



Dear Hon Cyd Ho and members of the Panel on Environmental Affairs 2013-14,

15<sup>th</sup> October 2013



UPDATED Version

**Dealing with our wet food waste**



**The big problem with Hong Kong's ultra-wet food waste (WFW) is.....**

- It's very wet and difficult to handle (90% water content in wet market food waste, 70-75% water content in malls and restaurant WFW)
- It requires more energy to burn than it inherently contains.

<http://www.massbalance.org/downloads/projectfiles/1826-00237.pdf>

(p.8) *European food waste 4.2 MJ/kg calorific value (CV)* but European food waste has on average only 30% moisture content, so HK WFW will be even lower (CV). Hong Kong has the wettest worldwide putrescible waste w/ 90% moisture levels from wet markets & avg 70+% domestic WFW versus 56% Korea, 50% Japan, 30% Europe.

Anaerobic digestion is an appropriate treatment for putrescible wet food waste(WFW), not incineration. The Government's "Bury 'N Burn" waste 'plan' is for 3 incinerators & extended landfills – however you cannot combust low CV /high moisture WFW without co-combusting additional higher CV feedstocks, (thus defeating recycling efforts) since at least 6 MJ/kg CV in the feedstock is needed for combustion.

<http://www.waste-management-world.com/articles/2013/07/is-waste-to-energy-to-answer-for-india.html>

**But Hong Kong can consider another method.....** methane generating food waste is the smelly and obnoxious component of MSW ; *48% of HKG daily MSW is putrescible waste (42.3% wet food waste / 1.6 % yard waste / 4.3% used nappies + cotton wool)*

- WFW is a health hazard as it generates methane – methane is 21 times more damaging to the environment than CO<sub>2</sub> so it is flared off at the landfills 24/7.



- It is the prime reason why we need to employ so many Refuse Collection Vehicles (RCV's) to clear the problem daily from HKG's WSW generators
- It is the reason why odorous RCV's get a bad name
- It accounts for many of the RCV trips per day, 48% of HKG's daily MSW is putrescible waste
- RCV's spill stinky leachate on the road
- Were food waste not present in MSW we could reduce waste collection frequency and its weight and significant costs to handle, transport and landfill.

### **So why not remove food waste at source and before it gets into the MSW ?**

This would:

- Avoid the smell at collection points and landfills
- Avoid the smell from RCV's on the roads
- Improve public health
- Reduce the need to clean the roads
- Enable MSW to remain dry and more easily recycled and/or plasma gasified / syngas converted to bio diesel or aircraft / ship fuels
- Reduce the frequency of RCV trips
- Make people more aware of the packaging and food waste they generate

### **So how do we progress?**

*(instead of stepping backwards with HKG ENB's Bury 'N Burn Blueprint)*

At present we are planning to introduce two anaerobic digestion organic waste treatment facilities (OWTF) for 200 tpd & 300 tpd (Total 500 tpd WFW ) These will generate about 7.5 MW of power using anaerobic digestion that converts the waste to sugars and then gas to drive turbines but these will generate about 50 tpd of low quality compost as a result.

Where is all the low grade compost going to go? No-one will buy it. **Do we need to spend this money ?**

Altogether the OWTF's will cost about \$HK 3 billion to build and well over \$HK 250 million per year to operate and **will treat only a miserable 12.5% of the almost 4,000 tonnes food waste generated each day**, mainly from hotels, wet markets, food stalls and the catering industry as well as residential units.

The remainder of the food waste problem could be avoided and many of the issues



identified above could be eliminated if we were to make hotels, restaurants, caterers, markets, businesses etc and individuals responsible for processing their own food waste.

The best choice of course would be not to waste food in the first place. However, we are an affluent society in Hong Kong and can afford to bin half the food we buy and we no longer have pigs to feed...

### **So..**

Why not make every restaurant, wet market, business, caterer, hotel and household responsible for sorting food waste at source and disposing of their own food waste as it is generated **using waste disposal shredding (garburator) units with outfalls linked to the existing sewerage system ?**

It would foster a sense of responsibility and everybody could get involved and feel good about doing the right thing. Even easier than taking the lift down to the ground floor and walking to the garbage area. A garburator system needs to be inexpensive to install and operate when compared with housing costs and it should not require fancy new technology.

