

*Hong Kong Sustainable Development Forum*

*Response*

*Making Choices for our Future*

*First Strategy*

*Invitation and Response Consultation*

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## Introduction

The Hong Kong Sustainable Development Forum (HKSDF) welcomes the release of the *Making Choices for our Future First Strategy Invitation and Response Document* (hereafter the document) as it is a first opportunity for stakeholders to express views on the application and implementation of the sustainability, for the three pilot areas, since the Chief Executive's policy address in 1999.

After thorough review of the document, attending various forums, workshops and based on our research, our views and concerns about the following critical issues are detailed herein.

The document provides an excellent starting point for discussion and comment in these complex areas and necessarily covers the three pilot areas at a relatively high level in order to reach a wide audience and to avoid being too technical. The pilot areas under discussion are:

- Renewable Energy
- Urban Living Space
- Solid Waste Management

## Sustainability Principles

The concept of Sustainable Development (SD) is relatively simple; an inclusive, holistic approach, that considers all the factors related to a particular decision. The three pillars of SD include environmental, societal and economic factors.

Whether by accident or design, the three pilot areas presented for separate consideration are closely inter-twined, and using a sustainable approach should be considered, not as separate individual segments, but simultaneously as three sections of the same picture.

For example, any meaningful review, for example urban living space, cannot be complete, if other considerations are excluded. Creating urban living space without through consideration of heritage, solid waste, energy conservation, etc. is not an inclusive approach. A sustainable framework for urban living must consider other factors besides land value, plot ratio, ratio of site coverage, etc.

Careful consideration and incentives must be provided to encourage sustainable policies that encompass all aspects of sustainability including renewable energy installations, solid waste management and improved urban environments.

From the forgoing, it is clear that Government policies, if sustainable policies are to be implemented, must be framed, cognisant of the related Sustainable Development issues.

## **Renewable Energy**

### **Introduction**

It is particularly encouraging that the document recognizes that Renewable Energy (RE) is already financially and technically viable. The HKSDF believes that RE is not only a credible alternative to fossil fuel but also an absolute necessity to sustainably match the growing demand for energy whilst not compromising stakeholder lifestyle.

During the Renewables2004 conference (July 2004), with representatives from some 154 countries in attendance, including China, signed a declaration supporting RE coupled with energy conservation. Each country agreed to generate ten percent (10%) of energy needs from renewable sources by 2010. The declaration stated:

“They reaffirm their commitment to substantially increase with a sense of urgency the global share of renewable energy in the total energy supply. They share the vision that renewable energies, combined with increased energy efficiency, will become a most important and widely available source of energy and will offer new opportunities for cooperation among all countries.”<sup>[1]</sup>

However Hong Kong, seeking to create a world class environment for business, has already fallen well behind other countries. The document presented, focuses primarily on electricity generation has overlooked several important aspects of a comprehensive energy policy, and these issues are raised herein for further discussion.

### **Sources**

Whilst the scope for definitions for RE is beyond the scope of this paper, it is noted that potential RE sources, include:

- Solar Radiation (PV and Thermal)
- Wind Power
- Wave Power
- Biomass/Biogas
- Geothermal
- Hydroelectric Power

The HKSAR Government has the opportunity to lead RE and energy conservation initiatives, with the added benefit of lowering long term operating costs and reducing locally generated pollution.

It is important for the Government to create a transparent strategic framework, that provides an environment where RE sources and research can be developed without excessive red tape, lest developers and their investment move elsewhere.

### **Economic Opportunities**

The Renewable Energy industry is a high technology business, requiring innovative engineers and scientists. Hong Kong has the potential to leverage its primary

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advantage, its location at the heart of the Pearl River Delta (PRD), with the manufacturing expertise within the PRD to drive innovation and lead the world in the RE development. However, without a domestic market Hong Kong will be left behind further behind.

Consider too, that during 2003, approx. US\$ 23 billion dollars was spent globally on RE research and development. RE offers direct and positive economic benefits; attracts investment and creates employment opportunities. Many of these employment opportunities will be value added and high-tech positions.

For example, a recent Canadian report estimated that RE initiatives could add over CAN\$9 billion and create 25,000 new jobs by 2010 for the economy of just one Canadian Province (Ontario).

In Japan, a RE world leader, used their domestic market as a proving ground for RE development. What is very clear, no country without a simple and accessible grid connection framework can develop a thriving RE industry.

The HKSDF believes that the Government is ideally positioned to leverage Hong Kong's position at the PRD gateway to develop a world class RE industry. A simple standardised grid-interconnection policy will be a key factor to achieve this objective.

### **Energy Efficiency**

The Renewables2004 conference<sup>[1]</sup> and the ISES white paper<sup>[3]</sup> elucidate the requirement for energy conservation policies to be developed alongside RE initiatives. The HKSDF believes that the Government should actively promote improved energy efficiency as a matter of policy. Voluntary initiatives whilst laudable, tend to be slow acting, mandatory policies are needed:

- Motivate energy conservation features in speculative commercial buildings - Specifically air-conditioning systems which presently account for more than 40% of energy consumed in buildings<sup>[2]</sup>
- Create sustainable energy conservation policy; consulting views of both experts and general public BEFORE framing policy
- Inefficient incandescent tungsten lamps<sup>[4]</sup> to be prohibited or taxed heavily to discourage usage
- Rejuvenate the Overall Thermal Transmission Value (OTTV) Code of Practice 1996 with a comprehensive prescriptive and performance-based energy code;
- Implement HK-BEAM ([www.hkbeam.org](http://www.hkbeam.org)) for all government projects, with a view to introduce mandatory HK-BEAM in 2008
- Replacement buildings shall be 35% more efficient than predecessor
- Presently, the difference between the time-of-use (TOU) tariff and the regular tariff is slight, and does not encourage energy saving innovation - Lowering the time-of-use tariff would reduce generation capacity.

