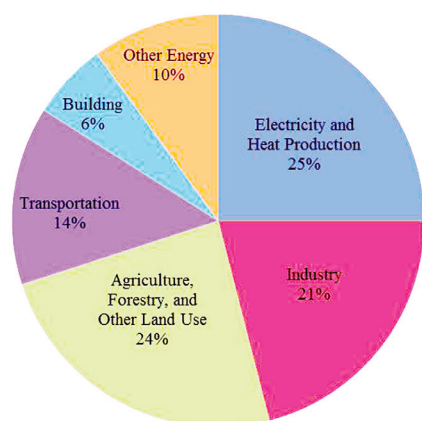
While the Paris Agreement offers resounding triumph for multilateralism, there are many challenges attached to its implementation. The promises must now be translated into real-world actions. One of the challenges is financing climate change mitigation and adaptation. There is no clear consensus on how much mitigation and adaptation efforts will cost and how they will be paid. A number of non-governmental organisations have called for developing countries to stall on signing the agreement in their efforts to pressure richer nations to provide funds to help their transition to clean energy and to deal with the consequences of global warming which already have become apparent globally.

Another immediate concern is political campaign rhetoric in the United States that calls for scaling back environmental and energy regulations and continued development of fossil fuels. The United States is expected to try to ratify the agreement before President Obama leaves office in January. Among the issues still to be determined is what happens to countries who fail to honour their climate change commitments to cut emissions and forms of penalties applied. It remains to be seen whether signatory countries are able to collectively address all these unresolved issues amicably.

COP21: Making a Difference Through Renewable Energy



Global greenhouse gas emissions can be broken down by the economic activities that lead to their production. According to IPCC (2014), the energy sector – burning of coal, natural gas, and oil – for electricity and heat is the largest single source of global GHG emissions, followed by emissions from agricultural and deforestation activities. Industrial activities involving primarily fossil-fuel combustion also contribute about 20% of total emissions while the transportation sector accounts for 14% of GHG emissions (see Figure 1).



(Source: IPCC (2014), based on global emissions from 2010)
Figure 1. Global greenhouse gas emissions by economic sector

Energy-related emissions are expected to increase by 78% by 2050 from 2005 levels if mitigation actions are not taken as non-renewable energy sources such as coal and natural gas are often utilised to meet demand for energy (OECD, 2016). The share of transport in global emissions is also expected to grow significantly as the demand for private and business vehicles is expected to increase, particularly in developing countries. Recognising how non-renewable energy sources negatively impact our health and environment, the Paris Agreement sends a strong signal to signatory countries that they should take actions to gradually decarbonise their energy sector. One of the key pillars recommended in the climate change mitigation strategies in the Paris Agreement is decarbonisation of the energy sector through renewable energy deployment.

International Energy Agency (IEA) defines renewable energy as “energy derived from natural processes such as sunlight and wind that are replenished at a faster rate than they are consumed”. Solar, wind, geothermal, hydro and some forms of biomass are common sources of renewable energy. Over the past decade, global renewable energy production and consumption have substantially increased and supporting policies have spread to more countries in

all regions of the world (see Table 1). Global perceptions of renewable energy have also shifted considerably. Policy makers and consumers have widely acknowledged the potential benefits of renewable energy as evidenced by continuing technology advances and rapid deployment of many renewable energy technologies. However, large-scale deployment has yet to be demonstrated in many regions of the world partly due to high capital

costs and lack of technological expertise. Energy security and climate change are the two main drivers of the expansion of renewable energy in developed economies. In recent years, renewable energy sources and technologies are not only viewed as measures for improving energy security and mitigating and adapting to climate change, but also increasingly recognised as having positive impacts on economic activities and employment.

Table 1. A decade of evolving global renewable energy indicators (2004-2014)

		2004 ¹	2013	2014
INVESTMENT				
New investment (annual) in renewable power and fuels ²	billion USD	45	232	270
POWER				
Renewable power capacity (total, not including hydro)	GW	85	560	657
Renewable power (total, including hydro)	GW	800	1578	1,712
Hydropower capacity (total) ³	GW	715	1,018	1,055
Bio-power capacity	GW	<36	88	93
Bio-power generation	TWh	227	396	433
Geothermal power capacity	GW	8.9	12.1	12.8
Solar PV capacity (total)	GW	2.6	138	177
Concentrating solar thermal power (total)	GW	0.4	3.4	4.4
Wind power capacity (total)	GW	48	319	370
HEAT				
Solar hot water capacity (total) ⁴	GW _{th}	86	373	406
TRANSPORT				
Ethanol production (annual)	billion litres	28.5	87.8	94
Biodiesel production (annual)	billion litres	2.4	26.3	29.7
POLICIES				
Countries with policy targets	#	48	144	164
States/provinces/countries with feed-in policies	#	34	106	108
States/provinces/countries with RPS/quota policies	#	11	99	98
Countries with tendering/public competitive bidding ⁵	#	n/a	55	60
Countries with heat obligation/mandate	#	n/a	19	21
States/provinces/countries with biofuels mandates ⁶	#	10	63	64

Notes

- ¹ Capacity data are as of the beginning of 2004; other data, such as investment and biofuels production, cover the full year. Numbers are estimates, based on best available information.
- ² Investment data are from Bloomberg New Energy Finance and include all biomass, geothermal, and wind generation projects of more than 1MW; all hydro projects of between 1 and 50 MW; all solar power projects, with those less than 1 MW estimated separately and referred to as small-scale projects or small distributed capacity; all ocean energy projects; and all biofuel projects with an annual production capacity of 1 million litres or more.
- ³ The GSR 2014 reported a global total of 1,000 GW of hydro capacity at the end of 2013; this figure has been revised upwards. Hydropower data do not include pumped storage capacity.
- ⁴ Solar hot water capacity data include water collectors only. The number for 2014 is a preliminary estimate.
- ⁵ Data for tendering/public competitive bidding reflect the number of countries that had held tenders at any time up to the year in question, but not necessarily during that year.
- ⁶ Biofuel policies include policies listed under both the biofuels obligation/mandate in respective countries. *Note:* All values are rounded to whole numbers except for numbers <15, and biofuels, which are rounded to one decimal point. Policy data for 2014 include all countries identified as of early 2015.

Renewable energy has contributed to emission reductions, particularly in the energy sector. For instance in 2012, the equivalent of 720 Mt CO₂ emission was avoided in EU-28 countries due to the final renewable energy consumption in electricity, heating/cooling and transport sectors, which represents about 40% in total greenhouse gas emission savings (Banja *et al.*, 2015). Parties to the Paris Agreement need to accelerate renewable energy deployment in order to limit the global temperature rise. IRENA's Roadmap for a Renewable Energy Future predicts that doubling the share of renewable sources in total energy consumption from 18% in 2010 to 36% by 2030 coupled with significant improvements in energy efficiency is needed to achieve the limit of rise in average global temperature (IRENA, 2016).

Utilisation of renewable energy has increased rapidly in recent years. In 2014, global electricity generation capacity from renewables increased by 8% (2014: 1,828,722 MW) compared with 2013 (1,695,574 MW). Countries in the Asian region appear to record the highest percentage increase of capacity installed and connected using renewable energy sources (see Table 2). The growth in installations and connections indicates that renewable energy deployment does not only contribute towards greater energy security but also helps in mitigating and adapting to climate change. Transition to a sustainable energy future has also increasingly been technically feasible and economically viable in recent years. Declining costs of renewable energy technologies, particularly solar and wind power, have contributed considerably to the growing competitiveness of renewables *vis-à-vis* fossil fuels. To further promote global growth, greater investments are

needed in countries that are committed to transforming their energy systems. Moreover, effective action against climate change requires scaling up investments in renewable energy worldwide.

For sustainable energy future and climate change mitigation, a number of steps should be taken sooner rather than later:

- 1 Governments around the world need to put in place enabling policies and regulatory frameworks that help reduce barriers to the successful deployment of renewable energy in their respective countries.
- 2 Government funding remains an important catalyst for initial investments in renewable technologies and projects. Risk mitigation instruments and structured finance products are also needed to mobilise private investments in scale-up renewable energy projects.
- 3 Capacity-building efforts should be undertaken to support renewable energy deployment, particularly in developing countries where both institutional and technical capabilities are still evolving. International technology collaboration by sharing information on costs, technologies and R&D findings may help accelerate and facilitate capacity-building efforts and enhance regional engagement and international cooperation among countries on renewable energy deployment.

4 Environmentally sustainable energy systems have a multiplier effect on a wide range of other sustainable development goals such as improved livelihoods and healthcare, job creation and greater access to water and food.

Conclusion

The Paris Agreement 2015 has given a major impetus for the signatory nations to collectively combat climate change and its effects by agreeing to take climate change mitigation actions towards reducing greenhouse gas emissions. Increasing the development and deployment of renewable energy technologies would allow these countries to replace carbon-intensive energy sources and significantly reduce global warming emissions in years to come. Scientific studies have shown that renewables are a viable, affordable and scalable solution to climate change concerns. Renewable energy deployment does not only meet climate goals but also supports economic growth, provides basic needs for vulnerable communities, creates value and generates employment.