**So, consider making sink outlet WFW shredding disposal units mandatory in households and industrial garburator units in restaurants, hotels, hospitals, schools and the catering industry, businesses etc, & connected to the sewage system. The DSD waste water sewage handling system is already there and capable of accepting it.**

Phase 1- every hotel, restaurant, food business, hospital and wet market management etc would have industrial sized food waste shredding units - extending to Phase II Govt housing estates next, then Phase III to the rest of HKG households that have a legal sewage connection, so there would be no discrimination.

For those premises not connected to the existing sewage system such as village houses there would be a **GREEN BIN** collection scheme, charged for at sewage rates, which would be delivered to neighborhood industrial WFW shredding disposal units connected to the existing sewage network.

### **GREEN BIN**



***Shrieks of horror ! we cannot do that, Government will rant*** (because they never thought about it whilst blindly idolising their regurgitated 'Bury ' N Burn Blueprint')

**OK let's check the feasibility then.....**

[http://www.biwater.com/Articles/325198/Biwater/BW\\_Home/waste\\_water/waste\\_water\\_projects/Stonecutters\\_Island\\_STW.aspx](http://www.biwater.com/Articles/325198/Biwater/BW_Home/waste_water/waste_water_projects/Stonecutters_Island_STW.aspx)

**Stonecutters treatment plant is designed to handle up to 2,764,800 cubic meters of waste water sewage per day by 2016, albeit DSD advise it will be 2.45 million tonnes per day.** Stonecutters currently handles approx 1.6 million cubic meters of waste water (1.6m tonnes per day) of which the remaining sludge is approx 800 (eight hundred) tonnes per day. Disposing of a few extra thousand cubic meters of shredded WFW (70-90% water content) would add a very small additional load to Stonecutters capability to process additional sewage above the current 1.4 million tonnes load per day, since between 70%-90% of the 3,500 tonnes WFW is already water anyway!

**The Stonecutters sewage treatment plant is ideally suited to handle such a relatively small additional quantity (3,500 tpd WFW) and is already operational.**

Such a small increment of the incoming sludge would be negligible and it would all have calorific value (CV) so it would benefit the new Tsang Tsui sludge incineration process we have already implemented (at least once it's commissioned) and it will generate power

which is already being negotiated to be fed into the grid.

**The Big Advantage with this proposal will however be.....**

**It uses existing facilities and technology** but more importantly the pre-processing will be done by hotels, restaurants, caterers, fast food outlets, businesses, hospitals, wet markets, Government and private estates and at least 2 million households, - everybody doing their bit and thereby using existing end of line reception resources and diverting the vast majority of daily MSW from landfills!

Excellent...! we will mobilize the entire population and they will feel “good” about doing the right thing (they even do not have to walk to the garbage area with it any more)

**provided the idea is marketed correctly.**



***So where do we go from here.....***

Government Departments are highly adept at passing the responsibility buck. CEDD at Area 137 Wan Po Road handles Hong Kong’s 18,000+ tpd (reusable fill) construction waste for export.

So let’s suggest ENB pass on their WFW problem to DSD.... ENB has a great incentive to do this and for DSD, this would be minimal fuss, just slightly more dehumidified sludge to be shipped to Tsang Tsui sludge incinerator each day- The garburator scheme could even win brownie points for the beleaguered Government of CY Leung.

### **Make it Free**

The funds will be easily recovered by the reduced handling costs and landfill benefits Provide vouchers not cash subsidies for every household from the Budget surplus to install a sink waste disposal unit from appointed installers (paid by voucher) and make them mandatory to install and to use. ( 1 x Govt provided free garburator voucher per household ... HKG people love freebies even if they are mandatory)



Non households, hotels and catering business outlets etc must buy their own commercial units and be inspected by FEHD under licensing conditions.

Next: Charge heavily for WFW disposal from the general public dumped at garbage collection points... and instead propose the use of private sector WFW collectors for **GREEN BIN** contents to dedicated reception points for disposal in each neighborhood for shredding and feeding into the sewage system. Government could actually pay for this collection service since the reduced number of current RCV trips and transfer stations would cover the costs of WFW **GREEN BIN** collections

We would need to deal with glass recycling. Glass has a very low calorific value (0.7 MJ/kg) Govt should encourage a new local recycling business to keep people at the bottom end of the chain employed. Glass can be ground to produce a substitute for aggregate in concrete products., Alternatively glass could be plasma gasified to produce an inert vitrified molten slag that can be used as a construction aggregate substitute given that all our building aggregate here is imported. Likewise plasma gasification could treat the construction waste that cannot be recycled and convert it to usable vitrified inert aggregate.

