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(Revised version)

The Hong Kong Government Legislative Council Panel on Environmental Affairs
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Submission of Kadoorie Farm and Botanic Garden to the Hong Kong Legislative Council on the Issue of Climate Change and Hong Kong.

1. Climate Change and Peak Oil

I believe that it is vital to view and plan for the effects of Climate Change and Peak Oil in parallel, as the two issues are intertwined. To plan for only Climate Change reduction or mitigation without considering the Peak Oil phenomenon will very likely lead to ineffective decisions, whereas actions carefully designed to combat both challenges are likely to be successful.

2. Climate Change and Education

Climate Change is fairly well researched and much is known by scientists. However, according to leading climate scientist James Hansen of NASA, there is a big gap between what scientists know and what the public understands (Hansen).

Suggested Government Action - Climate Change and Education:

I suggest that the Hong Kong Government should urgently embark on a sustained, positive public education programme through schools, universities, business groups, the media and public forums to raise awareness about climate science so as to significantly increase the public understanding of Climate Change, its current and future effects, and what citizens, businesses and institutions can do to:

a. Reverse Climate Change.

b. Adapt to Climate Change. Adopting a positive attitude towards this crisis (and the effects of Peak Oil) will help to build more resilience against its effects. There is a growing realization around the world, including Hong Kong, that helping people to develop more love for their fellow humans, animals and plants, and helping people find joy and meaning through enhancing their relationship with nature rather than money, are important to wellbeing (Aked et al. 2008; Macy). A shift in mindset and awareness of who we are is felt to be essential for people to be able to adapt. Civil

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society and the Government have a role to play in this. Schools are pivotal and should be teaching young people about adapting to the consequences of Climate Change and providing the practical, intellectual and emotional skills with which to cope. Governments around the world are now including this work in their curriculums under the field of Education for Sustainability. (e.g UNESCO; The Governments of Australia; Britain; Denmark; Wales)

3. Peak Oil and Education

The age of cheap oil is likely to be coming to an end within the next few years. Our economy and our whole lifestyle in Hong Kong are reliant on cheap oil. Peak Oil is likely to cause economic instability, at the same time that Climate Change meets or surpasses the worst predictions of leading scientists. It is easy to feel overwhelmed, helpless and fearful of the world of the future. In my personal experience very few people in Hong Kong have heard of Peak Oil or its likely impact and we therefore have very little resilience against it.

The Peak Oil phenomenon has been very widely researched by writers (Heinberg, Kunstler), economists (Birol) and oil experts (www.oilcrisis.com) over recent decades. Peak Oil is of great concern to the International Energy Agency (IEA), The US State Department (USSD), and the German Military ("*probability of bottlenecks in the supply of important goods including food supply; partial or even complete market collapse … government rationing")* (German Military). US Department of Energy *("The peaking of world oil production presents the US and the world with an unprecedented risk management problem… abrupt, revolutionary and not temporary"* (USDE). Heads of major oil companies Conoco and Total have stated that production of 100 million barrels of oil per day to meet demand is impossible (Mulva; De Margerie). Deputy Chief Economist of CNOOC China's oil giant Zhang Weiping said in September 2006, *'I expect global oil production to peak during the next five years."* (Zhang). The head of General Motors, Rick Wagoner, has stated that oil demand is exceeding supply (Wagoner). Insurers Lloyds have reported their serious concern over Peak Oil and the wider energy crunch (Froggatt & Lahn). Government leaders have made statements of concern about Peak Oil, US President George W. Bush stated in 2007, *"Oil prices are going up because the demand for oil outstrips the supply for oil.. we use too much oil and the capacity to replace reserves is dwindling."* (Bush); Vice President Dick Cheney stated in 2008 *"There is not a lot of excess [oil] capacity worldwide"* (Cheney).

Peak Oil is not the end of oil, just the end of cheap oil. The exact timing of Peak Oil and its effects can not be accurately predicted, but most experts point to 2010 as the most likely date of global peak production (Oildrum.com). We may not know for sure if Peak Oil has happened until a year or more after it happens. The current economic slow-down may delay it. Some analysts project that Peak Oil will come later; this would be good as it would give us more time to prepare. Analysts predict that following the peak, oil supplies will be progressively unable to meet demand; prices will thus go through the roof, bringing unprecedented economic and social challenges (Kunstler).