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Table 2. Total renewable energy sources for electricity generation (in MW)

	2000	2006	2007	2008	2009	2010	2011	2012	2013	2014
World	842,594	1,036,837	1,094,458	1,164,173	1,250,215	1,347,755	1,456,265	1,569,791	1,695,574	1,828,722
Africa	23,119	25,094	25,530	26,124	28,209	29,179	29,509	30,665	31,668	34,276
Asia	209,432	292,592	321,394	359,493	407,081	456,113	507,780	555,630	631,188	706,812
Central America & Caribbean	5,543	6,549	6,880	7,011	7,250	7,593	8,437	9,139	9,495	10,100
Eurasia	58,673	63,928	65,075	65,866	67,181	69,244	71,164	75,810	80,896	84,546
Europe	216,996	272,859	285,518	302,358	322,581	352,649	389,606	423,986	450,550	471,989
Middle East	4,107	10,677	11,591	12,100	12,183	13,025	13,445	14,576	15,408	16,201
North America	194,170	212,980	221,583	231,702	244,909	253,026	264,067	281,667	292,185	309,281
Oceania	15,930	16,869	17,579	17,894	18,449	19,129	20,508	22,032	22,915	24,500
South America	114,624	135,290	139,308	141,628	142,373	147,797	151,749	156,287	161,270	171,018

Source: International Renewable Energy Agency (IRENA). Renewable energy capacity statistics 2015.



The Paris Agreement is lauded as a success that will steer a new global solution to fight climate change. But is it so? The first item that we need to check in the Paris Agreement is whether there are any binding terms to reduce green house gas emission (GHG) globally to specific high emission countries. It turns out that solutions are not offered. We can therefore only summarise this agreement into something that says, "We are all trying our level best to mitigate the current situation after we sort out a few things."

Economy size, population size, type and mixture of economic activities as well as technology know-how are a few key points that can be used to suggest a solution formula for a nation. Key national economic areas should be part of the 'solution formula'. Obviously, the solutions that will be derived will come with no investment, low investment or high investment financial risks. It is in this area of financial risk that the Paris Agreement should play an important role. Simple sectoral based solutions are vital to achieve collective impact.

The Electricity Sector

Let us look at some simple decisions that can be adopted as part of the solution to reduce GHG emissions from the electricity sector via regulating the appliances:

1 Reducing the gap between equipment that are with and without energy efficiency labelling and Minimum Energy Performance Standard (MEPS) within a region. This is vital to prevent inefficient products being dumped into countries that have not implemented their MEPS and labelling.

2 There should be a Global Minimum Energy Performance Standard (gMEPS) developed as a basic benchmark. Each country can adopt this basic benchmark and can implement stricter MEPS for the country. MEPS is the most effective way of removing inefficient energy consuming products from the market and can be implemented for a wide range of products in a short period of time.

3 Very few countries have specific programs for stand-by electricity consumption. In the Information Technology (IT) and computerised world; stand-by electricity consumption is surging. Therefore, more focus should also be given for this group of products and their development.

4 Indicators for energy efficiency measurement should also be made uniform internationally. This is to ensure all countries can participate and actively compete to achieve better environmental performance. Different indicators will not give harmony in reporting and will confuse the public and businesses in practising energy efficiency as well as in interpreting data.

5 The developing economies must focus on optimising energy utilisation to prevent increasing energy use in tandem with GDP growth. Optimisation via energy efficiency can assist developing economies to achieve higher GDP with minimum increase in energy use. Such a move must be part of the development process.

Financing the 'Protect, Reduce, Prevent, Mitigate and Adapt'

There is a need to understand that financing protection of the environment may be costlier than what we think. For example, the rush to develop Renewable Energy (RE) resulted in the introduction of a new mechanism called Feed-in-Tariff (FIT) in Malaysia. FIT is like a drug given to increase RE electricity generation mix locally. Due to lower electricity generation cost from non-RE (fossil fuel), the ability to reach grid-parity causes RE generation to be slow in our country.

Grid parity is the ability of new generation technology to reach generation cost of conventional technology. Unfortunately, when oversupply of solar parts occurred a few times globally, the prices did not really come down for solar power generation. In addition, a profit oriented (close to First Generation Power Purchase Agreement) solution was introduced in Malaysia via FIT. In February 2016, the government admitted that FIT failed to meet targets set in RE generation mix. A wrong implementation such as FIT that gives lucrative cash flow now becomes a baggage that is not economical and furthermore fails to "protect" the environment.

Let us look at moving towards energy efficient appliances. Phasing out non-energy efficient electrical appliances must be coupled with the management of e-waste and scheduled waste (with mercury). Second-hand electrical and electronic products are noticed to be also in the market. While the Department of Environment and National Solid Waste Management Department are

committed to solving this issue, it needs to take the 'cradle to cradle' approach. The 'cradle to cradle' approach via proper Life Cycle Assessment (LCA) will assist Malaysia to improve its waste management as well as increase raw material reserves that can be used in the manufacturing sector. This approach needs long term commitment from the public, businesses and government. It must be remembered that it has been implemented successfully in many parts of the world.

Can All Low Carbon Technology Meet the Sustainable Development Characteristics?

Low carbon technologies should focus more on reducing global warming potential compared to improving environmental performance as a whole. In other words, an extremely low carbon technology may end up making the world a more toxic place to live in as toxicity is not part of global warming potential measurement. Therefore, under the Paris Agreement, the technology transfer that is being proposed must be studied carefully. Fortunately, the Paris Agreement reiterates (via a clause) that low carbon technology must be based on Sustainable Development.

Let us look at electric vehicles that are being pushed to replace conventional vehicles here in Malaysia. The argument "electric cars have no *in-situ* emission so it reduces emission significantly" is scientifically wrong. Life Cycle Assessment (LCA) studies show that usage of electric vehicles in countries with coal or fossil fuel dominated electricity generation mix will not be able to be "green" and electric vehicles perform worse than conventional vehicles. In addition, the negative impacts on the environment from the batteries are high. Compared to getting more electric cars on the road, the need to improve holistic public transportation until the last mile connectivity and its efficiency in terms of energy use would be able to cut emission many folds.

Another global move that went wrong: Compact Fluorescent Lights (CFL) was promoted heavily as a replacement for conventional incandescent bulbs. It was seen as a green product. Unfortunately, the mercury content in CFLs is a health hazard. While finding a solution for being energy efficient is vital, it must also fit the Sustainable Development definition. The "green" solutions should not cause more harm either to the people or the environment.

Transportation Sector: A Forgotten Solution

Compared to technology transfers and a major shift in the economy, some simple adjustment and infrastructure realignment will give a tremendous positive impact on the environment.

In 2012, the transportation sector in Malaysia used 17,180 kilo tonnes oil equivalent of energy (Malaysia Energy Statistics Handbook, 2014). It is 36.78% of the final energy use. The transport sector has superseded the industrial sector's energy use since 2008. Based on International Energy Agency (IEA), Malaysia emitted 1,494 kg CO₂ (carbon dioxide) per capita for the transportation sector in 2010 and it is projected to increase to 2272.83 kg CO₂ per capita under a Business as Usual (BAU) scenario in 2030 (AWER).

It is generally known that people will take public transportation more frequently if public transportation services are improved and made more efficient. At the moment, the modal share for Klang Valley is planned at 20% public transportation and 80% private vehicles. There is huge potential to improve it to 50% public transportation use. Will the government go all out for a better public transportation system?

The MRT and additional LRT line are focused on Klang Valley. Pockets of public transport measures do not solve the actual public transport services needed by the Malaysian population. If the outreach is low, people tend to drive to their destination. Connectivity between cities, towns and rural areas and states is vital to increase public transport users.

Forest and Water Catchment Protection

Under the Paris Agreement, governments are asked to protect forests as carbon sinks. In Malaysia, forests are part of state governments' jurisdiction. State governments derive income from logging and development in these areas. How do we decouple this problem and find a solution?

A raw water quality based raw water tariff should be in place to ensure the state governments are receiving equitable income by protecting water catchment areas to secure raw water resources including trans-boundary raw water. This is seen as an important milestone to ensure state governments receive continuous income without the need to carry out logging activities or other development projects in water catchment areas which may generally give "one-off income" only. In addition, protecting water catchment areas will keep the raw water quality better and reduce cost



Cheras MRT station in construction phase



New LRT-Commuter link in Subang

of treating water which will be translated to equitable and affordable water tariff.

More from Water Sector for the Environment

Sewerage is wastewater that is largely untapped as a resource. Firstly, treated effluent from sewerage plants can be sold to dedicated demand zones for non-potable use. This is an effective measure to reduce treated water (potable) demand for industrial use like cooling and processing non-edible products. Secondly, the sludge that is left over can be converted into fertilisers. In case the sewerage plant is a centralised plant which generates electricity, the sludge can be combusted and converted to concrete admixtures which reduce usage of cement in concrete mixtures. Thirdly, production of biogas for sludge combustion as well as renewable energy (RE) generation can be implemented in centralised plants. In addition, organic solid waste that is collected

can be partially digested (through engineering processes) and mixed with the sewerage sludge to increase biogas generation. We can save more space in landfills while optimising centralised sewerage plants for renewable energy output.

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Source

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COP21: The Role of Technology Development and Technology Transfer



Background

Sustainable development and economic sustainability for the future is a hot topic as global climate change is more than a reality. The recent landmark conference in Paris in 2015, the COP21¹ comes in the wake of mounting evidence on the relationship of sustainable development to global warming and climate change. The COP21 ended with an agreement endorsed by delegates from 195 nations to decarbonise the global economy and to cap temperature rise to 1.5°C (COP21, 2015).

