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CLIMATE CHANGE AND CARBON REDUCTION INITIATIVES

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ABSTRACT

Climate change is a global issue that needs to be tackled by every individual, groups, organization and nations. With our current path of development, climate change seems inevitable. Mitigation measures and adaptation strategies need to be set up just to avoid any further destruction. As IPCC reported that current CO₂ level is around 380ppm and will increased to 450ppm under business as usual scenario, stabilization at this point will increased temperature by 2⁰C. Any increasing in temperature beyond this point will risk human life. This research promote one of mitigating measure, Carbon Reduction Strategies (CRI) that involved behavior changes on individual and using financial gains as selling point.

INTRODUCTION

Inevitable and irreversible, so said the scientists about climate change and it implications to us. The past century has witnessed unprecedented economic growth and human prosperity. Global per capita income has nearly tripled (World Business Council on Sustainable Development 1997), average life expectancy has increased by almost two thirds (World Resources Institute 1994), and the past century has also witnessed unprecedented damage to the natural environment. The human population is expanding while crop land is eroding, forests are declining, species are facing extinction, fresh water supplies are dwindling, fisheries are collapsing and pollution threatens human health (Brown 1998). We are pursuing economic growth and utilizing natural resources in effort to increase our quality of life (or maintaining the present lifestyle!).

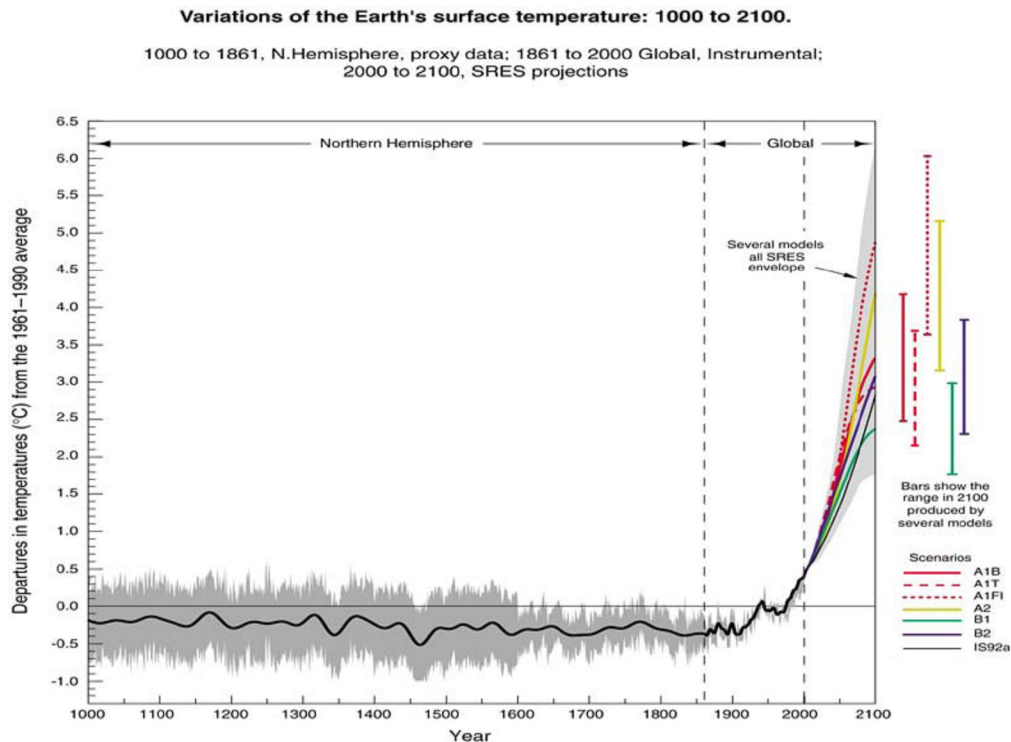
Climate change or generally the environmental problems are not primarily technological or economic, but behavioral and cultural. It is both; the behavior of the decision maker and the consumers. While technological and economic activity may be the direct cause of environmentally destructive behavior, it is individual beliefs, cultural norms and societal institutions guide the development of that activity (David 1985; Barley 1986). While most scientific researches probably suggested various mitigation and adaptation strategies to combat climate change, we would consider how individual and social behavior, organizational, and institutional values perpetuate behavior that damages it. This paper highlights a carbon reductive initiative that purposely targeted simple behavioral changes which could also give financial gains.