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Oil is currently (November 2010) priced at USD 85 per barrel; analysts have different predictions about the price after Peak Oil ranging from USD 125, USD 200 to even USD 800 (Oildrum.com). The end of cheap oil will severely limit food supplies (I will discuss this later in this paper), the production and transportation of all manufactured goods, and the provision of all services.

Experts believe it will take massive changes to adapt cities and economies to a post Peak Oil world, and that the transition process will take well over ten years if we are to avoid the social unrest and collapse that may accompany a sudden change (Kunstler). Our preparations are now far behind schedule and time is of the essence.

The steps we should take to build resilience against Peak Oil must also help us to reduce and adapt to Climate Change; these are laid out elsewhere in this paper.

Experts feel that these challenges are best faced through community support, planning and action (Hopkins, 2008). The economy and everyday life in Hong Kong (housing, food, transport etc.) depend entirely on cheap fossil fuels. This is not sustainable. The good news is that the alternative may turn out to be much more attractive: less work, less travel, less overseas products to spend money on, working nearer to home, growing, harvesting, cooking and sharing some of our own food, engaging more and working more with neighbours in community activities; lower expectations of financial wealth and more opportunity to build natural and spiritual wealth through more time spent with nature. This kind of future seems not so bad if we are able to adjust positively when we need to. KFBG and many other organizations are promoting community participation in building more positive, life-sustaining lifestyles for ordinary people, and helping to build personal resilience to great change. Endless economic growth is impossible on a finite planet and was possible only while energy availability expanded. We have already gone well past the point at which our lifestyles have unbalanced the safe working of the planet; that was at an average global temperature of 0.5 degrees Celsius above pre-industrial levels (Hansen). A massive turnaround, referred to by some experts as ‘The Great Turning’, a movement towards localized economies and simpler lifestyles is inevitable so it is best to prepare people for this (Macy, 2008).

Suggested Government Action - Peak Oil and Education:

I suggest that The Hong Kong Government should urgently embark on a sustained, positive, public education programme through schools, universities, business groups, the media and public forums to raise awareness about Peak Oil so as to significantly increase the public understanding of Peak Oil, its likely future effects, and what citizens, businesses and institutions can do:

a. The Government should increase the Hong Kong people’s awareness and understanding of Peak Oil and its consequences People should know that food, for example, will take up a higher proportion of their income when it is not subsidized by cheap oil.

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b. The Government should help people to adopt a positive attitude towards this crisis by showing them the positive and enjoyable way to a more sustainable lifestyle, less dependent on cheap oil.

c. The Government should provide training in all schools (to teachers and children) and at community level to build the skills needed by our people to be more self-sufficient. These would include farming and many more skills that most of us lack. Whereas we cannot feed 7 million people from the land available in Hong Kong, we can go a long way towards regional self-reliance with concerted planning and action.

d. An expert working group should be formed to determine what skills will be needed; collect, record and adapt appropriate skills; organize the training of trainers and the spread of programmes. KFBG are able and willing to contribute to this group.

e. The Government should help to incubate and develop a large number of social enterprises that will engage and equip the broad community.

4. Possible actions to address the combined effects of Peak Oil and Climate Change.

The key areas that need to be addressed urgently are food security; energy; plants; transport; economy, population and water; these are each explored below.

4.1 Food Security

The vast majority of Hong Kong's food is imported from China. The only way China has been able to produce enough food to feed its huge population is by adding very large amounts of chemical fertilizer and pesticides to the soil for decades. These fertilizers and pesticides are fossil-fuel-based. Much industrial farming is likely to become economically unsustainable after Peak Oil. In many areas fertilizer and pesticides have also killed the soil as the natural processes driven by micro-organisms have stopped, creating the need for more and more fertilizer. Even without factoring-in Peak Oil, the climatic stress on food production and over-population are very likely to make it harder for our Mainland friends to support us in the future, perhaps bringing a food security crisis to Hong Kong in the not so distant future. The saying goes that civilized society is only three meals deep. Increased Climate Change will probably bring about a gradual falling of crop yields, though with perhaps increased yields in higher latitudes (Zhenglis).

