

***** (Translation)*****

Prof. K C LAM: I am the moderator of this public hearing. The main purpose today is to give opinions with regard to the consultation paper of Harbour Area Treatment Scheme (HATS) Stage 2. You can speak in either Chinese or English and I shall switch channel accordingly later. We will provide a simultaneous interpretation service. There are headphones outside through which this service is provided. You are welcome to use them. As I said, the consultation of HATS Stage 2 has been in progress for several months already, and it is going to finish within a week or two. This public hearing is aimed at providing an opportunity for the public to air their opinions. As I have said just now, you can use either English or Chinese. And now I shall switch to English.

Ladies and gentleman and friends, I am K.C. Lam moderator of this public hearing. On behalf of the organizer ETWB, I wish to thank you all for attending and contributing to the public hearing. The public hearing will be bilingual so feel free to use either Chinese or English. I am very glad indeed to be part of this public hearing. This provides opportunity for the public to express views on the proposed HATS Stage 2 scheme. Hong Kong is famous for her harbour. The name in Chinese Hong Kong 香港 “Fragrant Harbour” reminds that how blessed that we are in having such a natural asset. Many of us have observed at the same time that what the quality has degraded over time due to the increasing population and effluent to such an extent that our health may be at risk and tourism industry also at stake. We are here today to express views to the Administration. You are here today because you are concerned about the water quality in Hong Kong and also you are keen to express your views to provide your input to this decision making process. Managing water quality in Hong Kong is not a new issue. The public and the professionals have discussed and debated the issue for over ten years. It’s high time that we must take a decision. We have been waiting for a long time. And that’s why now today we are going to hear a short presentation on the scheme and then we look forward to having your views and inputs. About my role, when I was young I aspired to be a pilot. Soon I realized that the dream couldn’t be realized. So I think then I aspired to be an air controller to control the pilot. And I see my role today to be more like an air controller, to ensure that you get to the destination on time and safely. And therefore, I shall exercise my right and ensure that we take off and finish on time. And then don’t carry too excessive luggage because, to the port, address the issues that we have had. Of course I think there are

certain forbidden items on the plane. No weapon, no abusive words, surely I think we don't need to resort to those. We are going to have five presentations. That's on our register, but then to begin with, I think that would be useful that we have a very brief summary on HATS Stage 2 scheme. Now as this is the day for the public to air their views to Government, presentation would focus mainly on the facts and perhaps not too much on the opinions. Each presentation would have only fifteen minutes. Stick to the time. As I said I shall use whatever appropriate means to ensure that we take off and finish on time. SI is available and there would be verbatim recording of what is presented in the public hearing. And the recording would also be put on the Government website as well. This is an economy flight; we don't provide meals. There will be a short break for you to stretch your legs etc. and to have a cup of water perhaps outside after 10:40. And then after the short break, we are going to have a free discussion when I shall invite all presenters to be on the stage. And then I shall welcome questions and views from the floor. So without further ado, may I firstly invite Mr. Raistlin Lau, Principal Assistant Secretary for the Environment, Transport and Works Bureau, to give us some basic background about HATS Stage 2. So Mr. Lau.

***** (Translation)*****

Mr. Raistlin LAU: Good morning, everybody. I am Lau Chun, representative of the Environment, Transport and Works Bureau. I am here to give you a brief account of the way forward for the HATS Stage 2. You may have heard of what I am going to say before, but I hope I can give you a review here.

Actually, before HATS, most effluent of Hong Kong was untreated and discharged into Victoria Harbour at these points here. We are now generating 1.7 million cubic metres of effluent everyday, an amount that can fully fill the Shek Lei Pui Reservoir or 800 Olympic size swimming pools. The diagram here shows the changes of the amount of *E-coli* between 1986 and 2001. From the data collected from these water quality monitoring stations, we can see that the trend is on the rise. This diagram here shows the situation in December 2001 when the HATS Stage I was fully commissioned. The dotted lines are the tunnels deep down to 80-150 metres underground, which connect most parts of the urban areas in Hong Kong and Kowloon to the Stonecutters Island, including Kwai Tsing, Kowloon, Tsuen Kwan O, East Kowloon, Chai Wan and Shau Kei Wan. However, there is still a large part of land in the north and west coast of Hong Kong Island, those urban areas shown by

dots here, which have yet to be connected to our system. These are the areas that will be covered in the Stage 2.

Stage 1 of the HATS employs the chemical treatment method, and is now handling 1.4 million cubic metres of effluent everyday. It is a very effective system, effective in the sense that a large amount of pollutants are eliminated, including 70% of organic pollutants, 80% of suspended solid and 50% of *E-Coli*.