CLIMATE CHANGE PRESSURES

Environmental pollution is not just localized in its impact. Worldwide concentrations of greenhouse gases, such as carbon dioxide (CO₂), have increased steadily. Before 1750, the mixing ratio of atmospheric CO₂ was approximately 280 ± 10 ppm (512 ± 18 mg m⁻³). In 1950, world annual CO₂ emissions were 1.6 billion tons per year. By 1997, they had reached 7.0 billion tons per year. As a result, atmospheric concentrations have grown from 280 ppm to 380 ppm since the beginning of the industrial revolution in the middle of the 19th century (Office of Science and Technology Policy 1997; IPCC 2007).

Latest IPCC AR4 Report stated that the total temperature increase from 1906 –2005 is 0.76 [0.56 to 0.92]°C. Eleven of the last twelve years (1995 -2006) rank among the 12 warmest years in the instrumental record of global surface temperature (since 1850). Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases. The average global surface temperature is projected to increase by between 1.4 and 5.8°C over the period 1990 to 2100. Satellite data since 1978 show that annual average Arctic sea ice extent has shrunk by 2.7 [2.1 to 3.3]% per decade. Global average sea level rose at an average rate of 1.8 [1.3 to 2.3] mm per year over 1961 to 2003. The rate was faster over 1993 to 2003, about 3.1 [2.4 to 3.8] mm per year (IPCC 2007).

This buildup is caused by continued economic growth despite its potential to alter the global climate (Hoffman 1998). Commonly predicted effects include drier weather in midcontinent areas, sea level rise, more violent storms, and northward migration of vector-borne tropical diseases and climate-sensitive species (IPCC 1990). Many species would not be able to migrate quickly enough and would become extinct.



Sources: Gerrard 2008

According to Stern (2006), whatever mitigation measures currently taken, it is no longer possible to prevent the climate change that will take place over the next 2 to 3 decades. Furthermore, the cost in implementing mitigation and adaptation measures is only a fraction of the actual devastation due to impact from business as usual scenarios, even if only 50% of the prediction as a result of business as usual materializes.

Predicted scenarios in Malaysia are nothing less significant. According to Chong and Mathews (2001), Malaysia will face an increased of temperature by 0.18°C per decade. However, the more concerned should be given to changes in rainfall which has been predicted will varied between -30% to +30% from current trends (Chong & Mathews 2001). Less rainfall will increased drought episode whereas increased rainfall will resulted in severe flood. Rainfall variation in Malaysia will have very significant impacts to agricultural activities.

MALAYSIA'S CARBON DIOXIDE EMISSION

CO₂ is the most important anthropogenic greenhouses gases (IPCC 2007). Malaysia's CO₂ generation has increased from 55.3 MtCO₂ in 1990 to 177.5 MtCO₂ in 2004 which is well above global average (Table 1).

Table 1. CO₂ Emission in selected countries, 1990-2004.

CO ₂ emitters	Total emissions (MtCO ₂)		CO ₂ emissions annual change (%)	CO ₂ emissions share of world total (%)		Population share (%)	CO ₂ emissions per capita (tCO ₂)	
	1990	2004	1990-2004	1990	2004	2004	1990	2004
United States	4,818.3	6,045.8	1.8	21.2	20.9	4.6	19.3	20.6
China	2,398.9	5,007.1	7.8	10.6	17.3	20.2	2.1	3.8
Russia	1,984.1	1,524.1	-1.9	8.8	5.3	2.2	13.4	10.6
Korea	241.2	465.4	6.6	1.1	1.6	0.7	5.6	9.7
Indonesia	213.8	378.0	5.5	0.9	1.3	3.5	1.2	1.7
Malaysia	55.3	177.5	15.8	0.2	0.6	0.4	3.0	7.5
Singapore	45.1	52.2	1.1	0.2	0.2	0.1	14.9	12.3
Myanmar	4.3	9.8	9.2	0.0	0.0	0.7	0.1	0.2
Brunei	5.8	8.8	3.7	0.0	0.0	0.0	23.0	24.0
Cambodia	0.5	0.5	1.3	0.0	0.0	0.2	0.0	0.0
Global aggregates								
High-income OECD	10,055.4	12,137.5	1.5	44.3	41.9	14.3	12.0	13.2
Low human development	77.6	161.7	7.7	0.3	0.6	7.8	0.3	0.3
World	22,702.5	28,982.7	2.0	100.0	100.0	100.0	4.3	4.5