**So with a new direction and using existing operating end-of-line reception facilities at Stonecutters we can handle our existing and future WFW, which is almost half of our daily MSW.**

The other half of the daily MSW can be locally recycled as RDF (Refuse Derived Fuel) thus providing more local jobs and then sold to Europe as high CV feedstock in the interim; Europe considers MSW as a commodity feedstock for its overcapacity incinerator networks and which relies on same for its electricity and heat generation.

This will give Hong Kong breathing space to commission enhanced landfill mining at its landfills using plasma gasification technology that can produce bio diesel and bio fuels for airlines and Ocean Going Vessels (OGV's our biggest source of pollution).

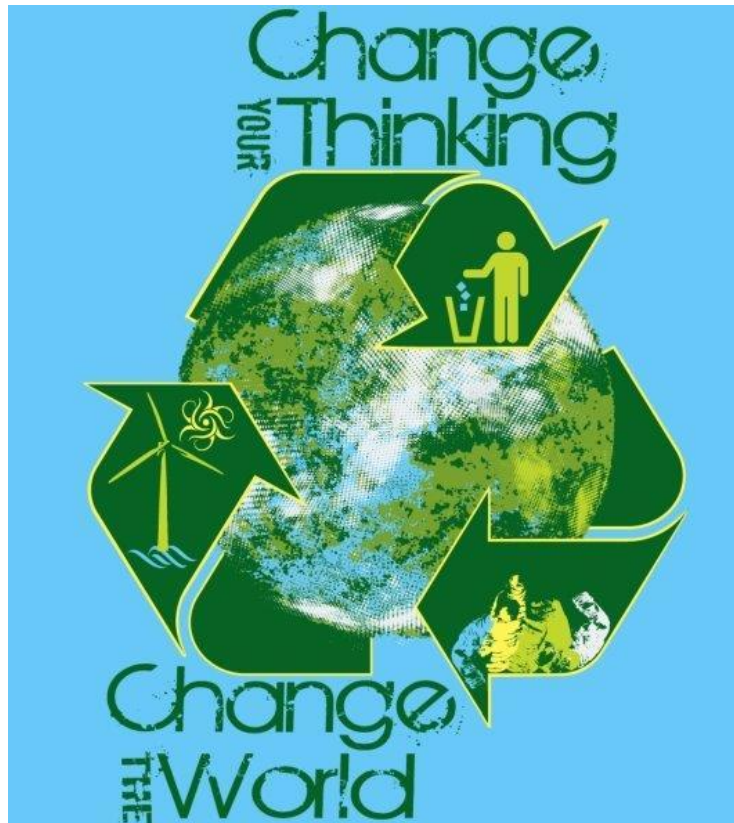
#### **MAJOR BENEFITS**

The resultant resumed former landfill land (270 hectares) can be used for local public housing units instead of waiting 50 years (with maintenance costs of the closed sites) after



the closure of the landfill, as at present due to subsidence and methane problems.

**Message for Hong Kong Government**



Yours sincerely,

*James Middleton*

Chairman

[www.cleartheair.org.hk](http://www.cleartheair.org.hk)

Technical Update October 2013

Update as provided by our technical engineer advisors. 15th October 2013 in response to public queries:



The whole point about separately processing the easily biodegradable 3,500 cubic meters per day wet food waste component of the waste stream at source is to ensure that the ultra wet, smelly and potentially unhealthy elements are removed before they contaminate the remaining bulk of the waste.

Having removed food waste, the remainder of the recyclable waste stream remains dry and is much more easily dealt with, allowing the dry waste component to be reused or recycled in a much more efficient manner (thus creating new business recycling opportunities and jobs in areas like Tuen Mun, which could become **Green Tuen Mun** instead of a fly ridden smelly landfill Tuen Mun.)

Even those unrecyclable parts of the dry waste, the residues from the reusing and recycling processes, can be retained in a sufficiently dry state such that their calorific value remains high and, under these circumstances, the gasification or plasma gasification Syngas process can be beneficially used to produce electrical power in a Green way i.e. we can avoid the recourse of having to burn fossil fuels or adding recyclables to co-combust food waste in a Neolithic incinerator in a pathetic attempt to burn water, thus requiring more increased energy above what can be extracted from the process, thereby avoiding unlocking historically sequestered CO<sub>2</sub> into the atmosphere where the vast majority of world scientists believe it leads to global warming.

It can be emphasised that efficient disposal in a fluidised bed + plasma reactor converting recently formed organic materials is sustainable. Recycling recently generated carbon content in the waste does not involve changing the volume of carbon in the dynamic carbon cycle. This is contrary to releasing sequestered carbon into the atmosphere by burning fossil fuels which is not sustainable and leads to the global warming events we are experiencing.