This system has reduced the amount of sludge discharged into our harbour by an amount of 600 tonnes a day. It is also a very cost effective system too. The photo here shows the sewage plume seen in the harbour before the HATS Stage 1 was commissioned. As a result of discharging untreated sewage directly into the harbour, once in a while, we would see such a phenomenon. This photo shows the sewage plume outside Kai Tak Airport. Here is another photo showing the current situation after the commissioning of HATS Stage 1. Although the contrast of the photo is a bit different, basically you can still see that the sewage plume has disappeared. Our chemical treatment process is very effective and thus we have a great improvement in water quality. This diagram shows the degree of the improvement of dissolved oxygen. On average, there is an overall increase of 10%. The most significant changes can be seen in the central and the eastern part of the harbour in which there is a varying degree of increase of 13 to 20%. In the western part, there are also some improvements, though not that significant.

As for nutrient...for those harmful substances, ammonia has been reduced significantly by 25%. As a result, we can fully meet the ammonia standard set for the harbour area. And, of course, the change is more obvious in the eastern and central parts than in the western part. The main reason is we conveyed all the sewage generated in the eastern and central parts to Stonecutters Island for treatment and then discharge there. That is why we need Stage 2 to make the system more perfect and to tackle the remaining water quality problem. This diagram shows the changes of total inorganic nitrogen as a nutrient. Since the commissioning of Stage 1, the amount of total inorganic nitrogen has decreased by 16%, which made our compliance rate increase from 76% to 94%. Amount of phosphorus has decreased by 36% and *E-Coli* in the whole harbour has decreased 50%, and the change is again more significant in the eastern and central parts. In the eastern part, there is even a drop of more than 90%. But in the west, especially those parts outside Tsuen Wan, there is an increase of the amount of *E- Coli*. The main reason is that our outfall is in the

west and the water current bring these influences up to the north affecting the beaches near Tsuen Wan and Kwai Tsing.

This shows the overall changes of water quality. You can see that there are significant improvements in water quality. The only deterioration is noted for *E-Coli*, ammonia and nitrogen in some areas such as Ma Wan Channel. This results in closure of four more beaches in Tsuen Wan area. Together with those three that had been closed before, a total of seven Tsuen Wan beaches have had to be closed. This slide is a newspaper cutting showing that new living organisms were found in the Victoria Harbour after the commencement of HATS Stage 1. This implies that Stage 1 of HATS is very successful. However, we still have to cope with the future increase in population and sewage around the Victoria Harbour. That is why we need Stage 2, and also we still have to deal with the sewage generated from the remaining parts of the Hong Kong Island which are not yet connected.

Here we have the four options which are the way forward for HATS as proposed by the International Review Panel appointed by the Government in 2000. Option A proposed a centralized treatment, whereas options B, C and D are more decentralized. The IRP further recommended the Government to evaluate the feasibility of these four options against five main criteria: environmental, engineering, social, economic and land resources factors. In response, the Government then conducted a number of studies and trials and, as a conclusion, the Government preferred Option A which is the most centralized option. There are six main reasons for that: Firstly, this option should be easier for the public to accept as the proposed site is far away from those environmentally sensitive areas and residential areas. Also, we have a similar facility nearby which is the Stonecutters Island Sewage Treatment Works that is now in operation and therefore it is easier for the local residents to accept. Secondly, there is adequate space for the building of the facilities, and to allow flexibility for any future expansion. On the other hand, a centralized treatment will have an advantage of economy of scale and we will have more room for installing standby facilities, thus reducing the operational risk. This is also the option which is the most environmentally friendly, takes up the least area of land, and the most cost effective, both in terms of capital or operational cost.

There are 4 main elements in HATS Stage 2: First, to construct deep tunnels for those unconnected areas on the Hong Kong Island. Second, we have to upgrade the current Stonecutters Island Sewage Treatment Works so that its capacity can increase from the current 1.7 million cubic metres (per day) to the planned capacity of 2.8 million

cubic metres (per day), in order to cater for future demand resulting from the population growth. Third, we have to install a disinfection system for the effluent so that we can reopen the beaches in the Tsuen Wan area. Finally, as a result of population growth, we need to have biological treatment facilities. The sewage thus discharged will not affect the water quality within the harbour because it can be handled by the harbour's self purifying ability.

We estimated that at least 12 hectares of land will be required for HATS Stage 2. Of course, more land will leave us with more choice regarding the technologies selection. The capital cost is estimated to be HK\$19.1 billion and the annual operation cost is HK\$1.18 billion. The government also proposes to split the Stage 2 project into two phases: Stage 2A is to construct the deep tunnels first. It is the most time-consuming work and anticipated to be completed in 2013-14. It also includes the expansion of the existing chemical treatment facilities which is anticipated to be completed in 2011 and 2012 the earliest. The last part of this stage will be the addition of disinfection facilities. In response to the request of District Council and LegCo, we can speed up this process and, if everything goes well, we can finish it by either 2008 or 2009.