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There is a commonly held misconception, both in government and community, that Hong Kong is more “advanced” than China. Whereas the facts indicate the opposite is true.

One example to illustrate the point, almost every road traffic signal in Guangzhou utilises the Light Emitting Diode (LED) lamps. LED lamps have an operating life span approx. 100,000 hours, and the lowest energy consumption per lumen. LED lamps save money, having low energy needs and lower operating costs since the frequency of lamp replacement is significantly lower – a sustainable solution.

The HKSDF believes that Government must review and incorporate mandatory performance based Energy codes for new buildings, both public and private, within six months.

### **RE Policy**

The white paper “Transitioning to a Renewable Energy Future”<sup>[3]</sup> published by the International Solar Energy Society (ISES) provides an eminently sensible roadmap to plan Hong Kong’s RE future.

Over the last few decades governments and organisations, from around the globe, have encouraged RE development, providing incentives, tax waiver, energy credits, low interest loans, financial assistance, etc. In fact, practically every type of imaginable incentive scheme has been implemented and tested somewhere.<sup>[3]</sup>

The Government must learn, leveraging this wealth of international knowledge, since it provides fast-track route to learn from the successes and failures of others. Another example is provided by the IEA<sup>[5]</sup> which clearly demonstrates that a mix of different energy polices and initiatives has been the most effective means to stimulate RE growth.

The Government owns, operates, and controls a wide range of buildings in Hong Kong and must lead by example, policies and strategies must be framed to encourage RE development.

### **Climate Change**

There is wide agreement that human activity is damaging the environment. In addition to the beneficial effect on the economy, RE systems also provide Certified Emission Reduction units (CER) through the Clean Development Mechanism (CDM) developed under the Kyoto protocol. These CER’s are a tradable commodity, and have financial value.

### **Enhanced Co-operation with China and Guangdong Providence**

The Government has been seeking increasing co-operation with China, specifically with Guangdong Providence. Since it is widely accepted that space is a serious constraint in Hong Kong, cooperation with China opens opportunities to leverage our respective regional advantages.

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Therefore, contrary to the document's stated position, RE sourced from China would be very competitive, and an example of increasing cooperation. For example, wholesale electricity generated by the Three Gorges hydroelectric scheme costs approx. 0.35 yuan/kwhr, which is equivalent to large scale coal generation. Another example, CLP already owns and operates a hydroelectric system in China, and consumers are not charged double or triple the normal charge.

Clearly it is not presently possible to generate 100% of Hong Kong's power needs with RE sources located within our border. However, a combination, with local and China sourced RE provides a transitional solution to increasing energy costs whilst lowering environmental pollution.

The Government must seek further cooperation within the PRD and the 9+2 region, leveraging the respective advantages.

### **Distributed Energy**

Distributed Energy (DE) solutions lowers transmission losses, improving efficiency and also opens opportunities for Combined Heat and Power (CHP) driving absorption chillers to provide air-conditioning. It is not widely understood or appreciated that waste heat can be used to provide air-conditioning.

RE systems, serving residential estates or industrial areas could qualify as DE. Mini or micro gas turbines, generating both electricity and heat is more efficient use of fuel than burning fuel at distal stations and discharging energy to the atmosphere or the environment as waste heat. Another key benefit will be stakeholder engagement, bringing the power generation back to the community will draw energy efficiency and waste issues to the door step.

Energy efficiency competitions, between blocks or entire housing estates would help the community understand that the energy problem is not a remote problem; it is a local problem for the entire community.

The document focus is primary electricity generation; however this is not the only opportunity for reducing reliance on fossil fuels. It is beyond the scope of this paper to detail every possible option; however the framework for the energy policy must reflect and take an inclusive view of present and possible future technologies. A sound energy framework would not restrict innovation solutions that use fuel resources more efficiently than traditional generating power stations.

Once again, as mentioned herein, the key to develop efficient DE technologies is a simple standardised grid-interconnection agreement.

### **RE Targets**

The document includes outline proposals for electrical energy generation via RE sources. The proposed targets are not specific and even the ambitious choice too conservation. RE targets need to be aggressive, forward looking, and to be effective must be specific.

Experience from overseas indicates that generators, acting in haste to meet targets, will choose the cheapest, fastest means to achieve a non-specific target. Therefore learning from this experience, RE targets must be precise, clearly defining the both the capacity and the source. For example, 10% (based on 2004 capacity) RE generated by onshore wind power before 31 Dec 2006. Plain English definitions will be an important aspect of any policy framework development.

RE targets that are not accompanied with aggressive energy conservation measures, will not improve the environment. The profligate waste of energy needs to be curtailed.