Source: UNDP (2007)

Global concentration of CO₂ has increased to 380ppm in 2005. In business as usual scenario, stabilization of CO₂ at 450ppm CO₂e will limited temperature increase by 2°C above preindustrial level, while stabilization of CO₂ at 750ppm CO₂e will increase

temperature by 5°C (IPCC 2007). Scientists have warned that temperature increase more than 2°C will be very risky to our life.

During a period of 1990 to 2004, Asian countries has the most significant increase in CO₂ generation. This mainly due to rapid development and industrialization especially in China and India where both countries amounted 22% of world emissions (Wee et al. 2008).

CHANGING BEHAVIOUR THROUGH CARBON REDUCTION INITIATIVE

Core to the earth's destruction are millions of decisions made by consumers (Bazeman & Hoffman 1999). The last four decades of behavioral decision research have resulted in researchers being able to predict, a priori, how people will make decisions that are inconsistent, inefficient, and based on normatively irrelevant information. People rely on simplifying strategies, or cognitive heuristics. While these heuristics are frequently useful shortcuts, they also lead to a wide variety of decision biases (Kahneman & Tversky 1973, 1979; Bazerman 1998).

According to Bazeman and Hoffman (1999) consumers ignored the future of environment even though there are well informed about the risks. They found out that consumer still giving **high discount rates** in their consumption behavior by purchasing energy-inefficient appliances, despite the implications for future energy costs. It is understood that most consumer in developing countries will consider the lower price of goods than the product itself and green product always cost more.

Since behavior changes are inter related to monetary issues, our research try to tackle both aspects by pursuing initiative that suited consumer. Carbon reduction programs has been applied in various part of the world, however, more concentration has been given to industrial activities and larger organization. Approach on changing individual behavior has started by Carbon Reduction program in East of England since 2003. Since climate change issues encompasses various aspect, this program give concentration on energy based aspects (Simon 2008).

Carbon Reduction Initiatives (CRI) @ Universiti Kebangsaan Malaysia

CRI in UKM has started the program in middle 2008. This research applies DEFRA Diagrammatic Representation Model (Figure 2) in implementing the CRI. The pilot project for CRed program is in UKM campus.

Based on Human Development Report, UNDP (2007), Malaysia's CO₂ generation has increased from 55.3 MtCO₂ in 1990 to 177.5 MtCO₂ in 2004. Per capita CO₂ emission for Malaysia has increased from 3 tCO₂ per person in 1990 to 7.5 tCO₂ in 2004 (Figure 3). Malaysia's CO₂ per capita in 2004 are exceeding global average (4.5 tCO₂).

Using this figure, it is estimated that UKM with population of 31,302 has generated 234,765 tCO₂. If UKM need to reduce carbon generation based on 1990 figure, 60% of carbon generation or 14,859 tCO₂ need to be eliminated.