We also suggest all the preparation works for the biological treatment facilities of Stage 2B should be started simultaneously with the Stage 2A, so that its construction can be launched whenever needed. The preparation will include: the close monitoring of the change in the quantity of sewage; the change of water quality in the harbour; we shall secure the required land and process the change of land use, if necessary; we shall also complete all the site investigation works and the environmental impact assessment. With everything ready, the construction work of Stage 2B can start at any time when it is called for, so as to ensure proper protection of the water quality. Of course, Stage 2B is very complicated as it involves the biological treatment facilities of a size which we have never come across in Hong Kong. Also, it may also involve some sort of new technologies. For this reason, we believe more preparation time is needed. This is also why the government proposed to split the Stage 2 into two phrases so that we can start Stage 2A immediately to bring early improvement of the water quality in the Victoria Harbour. If we have to wait till the completion of all the preparation works for Stage 2B, then the whole Stage 2 project has to be delayed.

The total capital cost if we go for phased implementation is HK\$19.5 billion, which costs 400 million more than the HK\$19.1 billion that I mentioned just now. The operational cost, however, will only be HK\$1.16 billion which is 20 million less. What is the financial benefit if we go for phased implementation? If we can

implement Stage 2B only at the time when it is needed, we could save 720 million for each year, enough to make up the difference of 400 million in capital cost if we start the operation of Stage 2B by a year later. Thus the government is in the opinion that the planning of Stage 2B should be finished as soon as possible, so that it can be launched once it is called for.

What will be the benefits brought to us by HATS Stage 2? In terms of water quality parameters, all of them will generally be further improved. After going through chemical, biological treatment and disinfection, the sewage from the harbour area will be properly treated and the self purifying ability of our harbour will be capable of dealing with this effluent. This will further reduce by 500 tonnes the sewage sludge going into the harbour, increase the dissolved oxygen content, and lower the amount of toxic ammonia, nutrient and pathogen. We then will have a healthier ecological system and all water quality standards and objectives can be met. **(Prof. KC Lam: two minutes)** We will also have benefits like our beaches can be re-opened; the sewage plume will disappear, the annual cross harbour swimming races can be organized again, we shall have a more ideal environment for all marine creatures ... restore the harbour to a standard commensurate with Hong Kong's status as Asia's World City. We would like to hear your opinion particularly whether you agree with our preferred option – the centralized option, whether you agree with the grounds for phased implementation and whether you think it's worth protecting our harbour by paying a higher sewage charge? My presentation is just a brief one. Thank you.

Prof. K C LAM: Thank you Mr. Lau. I understand that there has been a problem with the simultaneous interpretation. Do I understand that the problem has been rectified now? Ok, right. Please accept my apology for that. There is a minor technical problem. Understand that English is channel 3. Chinese is channel 2, right? Right... Now we are going to hear the second presentation by Mr. David Wu. He would be assisted by Mr. Damien Ku in a minute. Both of them are from the Chartered Institute of Water Environment Management, the abbreviation CIWEM. Ok, so please.

Mr. David WU: Good morning, my name is David Wu, former chairman of CIWEM. Before I get on the plane, can I declare I carry excess bags, just a little bit - not too much... Ok?

CIWEM stands for Chartered Institution of Water and Environmental Management.

We have over 11,000 members worldwide with headquarter based in UK. Locally, we have two hundred odd members. We are qualified professional body with members we have very strong background in water protection field. In last twenty years, our members have been involved in virtually every project: building Hong Kong sewage treatment and water treatment work. So they are in a variety of consultants, Government departments. And so we can say we know what we are talking about. So the views I am going to present to you have been thoroughly discussed, debated. And we present by no means it is...we have reached an agreement; but, anyway it is a consensus view. But one thing we have complete agreement is the Government would have a full support to initiate the scheme. The commitments to initiate the scheme and we fully supported that.

Well, before I talk other issues. I would like to highlight the main objective of the scheme. I think the main objective of the scheme is to install biological treatment for the sewage, so that the Victoria Harbour can meet the water quality objectives. So to sustain ecological development without posing health risk to the human being, and provide good quality seawater for toilet flushing in fact not many people realize that.