Among other things, the delegates addressed issues relating to the climate action agenda by local governments, technology development, technology transfer and support for developing and least developed nations on the pathways towards a low carbon action plan for sustainable development. The central issues relating to global sustainability and climate change were diffusion of technology, transfer of technology, a greener market environment, green growth economic development, low carbon equipment, finance and a local government climate roadmap. The COP21 agreement fortunately ended with huge expectations for sustainable development with a mandate but without details for a technology and diffusion pathway.

The crucial question is: “what did the political leaders obtain from the historic COP21 agreement and what needs to be done in terms of future actions, and what strategies are eventually required of the local governments, international organisations, NGOs, firms, private sector and all stakeholders?”

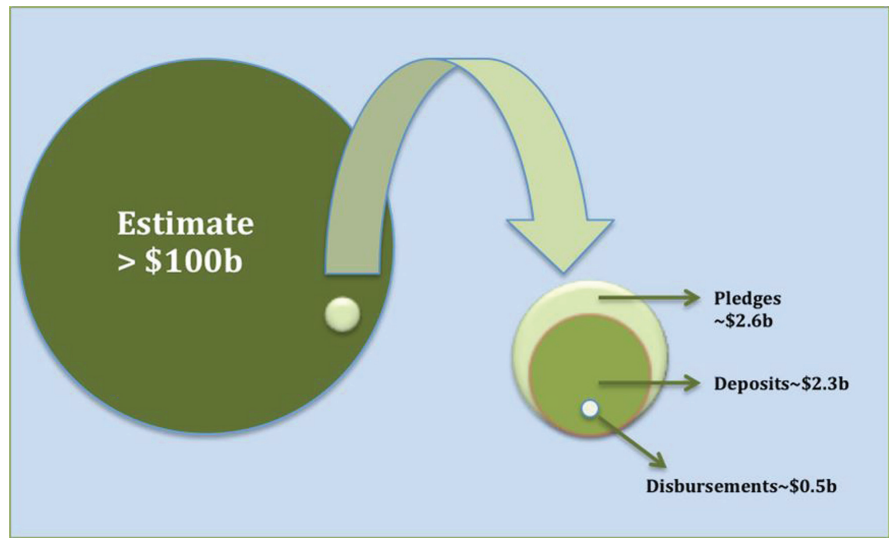


Figure 1. The requirement of a climate fund and its present pledges and disbursements (USD)

A Greener Pathway

The landmark agreement clearly expects that we should have a greener pathway for a carbon neutral society by 2050, which sets an incredibly ambitious goal without a suitable roadmap of technology development and its diffusion for the least developed countries.² This agreement thus requires an unprecedented scale of innovation and technological momentum to meet its target. The countries that signed the agreement are not legally bound to decarbonise their economies. The goals agreed on relate to the overall sustainable development plans that need to be submitted and reviewed on a regular basis with provisions of amendments

to actions. A lot of uncertainty remains and it is not clear how local governments should implement technology development and technology transfer.

Therefore COP21 should have laid out the guidelines to promote the diffusion and transfer of technology, finance for low carbon equipment as well as a realistic climatic roadmap for the local governments. In addition, efforts should have also been directed at creating a vision of a new technology framework that should address existing barriers to the diffusion of technology and its transfer to the developing and least developed nations from the short-run to long run.

The prevailing financial support and resources are certainly insufficient to meet the existing barriers to green technology transfers using the present status of Green Climate Fund (Figure 1).³ Particularly, the key challenge revolves fundamentally around the deployment of technology and financial provisions as well as a realistic diffusion roadmap. The earlier Bonn meeting debated on how to use the Green Climate Fund as an alternative option to evaluate the applicable costs of sustainable technologies and how to diffuse and transfer technologies to the Parties in the developing countries, free of charge. The revised draft of the Bonn meeting did include support and resource transfer from developed nations to developing nations based on their obligations. However, the revised draft provisions should have further considered the capability of domestic research and development, access to sound technology options and supports for strengthening cooperative action and collaboration between intra-developing and least developed nations. The concept of sustainable development surely needs to focus on all aspects such as research and development, finance, cooperation, commitment and a sustained framework of action plans (Figure 2).

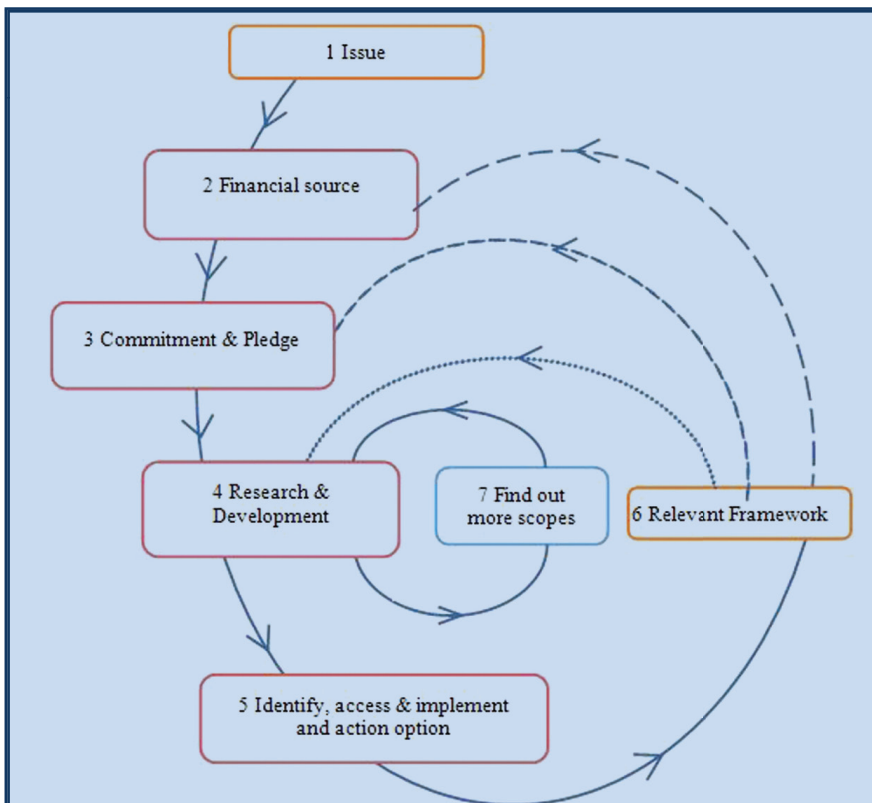


Figure 2. Application of effective sustainable development process

The strategic action plans and transfer of technology, innovation and a support pathway must be clearly recognised as a strong moral and economic issue that world political leaders need to resolve for developing and least developed nations to go on board. A lot rests on what may be settled in this matter, as it is not an easy task for the world's political leaders to endorse meaningful technology development and transfer to the developing and least development countries.

Meaningful Technology Development and Transfer

Meaningful technology development and transfer should be an integral part of the solution that is expected in the COP21 provisions. The initial Cancun Agreements (CA) also ended with a similar expectation earlier for the Technology Mechanism (TM) options of UNFCCC's negotiating provisions (UNFCCC, 2014). The outcomes were limited due to disagreements by the developed nations. To date, it has seen limited success due to limited resource availability, poor implementation process and actions, and global politics.

This meaningful technology transfer provision must be translated into a clear long-run vision into what low income and least developed countries stand to gain from the developed countries from the overall agreement, and how to fulfill the necessary conditions agreed upon in COP21 in Paris. A fundamental concern is that the least developed nations are compounded by weak institutional capacities, lower capabilities and widespread poverty. The UNFCCC must concern itself with these issues before intensifying the transformation agendas to enable a conducive environment for both developed and developing nations to go through the stages of innovation, invention, and advancement to achieve the successful technology diffusion with sustainable development (Figure 3).

Thus it can be summarised that for COP21 provisions to be effective, there is a need for (i) global recognition of the Technology Mechanism (TM) options of UNFCCC's provisions for innovation systems and capability

building; (ii) financial commitments from the developed nations to the developing nations to make use of the Technology Mechanism provisions raised in COP21; and (iii) a variety of practical arrangements, including R&D for absorption of technologies, innovation, diffusion and transfer of technologies, building of capabilities and other related efforts.

Financial Support for Developing and Least Developed Nations

Technology mechanism, technology development and technology transfer have to be embedded within relevant, 'healthy' and balanced strategies. The Paris meeting addressed the policy relevant issues such as how to foster 'healthy' national innovation systems by the present Technology Executive Committee (TEC) under the UNFCCC Technology Mechanism (TM) systems. The present focus of the Technology Executive Committee is to explore the efficacy of the Technology Needs Assessments (TNAs) to examine further the relevant technologies and strategies that the local governments need to adopt, as endorsed by UNFCCC.

The Technology Needs Assessments (TNAs) are expected to consider relevant technologies that raise 'healthy' national innovation systems through (a) Technology Action Plans (TAPs), (b) Intended Nationally Determined Contributions (INDCs), (c) Nationally Appropriate Mitigation Actions (NAMAs) and (d) Low Emissions Development Strategies (LEDS). The Green Climate Fund (GCF) currently leverages on some alternatives and possibilities to find the funding resources; however, it is obvious that they need to attract a good number of private sector firms to contribute a greater share than expected. The GCF has limited funds and it is doubtful whether the limited funds are sufficient to support projects for developing and least developed nations? There needs to be heightened focus to get Parties to fulfill funding pledges and more developed countries to give additional funding.