### **Building Integrated Photovoltaic (BIPV)**

Buildings in Hong Kong consume approx. forty percent of energy providing air-conditioning<sup>[2]</sup>, using Building Integrated Photovoltaic (BIPV) panels offer a double benefit, when fitted to occupied buildings, not only generating useful power but also lowering the solar gain striking the building.

During peak periods buildings must absorb the incident solar gain, approx. 25 MJ/square metre/day<sup>[6]</sup>, therefore the energy saved could be a significant a factor. Lowering the building air-conditioning load, reduces the electrical consumption, and also prevents pollution.

The Government should encourage BIPV installations, whether through plot ratio allowances, other GFA allowances or tax incentives.

### **Net Metering**

The mechanism for selling power to the grid or electricity feed in, is generally called net metering. RE suppliers and generators that create electricity for the general consumption (input power to the grid) must be actively encouraged and properly compensated.

As detailed elsewhere, it is clear that RE power generation reduces pollution, and greenhouse emissions. In 2000, Germany had the foresight to introduce the Renewable Energy Sources Act, a substantive and innovative energy policy that aimed to reduced greenhouse emissions and incentivized independent RE generation. It obliged utility companies to pay independent power producers (IPPs) for every kilowatt of RE power generated.

The policy was innovative because it offered different tariffs for each RE source. Germany, we must remember is a northern European country, and is now widely acknowledged as a world leader in RE industry, exporting both its products and technology, to countries all over the world.

Here in Hong Kong, the same principal should be applied, with a tariff structure to suit local conditions. Attractive tariffs drove Germany to the top of the RE leader

board, now German RE technology is used throughout the world. The Government should introduce tariffs that drive wide adoption of RE.

### **Renewable Fuel - Biodiesel**

Biodiesel is renewable energy fuel that can be used in existing diesel engines with little or no engine modification. Burning biodiesel fuel lowers emissions and most importantly practically eliminates Respirable Sized Particulates (RSP).

RSP are minute particles that float in air we breathe, they are created during the combustion process and emitted from both diesel vehicles and power plants. Since RSP are very small in size, they are drawn deep into the lung, and very harmful to the health of the population.

RSP free biodiesel can be economically created from waste cooking oil, and used to fuel vehicles or drive electrical generators, whilst reducing pollution. Biodiesel can be easily mixed and combined with petroleum based diesel products.

Whilst studies show a slightly elevated nox emission, the risk, compared to harm created by particulates is relatively low. The Government should introduce a pilot scheme, without delay, to test the viability of biodiesel fuels. Since EPD have a stated objection to the slightly increased nox, the pilot scheme could be tested outside congested areas. A study, with the assistance of University of Hong Kong, Community Medicine Department would be able to identify the risks and benefits.

Once again, international experience from developed countries demonstrates biodiesel is a viable, renewable, and low pollution alternative. For example, every diesel in vehicle in France burns a mixed fuel, comprising premixed petroleum diesel and biodiesel.

### **Question 1**

*Should we begin to take steps to generate a certain percentage of our electricity from renewable energy sources, having due regard to ensuring that the reliability of our power supply will be maintained?*

Hong Kong is heavily reliant on electrical energy, forty eight percent (48%)<sup>[2]</sup> of energy consumption is consumed in the form of electricity, with air-conditioning for commercial buildings consuming forty percent (40%) of the total buildings operating energy requirement<sup>[2]</sup>. It is widely anticipated that this thirst for electricity, left unchecked, will continue to expand.

Any discussion focused on energy or RE must include conservation measures. The existing building code standard (OTTV) needs to be upgraded and improved. Nearly ten years old, the code sets out a low level prescriptive standard, a new code with performance standards should set out energy conservation as a top priority.

Fossil fuels, a finite resource obviously will not last forever. In a free market economy the invisible hand will act to increase fuel costs as fossil fuel becomes

scarce. Therefore, it is sensible, if Hong Kong is to remain a vibrant and sustainable economy, that alternative energy sources are fully exploited.

It is disappointing to note that the document implies the RE provision should be provided by the existing utilities; where a clear conflict of interest exists. The transparent framing of energy policy would avert this conflict.

HKSDf believes that the Government must, institute an energy policy framework that meets the needs of stakeholders and incorporates Renewable Energy (RE). The framework should follow established open market principles, and provide a level playing field for all participants, whilst considering the hidden costs for fossil fuel generation (externalities). This framework should remove the barriers, creating an open, transparent, market system.

## **Question 2**

*Bearing in mind that RE is recognised as being more expensive than fossil fuels in the short-term, how should we, as a community, meet the likely increased cost of electricity from renewable sources?*

The cost of RE is NOT generally recognised as more expensive than fossil fuel. Presently, the community pay a charge for electricity, this is only a monetary value, yet the externalities (social and environmental costs) are seemingly over-looked.

Every Utility burning fossil fuel to generate electricity creates huge quantities of pollution, which damages community health, environment and is detrimental to the climate.

There is a direct and proven correlation between increased air pollution contamination and hospital attendance. Therefore, it is misleading to consider RE as more expensive than traditional generation without considering all the relevant factors. The policy framework must be structured to encourage competition, leaving the utilities companies responsible is not an option.

It is noteworthy that local power generation providers supply electricity for both the Hong Kong and China markets. Yet only the Hong Kong community bears the human cost of the externalities without compensation.