Why is it so important? Why is it so important to have secondary treatment? Now, if you can remember a few years ago, SSDS was abandoned because it was criticized for not having the sewage treated before disposal. So the Government appointed international review panel and the recommendation is to have the sewage treated on site treated to the secondary standard. And Government accepted this and that we think that is the way forward. Well, although secondary treatment is included in Stage 2B but there is not definite date for the completion, or no definite date for restarting the introduction of secondary treatment. We, CIWEM, have been thinking very hard on this and we don't think it is a good idea; because what the documents are proposing is finish Stage 2A first and then see what happens. And also the reason for not having committed the Stage 2B is to have so much money saved each year on operating cost. Well, you can save money, but you don't get sewage treated. That is the reason. And I understand that you worry about whether you do it in one phase or two phases. Our view is that it doesn't matter how many phases you do. The main thing we asked for is firm commitment on biological treatment.

Well, why the commitment of biological treatment is so important? Because it does affect the Stage 2A. If we committed to biological treatment, do we still need disinfection in Stage 2A now; because biological treatment is also a form of disinfection. It will remove 3 log q of *E-coli*. Now the other reason why secondary

treatment is so important is secondary treatment is a world trend to have secondary treatment for big coastal cities. We don't have to go far. Macau, Shenzhen, Shanghai is doing it. Well, Mr. Tung keeps telling us that we want Hong Kong to be world-class city. That is the thing we have to do.

Is disinfection of CEPT necessary? To have disinfection before the secondary treatment is something really odd, not doing in a conventional way in term of sewage treatment. As I said, refer to IRP, there is no recommendation on disinfection in IRP report. But why suddenly become so important? Now, as we understand that Victoria Harbour is designated for navigational use only. The reason says that we can have cross-harbour swimming. Yes, very nice to have cross-harbour swimming, but it costs 300 million dollar in running cost for only once a year event. If the Government wants to do it, I think it has to tell the public how much it would cost. Also sorry, before go to the technology, also the Government wants to reopen Tsuen Wan beaches. Well, if I am a swimmer, I would like to, if I have a choice of Tsuen Wan beach and Repulse Bay, I would go for Repulse Bay. So I guess the Tsuen Wan beaches would not be so popular. But also after disinfection, would it be, will actually reopen the Tsuen Wan beaches? Would it be a cheaper way to do it? Say for instance, to get rid of the expedient connection? And also look into other point sources like Pillar Point. So there is a cheaper way to do it. For technology wise, if they go for chlorination and dechlorination, harmful by-product which is well known, I'm sure lot of academics and a lot of people did have a lot of views on that. So I don't intend to go too much detail on that.

And as I understand for the disinfection process, they're going to use the sewer and the outfall as a mean of contact tank. But I think it would be very very difficult to design a proper dosage system. In case it doesn't work properly because we are talking about 40 tones of chlorine per day to go into the sea. You then have overdosed sometime. So in that case, you would do more harm than good. That's the point. And in fact, some of the literatures show that the virus cannot be killed completely even by chlorination. For UV disinfection because CEPT effluent they still have fair amount of solid in there. So the bacteria will hide behind the solid. What you have to do is to use high dosage of UV, which is involved obviously a lot of energy, a lot of cost and also extra greenhouse gas will be produced. And if Stonecutters Island is going to do the UV disinfection, it would become the largest world mercury user. Mercury is, once in the environment, would be very difficult to handle. It would be bad for environment. And looking at the whole picture, are we in the cycle of trying to solve one problem and create even bigger problem. So we have to consider this very

carefully.

So for this centralization and de-centralization, centralization definitely has an advantage of economy scale: The bigger the plant, the cheaper it can run. But not to the extent if the plant have to build tall or build deep, then you'll have a more cost. The other advantage you will lose for centralizing system is dilution effect. You look at the Tsuen Wan beaches situation. Before Stonecutters Island, there are several discharges along the Victoria Harbour. There is little impact from the Victoria Harbour discharge, but since the discharge will be moved to Stonecutters Island. Then the problem takes over in Tsuen Wan. So really that is one thing you have to consider very carefully. But the other thing that de-centralization may pose a lesser risk in case of a complete system failure, like whether you want to put all the eggs into one basket that is the situation you have to consider.

The proposed change, well, CIWEM suggested to instead of installing disinfection, they should consider to adopt de-centralization system with introduction of biological treatment. And additional outfalls maybe to Stonecutters Island to disperse bacterial impact to Tsuen Wan beaches, as I said before, reduction load from other point sources, just as I said the Pillar Point situation we can look again. For compact technologies, as I say, if we could build treatment plant in the urban area you have to go for compact technology. Meantime, meeting to the implementation of biological treatment maybe you can look into other process option.

For actually designing the treatment plant, other design parameters, population projection, the Government promise to look at it again. Well, the peak flow factor which becomes big...with the existing data. Well for the discharge standard geared to seasonal changes. At the moment, we have one standard all year round. Well, can we relax during the wintertime, where the performance is the lowest? Our impact is lower. Nutrients removal requirements, can we really have to go for a Rolls-Royce job, or just see what we can afford and what's the best value for money. Well, for public private participation, we support the approach. And I think the Government should be aware of to involve employment of local expertise and protect public interests.