**In answer to recent public queries:**

Addition of special bacteria at the CEPT sewage treatment plant to the pulped food waste is NOT necessary.

[http://www.biwater.com/Articles/325198/Biwater/BW\\_Home/waste\\_water/waste\\_water\\_projects/Stonecutters\\_Island\\_STW.aspx](http://www.biwater.com/Articles/325198/Biwater/BW_Home/waste_water/waste_water_projects/Stonecutters_Island_STW.aspx)

The processes involve quite normally occurring bacteria which are encouraged to participate as part within the sewage treatment process by placing them in a stable and favourable

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environment whilst they are dosed with “food” comprising raw, semi digested and fully digested components.

Food waste, when it is placed with sewage, as is proposed, will be digested by the same types of bacteria as are present in our own digestive systems and are excreted along with the food waste from our own digestion processes. Hence, we might conclude that the same bacterial processes will occur as the sewage passes down the pipes to the treatment plant as occurs in our own digestive systems whether the sewage comprises digested food or raw waste food. (which food waste in Hong Kong’s situation has a massive water content level already, being in excess of 70% water for Mall waste and 90% water for wet market food waste)

The critical factor here is to pulp and thereby dilute the waste sufficiently so as not to inundate the bacteria and to allow sufficient time for the bacterial digestion processes to occur en-route before the waste reaches the treatment plant where residues are separated by the sedimentation process to leave the sludge and processed water.

(A mesh screen at the sewage plant would possibly be required to sort any floating Styrofoam food packaging that might remain after the pulping process)

In Hong Kong the sludge will shortly be incinerated at Tsang Tsui fluidised-bed plant rather than being placed in the landfill, while the processed water, as at present, will be returned to the sea where yet more natural bacterial digestion processes occur, eventually resulting in the next cycle of the food generation process.

This is the ultimate recycling process and has evolved over many millions of years with mankind being an integral part of the top end of the process. In the modern sewage treatment process, engineers have harnessed the naturally occurring bacterial processes and have nurtured them to enhance their ability to deal with the huge volumes of waste which need to be dealt with and arise from urbanisation and placing too many people in too small a space for traditional nature to deal with on its own.

Despite Stonecutters plant being able to easily handle all our daily 3,500 cubic meters of wet food waste in minutes, Hong Kong has 10 additional sewage plants and pipe delivery networks that could also be enlisted to do the like actions:



### **This concept is totally viable.**

It reduces the mal-perceived need for landfill extensions and retrograde lethal polluting incineration plants as promoted by the ENB.

It will create new jobs in areas currently opposed to landfill extensions.

It will promote recycling instead of burning and resultant necessary toxic ash landfill and costs.

It will obviate the need for expensive man-made islands as the new ash lagoons required by incinerators ad infinitum.

It makes sense, something currently lacking in the ENB's tunnel vision for our waste blueprint.

It uses readily available in-situ sewage networks and will cost little to setup the pulping at Transfer stations.

It complies with 2012 Panel on the Environment's directions to Government: *(still ignored by the administration)* and is shown below for your ease of reference:

<http://www.legco.gov.hk/yr12-13/english/panels/ea/papers/ea0527cb1-1079-2-e.pdf>

13. Details of the funding proposals for the three landfill extension projects are set out in LC Paper No. CB(1)1369/11-12(01) which is hyperlinked in the Appendix. According to the

Government, IWMF would require some seven years for reclamation, construction and commission, while landfill extension would need a few years for site preparation works. In this connection, the IWMF Phase I project and the landfill extension projects should be pursued as a package to ensure that Hong Kong could maintain environmental hygiene and handle waste properly and timely. Deliberations by the Panel on the funding proposals for landfill extension are summarized in the ensuing paragraphs.

**15. The Panel held another special meeting on 20 April 2012 to continue discussion on the funding proposals. Noting that many measures pertaining to the Policy Framework had yet to be implemented, members were opposed to the reliance on landfills for waste disposal in view of the associated environmental nuisances, as well as the long lead time and cost incurred from restoration of landfills. They stressed the need for a holistic package of waste management measures (including waste reduction, separation and recycling) with waste incineration as a last resort and better communication between the two terms of Government on environmental policies, in particular on the need for incineration. They also urged the Administration to identify other suitable outlying islands for IWMF and promote the local recycling industry. In view of the foregoing, members did not support the submission of the funding proposals to the Public Works Subcommittee for consideration.**