Indeed, as mentioned herein, competition will generate innovative services and lower costs for the community. For example, after Hong Kong's International Direct Dialling (IDD) monopoly was abandoned competitors, given a level playing field, introduced innovative services and tariffs, and costs for the consumer dropped dramatically. An open transparent market will release the potential of the invisible hand.

Notwithstanding whether or not RE is more expensive, fossil fuels are finite, the community does not have a real choice, RE provides the only feasible solution for medium and long term sustainability.

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### **Question 3**

*Should we implement measures to facilitate access for RE suppliers to the main electricity power grid?*

Yes. It is essential that comprehensive energy policies are instituted, transparently and without delay, within an overall framework to encourage Independent Power providers (IPP) to connect to the electricity power grid, with the absolute minimum of administrative red tape.

The present situation is untenable. The Government has largely conceded energy policy decisions to the utility generators, allowing full control over grid access and inter-connection. It is a fact that the utility companies, within their supply rules, specifically prohibit other sources of electricity generation, clearly anti-competitive position.

The energy policy framework needs to be cognisant that the utility companies have entrenched views, and little expertise regarding RE.

It is reported that the Utility companies are seeking an extension to the existing “scheme of control” contract, which expires in 2008. If the contract is to be extended, then the Government’s own fair and open market principle should be applied and RE generators must be permitted to enjoy the same benefits, namely 15% guaranteed Return On Investment (ROI).

In June 2004, China agreed to generate ten percent of energy needs from RE sources by 2010<sup>[1]</sup>. If Hong Kong aims to be a world city, and try to catch up with China, USA and Europe, then our RE policy initiatives need to encourage RE generators. Once again, these initiatives must be created transparently and seen to be so, whilst stakeholder’s views are heeded.

### **Question 4**

*Under what circumstances would you accept the location of a renewable energy facility, such as a wind farm or an energy-from-waste incineration plant (albeit equipped with the latest technology in emission reduction) in your district? Or in a country park or coastal waters?*

RE and Sustainable Energy (SE) are absolutely essential, the challenge will be overcoming the last 150 years of fossil fuel convenience and facing the new reality.

When power stations were first conceived, they were erected close to population centre served; this proximity also saved long transmission lines and the inherent losses. Battersea power station in London, UK is just one example.

However, over time, the increasing local pollution from low efficiency coal burning boilers combined with rising land values to drive the generation plants away from population, significantly increasing transmission losses. Today, the most efficient systems for power generation have an overall efficiency of only 25-35%.

The introduction of community based installations, commonly defined as DE systems, eliminates these transmission losses. Whether Solar BIPV, micro gas fired turbines, or micro-wind turbines, these systems are part of the necessary future, and reflecting the reduced availability of fossil fuel.

#### **4a**

The location of RE sites will be a challenge. However, once it is clear to the community that every person, in every district must play apart, resistance will decrease.

Burning municipal waste is not classified a source of RE. However, considering the wider issues, holistically, the discussion should consider Sustainable Energy. Biogas from existing landfills can be utilised. Waste-to-Energy is discussed in more detail under the Solid Waste Management section of this paper.

#### **4b**

Most of us in the community live and work within a high density, high stress, urban environment, and treasure the country park as the “green lungs” of the Hong Kong. Any move to reduce biodiversity, usage or area would be detrimental to the community. Off-shore wind farms would not be favoured, if Hong Kong is to remain a world class transportation hub, any impediment to shipping must be carefully considered.

### **Question 5**

*Should we provide incentives or make regulations to mandate the provision of rooftop solar energy panels or other building design features that could contribute to promoting the use of RE?*

A comprehensive framework for an energy policy, mentioned herein, should encompass a variety of strategies, a baseline mandatory and other optional features, to drive and encourage wider acceptance. Learning from the experience of other countries, for example Barcelona, Spain, which has already implemented a compulsory RE policy for every roof in the city.

In this instance, the Government must lead the initiative, and the market will follow. The Government projects should drive demand, requiring RE components and targets for every structure and building. For example, existing walkways and bridges could easily incorporate RE to power street lighting and signage lowering long term operating costs for Government and tax payers.

Other incentives for private sector projects could follow the lead given by Building Department, offer incentives for greener buildings. Various incentives schemes must be developed, performance or prescriptive. Alternatives include plot ratio allowance, tax incentives, reduced land premium, interest free loans, etc.

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## **Urban Living Space**

### **Balancing “urban” and New Territories-based Development**

#### **Question 1**

*Should we concentrate new residential and commercial development in the NT, bearing in mind the possible negative impacts, in order to reduce congestion and allow for more open space in the “urban” area?*

#### **Question 2**

*What types of development do you wish to see in the NT? Should we focus on developing high-rise buildings around the new towns in order to preserve more rural land? Or should we encourage more low-rise housing and commercial projects in rural areas to keep development density low?*

Development in both the existing urban area and the New Territories should be complementary. Development should not be “concentrated” in New Territories, whilst merely building roads and “greening” the urban area; balanced planning is needed.

There should be a focus on more urban renewal within the urban area, complemented by the development of low-density housing in the New Territories.