Polluter pays principle. CIWEM also support fully. And maybe the form of Government- born capital cost and the public have to pay the operation and maintenance cost. And a fair charging system should be devised, and not like TES heavily weighted into certain sectors of industry.

The main message we want to pass on to the Government is we should make firm commitment to introduce biological treatment. And we think disinfection of CEPT effluent is expensive and can be environmentally damaging and should not be considered. And also we should investigate other options to solve the Tsuen Wan beaches. Thank you very much.

Prof. K C LAM: Thank you David. I think we can only allow a very short supplement by Damien, no more than two minutes, please. OK. Thank you.

Mr. Damien KU: It's all right. As David has presented, they are a lot of controversial ideas. And actually within CIWEM, we have a long discussion etc. And so what David has presented may need further discussion and investigation. And CIWEM welcomes the authorities to come along and discuss with us. In general, I would conclude that the Government should consider both innovative ideas, not even included in the current recommendation. And also the Government should carefully access all the options with sound basis of theory. And detailed investigation should follow, not only within a certain period perhaps over a longer period to find out the practicality and performance of the proposed system. And also to put forward the recommendations, probably involvement of more than one department would be necessary, not only the EPD, DSD but also Water Supplies Department, Buildings Department, Architectural Services Department etc...Health Department. There must be inter-departmental effort here in it. The idea is to end up with a solution that would not produce abortive work; we are now talking about a large investment and long term running cost. And I will say some suggestions in my Q&A section.

Prof. K C LAM: OK. Thank you. That's why we are going to have a free discussion after the short break. We shall welcome comments and suggestions from either CIWEM Hong Kong or without. May I now call upon Dr. K.F. Chan? Yes, No, H.F. Chan. My apology, should be Dr. H.F Chan. He is representing Hong Kong Institution of Engineers. And while H.F. is going to fix the PowerPoint, let me reiterate again we have simultaneous interpretation, so both languages could be used, Chinese or English. I will switch channel later during the discussion session so that all can participate. Simultaneous interpretation is now operating normally, isn't it? Ok, so, Dr. Chan, please.

Dr. H F CHAN: Thank you Chairman. Because I have known K.C. for a long time, I thought he should know my name. I was kidding. No hard feeling. My name is Chan Hon Fai, I am a representative of Hong Kong Institution of Engineers. The Hong

Kong Institution of Engineers is a statutory organization with more than 10 thousand members. The HKIE in short is pleased to know that after the commission of the HATS stage one, the water quality of Victoria Harbour has been substantially improved. Hong Kong SAR Government should be commended for his commitment and efforts in protecting the water of Victoria Harbour and the adjacent water control zone in Hong Kong.

As a statutory engineering institution in Hong Kong, the HKIE is supportive of this project, and wishes to urge the Government to proceed with this project without delay. In response to the consultation paper released by the HKSAR Government, the HKIE, in association with the CIWEM, the presentation you just heard, organized a forum on the 9th October to discuss the consultation document and to collect members' view on the document for the preparation of a position paper to the Government. Today's presentation is just a summary of the majority views. We would not have consensus view within so large an organization. And by majority here, I only mean that it represents those views expressed, there are a lot of silent views which we cannot collect. Today's presentation is a summary; we'll have a detailed comment on the documentation paper to be submitted to the Government.

My presentation today would be to respond to the three questions asked in the consultation paper. The first is "Do you agree with the preferred option, Option A -- centralized treatment at Stonecutters Island?" The HKIE's view is that 'YES'. We support option A but we also think that option B may be better; because under this option, land is readily available for an above ground facility using various proven treatment technologies, and therefore we would not be dependent on the use of compact technology. We are not commenting on the compact technology but we think that it is more flexible for the Government. At the same time, the capital and recurrent costs of this option are only marginally higher than those of option A. In terms of resilience, option B will provide more flexibility for sewage transfer and for future expansion. Also, it will reduce concentrated discharge of effluent, though the higher risk of this option on ecological resources around the south of Lamma and fisheries resources in the southern waters should be duly considered.

On the second question: "Do you agree that Stage 2 should be implemented in two stages?" Our view is that 'YES', but the two phases should be implemented as an integral plan, but in two engineering phases for practical reasons. It is essential that a definite consecutive time frame for the two phases should be specified in the consultation document. In a way, this should show the Government's commitment on

the Stage 2B.

On the use of disinfection particularly the use of chlorination for disinfection, the HKIE's view is that the Government should strike a balance between protection of public health and long-term environmental impact of chlorination. The HKIE concurs in the use of chlorination as an interim measure or as needed during, for example, bathing seasons, pending the implementation of Stage 2B.