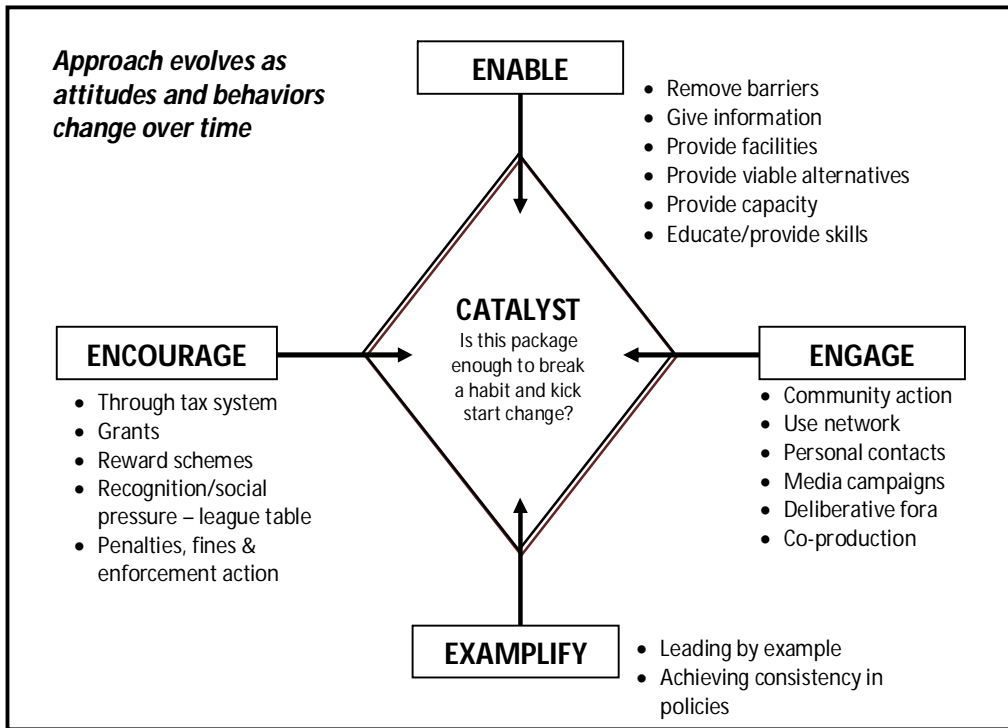


Figure 2: DEFRA Diagrammatic Representation (DEFRA 2007)

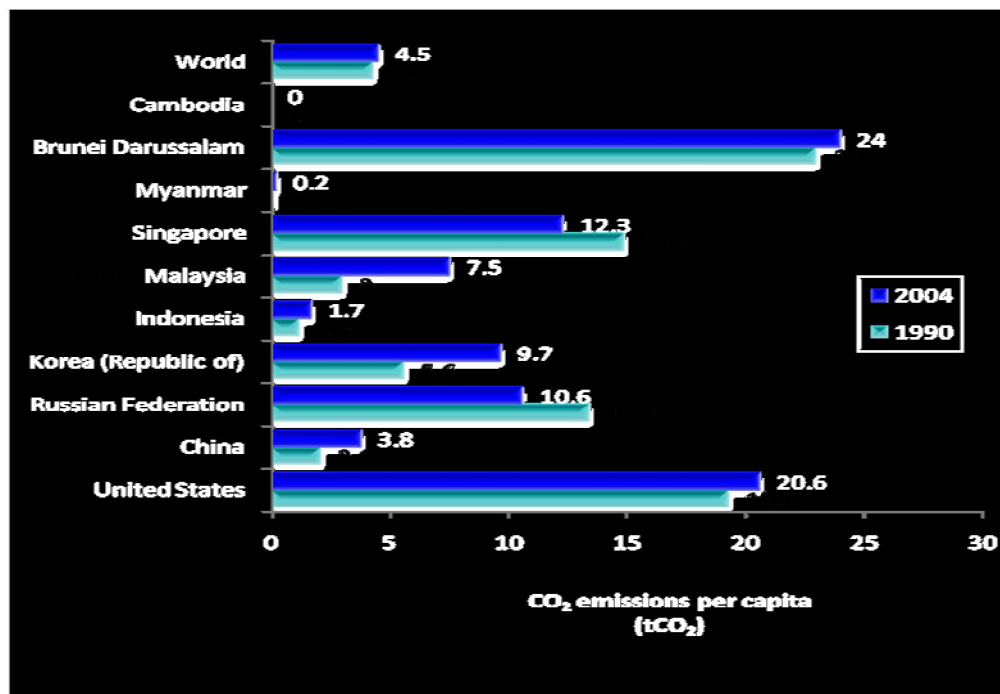


Figure 3: CO₂ per capita in selected countries (UNDP 2007)

Since 72% of UKM populations are student and mostly living in UKM student residential facilities, the pilot project started in student residential college. CRI@UKM has set a target to reduce 60% of carbon emission by 2010 through various strategies especially that related to energy efficiency programs and possible changes in UKM purchasing policy (Kadaruddin et al. 2008). This project has been divided into several phases (Table 2).