A sustainable vision for our future generation should thus consider a number of proposals that had been raised by experts and research

findings. These include improved R&D on low carbon development pathways within the scope of sustainable development concerns, financial mechanisms for the developing and least developed nations and overall strengthening of technology networks beyond political issues. Thus, it is obvious that the Technology Action Plans (TAPs) and Intended Nationally Determined Contributions (INDCs) should be expanded further to accommodate a privileged link to financial mechanisms for developing and least developed nations which are looking for direct funding support to extend their existing specific innovation capabilities. The Paris meeting should thus follow up on (i) technology transfer mechanisms and its limitations, (ii) whip up support for low carbon technology development, (iii) advance technology transfer, and (iv) enlist potential support for sustainable development and economic sustainability.

Concluding Remarks

The Paris COP21 agreement presented a good opportunity to boost technology transfers, diffuse technologies, promote R&D, and promote absorption of enhanced technologies and innovations in developing countries. COP 21 also acknowledges the building of capabilities and other related efforts which should be seized by the developing countries. The support pathway is now clearly recognised by the world's political leaders but they need to resolve the disputes to these arrangements to pave the way for sustainable development to get on board. It is accepted that international organisations, governments, NGOs, firms and all stakeholders must work together to bring "enabling environments" to seek meaningful sustainable development. The question that still lingers: 'Is COP21 just an agreement or will there be some concrete consequence post COP21?'

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Footnotes

- 1 The United Nations Conference on Climate Change (COP) in 2015 held since 1995 under the framework of the United Nations Framework Convention on Climate Change (UNFCCC).
- 2 Only the promises for finance and support to the developing nations have been outlined.
- 3 The existing provision of mechanisms and institutions would include the Technology Mechanism (established in 2010 to support efforts to accelerate and enhance action on climate change), the Technology Executive Committee (the Technology Mechanism's policy arm) and the Climate Technology Centre and Network (the implementation arm of the mechanism) (Bulkeley & Newell, 2015).

Source

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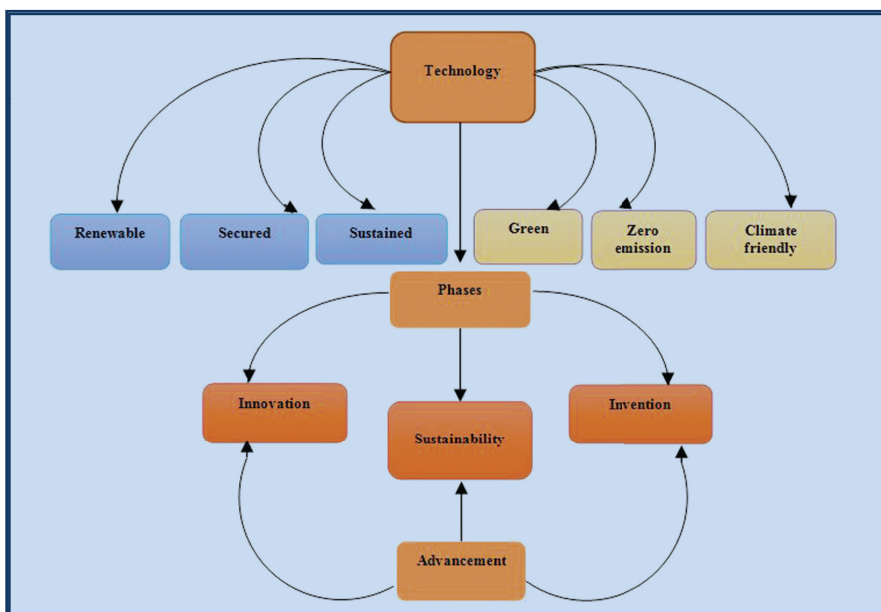


Figure 3. Stages of successful technology diffusion

Pembaharuan Dalam Penilaian Kesan Kepada Alam Sekeliling (Amendments to Environmental Impact Assessment) (EIA)

Latar Belakang

Penilaian Kesan Kepada Alam Sekeliling atau *Environmental Impact Assessment (EIA)* mula dikenali oleh masyarakat Malaysia apabila beberapa isu berkaitan dengan pencemaran alam sekitar menjadi paparan muka hadapan akhbar harian tempatan dan juga media massa. Ini merangkumi isu-isu seperti isu pembinaan kilang bauksit yang menyebabkan laut merah di kawasan perindustrian Gebeng, Kuantan, Pahang, iaitu Lynas Advance Material Plant (LAMP), penarahan bukit di Pulau Pinang, tanah runtuh di Karak dan sebagainya.

EIA bukanlah satu perkara baru di Malaysia. Ianya telah diwartakan semenjak 1 April 1987 di bawah Perintah Kualiti Alam Sekeliling (Aktiviti Yang Ditetapkan) (Penilaian Kesan Kepada Alam Sekeliling) 1987 susulan daripada pindaan kepada Akta Kualiti Alam Sekeliling 1974 pada tahun 1985 yang memasukkan elemen pembangunan lestari melalui keperluan Seksyen 34A, Akta Kualiti Alam Sekeliling (AKAS), 1974 iaitu :

Subseksyen 34A(1): Menteri, selepas berunding dengan Majlis, boleh dengan perintah menetapkan apa-apa aktiviti yang mungkin mempunyai kesan yang bererti pada alam sekeliling sebagai aktiviti yang ditetapkan.

Sejajar dengan keperluan seksyen tersebut, 19 Aktiviti Yang Ditetapkan disenaraikan dalam Perintah Kualiti Alam Sekeliling (Aktiviti Yang Ditetapkan) (Penilaian Kesan Kepada Alam Sekeliling) 1987. Perintah ini lebih dikenali sebagai **Perintah EIA 1987**. Mana-mana orang yang berhasrat untuk melaksanakan apa-apa aktiviti yang ditetapkan hendaklah menjalankan EIA dan mengemukakan laporan EIA kepada Ketua Pengarah Alam Sekitar untuk mendapat kelulusan sebelum menjalankan aktiviti itu. Ini selaras dengan keperluan Sub Seksyen 34A (2), AKAS 1974 pindaan 2012 seperti berikut:

Subseksyen 34 A (2): Mana-mana orang yang berhasrat untuk menjalankan apa-apa aktiviti yang ditetapkan hendaklah melantik orang yang layak untuk menjalankan penilaian kesan kepada alam sekeliling dan untuk mengemukakan laporan mengenainya kepada Ketua Pengarah mengikut cara sebagaimana yang ditetapkan oleh Ketua Pengarah.

Memandangkan sebahagian aktiviti yang ditetapkan didapati memberi impak yang signifikan, Ketua Pengarah Jabatan Alam Sekitar juga telah mengeluarkan Arahan Pejabat supaya

aktiviti-aktiviti yang disenaraikan di dalam **Jadual 1** di bawah hendaklah menyediakan Laporan EIA Terperinci (Detailed EIA or DEIA) mengikut prosedur yang ditetapkan iaitu;

- i) Menyediakan Bidang Rujukan atau *Terms of Reference (TOR)* untuk menjalankan kajian DEIA,
- ii) Mempamerkan laporan tersebut hendaklah untuk ulasan awam,
- iii) Melantik pakar pengulas bagi membantu Jabatan dalam menilai laporan yang dikemukakan.

Jadual 1. Senarai aktiviti yang ditetapkan yang perlu menyediakan Laporan EIA Terperinci (DEIA)

BIL. AKTIVITI YANG DITETAPKAN

1. Industri besi dan besi waja
2. Industri kertas dan pulpa
3. Loji pembuatan simen
4. Pembinaan sistem janakuasa arang batu.
5. Pembinaan empangan-empangan bekalan air dan skim empangan dan kuasa hidroelektrik
6. Tebusguna tanah
7. Loji penunuan (buangan terjadual dan buangan pepejal perbandaran)
8. Pembinaan kemudahan-kemudahan penimbunan tanah buangan pepejal (termasuk stesen pemindahan buangan pepejal)
9. Projek melibatkan pembersihan tanah 50% kawasan adalah berkecerunan melebihi 25° (kecuali kuari).
10. Pembalakan meliputi kawasan seluas 500 hektar atau lebih.
11. Pemaju kemudahan-kemudahan pelancongan atau rekreasi di pulau-pulau dalam perairan sekeliling yang telah diwartakan sebagai taman-taman laut negara
12. Pembinaan loji pulihguna (luar tapak) bagi buangan bateri asid-plumbum
13. Pulihguna buangan terjadual (luar tapak) yang menghasilkan efluen yang signifikan dan terletak di hulu takat pengambilan air minuman
14. Bukan besi – Peleburan utama
15. Petrokimia – Semua saiz
16. Pembinaan kilang-kilang penapis minyak
17. Aktiviti yang ditetapkan yang melibatkan penggunaan bahan radioaktif dan penghasilan buangan radioaktif

Setelah 27 tahun Perintah EIA 1987 dilaksanakan di Malaysia dan telah dikenali di kalangan agensi kerajaan sebagai salah satu alat perancangan yang efektif dari segi pelaksanaan, konsep pembangunan lestari

dan subjek EIA juga telah turut diajar secara meluas oleh pihak Institusi Pengajian Tinggi. Selaras dengan perkembangan projek-projek pembangunan di Malaysia, Jabatan Alam Sekitar telah menyemak kembali keperluan aktiviti yang ditetapkan untuk menjalankan kajian EIA.

Pindaan Perintah EIA

Proses penyemakan semula Perintah EIA ini melibatkan beberapa siri perbincangan dengan pihak berkepentingan selaras dengan keperluan Bahagian Pengubalan, Jabatan Peguam Negara. Antara pihak berkepentingan yang terlibat adalah seperti di **Jadual 2**.