On the last question of whether we support, we agree to the "Polluter Pays Principle" and the protection of water quality of the Victoria Harbour. Our response is that 'YES', it is essential to protect the water quality of the Victoria Harbour. The Government has the legal responsibility to protect the water quality of Victoria Harbour, and it must carry out the necessary measures in the most cost-effective manner.

On the "Polluter Pays Principle", the HKIE has no consensus view on this, on how to adopt. We have no consensus as to how to adopt the "Polluter Pays Principle" doesn't mean that we don't support this principle. But the way it should be carried out, we don't have consensus and it's beyond the consultation document.

Last but not the least, the HKIE would recommend the following for Government consideration: First, we propose that a standard should be set for effluent discharged into the receiving waters. Second, we propose that the Government should consider shifting the tunnel alignment southward to reduce the risk and cost in tunneling in the reclaimed area, and to carry out detailed site investigation as soon as possible. This is the end of my presentation, thank you.

Prof. K C LAM: Right, thank you Dr. Chan. H.F. is always a highflier, gets to the destination on time and even before time. Thank you. That would allow us more time for discussion. Next, may I invite Mr. Choi Chun Chau? Oh! I am sorry, Mr. Choi. Mr. Choi's presentation will be delivered in Chinese.

***** (Translation)*****

Mr. C S CHOI: Hello everybody! Please do not think that I am here to sell chocolates. This is an equipment which I will show you later. I am a sales manager of (科斯特節水有限公司). The main theme of my presentation today is how to use

water in a scientific way and how to save water with modern technology. What I'm trying to do is to look at HATS from a different angle.

We all have to go to the toilet every day, say for example after getting up in the morning. Our toilets are fine but you may find that you have to press the button hard for flushing and, after pressing, the water splashes loudly. This is our existing water closet. We noted an important issue from HATS that most of our sewage is domestic. If we can save water properly at home, it will subsequently help a lot in sewage treatment. How about if we can reduce the volume of our flushing water by half? Maybe this can solve our existing problem on sewage treatment capacity and consequently help in cleaning up our harbour as well. I am here today to show you a better design for the toilet flushing mechanism for the water closet.

Imagine this is a cistern and this is the flushing button. We simply need to press it once lightly, just like pressing the mouse for computers. Let us take a look at the device inside. This device is similar to those used in ordinary toilets, which comprises three main parts: flush valve, water inlet and a button. All these parts are connected to a plastic panel, which is also the one that changes the whole operation of toilets. We used to press the button for flushing but we don't need to do that now. Water pressure controls the whole operation. This simple button is capable of providing different flushing volumes for different occasions. Urine can be flushed with around 2 to 3 litres of water by pressing the button once while faeces can be flushed with about 4 to 5 litres of water by pressing the button twice. The button can, if necessary, also be pressed and hold it for a while so that all the water inside the cistern will be used.

This flushing valve is the key component of the whole design. It has a very good stainless steel bayonet design. Once the upward pressure is exerted upon, the valve will be sealed, making it leakage free.

Let me now explain how it operates. Once the button is pressed, the water pressure will lift the valve to this level and then lower it slowly, with the speed controlled by this drainage control device. It will lower quickly to deliver flush water to the bowl at a high flow rate and vice versa. It is also adjustable according to our need. When we ...

Prof. K C LAM: Mr. CHOI and all of you here, we can of course listen to everything in this occasion. (**Mr. C S CHOI:** hm...) Maybe we should go back to HATS Stage 2 and focus on our topic of discussion. Could Mr. CHOI please briefly

focus on the key issues of HATS Stage 2 which have more to do with the consultation?

Mr. C S CHOI: I am here to explain how this product can be used to reduce the generation of household sewage. Is that alright? (**PROF. K C LAM:** Yes, it's OK) I would like to explain how to save our flushing water....

Ms. Lucianna WONG: Chairman, time is up now. Excuse me. We know such thing exists already, thank you very much.

Mr. C S CHOI: OK. What I would like to stress is the role to be played by this product in saving water.

Mr. Damien KU: I would like to provide some supplementary information. The Water Supplies Department is studying some similar products for reducing the use of flushing water, including designs of flushing mechanism and toilet bowls. I suggest that you should approach the department and talk to them.

Mr. C S CHOI: OK. Thank you.

Prof. K C LAM: Fine. We thank Mr. CHOI for showing us the product. As Mr. KU just mentioned, there are different types of products in the market. Of course, we should not ignore the topic on water-saving. I would also like to focus our discussion and briefing today more on HATS, which is the most pressing issue that we are facing now. May I invite our next speaker Mr. YEUNG Tze Tsun. We would like to draw on the wisdom of the masses in this hearing and listen to anything in relation to this topic.