Now HK's largely unused and abused farmland is inadequate to feed its huge population, yet villagers, planners and developers seek to cover more and more of it with concrete to promote short-term financial growth. The production of one tonne of concrete relates roughly to one tonne of carbon emitted so building should be kept to a minimum.

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Local resilience is vital. It is important that people start now to understand the issues, to re-skill and to join or form more and more community groups throughout Hong Kong to develop local urban and rural food gardens to build more resilience into Hong Kong's food system – just as in other cities worldwide (e.g. www.capitalgrowth.org). It is also important that land owners (a large proportion of unused farmland is owned by property developers) and the Lands Department make land available to these groups. The Government should conduct a study to assess the carrying capacity of Hong Kong land and make plans accordingly. The Government may need to resume all existing uncultivated farmland so as to ensure that a secure strategic stock of community farmland exists, both urban and rural. We must not cut the forest for farmland, for this too provides vital ecosystem services including carbon sequestration. Agricultural land must retain its zoning protection and must not be covered with concrete, houses, roads or logistics hubs. Many vacant urban plots exist. The Government must put adequate and stable financial and administrative resources behind developing as many sites as possible into urban community food farms; also teaching organic farming and other basic skills to young and old and helping groups to organize. Soil contains twice the carbon of air, more under organic farming practices, so if we change all industrial farming in the world to sustainable organic farming that restores carbon-rich organic matter to the soil through compost we can greatly reduce climate change. According to Professor Lal, a renowned soil expert at Ohio State University, by changing land use (away from meat production) and changing farming to sustainable practices we should be able to reduce the CO_2 parts per million in the atmosphere from (current level) 380 ppm to 330 or even 300 ppm (Lal, 2008). By bringing Hong Kong's abandoned farmland into appropriate organic production, we would be a part of this initiative, as active organically farmed farmland will absorb more carbon than fallow land. It will also feed more people with healthy food, create new educational, social and recreational opportunities and provide many jobs, as organic farming can be labour-intensive.

Suggested Government Action - Food:

a. It will be beneficial to the current and future community if there is a policy with immediate effect to prevent the change of Town Planning zoning for any agricultural land that would allow development.
b. The Government should make it 100% clear that a change of zoning of agricultural land is never going to happen so there is no point for developers and other owners to hold on to agricultural land in the hope of a future change of zoning for development.
c. The Government should create a financial incentive for land owners to release agricultural land for organic production. Government economists could work out the details – resumption and subsidies are two options.
d. It would be beneficial to make it a policy that a fixed percentage, say 10% as in New Mexico (Ausubel), of food purchased by Government institutions (rising eventually to 100%) must be organic and produced locally or nearby. Thus schools, hospitals etc must buy local

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and organic. This will create a huge market of guaranteed business that will enable organic farmers (and farmers converting to organic) in Hong Kong and South China to get established. The Government should subsidize the local organic food market so as to make it cheaper for the consumer to stimulate the market.

e. The Government should commission research into effective methods of growing food on rooftops in such a way that the plants can survive the current and future climate.

f. The Government should make it policy that all new housing developments must set aside and encourage a certain proportion of their public space as community farmland, managed under a community scheme whereby individuals contribute labour to any part of the farm and receive vouchers in return, which they can use to buy vegetables etc. (United States Department of Agriculture). Existing housing developments should be incentivized and encouraged to adopt these schemes as far as possible.

g. The Government should release large urban plots for Community Food Farms and put resources into training and managing these Farms. (A bi-product of Community Farms is increased community and personal spirit and hence resilience.)

h. The Government should encourage the reduction in meat consumption through public education and taxation, as meat production, especially beef, is a large contributor to climate change.

4.2 Energy

Of course a basic starting point is an urgent shift away from producing energy from fossil fuels; this may have an effect on slowing the rate of climate change (Hansen). However projections generally predict that global peak coal production may occur sometime around 2025 (Energy Watch). Natural gas production is expected to peak around 2020 (Bentley), after which production will continue to decline irreversibly, with the result being that, following economic laws, the price must increase. The current global economic system is dependent on growth to service debt, and is also dependent on increasing supplies of energy. Ever-increasing supplies of energy are impossible. Nuclear power is seen as a stop-gap and this may or not be valid; it may buy some time. Unfortunately a uranium peak is approaching; some analysts claim that Peak Uranium has already passed (Uranium Investing News). The depletion of high grade uranium ore means that the Energy Return on Energy Invested is worsening. Taking into account the full lifecycle of nuclear electricity generation including building and decommissioning of power stations, mining, transportation and milling of the fuel, and managing the waste, it is an open question whether nuclear projects are likely to consume more energy than they generate, thus worsening the climate change/ peak oil challenge. Nuclear electricity generation is far from carbon-free since most aspects of the nuclear life cycle are powered by fossil fuels. The general peaking of fossil fuel resources and uranium will increase costs dramatically. There are also the questions of accidents, extremely long term storage challenges and the risk of terrorism to be considered (Fleming).