Bagi mematuhi prosedur Pejabat Peguam Negara, JAS juga mengumumkan kepada orang awam untuk mengemukakan ulasan melalui laman sesawang Jabatan iaitu bermula dari 21 Mei 2012 hingga 6 Jun 2012 seperti yang ditunjukkan dalam **Rajah 1** di bawah.



Rajah 1. Pengiklanan kepada orang awam dalam Laman sesawang JAS

Dalam menyemak dan meminda Perintah ini, beberapa prinsip asas digariskan iaitu seperti berikut:

1. Elakkan perkara yang tidak jelas (*ambiguity*).
2. Aktiviti yang ditetapkan memberi fokus kepada projek pembangunan yang mempunyai impak ketara terhadap alam sekitar dan yang terletak di kawasan sensitif alam sekitar.
3. Tiada terminologi *PEIA*, *DEIA*, *Comprehensive EIA* atau *full EIA*. Hanya terminologi EIA digunakan dan mengikut keperluan Jadual yang ditetapkan iaitu **Jadual 1** (tanpa pameran awam dan ulasan awam) dan **Jadual 2** (pameran awam dan ulasan awam).
4. Aktiviti yang tidak memberi impak yang signifikan dan bukan di kawasan sensitif alam sekitar boleh dikawal melalui perundangan di bawah bidang kuasa Pihak Berkuasa Negeri/Tempatan atau agensi-agensi lain.

Jadual 2. Pihak berkepentingan yang terlibat dalam menyemak pindaan perintah EIA 1987.

Agensi-agensi Kerajaan		Pihak Pertubuhan Swasta
1. Unit Perancang Ekonomi, Jabatan Perdana Menteri	20. Jabatan Laut Semenanjung Malaysia	1. Federation of Malaysia Manufacturers (FMM)
2. Bahagian Konservasi Alam Sekitar, NRE	21. Jabatan Keretapi	2. Malaysian International Chamber of Commerce and Industry (MICCI)
3. PUU, NRE	22. Kementerian Perumahan dan Kerajaan Tempatan (KPKT)	3. Chemical Industries Council of Malaysia (CICM)
4. PUU, JAS	23. Jabatan Kerajaan Tempatan	4. Malaysian Pulp & Paper Mill Association
5. Jabatan Pengairan dan Saliran (JPS)	24. Jabatan Pengurusan Sisa Pepejal Negara	5. Malaysian Petrochemicals Association
6. Jabatan Perhutanan Semenanjung Malaysia (JPSM)	25. Jabatan Perancang Bandar dan Desa (JPBD)	6. Federation of Livestock Farmers Association Malaysia (FLFAM)
7. Jabatan Ketua Pengarah Tanah dan Galian (JKPTG)	26. Kementerian Tenaga, Air dan Komunikasi (KTAK)	7. Construction Industry Development Board Malaysia (CIDB)
8. Jabatan Mineral dan Geosains (JMG)	27. Kementerian Pelancongan	8. Malaysia Quarry Association (MQA)
9. Jabatan Taman Laut (JTL)	28. Kementerian Perdagangan Antarabangsa dan Industri (MITI)	9. Malaysian Chamber of Mines (MCM)
10. Kementerian Pertanian Industri Asas Tani(MOA)	29. Malaysian Industrial Development Authority (MIDA)	10. Real Estate and Housing Developers' Association Malaysia (REHDA)
11. Jabatan Pertanian (DOA)	30. Kementerian Kesihatan (MOH)	
12. Jabatan Perikanan (DOF)	31. Jabatan Kesihatan	Pihak Pertubuhan Bukan Kerajaan
13. Jabatan Veterinar (DOV)	32. Jabatan Perlindungan Alam Sekitar Sabah (JPAS)	1. Malaysian Environmental NGOs (MENGO)
14. Kementerian Kerja Raya (KKR) (1) Jabatan Kerja Raya (JKR)	33. Lembaga Sumber Asli dan Alam Sekitar Sarawak (NREB)	2. ENSEARCH
16. Kementerian Pengangkutan (MOT)- Bahagian Darat		3. World Wide Fund for Nature (WWF)
17. Kementerian Pengangkutan (MOT)- Bahagian Udara		4. Malaysian Nature Society (MNS)
18. Kementerian Pengangkutan (MOT)- Bahagian Maritim		5. FOMCA
19. Jabatan Penerbangan Awam (DCA)		

Jadual 3. Perbezaan antara Perintah EIA 1987 dan 2015

BIL	PERKARA	PERINTAH EIA 1987	PERINTAH EIA 2015
1	Pengurangan saiz	Saiz keluasan : Had minimum : 50 hektar untuk pembangunan estet perindustrian Had minimum: 500 hektar untuk pertanian dari kawasan hutan	Saiz keluasan minimum : 20 hektar untuk pembangunan estet perindustrian Had minimum : 20 hektar untuk pertanian dari kawasan hutan
2	Pertambahan aktiviti yang ditetapkan dengan mengambilkira pemeliharaan ekologi dalam pembangunan		i. Kawasan cerun ii. Kawasan sensitif alam sekitar/ kawasan perlindungan/ kawasan pemeliharaan iii. Penggunaan dan pengeluaran buangan bahan radioaktif iv. Ladang ternakan khinzir v. Pembangunan ladang hutan vi. Tapak pelupusan bahan pengorekan vii. Kemudahan rawatan enap cemar viii. Pengorekan utama ix. Perlombongan pasir di pelantar benua x. Pembinaan stesen pemindahan sisa pepejal xi. Pembinaan rangkaian sistem pemetungan air kumbahan xii. Pembinaan loji pulihguna di luar tapak atau kemudahan rawatan bagi buangan terjadual di hulu takat pengambilan air xiii. Perlombongan pasir di sungai, persisiran dan luar pantai xiv. Pembinaan pulau buatan manusia xv. Kilang kitar semula kertas dengan keupayaan 50 ton sehari atau lebih xvi. Jajaran pemancar kuasa (bekalan elektrik)
3	Pertukaran nama atau terma aktiviti yang ditetapkan	Lapangan terbang Insinerator Kawasan hutan bukit	Aerodrome Loji rawatan termal Kawasan 300 m atau lebih di atas purata paras laut
4	Mengambilkira perundangan agensi lain	Aktiviti pembalakan	Hanya aktiviti pembalakan di luar kawasan hutan simpan
5	Melupuskan aktiviti yang tidak relevan dengan keadaan semasa	i) Pembinaan hospital yang melepaskan air buangan ke kawasan pantai rekreasi melalui 'outfall' ii) Program penempatan semula 100 keluarga	i. Polisi sediaada tidak membenarkan hospital melepaskan air buangan ke kawasan pantai rekreasi melalui 'outfall' ii. Tiada program penempatan semula keluarga, jika melibatkan pembinaan perumahan melebihi 50 ha, ia masih tertakluk sebagai aktiviti yang ditetapkan
6	Elemen pecah kecil dan pertambahan kapasiti atau keluasan projek	Tiada	Dimasukkan bawah Perintah 3 (4), Perintah EIA 2015
7	Naik taraf sub aktiviti yang ditetapkan kepada aktiviti	Aktiviti Utama Infrastruktur Sub Aktiviti Estet perindustrian jalan bandar baru Aktiviti Utama Saliran dan pengairan Sub Aktiviti Pembinaan empangan Aktiviti Utama Penjanaan dan pemancaran kuasa Sub Aktiviti Pembinaan empangan Aktiviti Utama Bekalan air Sub Aktiviti Pembinaan empangan	Aktiviti Utama Estet perindustrian jalan bandar baru Aktiviti Utama Pembinaan empangan
8	Dari kuantum/keluasan kepada tanpa keluasan	Perlombongan seluas 250 ha	i. Perlombongan berskala besar ii. Perlombongan berhampiran, berdekatan atau dalam kawasan sensitif alam sekitar

Continued on page 12

Perintah EIA yang baru adalah Perintah Kualiti Alam Sekeliling (Aktiviti Yang Ditetapkan)(Penilaian Kesan kepada Alam Sekeliling) 2015 atau **Perintah EIA 2015**. Antara intipati yang ketara dalam Perintah EIA 2015 berbanding dengan Perintah terdahulu adalah seperti yang disenaraikan dalam **Jadual 3**.

Perintah EIA 2015 Dikuatkuasakan pada 29 Ogos 2015

Perintah EIA 2015 ini telah diwartakan pada 28 Ogos 2015 dan dikuatkuasakan pada 29 Ogos 2015. Dalam Perintah EIA 2015, aktiviti yang ditetapkan disenaraikan dalam dua Jadual berdasarkan magnitud impak bagi sesuatu projek berasaskan jenis aktiviti, kuantum, saiz dan lokasi dengan kawasan sensitif alam sekitar iaitu Jadual Pertama dan Jadual Kedua.