Where urban renewal is planned, the stakeholders should be adequately consulted to avoid the type of controversy that has erupted over Lee Tung Street (Wedding Card Street) in Wanchai. Although existing derelict buildings in the urban area should be re-developed, there should be a better effort to save and maintain historical buildings that are an important part of the urban setting. Retaining an existing building, possibly through creating a new use, is a means of maintaining Hong Kong heritage.

The existing urban area has in the main a satisfactory transport infrastructure, well served by MTR and KCRC. Making use of this infrastructure through urban renewal is more sustainable than providing new transport infrastructure to serve communities in the far reaches of the New Territories. Although the New Towns were originally designed to be self-contained communities with homes and workplaces in one location, they today mainly serve as suburbs with many workers travelling long distances to work.

In the New Territories, there should be an emphasis on maintaining a good balance with the natural environment by using low-density housing.

### **Improving Old Urban Neighbourhoods**

#### **Question 3**

*Should we impose mandatory requirements or offer economic incentives to encourage developers (including the HKHA, HS and URA) to revitalise old neighbourhoods rather than demolish them for full-scale redevelopment?*

#### **Question 4**

*Should the public purse meet some of the direct initial cost of renewing old urban areas by rehabilitation, revitalisation and preservation in order to create more sustainable neighbourhoods?*

Requirements need to be set for developers and or owners to revitalise old neighbourhoods. This is basic requirement of being an owner of a property. A car owner has to maintain his car; a property owner should do likewise.

A developer should need no economic incentives to revitalise an old neighbourhood. If there is a requirement that only part of an old neighbourhood can be developed, with certain “historical” properties being retained, the developer will carry out his basic cost analysis to develop the site accordingly, in order to maximise his return on the properties that he develops.

In some countries, planning bylaws require the developer to maintain the original façade and appearance of an existing building, whilst allowing the demolition of the core of the building for redevelopment.

Developers and Owners Incorporations should bear the cost of urban renewal. It is surely the wrong concept for the public purse to bear the cost of redeveloping individually owned properties.

#### **Heritage**

The Government should act to protect Hong Kong’s heritage buildings - today. Tourists don’t only visit Hong Kong for shopping; they want an experience, which includes Hong Kong’s history and historical buildings are part of that heritage. Mistakes have been made in the past, for example, in Beijing the ancient Ho Tung’s have nearly vanished completely, the few remaining examples are now protected by The Chinese Government.

The outrage created over the potential demolition of Kom Tong Hall in Mid levels clearly indicates that the community values these buildings and must be retained. The Housing Authority’s revitalisation of Murray House in Stanley is good example of sustainable building, enhancing the environment and encouraging tourism.

The HKSDF believes that the Government must act today, decisively, enforcing a moratorium on destruction of Hong Kong’s heritage buildings.

#### **Sustainable Urban Design**

#### **Question 5**

*Should we impose mandatory requirements or offer incentives for sustainable building and urban design (e.g., for: maximum development height; the layout of building blocks to allow for more open space, breezeways and visual corridors; greening; and pedestrian-only streets)?*

## **5a**

There should be mandatory requirements for sustainable building and urban design. The Government should also encourage the use of sustainable reusable building materials.

Erecting canyons or creating valley's bordering the harbour is not sustainable development. The Government's existing ideas for planning needs a drastic overhaul, to prevent further poor planning; canyons of buildings obstructing the natural line, visual lines, and prevent air circulation must be eliminated.

Incentives need not be provided. The Government is tasked and paid by taxpayers to create a masterplan for Hong Kong, and that includes a vital Hong Kong asset, the harbour frontage which must not be carelessly destroyed.

The Government, using effective building and planning regulations, must control what is built where, its character and community value. Community value in this instance means the added value of open space, open views, and circulating breezes, etc.

Along the harbour front for example, development must be staggered, incrementally. Pedestrian areas, and open green space along the harbour front, followed by low rise buildings further inland. High density, high rise buildings set back still further inland. High rise density construction on the harbour front prevents open vistas, and air circulation and must be avoided.

Once again, a key tourism location is under threat. High rise buildings that block the spectacular views from the Peak across the harbour must also be reined back.

## **5b**

Pedestrian only areas, if properly planned and maintained, add value to the community, providing open space, lower roadside pollution, increases property value and should be encouraged.

However, it is essential that these areas are properly designed and planned. From the transport perspective, comprehensive a perimeter zone must be provided, that includes space for bicycle and vehicle parking, bus stops, taxi ranks and other transportation links.

Sadly, Hong Kong has once again lagging behind other countries. The benefits for pedestrian areas, both for business and tourism have been clearly demonstrated elsewhere in the world, not only within first string capital cities, but also in smaller cities and townships.

## **Recycling**

The use of recycled material for construction (e.g. recycled aggregates) should be made mandatory to minimise the use of natural resources. Even though it would cost more in the short term, once amortised over the life of the building, the cost can readily be justified.

## **Solid Waste Management**

### **Introduction**

Hong Kong has one of the most envied waste management systems in Asia, operating in many respects to the best international environmental and operational standards.

Waste management is a vital public service that the Government provides to householders, businesses, industries etc with waste being collected on a daily basis under tropical climatic conditions and ultimately disposed of in modern facilities, operated to ensure that public health and environmental hygiene standards are maintained at all times, and pollution impacts avoided.