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If an energy supply shift is to be made it should be to renewables. The current level of electricity use cannot realistically be met by renewables. If we double the current global amount of renewable energy, double it again, and double it again – a heroic achievement which may take a decade – it will still only amount to 3% of the current energy requirements (Exxon Mobil). According to James Hansen the maximum capacity of wind and sun is 20% of our needs (Hansen). So of course it is vital to the future of the human race that energy consumption is drastically cut now. A reduction in wastage now will allow the fossil fuels under the ground to stay there longer so as to be available for essential services in the future. Indeed experts tell us that to turn around Climate Change, two-thirds of the fossil fuels remaining in the ground today need to stay there and must not be burned.

Suggested Government Action - Energy:

1. The Government should ban now the obvious wastage of energy in building lighting. Reduce the lighting of Hong Kong's skyline to a minimum. Answer the critics by explaining the reality.
2. The Government should reduce the usage of energy on street lighting by cutting the number of working street lights and using more efficient bulbs.
3. We should move away from coal burning power generation as soon as possible.
4. Contingency plans for long-term (hopefully comfortable) survival in a severely reduced energy situation should be made.
5. The Government should put resources, and urgent and priority action, into establishing as much renewable energy generation as possible, whilst there is still cheap oil available to develop and produce the devices.
6. The Government should thoroughly research all aspects of the nuclear lifecycle under different scenarios and share the results with the public before committing to a major increase in nuclear power-generated electricity.
7. It would be beneficial for Hong Kong to establish an international competence and research centre for renewable energy, with an emphasis on exploring the use of photosynthesis as an energy source.
8. The Government should investigate electricity rationing through the use of Tradable Energy Quota's (TEQ's) that use maximum emissions allowable (by nature and by international enforceable emissions targets) as the starting point; Under this scheme each adult citizen, business and Govt. department etc. can only buy electricity with ration coupons, real or virtual. Those using less than their quota may sell the unused quota amount on the local market (at a higher price) to those who want to use more energy; thus creating an incentive to reduce grid generated consumption and also guaranteeing that the emissions target is met. (Flemming TEQ's).

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4.4 Plants

Plants, including trees, are an import tool in reducing climate change and the effects of climate change. Plants have a positive CO_2 balance (they absorb CO_2 and produce oxygen); they stabilize and enrich soil; they retain water, thus protecting water supplies and reducing flooding; they provide habitat for wildlife and control weather, thus helping to keep our ecosystem functioning; they also provide food. Hong Kong's hills were once covered with forest but many are now grasslands. The tree cover was lost through human action and efforts to regenerate the forest have been repeatedly blocked by hill fires. Hill fires have a double impact: they put more CO_2 into the atmosphere and they stop or slow the regeneration of the forest cover. We must repair and enhance the functioning of our forests.

Suggested Government Action – Plants.

1. The Government should make it a priority objective to prevent all hill fires (much work has been done already). Devise a package of measures that make major hill fires a thing of the past. This may include school and community education, paid hill-fire prevention teams, media campaigns; massive on-the-ground presence on high risk days including festivals; this presence may include teams that cut gravesites in advance; enforcement of laws and very heavy penalties for those who can be caught; and other approaches learnt from fire-prone areas overseas.

2. Based on solid science, the Government should undertake a major tree-planting effort to identify the appropriate native species of trees and shrubs to grow in every location, collecting seeds, growing seedlings and planting these, using the correct methodology, on every possible hill in Hong Kong, using trained volunteers (great efforts have been made by AFCD to restore forests, of course, and this should continue). Research into methods of planting trees and plants on steep hillsides should be conducted and if feasible, implemented (e.g seed balls). A bi-product is that tree-planting by groups enhances community and personal spirit. Additional benefits of more trees are more retained water, less flooding of villages, less need to concrete natural river systems, and fewer and smaller land slips as there are more roots to hold the slopes.