Dalam Perintah ini juga, laporan EIA yang disediakan di bawah Jadual Pertama tidak memerlukan pameran awam dan ulasan awam. Laporan EIA yang dikemukakan ini akan diproses di JAS Negeri dan jika ia melibatkan dua negeri, Laporan EIA akan diproses di Ibu pejabat JAS. Jadual Kedua adalah senarai projek yang dijangka memberi magnitud impak signifikan semasa

Jadual 4. Senarai aktiviti yang ditetapkan dalam jadual pertama dan jadual kedua, perintah EIA 2015

NO.	JADUAL PERTAMA AKTIVITI YANG DITETAPKAN	NO.	JADUAL KEDUA AKTIVITI YANG DITETAPKAN
1.	Pertanian	1.	Pertanian
2.	Aerodrome	2.	Aerodrome
3.	Pengairan dan Saliran	3.	Pengairan dan Saliran
4.	Perikanan	4.	Perikanan
5.	Perhutanan	5.	Perhutanan
6.	Industri	6.	Industri
7.	Penebusgunaan Tanah	7.	Penebusgunaan Tanah
8.	Perlombongan	8.	Perlombongan
9.	Petroleum	9.	Petroleum
10.	Pelabuhan	10.	Pelabuhan
11.	Penjanaan dan Pemancar Kuasa	11.	Penjanaan dan Pemancar Kuasa
12.	Pembangunan di Kawasan Pantai dan Bukit	12.	Pembangunan di Kawasan Pantai, Taman Negara dan Taman Negeri
13.	Pembangunan di Kawasan Cerun	13.	Pembangunan di Kawasan Cerun
14.	Pengolahan dan Pelupusan Buangan	14.	Pengolahan dan Pelupusan Buangan
15.	Pengorekan	15.	Pembinaan Empangan
16.	Perumahan	16.	Pengangkutan
17.	Pembangunan Estet Industri	17.	Bahan Radioaktif dan Buangan Radioaktif
18.	Bandar Baru		
19.	Kuari		
20.	Jalan		
21.	Bekalan Air		

pelaksanaan dan operasi, oleh itu laporan EIA yang disediakan memerlukan pameran awam dan ulasan awam. Laporan EIA ini akan diproses di Ibu pejabat JAS dan beberapa individu juga dilantik untuk membantu

Jabatan dalam menilai Laporan EIA yang dikemukakan. **Jadual 4** menunjukkan senarai aktiviti yang ditetapkan bagi Jadual Pertama dan Jadual Kedua.

Jadual 5. Aktiviti yang ditetapkan di proses oleh agensi di bawah kerajaan Negeri Sarawak

NO.	JADUAL PERTAMA AKTIVITI YANG DITETAPKAN	NO.	JADUAL KEDUA AKTIVITI YANG DITETAPKAN
2.	Aerodrome	2.	Aerodrome
6.	Industri	6.	Industri
9.	Petroleum	9.	Petroleum
10.	Pelabuhan	10.	Pelabuhan
11.	Penjanaan dan Pemancar Kuasa (a) Pembinaan stesen janakuasa stim yang menggunakan bahan api fosil (selain arang batu) dan mempunyai keupayaan 10 megawatt atau lebih, dengan atau tanpa talian pemancar. (b) Pembinaan stesen janakuasa kitar padu, dengan atau tanpa talian pemancar.	11.	Penjanaan dan Pemancar Kuasa
16.		16.	Pengangkutan
17.		17.	Bahan Radioaktif dan Buangan Radioaktif

Jadual 6. Aktiviti yang ditetapkan yang diproses oleh agensi di bawah kerajaan Negeri Sabah

NO.	JADUAL PERTAMA AKTIVITI YANG DITETAPKAN	NO.	JADUAL KEDUA AKTIVITI YANG DITETAPKAN
2.	Aerodrome	2.	Aerodrome
6.	Industri	6.	Industri
9.	Petroleum	9.	Petroleum
11.	Penjanaan dan Pemancar Kuasa (c) Pembinaan stesen janakuasa stim yang menggunakan bahan api fosil (selain arang batu) dan mempunyai keupayaan 10 megawatt atau lebih, dengan atau tanpa talian pemancar. (d) Pembinaan stesen janakuasa kitar padu, dengan atau tanpa talian pemancar.	11.	Penjanaan dan Pemancar Kuasa
14.	Pengolahan dan Pelupusan Buangan	14.	Pengolahan dan Pelupusan Buangan
17.	-	17.	Bahan Radioaktif dan Buangan Radioaktif

Selain itu, kuasa turut diberikan kepada Ketua Pengarah untuk membenarkan aktiviti Jadual Pertama melalui proses pameran awam dan ulasan awam seperti keperluan di bawah Perintah 3 (2), Perintah EIA 2015. Ketua Pengarah berhak untuk menentukan prosedur pemprosesan Laporan EIA bagi Jadual Kedua di bawah Perintah 3 (5), Perintah EIA 2015.

Perintah EIA 2015 juga menyenaraikan aktiviti yang ditetapkan yang diproses oleh pihak agensi Kerajaan Negeri Sarawak dan Sabah dalam Perintah 4 (1) dan (2), Perintah EIA 2015. Aktiviti yang diproses oleh agensi tersebut adalah aktiviti berkaitan dengan sumber semulajadi. Antara aktiviti yang ditetapkan yang akan diproses adalah disenaraikan dalam Jadual 5 dan Jadual 6.

Kesimpulan

Pelaksanaan pindaan Perintah EIA 2015 adalah bersesuaian dengan keadaan semasa di mana isu pemeliharaan dan pemuliharaan kawasan sensitif alam sekitar, sistem ekologi, biodiversiti dan perubahan iklim diambilkira semasa penyediaan laporan EIA serta turut melibatkan semua pihak berkepentingan termasuk orang awam. Sehubungan dengan itu, pelaksanaan Perintah ini dapat menjamin pembangunan lestari negara demi kepentingan generasi akan datang.

Environmental Quality Council (EQC)

The Environmental Quality Council (EQC) was established following the enactment of the Environmental Quality Act (EQA) 1974. The functions of the EQC are to:

1. Generally advise the Minister on matters pertaining to EQA 1974
2. Advise the Minister on any matter referred to it by the Minister.

The appointment of EQC members for the 15th term of 1st April 2015 to 31st March 2018 was made by the Minister of Natural Resources and Environment. YBhg. Prof. Dato' Dr. Mazlin Mokhtar, Deputy Vice Chancellor, Research & Innovation Affairs, Universiti Kebangsaan Malaysia is the new Chairman of the EQC. He brings with him a wealth of experience having been a Principal Fellow at the Institute for Environment and Development (LESTARI) in UKM. The current EQC Members are found in Table 1.

On 12 April 2016, a dialogue was held between YB Dato Sri Dr. Haji Wan Junaidi Bin Tuanku Jaafar, Minister of Natural Resources and Environment and the EQC Members at the Department of Environment, Putrajaya. Following this dialogue, the council had a further discussion with the Minister on setting the direction for this term.

The council also deliberated and endorsed matters presented at the meetings. The following papers were brought to the attention of the EQC members for this term (Table 2):

Table 1. Environmental Quality Council Members 15th Term (1 April 2015 – 31 March 2018)

Bil	Representative	Name
1	EQC Chairman	YBhg. Prof. Dato' Dr. Mazlin Mokhtar
2	Representative for Minister, Ministry of Natural Resources and the Environment	YBhg. Dato' Sri Azizan bin Ahmad
3	Representative for Minister, Ministry of Science, Technology and Innovation	Dr. Zulkifli Mohamed Hashim
4	Representative for Minister, Ministry of Trade & Industry	Tuan Haji Zakaria Jaafar
5	Representative for Minister, Ministry of Domestic Trade, Corporation & Consumerism	Cik Fatimah Nazaliza binti Mohd. Nasir
6	Representative for Secretary-General, Ministry of Agriculture and Agro-Based Industries	YBhg. Datuk Ahmad bin Loman
7	Representative for Minister, Ministry of Human Resources	Tuan Haji Saiful Azhar Mohd Said
8	Representative for Minister, Ministry of Transport	Encik Misrun Timin
9	Representative for Minister, Ministry of Urban Wellbeing, Housing and Local Government	Encik Mohd Rosli bin Haji Abdullah
10	Representative for Minister, Ministry of Energy, Green Technology and Water	Puan Rogayah binti Kadari
11	Representative for Minister, Ministry of Health	YBhg. Datuk Dr. Lokman Hakim bin Sulaiman
12	Representative from the Sabah Government	Encik Ginun bin Mattangai @ Ginun bin Yangus
13	Alternate Member	Datuk Yabi Yangkat
14	Representative from the Sarawak Government	YBhg. DatuSudarsono Osman
15	Alternate Member	Encik Peter Sawal
16	Representative from the Petroleum Industry	Dr. Bea Ponnudurai
17	Alternate Member	Cik Lee Tzee Wan
18	Representative from the Oil Palm Industry	YBhg. Prof. Emeritus Dato' Dr. Makhdzir Mardan
19	Alternate Member	Dr. Ruslan Abdullah
20	Representative from the Federation of Malaysian Manufacturers	YBhg. Dato' Hj. Mizanur Rahman Ghani
21	Alternate Member	Encik K.N. Gobinathan
22	Representative from the Rubber Industry	Encik Lim Sum Teck
23	Alternate Member	Encik Chin Hon Meng
24	Representative from the Academic Staff of the Universities or Colleges in Malaysia	Dr. Subramaniam Karuppannan
25	Alternate Member	
26	Representative from registered societies knowledgeable and having interest in matters pertaining to the environment	Ir. Elias Saidin
27	Alternate Member	Puan Geetha P. Kumaran
28	Representative from registered societies knowledgeable and having interest in matters pertaining to the environment	YBhg. Dato' Dr. Dionysius S.K Sharma
29	Alternate Member	Dr Sundari Ramakrishna

Table 2. Papers discussed by the EQC

116th EQC Meeting (23 February 2015)