The Government owns all major waste management facilities, although the private sector provides a significant part of the waste management services through contracts awarded by the Environmental Protection Department (EPD) and the Food and Environmental Hygiene Department (FEHD). The Civil Engineering and Development Department (CEDD) are responsible for finding sites for the “disposal” of inert Construction & Demolition Material as reclamation filling.

Since 1988, the Government has made significant investments in a range of new waste management facilities with landfilling currently being the final disposal destination for much of the waste.

Yet despite the investments in new facilities and the high standards that the waste management system operates to, a number of challenges need to be faced:

- Every day, 365 days a year, Hong Kong produces large quantities of waste that are landfilled. In 2003, the landfills were disposing of 17,760 tonnes of waste on average every day. Of that total 7,400 tonnes per day was Domestic Waste; 6,730 tonnes per day was Construction Waste; 2,040 tonnes per day was Commercial and Industrial Waste; and 1,590 tonnes per day was Special Waste.
- The Government currently funds almost the entire cost of the waste management system, with little if any revenue collected from charging the users whose waste is collected and disposed of.
- The virtual absence of “user charges” for publicly collected waste gives no incentive to waste minimisation. This is neither environmentally nor economically sustainable.
- As a community, the SAR needs to reduce the quantity of waste being produced, and break the link between economic growth and increasing waste quantities.
- Although 41% of Municipal Solid Waste (MSW – collectively defined in Hong Kong as Domestic Waste, together with Commercial and Industrial Waste) was recovered for re-use or recycling in 2003, only 14% of Domestic Waste was recovered, with an elderly population of waste scavengers feeding an informal sector of waste recyclers who generate revenue from aluminium

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cans, waste paper and cardboard. This aging army of waste scavengers manoeuvring dilapidated handcarts along our streets is not sustainable, nor does it project an appropriate image for Asia's world city.

- Unlike most other cities in the developed world, there is no recycling outlet for "glass" waste in Hong Kong; as a consequence glass is disposed of to landfill.
- Landfilling represents a wasted opportunity, recognising the valuable resources that get buried every day in the SAR's landfills. In turn the decomposing waste then becomes a significant source of greenhouse gases.
- In 2003, 38% of the waste disposed of in the SAR's landfills was Construction Waste; this is a "waste" of valuable landfill space and is not sustainable.
- With large inputs of Construction Waste going into our landfills, our landfill capacity is declining rapidly.
- With the declining capacity of the SAR's existing landfills, new landfill sites need to be planned; but because of the SAR's limited land mass this is becoming increasingly difficult. Not only have the Hong Kong public become more vociferous in objecting to "bad neighbour" facilities of this type, but there are also few sites where a 100-hectare landfill could be located. In addition, the SAR Government subscribes to the "proximity principle" meaning that all our waste has to be disposed of within the SAR's boundaries. If the "proximity principle" was abandoned, potential landfill sites could be investigated within Chinese waters beyond the SAR's boundaries.
- Although the SAR Government has investigated the possible construction of Waste-to-Energy Facilities (WEF) and has identified sites for their construction, there is considerable public disquiet over such facilities, particularly driven by unscientifically founded fears over dioxin emissions.
- In many countries, although not in Hong Kong, mechanisms are in place to either oblige or encourage electricity generators/suppliers to meet a certain proportion of their supply from non-fossil fuel sources. Such sources may include energy-from-waste or methane gas (methane is a major component of landfill gas produced by the decomposition of waste in landfills). Mechanisms to encourage the use of non-fossil fuel sources could be included in the "new" Scheme of Control that has to be negotiated with the power companies by 2008. In Hong Kong, only The Hong Kong and China Gas Company has actively pursued the use of landfill gas for the production of town gas. Despite small amounts of electricity being generated on six landfills in the SAR, there are no installations where any of this power is fed into the electricity grid.
- There are conflicting priorities as three different Government departments under two different bureaux provide waste management services.

### **Question 1A**

*Should we charge households and businesses directly for the waste management services provided?*

In the developed world, Hong Kong is one of the few jurisdictions where there is no waste management charging; even some Chinese cities practise charging.

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It is an imperative that Hong Kong moves ahead quickly to implement a charging system for all waste streams, recognising that legislation has now been passed for charging to be introduced for Construction Waste.

The benefits of introducing of charging in Hong Kong will include:

- **Waste reduction:** Free collection and disposal of waste has encouraged indiscriminate waste production. Charging will help ensure that waste producers pay the actual costs of waste collection and disposal with the costs clearly identified, assigned and internalised. With waste producers having to bear the collection and disposal costs, there will be a direct economic incentive for them to minimise waste generation.
- **Waste Recycling:** Charging will also provide an economic incentive for waste producers to separate out recyclable materials from the waste stream to achieve effective reuse or recycling. The local recycling industry will benefit from the greater business opportunities, as waste producers will be prepared to pay for waste separation and recycling if their alternative is to pay for waste disposal. (Currently the export of recyclable materials from Hong Kong is an annual HK\$2.5 Billion business).
- **Landfills:** Reduced waste inputs into the SAR's landfills will help to prolong their life, and reduce greenhouse gases

It has been estimated that the introduction of Construction Waste charging could reduce by at least 20% the amount of this type of waste received at the SAR's landfills.