4.5 Transport

Motorized road transport is a contributor to Climate Change and will be seriously challenged by Peak Oil. Road transport should be severely reduced to try to reverse Climate Change and will be greatly affected when oil reaches a price unaffordable by the general public.

Suggested Government Action- Transport

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1. Plans for infrastructure projects like bridges and roads should be rationalized, keeping in mind that oil may be too expensive in the coming years for the general public to run private vehicles, and non-local commercial transport is likely to be reduced. In particular the Government should review whether it is realistic to expect 50,000 vehicles laden with food and manufactured good to be rolling across the Zhuhai\ HK Bridge every day for the next 40 years (the volume and time span needed to pay back the construction costs). The Government should also review the wisdom of producing so much concrete as one tonne of concrete roughly equates to one tonne of carbon emitted into the atmosphere.

2. Trains are more likely to be viable for food transport and this would need to be planned.

3. A priority should be to establish cycle tracks and parking bays covering all parts of the territory that will be able to accommodate large numbers of cyclists.

4.6 Economy

Hong Kong's economy is currently reliant on the financial industry and the import and transit of goods in the global trade system. These goods are reliant on cheap oil in various ways and they also contribute to climate change. Peak Oil will inevitably dry up manufacturing and trade. This will be good for Climate Change and bad for industrial growth economic model. Employment in Hong Kong's most common employment sectors will be severely reduced under post-Peak Oil conditions. This may lead to social unrest.

Hong Kong currently has one of the highest per-capita Ecological Footprints in the world. Humanity's ecological footprint has more than doubled since 1966. In 2007, the most recent year for which data are available, humanity used the equivalent of 1.5 planets to support its activities (Living Planet Report 2010). Our consumption is a driver of Climate Change. Peak Oil will force us to slow this consumption dramatically when it comes; we must guard against reactive measures that increase Footprint and greenhouse-gas emissions, such as the proliferation of bio-fuel plantations.

Suggested Government Action – Economy:

1. A positive view of the inevitable changes and a positive vision for an age of austerity should be adopted and promoted; this may be difficult but is important to wellbeing.
2. The Government should take a leadership role in planning and preparing for a localized economy, where Hong Kong people produce, trade and consume as locally as is feasible.
3. The Government should evaluate the situation and include NGO's, community groups and academics in making plans and setting up programmes that will slowly transition Hong Kong to be able to meet future needs. This will also help to reduce carbon emissions now.
4. Although it may be counter-intuitive for a Government under the global industrial growth

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system, I suggest that the Government takes steps to reduce consumption through taxation, subtle education and positive incentives to spend money on items that have a positive impact on climate change. Such a list of items would need to be developed and is controversial.

5. The Government should incentivize the creation of Green Jobs (Asia Business Council, Ausubel). Green Jobs are jobs that will increase the integrity and functioning of nature (for example sustainable forestry on degraded land; organic farming; local food system) and jobs that build local resilience (Hopkins).
6. According to experts (Zenghlis), most of the required CO_2 emissions reductions can be made through legislation (carbon tax and other regulations to put a price on the externalities of business; banning of inefficient electrical products, limits on air-conditioning levels, banning of polluting vehicles, zonal road pricing, strict building codes, minimal construction, etc.). I suggest that this be investigated and such legislation be drawn up and implemented without delay.
7. In addition to the points in item 6 above, putting a pollution levy on vehicle fuels at the point of entry into Hong Kong will reduce CO_2 emissions by pricing some users out of the market. Leading climate scientist James Hansen proposes a levy that gradually increases over time, where the collected funds are channeled back to the public through grants or subsidies as incentives to buy low-carbon related products and localized renewable energy creating devices. Thus transition is funded partly by fuel (Hansen).

4.7 Population

Even with great advances in sustainable agriculture, without fossil-fuel energy it is possible the earth cannot support the world's current population given the expected impacts of climate change on agriculture.

Suggested Government Action – Population:

1. Calculations should be made to determine how many people Hong Kong can support under post peak oil and climate changed conditions.
2. The Government's '2030' predictions should be reviewed.
3. Although Hong Kong has one of the lowest birth rates in the world we need to contribute to a large decrease in the global population. Encourage couples now to have fewer children through education and positive incentives.