Mr. T T YEUNG: Nature has rung the warning bell again and again: ciguatoxin in carnivorous and herbivorous caused by dinoflagellate with potent heat-stable neurotoxin, red tides caused by Gmnodinium and Gonyaulax, chicken flu, influenza virus, herpes, hepatitis, Bacillus anthracis, flesh-eating staphylococcus, recent epidemic of leukaemia, various kinds of cancer, AIDS, SARS, the rising trend of tuberculosis and so forth... Which one is not caused by pollution? Mother Nature is warning us that the conventional treatment methods are not good enough for the future. The ocean can take no more and the result is the red tides. It was common that we thought the nature had an unlimited capacity. The reality is: life will still go on, but the mankind cannot if no improvement is made. It is a strange phenomenon that a

hell for human beings is the paradise for pests, rats, viruses and bacteria. This paradise lies exactly in our sewers, landfills and dump sites. It is now time for us to tackle the problem at its root using the most advanced technology.

Triatomic oxygen (i.e. ozone) is a gift to us from the nature. Firstly, it is the most environmentally friendly as it is free from residue pollutants and it is very effective in increasing the oxygen content. Secondly, it is the most effective and clear cut as it can eliminate all the viruses, bacteria, paints, chemicals, detergent, grease and even heavy metal. It is also the most economic, its low operating cost avoid imposing a heavy burden on our livelihood. Fourthly, it is the most cost-effective technology in reducing the burden on those industries that produced large quantity of sewage. With less sewage produced, there will be room for cutting sewage charge. In addition, it can further develop to become a mainstream industry in Hong Kong: a lot of talent will be required for the technology development, quality enhancement, production, export and the maintenance work as well. Fifthly, it is the quickest. Do you know why? The qualifications required by the government can be obtained within a year and professional training can be completed in half a year. In six years' time, this system can be installed in all buildings in Hong Kong. For every year starting from now, we can already enjoy the benefit, no need to wait for ten years. It is also the most reasonable since the government need not pay for it. It is just a private facility like the central air-conditioning systems and private cars. Consequently, it helps to make our society more harmonious and united. The government and the public will jointly establish an industry, targeting to have the cleanest harbour in the world.

Triatomic oxygen (i.e. ozone) is the substance that nature uses to counterbalance, control, destroy and abate the contaminants to living things. It is the second most reactive disinfectant right after fluorine gas, but it is the only safe one with no residue. Triatomic oxygen kills bacteria by destroying its cell wall. Bacteria double at every half hour at 32.2 °C, every hour at 21.1 °C, every two hours at 15.6 °C, every 3 hours at 10 °C and every twenty hours at 0 °C. When bacteria accumulate, their growth rate will be intensively increased and become more resistant (to disinfectant). It is a simple analogy that the electric resistivity is higher for a thicker copper wire. Ozone is the only substance which can be used as a sterilizing agent without exposure to a higher temperature.

Pyrogens, by-products of microbial growth that are toxic to human, cannot be sterilized by autoclaving or dry heat as they adhere to the substance surface very firmly and cannot be removed without exposing to an intensely high temperature for

extended periods of time. Being a kind of lipopolysaccharide, the unsaturated double bonds in pyrogenic molecules can easily be oxidized by ozone and become innocuous. Thus, we have to treat our wastewater at the earliest moment once it leaves our houses, i.e. installing this disinfecting system in every building, restaurant or factory as pretreatment process, so that the sewage can meet the required standard before discharging into the public sewerage system. It will also result in a reduction of loading to our sewage treatment works. It is suggested that a “Separate Flow Refining” system of the same technology should also be added to the existing sewage treatment system to secure the quality of treated effluent before discharge, which is safe, reliable and environmentally friendly. It is also the only way to protect our environment, harbour and families. It is also a sure approach so that we don’t have to face the same problem again in future, irrespective of any commercial, industrial or population change. It is a responsibility to be shared by the public. The government should only monitor the quality and quantity of discharge. Those who fail to meet the standard should pay all the required additional costs. This is the true meaning of “polluter pays principle”. The same technology can also be applied to purify our potable water and air. Thus, we could have a chance of not being required to drink chlorinated water any more. This is the only treatment technology that produces odour free water. Do any of you live on lower floors or next to sewage treatment works or outfalls? If so, they should be well aware of what odour emission is. It is hard to say that air is not being polluted.

If this technology is to be adopted in Hong Kong, it will not merely create a number of jobs, but can also become a mainstream industry. We can once again enjoy oysters in Lau Fau Shan. The reputation of having the cleanest environment in the world can be rebuilt in just a few years’ time. Our living quality will be raised as well. Thank you.