### Question 1B

*If so, should this charge be a flat rate for all, or should it be based on the volume of waste generated by each individual household or business premises?*

A corollary to this question could be:

*Or should the charge be based on the weight of waste generated?*

Hong Kong waste stream includes the following types of waste:

- Municipal Solid Waste (MSW) comprising:
  - Domestic Waste (including household waste, street cleansing waste, market waste, and waste from Government buildings and facilities)
  - Commercial and Industrial Waste
- Construction Waste
- Special Waste
- Chemical Waste (that pose a risk to health and/or the environment)

This question is fundamentally related to the way that waste is collected and taken to waste disposal facilities.

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If the quantity of waste generated by a waste producer can be measured (by volume or weight), the “polluter pays principle” can be properly applied. Where the quantity of waste is measured, the monthly charge levied on a waste producer can be determined from the amount of waste he produces. Thus a waste producer would see a direct reduction in his monthly charge if he reduced his waste production. If charging for waste collection or disposal were a flat rate (ie a fixed charge per household) a price-responsive waste producer would not see any corresponding reduction in his monthly charge if he reduced his waste production.

For big waste producers, measuring the volume or weight of waste is an accepted means of waste delivery. Construction Waste falls into this category. Similarly, big producers of Commercial, Industrial and Special Waste could be subject to charges levied by weight.

Chemical Waste is already charged by a combination of weight and volume, although currently the charging levels only represent about 30% of the variable operating cost of collection, treatment and disposal. But charges for Chemical Waste should be increased in line with the “polluter pays principle”.

The most complex area for charging by volume or weight involves small waste producers generating MSW. This could vary from an individual householder who puts out a small bag of household waste for collection every day (the average waste disposed of per household in Hong Kong is about 3.5 kg per day), to small businesses that only generate less than 50 kg of waste per day.

Technology exists for individual consignments of waste to be weighed before they are loaded onto a refuse collection vehicle; but in high-rise Hong Kong, there are logistical and practical difficulties for the waste produced by each household to be weighed before being loaded into a vehicle. Hong Kong is unlike a suburban area in North America where a refuse collection vehicle goes to each house in turn to empty waste containers put out for collection. The amalgamation of waste in Hong Kong from individual flats collected floor-by-floor from a high-rise block before the waste is taken to a refuse collection chamber or a refuse collection point potentially precludes weighing the waste from each householder. Although the waste from each high-rise block could be weighed, and an average charge imposed per household based on the actual waste collected.

Volume or weight based systems used in other countries that could possibly be used in Hong Kong include:

- ***Pay-per-bin System*** where householders or small businesses either subscribe to a service usually on the basis of a specific size of bin, or number of bins, or they pay a fee based on the size of bin and/or the frequency with which it is emptied
- ***Pay-per-bag System*** where householders or small businesses purchase clearly identifiable bags (usually by colour) from outlets, with different rates charged for bags for different waste types, and of different sizes. The waste collector

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will only load onto the refuse collection vehicle the “official” bags; any “unofficial” bags are left behind.

- ***Tag or Sticker Systems*** where tags or stickers are placed on the bag or bin to show the appropriate fee has been paid
- ***Weight-based Schemes*** where bins identifiable through computer chips are weighed on the refuse collection vehicle and software is used to record information about the household and the bin weight. This is then processed to invoice the household.

Each of these schemes could potentially be adapted for use in Hong Kong, but the proper regulation/measurement of waste taken from high-rise blocks or multi-user premises presents a challenge to any scheme.

There is the added concern that if individual containers or bags are used for householders, a malicious outsider could add his waste to a conscientious householder’s container or bag to avoid having to pay for his own waste.

Although the Government should move towards imposing charges for collection and disposal of waste from households in Hong Kong, the position of the lowest income households needs to be considered because of the disproportionate impact that charging could cause.

In Hong Kong, the first 12 cubic metres of water used in a 4-month period by a household is free of charge. Therefore a low-income household that only uses minimal water can get its water free. As water is metered in Hong Kong, this scheme is easy to operate. But unless every household had its waste weighed, a similar system would be difficult to implement for waste.

Another issue for consideration is the way charges are imposed, and the actions that are taken if charges are not paid. A household not paying their water bill, gets their water cut off. For someone not paying a waste charge, stopping the service would be difficult to implement and allowing waste for a non-paying household to go uncollected could create a public health and hygiene hazard. An option might be to combine the waste billing with another utility bill, like water or electricity. If the combined bill were not paid, the metered service (water or electricity) would be cut off, although the waste collection service would continue.

When collection and disposal charges are imposed for households and small businesses (recognising that currently this service is free) the Government should make a decision whether the charges should be progressively imposed and gradually ramped up, or whether the full economic charge should be imposed initially. Or indeed whether even when charges are introduced, the Government should subsidise part of the cost of the service as a long-term commitment; in the same way that Hong Kong’s current water charging system operates.

Therefore in summary, large waste producers (including Government departments) should pay for their waste collection and disposal on a weight based system. An

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equitable system for small waste producers (ie households and small businesses) needs to be devised. This needs to take account of:

- the benefits that the “polluter pays principle” brings, ie a volumetric or weight based system,
- the practical difficulties in arranging an equitable system for high-rise blocks and other multi-user premises,
- the impact that charging would have on the lowest income households
- minimising the costs of administration,
- the means of collecting charges,
- the means of “curtailing” the service if charges are not paid
- whether the full charge is imposed initially, or whether the charge is gradually ramped up.