4.8 Water

Hong Kong relies heavily on imported water from Guangdong, which faces an increasing shortage of water and this pressure will only increase with the expected changing climate of drier winters and wetter, hotter summers (Yueng, 2006). We have little or no resilience in water. Lack of water will lead to social unrest and health problems, and food crops will die in winter. If the global average

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temperature reaches 3 degrees Celsius above pre-industrial levels there will be one billion more people than today facing serious water shortages (Zhenglis).

Suggested Government Action – Water

1. The Government should devise and implement plans for local water collection and storage.
2. The Government should devise and implement plans to treat and recycle a large proportion of waste water.
3. The Government should devise and implement plans for reducing water wastage, including incentives.

5. Conclusion

LEGCO members are very fortunate to be our leaders during this great time of change and challenge. You have the opportunity to lead the Hong Kong society into a gradual transition that can see the people and the economy smoothly adjust to a new era with no cheap oil, less consumption and less energy use. We need to be well on our way towards being ready for a post-cheap-oil economy in this decade.

If we continue with business as usual - already climate zones are shifting pole-wards at 5 km per year, while atmospheric carbon will cause the oceans to be more acidic than they have been for 25 million years - we can expect increasing magnitude of species extinctions and ecological collapse (Hansen). According to Dimitri Zhenglis of the London School of Economics and a co-author of the Stern Review for the British Government, if CO_2 emissions peak in 2011 and reduce by 6-10% each year thereafter, CO_2 in the atmosphere may stabilize at 450 parts per million (ppm) (Zhenglis) (It is around 380 ppm today, and leading scientists believe that it must not go above 350ppm, so a fast reduction is vital) (Hansen). 450ppm is likely to limit the global average temperature increase to 3 degrees above pre-industrial levels (we have not yet reached +1 degrees, but +2 degrees now looks unavoidable). Though much hotter and more unstable than today, 3 degrees may be survivable for the human race, in a more ecologically balanced civilisation. It may already be too late to stabilize at 450ppm (Zhenglis). This message requires serious consideration.

Each year that goes by will make it harder to stay below 3 degrees (Hansen, Zhenglis). Sir David King, then the UK Government's Chief Scientific Officer, stated in Science Journal, January 2004, *"Delaying action on climate change for decades, or even just a few years, is not a serious option."* (King). If we are slow to change and emissions peak in 2020, and if we only achieve slow annual declines of 1% to 2.5% afterwards we can stabilize below 550ppm CO_2, which may mean a global average temperature of 4 degrees Celcius above pre-industrial levels. A 10 year delay almost doubles the annual rate of decline required (Zhenglis). It will be financially cheaper to make changes now than later (Zhenglis). Professor Martin Parry, co-chairman of the IPCC impacts working group stated in

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2007, "*We now have a choice between a future with a damaged world or a severely damaged world.*" (Parry). To reduce our current and future carbon emissions I propose the urgent implementation of the actions suggested in the sections above.

I suggest that you urgently form a special working group of Government officials, business people, academics, educators and NGO professionals to examine and answer the key questions of how Hong Kong will feed itself, do business, educate its citizens, power itself, provide transport, provide water etc in a post-peak oil, climate-changed world, and that recommendations from this group are put into action, as priority policies with all the needed funding and support, as soon as possible, to give a good chance of a positive future with minimal civil unrest. There is an urgent need for inclusion of an Energy Descent Action Plan into government policy to guide Hong Kong government departments, businesses and citizens in taking a realistic, peaceful path to reduce our reliance on fossil fuels and cut down CO_2 emissions.

Climate Change and Peak Oil are not economic or political issues; they are scientific, geological and inter-generational ethical and moral issues and when combined are the greatest challenge ever faced by humankind. I believe the Hong Kong Government has an obligation to manage the planet as a public asset and has the responsibility to inform the public, create a vision and a plan and guide the citizens to get through this imminent, complex crisis, and to give equal rights to current and future citizens. Many cities, towns and villages around the world are already making plans and taking positive steps in this direction and enjoying it. It takes time to cultivate resilience and we need the policy and implementation initiatives in place very quickly.

Yours sincerely

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With contributions from senior staff of KFBG.

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