- EQC Paper No. 1/116/2015: Report of the Special Working Committee of the Environmental Quality Council - Zero Burning Approaches in Agricultural Activities
Prof. Dr. Nik Meriam Nik Sulaiman, Representative from the Academic Staff of the Universities or Colleges in Malaysia

117th EQC Meeting (2 July 2015)

- EQC Paper No. 1/117/2015: Information Paper on the Establishment of Environmental Fund and Proposed Draft Environmental Quality (Cess Payment) 201X
Department of Environment

118th EQC Meeting (24 November 2015)

- EQC Paper No. 1/118/2015: Information Paper Related to Environmental Quality Act 1974 (Amendment) 201X
Paper by Department of Environment
- EQC Paper No. 2/118/2015: Information Paper Related to Regulations - Environmental Quality (Prescribed Premises) (Crude Palm Oil) 201X
Paper by Department of Environment
- EQC Paper No. 3/118/2015: The Implementation of Quality of Petrol and Diesel Fuels Based on Euro 4M and Euro5 Specifications
Paper by Department of Environment
- EQC Paper No. 4/118/2015: A Handbook of Environmental Impact Assessment in Malaysia
Paper by Department of Environment
- EQC Paper No. 5/118/2015: Recommendations for Deliberation
Paper by Department of Environment



Dialogue Session between YB Dato Sri Dr. Haji Wan Junaidi Bin Tuanku Jaafar, Minister of Natural Resources and Environment and the EQC Members, 12 April 2016



EQC Members (15th Term) with Minister of NRE and Secretary General of NRE

Garis panduan Kawalan Pencemaran Daripada Aktiviti Penternakan Lembu Tenusu

Aktiviti penternakan telah dikenalpasti sebagai salah satu penyumbang kepada pencemaran sungai di Malaysia. Dalam konteks ini adalah penting bagi semua penternak supaya mempraktikkan aspek pengurusan alam sekitar di ladang masing-masing kerana aktiviti penternakan sedang dilaksanakan secara meluas bagi menjamin sumber bekalan makanan (protein) dalam negara selaras dengan Dasar Agro-Makanan Negara 2011-2020 untuk meningkatkan kecekapan industri ternakan ruminan.

Masa kini, kawalan penternakan lembu tenusu adalah di bawah bidang kuasa Kerajaan Negeri yang dilaksanakan melalui enakmen-enakmen tertentu yang telah diwartakan. Umumnya, kawalan hanya tertumpu kepada kacau ganggu disebabkan haiwan yang merayau dan bukannya dari aspek kawalan pencemaran. Dari segi pengawalan alam sekitar dan amalan masa kini, hanya ladang-ladang lembu tenusu yang menyertai skim persijilan MyGAP perlu menjalankan pengawasan efluen ternakan bagi parameter BOD5. Isu utama dari aktiviti penternakan lembu tenusu yang biasanya mendapat perhatian umum adalah berkaitan pencemaran air dan bau yang terhasil dari pelepasan air buangan (efluen) ternakan dan pembuangan sisa pepejal.

Punca Penghasilan Buangan

Antara buangan yang terhasil dari operasi penternakan lembu tenusu adalah terdiri daripada najis ternakan, bangkai lembu, sisa makanan dan enapcemar dari sistem pengolahan efluen ternakan lembu. Sehubungan ini, garis panduan ini adalah sebagai panduan kepada semua penternak ke arah usaha mengurangkan dan meminimumkan penjejakan bahan-bahan buangan di ladang. Jadual 1 merupakan purata populasi ternakan lembu tenusu (sehingga Jun 2014) manakala Jadual 2 merupakan penghasilan harian tinja dan air kencing oleh setiap ekor ternakan lembu tenusu.

Jadual 1. Purata populasi ternakan lembu tenusu (Jun 2014)

NEGERI	JUMLAH
Johor	9,799
Kedah	2,363
Kelantan	377
Melaka	2,866
N.Sembilan	4,667
P.Pinang	556
Pahang	1,234
Perak	4,710
Perlis	114
Selangor	6,025
Terengganu	66
Jumlah Besar	32,777

(Sumber: DVS 2014)

Jadual 2. Jumlah penghasilan harian tinja (manure) lembu tenusu

Ternakan (Berat badan)	Jumlah penghasilan tinja (manure) dan air kencing (kg/ekor/hari)			Total
	Kandang (Barns)	Penempatan sementara (Holding area)	Tempat pemerahan (Milking parlor)	
Lembu dara (Milking cow heifer)(250kg)	13.2	1.6	0.7	15.5
Lembu tenusu (Milking cow)(400kg)	21.1	2.5	1.2	24.8

(Rujukan: Cost Methodology Report for Beef and Dairy Animal Feeding Operations-EPA-821-R-01-019-January 2001/Washington, DC 20460)

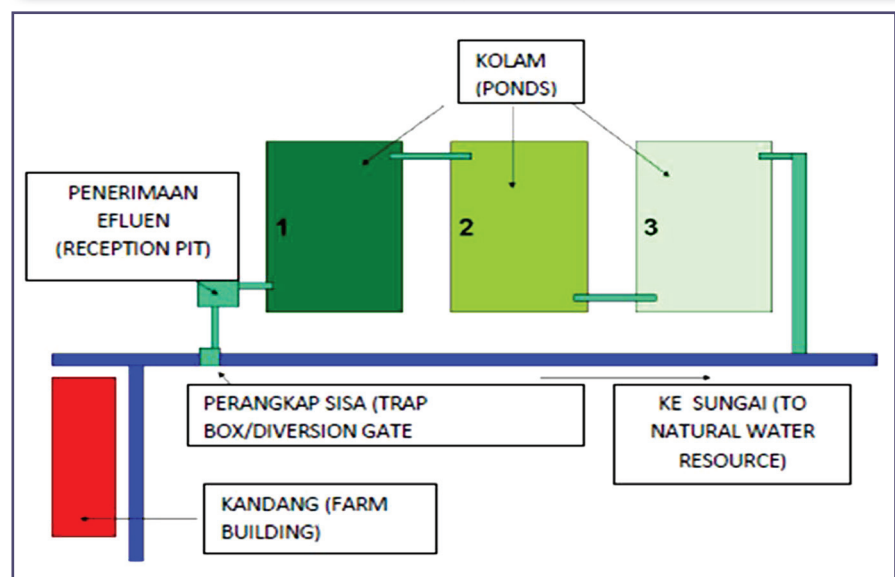
Jadual 3. Penghasilan harian air buangan oleh lembu tenusu

Ternakan (Berat badan)	Penghasilan air buangan (L/ekor/hari)			Total
	Kandang (Barns)	Penempatan sementara (Holding area)	Tempat pemerahan (Milking parlor)	
Lembu tenusu (Milking cow)	38.5	5.5	11	55

(Rujukan: Cost Methodology Report for Beef and Dairy Animal Feeding Operations-EPA-821-R-01-019-January 2001/Washington, DC 20460)

Jadual 4. Ciri-Ciri efluen lembu tenusu

Parameter	Nilai
Jumlah bahan pejal (TS) %	3 – 6 (30000 – 60000 mg/l)
BOD (mg/L)	5000-9000
COD (mg/L)	30000-60000
Jumlah Kjedaahl nitrogen (mg/L)	2000-3000
Ammonia-Nitrogen (AN)(mg/L)	500



Rajah 1. Contoh sistem rawatan sedia ada

Keperluan Pengurusan Buangan Ternakan yang Sempurna

Penghasilan buangan dari aktiviti ternakan lembu tenusu dapat dikawal dengan pengurusan yang baik dan juga penggunaan kaedah pengolahan yang sempurna. Bagi meminimumkan penghasilan buangan-buangan dari ladang ternakan, pengusaha ladang digalakkan mengaplikasikan penternakan secara moden dan melaksanakan amalan pengurusan ladang yang baik. Antara buangan yang terhasil adalah buangan cecair dan buangan pepejal.

Pengurusan Buangan Cecair Ternakan yang Sempurna

Sisa ternakan yang tidak diolah akan menyebabkan pencemaran sungai (alir air), air tanah dan perairan pantai, pencemaran bau busuk dan berpotensi diadukan oleh masyarakat berhampiran melalui eutrofikasi (*eutrophication*) dan penularan wabak penyakit. Pada masa ini, efluen ternakan yang dirawat hanya tertumpu untuk mematuhi satu parameter sahaja iaitu BOD5. Anggaran purata penghasilan efluen dari seekor lembu tenusu adalah lebih kurang 55 liter efluen

Jadual 5. Pilihan kaedah yang boleh dipraktikkan

Primary Treatment	Secondary Treatment	Tertiary Treatment
Digunakan untuk mengurangkan kuantiti atau kepekatan SS	Digunakan untuk mengurangkan kuantiti atau kepekatan BOD5, COD, SS	Digunakan untuk mengurangkan kuantiti atau kepekatan AN, <i>E.Coli</i> dan COD
<ul style="list-style-type: none"> Solid liquid separator Screens for solid separation 	<ul style="list-style-type: none"> Pond Oxidation pond Activated sludge Solids dewatering by centrifuge Trickling filter Dissolved air floatation Sequencing Batch Reactor (SBR) BioFil system/ Cosmo balls Sludge drying Sludge thickening and filter press Anaerobic digestion (Biogas) 	<ul style="list-style-type: none"> Phosphorus and solid removal by lime treatment and settling Partial nitrogen by air stripping Recycling for flushing water Tertiary flushing by membrane / ultra filtration, etc. Evaporation pond for disposal Nitrogen flushing by wetland Disinfection



Rajah 2. Pembuatan kompos secara "open stockpile compost"



Rajah 3. Pembuatan kompos secara mekanikal

mentah dalam tempoh aktif 16 jam sehari atau kira-kira 3.4 liter sejam. Perincian penghasilan air buangan dari setiap kawasan kandang termasuk dari aktiviti pembasuhan adalah seperti di Jadual 3. Disamping itu, efluen tidak diolah akan mencemarkan alam sekitar kerana mempunyai ciri-ciri seperti ditunjuk di Jadual 4.