## **Question 2**

*Given that landfills are considered unsustainable means of disposing of solid waste, and in view of the limited land space in Hong Kong, should we now be planning to build alternative waste disposal facilities, such as thermal treatment plants or composting facilities?*

Irrespective of whether Hong Kong does build alternative waste disposal facilities, landfills will always be necessary to take the remaining residue from treatment facilities (such as waste-to-energy facilities) or the waste that cannot be treated or disposed of by any means.

Hong Kong’s current generation of landfills has been constructed and are operated to the best international environmental and operational standards. Nevertheless, from a pure definition of sustainable development, landfills can be considered as being unsustainable, particularly recognising the significant quantities of valuable material that are “lost” to today’s and future generations when they are buried in a landfill.

The SAR needs to achieve a better use of resources, through waste reduction, re-use, recycling, composting and energy recovery in its waste disposal system. Society cannot sensibly continue to let landfill sites consume valuable resources, many of which (particularly metals and oil-based materials such as plastic) are available in limited quantities in the environment, or are difficult or environmentally damaging to extract.

In any event, Hong Kong only has a limited land mass and finding new landfill sites will become increasingly more difficult.

Hong Kong should be pursuing alternative waste treatment technologies now; but current progress seems “snail’s pace” slow. Although current studies are examining different technologies, it is unlikely that any substantive facility could be commissioned under current procurement arrangements in less than 4 years, recognising the need for sites to be identified, studies under the EIA Ordinance to be carried out, land use and planning issues to be resolved, public objections to be

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overcome, tenders to be called, designs to be prepared, construction to be carried out and facilities to be commissioned.

Dividing new treatment facilities into two types:

- those that involve thermal treatment
- those that involve a mechanical or biological form of treatment

The SAR public are nervous of any process involving thermal treatment because of unscientifically founded fears over dioxin emissions. Modern technologies used in thermal treatment in North America, Europe and Japan have demonstrated that these emissions can be controlled to a safe level. But it will be difficult to convince the SAR public of this.

On the other hand, treatment facilities that involve mechanical or biological treatment (a composting facility would fall into this category) could be used to pre-treat waste before it is landfilled. There is likely to be much less public objection to facilities of this type that could be incorporated within the footprint of the existing landfills.

Waste would need to be separated into two streams:

- **Biodegradable Waste**, including paper, food waste, market waste, and other “green” waste
- **Dry Non-biodegradable Waste**, including metals, glass, plastics and textiles

Assuming that most recoverable materials would have already been removed from the non-biodegradable waste stream, the remaining materials would be landfilled (unless there was a thermal treatment plant that could take some of the combustible materials).

Either aerobic composting or anaerobic digestion could treat the biodegradable rich stream. Both these technologies are being increasingly used for pre-treatment of Municipal Solid Waste in other developed countries. Both processes produce a residue of “inert” compost or sludge. If this is of a sufficient purity or quality, it could be used in a variety of soil conditioning or horticultural uses (although experience with the existing Sha Ling Composting Plant for livestock waste suggests there would only be limited demand in Hong Kong). Otherwise the residue would be landfilled. It has been estimated that a reduction of 20% by weight of the waste treated in this way could be achieved, coupled with significant energy recovery.

### **Question 3**

*Given that locating new waste facilities is going to be challenging, should the Government consider offering incentives to encourage communities to accept such facilities?*

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The difficulties associated with locating new waste facilities has been emphasised already in this response, coupled with the public's rising tide of objections to "bad neighbour" facilities coupled with Not-In-My-Back-Yard (NIMBY) protests.

It is hard to see how an "incentive" system might work, and what basis would be used for determining benefits. Clearly whatever system is used would need to be measurable, transparent and comparable between different locations.

For projects anyway, where private land needs to be acquired the Government already pays for clearance and resumption of private land.

A more ambitious approach could be to give the local community a share of a Joint Venture company set up to operate a waste facility; in this way the local community could benefit from the profits derived from the processing of waste.

Alternatively it could be a requirement of the contract for the waste facility for the contractor to construct and operate a recreational development to serve the local community; with the development powered with electricity generated by the waste facility.

#### **Question 4**

Should we set up a single authority to plan and manage all aspects of our solid waste management?

*Currently three different Government departments are directly or indirectly involved in the disposal of solid waste:*

- FEHD
- EPD
- CEDD

A single organisation set up outside the Government department system tasked with responsibility for the SAR's waste management (including the disposal of inert Construction and Demolition Materials) would provide a more focussed approach.

Such an organisation would:

- benefit from all waste management facilities and services being managed by one organisation, with interfaces eliminated (with waste collection and disposal under the management of one organisation, better levels of recycling should be achievable for Domestic Waste)
- not need to be staffed by Civil Service personnel and could hire staff from the private sector with more flexible employment terms.
- have a limited number of key objectives, compared to a Government department that has multiple objectives and many different activities that can divert it from conducting its affairs efficiently and effectively.

**Question 5**

*When implementing new policies, what measures might we take to make the sharing of cost burdens and economic gains more equitable to all sectors of the society, especially disadvantaged communities?*

This aspect has been discussed under our response to Question 1B.