Table 2. CRI Implementation Phases

PHASES	PROGRAM	OBJECTIVE
1	<ul style="list-style-type: none"> • Compiling baseline data • Awareness campaign on energy efficiency • Monthly energy monitoring 	Concentration on students' residential colleges (2 colleges). Priority is on building awareness on energy efficiency.
2	<ul style="list-style-type: none"> • Energy efficiency awareness program in all students' residential colleges • Energy reporting 	Reducing energy consumption by 10% Championing program created
3	<ul style="list-style-type: none"> • Energy efficiency awareness program in all UKM facilities (faculties, institutes etc) • Energy reporting 	Reducing energy consumption by 10% Championing program created
4	<ul style="list-style-type: none"> • Other CO₂ reduction program (waste, transport, reforestation) 	30% CO ₂ reduction
5	<ul style="list-style-type: none"> • Pursuing changes in purchasing policy • UKM energy and development planning policy • Consideration for alternative energy 	60% CO ₂ reduction Solar powered building

Source: Kadaruddin et al. 2008

This program has created a long term planning strategies in effort to reduce carbon generation and contribute to the process of mitigating climate change. Using DEFRA Diagrammatic Representation Model, we have strategized the CRI to benefit all the stakeholders (Figure 4). However, the success of this program needs commitment from all stakeholders from university top management to student. Even though the real intention for this program is to mitigate climate change, we use economic/monetary factors to gains attention. At present, electricity costs for UKM is nearly RM 1 million/month. We are targeting only 10% reduction which is RM100,000 per month. If this could be achieve through Phase 1-3, an investment could be made to new technologies or alternative energy. Furthermore, the saving can be returned back to university community through students' program and staff development.

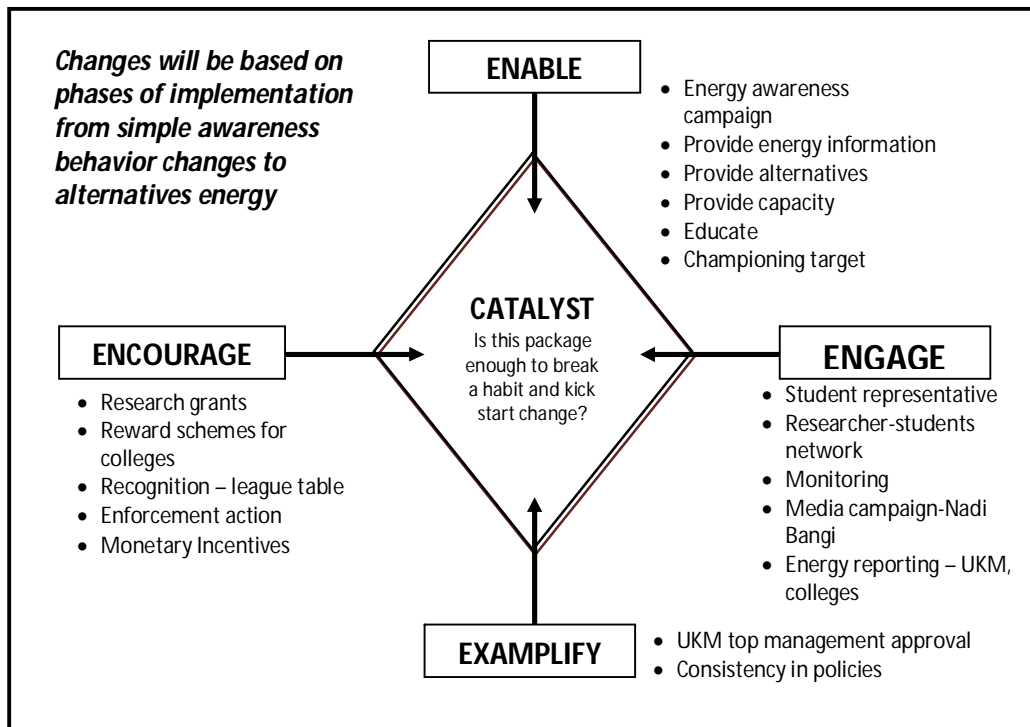


Figure 4: CRI strategies in UKM

Source: Kadaruddin et al. 2008

CONCLUSION

Climate change will give an impacts to everybody therefore it is everybody responsibility to try to mitigate in whatever ways they can. CRI will provide information and strategies that suited everybody from simple energy awareness or efficiency to alternative energy. The most important aspect for CRI is consumers will get monetary gains for efforts that they make. It is a long journey but we must start now.

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