Tambahan empat parameter iaitu COD, SS, AN dan *E.coli* adalah perlu dipantau bagi membantu mencegah pencemaran dan meningkatkan kualiti air sungai. Penternak boleh memperoleh pelbagai faedah dengan mengamalkan pengurusan sisa buangan yang baik di ladang ternakan. Antaranya ialah meningkatkan kualiti, produktiviti ladang dan keselamatan hasil pengeluaran ladang serta mengelakkan penularan penyakit berjangkit, memberikan nilai tambah kepada pihak ladang seperti pengiktirafan amalan perladangan terbaik ataupun menjadi rujukan kepada penternak lain, serta meningkatkan imej penternak dan ladangnya dari aspek penjagaan alam sekitar bagi mematuhi had pelepasan efluen ternakan mengikut piawai yang ditetapkan. Disamping itu, ia akan mewujudkan ladang yang lestari dan mesra alam serta mengurangkan pelepasan gas rumah hijau ke persekitaran (metana, karbon dioksida). Dengan itu, kos operasi pengurusan ladang

akan dapat dikurangkan dan penghasilan *by-product* bagi menjana pendapatan sampingan. Proses rawatan sedia ada dan pilihan kaedah yang boleh dipraktikkan terdapat di Jadual 5.

Pengurusan Buangan Pepejal Ternakan yang Sempurna

Sisa pepejal ternakan mengandungi unsur-unsur NPK (nitrogen, fosforus dan kalium) iaitu bahan sebagai baja kepada tanaman. Walau bagaimanapun, sisa pepejal ternakan termasuk enapcemar perlu dikompos, distabil, dikeringkan dan disimpan dengan sempurna di kawasan yang ditentukan oleh pihak berkuasa di dalam ladang tanpa mengakibatkan kacauganggu awam atau pembiakan lalat. Pengkomposan adalah satu proses penguraian yang dilalui oleh bahan-bahan sisa organik sehingga menjadi suatu bahan yang stabil, mudah dikendalikan (kurang dari segi kuantiti berbanding enapcemar asal) dan selamat (tiada patogen).

Penternak yang mempunyai ladang pertanian boleh mempraktikkan pelupusan sisa pepejal ternakan ke ladang mereka sebagai baja kompos untuk tanaman rumput (fodder). Bagi penternak yang tidak mempunyai ladang sendiri, mereka perlu mendapat persetujuan pemilik ladang pertanian yang berhampiran. Pelupusan atas tanah mesti

diuruskan dengan baik supaya tidak berlaku air larian permukaan (*surface runoff*) dan pencemaran bau. Kadar aplikasi atas tanah perlu mengambilkira keadaan cuaca, struktur dan kecuraman tanah, keperluan nutrisi yang diperlukan oleh sesuatu tanaman atau keperluan nutrien tanah yang berkenaan, jarak dari sungai atau telaga minuman, paras air tanah (*ground water table*) dan kawasan perumahan yang terdekat dan lain-lain lagi. Kaedah mengangkut tinja sebagai baja perlu dilakukan mengikut prosedur yang betul bagi mengelakkan masalah pencemaran semasa proses mengangkut dijalankan. Mesin digunakan untuk memproses tinja ke bentuk pallet bagi tujuan komersil (jualan) seperti yang ditunjukkan dalam Rajah 2 dan 3.

Kesimpulan

Transformasi kaedah ternakan telah berlaku dengan perubahan kaedah ternakan tradisional kepada kaedah moden di mana penternak telah pun menyediakan kawalan pencemaran yang asas seperti kolam takungan. Walau bagaimanapun, usaha perlu dipertingkatkan dengan menggunakan sistem pengolahan efluen (SPE) yang lebih cekap di samping menjalankan pemantauan dan penyelenggaraan berkala ke arah mencapai pertanian moden dan penternak yang berdaya maju.

National Level Environmental Choral Speaking Competition

in conjunction with EARTH Day 2016

The Strategic Communications Division, Department of Environment (DOE) in collaboration with the Ministry of Education organised the national level Environmental Choral Speaking Competition from 26 to 28 April 2016. Held in conjunction with Earth Day 2016, the competition also saw the involvement of DOE's strategic partners of UiTM, YTL Cement and UNISEL. The venue for the competition was Universiti Teknologi MARA (UiTM), Puncak Alam campus

The environment themed competition involved two categories: Secondary Schools (English - Choral Speaking) and Primary Schools (Bahasa Malaysia – Bicara Berirama). The competition saw participation from 32 teams from both primary and secondary schools throughout the country and involved about 1200 students and teachers. The list of competing schools is shown in Table 1.

The prize presentation ceremony was officiated by the Hon. Dato 'Sri Azizan bin Ahmad, Secretary General, Ministry of Natural Resources and Environment. SMK Convent Bukit Nanas, Kuala Lumpur emerged the winner for the secondary school category while Sekolah Kebangsaan Bukit Beruang, Melaka was the winner for the Primary category. The list of winners is shown in Table 2.

Table 1. List of participating schools

No.	State	Secondary School	Primary School
1	Perlis	SMK Perlis	SK Seri Indra
2	Kedah	SMJK Sin Min	SK JalanPegawai
3	Pulau Pinang	SMK Convent Bukit Mertajam	SK Seri Bayu
4	Perak	SMK St Bernadette Convent	SK Taiping
5	Pahang	SMK Abdul Rahman Talib, Kuantan	SK Bandar Pusat, Maran
6	Terengganu	SM Imtiaz Dungun	SK Tengku Mahmud, Besut
7	Kelantan	SMK Zainab	SRA TengkuAmalinAisyahPutri
8	Selangor	SMK Tun Hussein Onn	SK Bandar Sri Putra
9	Negeri Sembilan	SMK Methodist (ACS)	SK PasirPanjang, Port Dickson
10	Melaka	SMK Infant Jesus Convant	SK Bukit Beruang
11	Johor	SMK Dato' PenggawaTimur	SK Bandar Mersing
12	Sabah	SMK St. Francis Convent (M)	SK Sri Gaya, Sek Berprestasi Tinggi,
13	Sarawak	SMK St. Mary, Kuching	SK Sungai Amang, Kapit
14	W.P. Kuala Lumpur	SMK Convent Bukit Nanas	SK Convent Bukit Nanas 1
15	W.P. Putrajaya	Sek Sultan Alam Shah	SK PutrajayaPresint 16 (2)
16	W.P. Labuan	SM St Anne	SK Kerupang



Pic 1: SK Bukit Beruang



Pic 2: SMK Convent Bukit Nanas

Table 2. List of winners

RESULT	SECONDARY SCHOOL	PRIMARY SCHOOL
1st (RM5,000.00, Plaque and Certificate)	1. SMK Convent Bukit Nanas, Kuala Lumpur	1. SK Bukit Beruang, Melaka
2nd (RM3,000.00, Plaque dan Certificate)	2. SMK Bandar Tun Hussein Onn 2, Selangor	2. SK Bandar Seri Putra, Selangor
3rd (RM1,000.00 Plaque and Certificate)	3. SMK St. Mary, Kuching, Sarawak	3. SK Sri Gaya, Sabah
4th (RM500.00 Plaque and Certificate)	4. SMJK Sin Min, Kedah	4. SK Sungai Amang, Kapit, Sarawak
5th (RM500.00 plaque and Certificate)	5. SMK St. Francis Convent (M), Sabah	5. SRA Tengku Amalin A'ishah Putri, Kelantan
6th-10th(Plaque and Certificate)	6. SMK Dato' Penggawa Timur, Johor	6. SK Kerupang, W.P. Labuan
	7. SM Imtiaz, Dungun, Terengganu	7. SK Seri Bayu, Pulau Pinang
	8. SMK Zainab	8. SK Taiping, Perak
	9. SMK Convent Bukit Mertajam, Pulau Pinang	9. SK Convent Bukit Nanas 1, Kuala Lumpur
	10. SMK St. Bernadette's Convent, Batu Gajah, Perak	10. SK Bandar Mersing, Johor
11th-16th (Certificate)	11. SMK St. Anne, W.P Labuan	11. SK Putrajaya Presint 16(2), W.P Putrajaya
	12. SMK Infant Jesus Convant, Melaka	12. SK Jalan Pegawai, Kedah
	13. SMK Methodist(ACS), Negeri Sembilan	13. SK Bandar Pusat, Pahang
	14. Sekolah Sultan Alam Shah, W.P Putrajaya	14. SK Seri Indera, Perlis
	15. SMK Abdul Rahman Talib, Pahang	15. SK Tengku Mahmud
	16. SMK Perlis, Perlis	16. SK Pasir Panjang, Negeri Sembilan
The Best Script	SK Bandar Mersing, Johor (Sayangi Alam Sekitar)	
Best Conductor (Primary School)	SK Bukit Beruang, Melaka	
Best Conductor (Secondary School)	SMK Bandar Tun Hussein Onn, Selangor	

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