Prof. K C LAM : Thanks a lot for Mr Yeung’s presentation. Now I think our next speaker is Dr. John Russell. Is Dr. Russell around? Yes, so...it’s your turn now. As I said in the beginning, each presenter would have 15 minutes, a quarter of an hour. Short announcement that is for those who have come here and not yet registered. During the break, could you please put down your name and organization at the desk outside? Dr. Russell, please.

Dr. John RUSSELL: My name is Dr. John Russell. I am from Melbourne, Australia.

I am back in Hong Kong after a number of years. The most important part is I am back in the city; it's a brilliant city. It's certainly moving on very quickly. Now, what I wish to do is to put, to encapsulate, what Peter Wong and myself have presented to the HATS consultative process, which I will encapsulate that now, I then show some overheads.

In essence, the HATS Stage 2 and the SSDS have basically been good attempts to resolve or attempting to resolve the wastewater management problems but basically in a local sense. And it really...perhaps now we are saying it is essential for a regional solution, a difficult task, right? - which has been mentioned by many people, many authorities for a long time. But perhaps now is the time to grasp it. And this is really the essence of what Peter Wong and myself were putting up, in that no matter what treatment, what wisdom, what technology, what cleverness we have and applied to the local situation, the background levels of pollutants coming through from the Pearl River, from the Delta and the catchment areas are so significant, that basically they must mask out any attempt; they must mask out to a serious degree, attempts that we have to rectify the local problem.

So for that reason we are thinking of wanting to move out of the square and think for a regional form of solution. And basically concludes in a fairly substantial submission to the consultative process. It concludes with forming with the Guangdong provincial government, a Pearl River Delta Commission with powers, real powers, it will take a while to get in place, and also commence significant targeted investments to look at the problems which occurring in the region and not looking solely at really, the local area.

I have got a series of slides now, which I will try and cover very briefly what we have put into our submission. So, ok. Now Peter Wong and I have been associated with an interest in wastewater management for a number of years, twelve years, or more and as you know Peter was the past-chairman of the Advisory Council for the Environment for the Hong Kong Government. Now I have been involved in wastewater management issues in Melbourne, Australia. Basically as I said that there have been two approaches, very vigorous, thorough, very clever approaches. One is SSDS, that was the old one. And the one which we have before us now, in the consultative process, being HATS Stage 2, and then 2A and the mysterious 2B. And you can see that basically we are in a square, that is what we are endeavoring to resolve. Just a little bit about the history of SSDS, for those who are not familiar with it because there is a mountain of materials associated with it. So I will discuss from

the next few slides some of the history but very briefly. Ok. So what we have is one of the proposals. Here the chemical enhance primary treatment, disinfection, a long outfall, which is a key out here to the Lema Channel or the Lamma outfall area. And basically the International Review Panel actually recommended the SSDS in January 2000. But basically, within six months, it was affected to reverse the decision and go from really a solution out here to basically a solution right in the harbour area. Big decision! And they say in their documents what a massive decision that it was to make. The reason they give predominantly was that they had no confidence or little confidence.

In discharging, although treated effluent, into the waters here which are carrying high background levels of nutrients and low dissolved oxygen content. And basically, the future looks as if the numbers are going to increase not decrease. That's an artist's impression out of some of the old documents and most of you will be very familiar, far more familiar than me with the details of Hong Kong. This is the Stonecutters Island in here and the whole big tunnel system where the current treatment is. The early conception was to run out, here pass Aberdeen, then Lamma Island and out in here and you can see there the actual risers and the rosettes out in what's called the Southern waters, or oceanic waters, in or off Lamma Channel a whole series of terms have been used.

We won't go into this in detail, although in the report we have put it in some length. I have just modified the main points, the salient points, just for your overview. The location of the SSDS outfall is there. And basically I am comparing the 1998 situation to here and the 2016, here, this is all given data, with the SSDS in place. Now, the comparison of dissolved oxygen, you can actually see that, I am not going in detail here because of time, but basically in the dry season, it's a different effect. In the wet season, the dissolved oxygen is significantly less. And if you look at the organic nitrogen, in the dry season, there's little effect through here. And in the wet season due to the Pearl River which we will be discuss in a moment, you can see it basically builds up to high levels, levels we will discuss here. Unless there's nothing done. And that's what we looking with the SSDS in place. So the whole idea was to treat it with a set process and disinfection to high levels and given the plans, and figures indicate that it is even better than what it was designed for, and bring it out into the main body to the ocean there. OK.

Now HATS Stage 2, we have been discussing that, you are looking showing the differences in basically, that where the outfall would be. So the thing is no matter how

good, HATS 2A or 2B is, whether eventually built or is not, basically the discharge would always be there, within the harbour system. Now same as before, CEPT, disinfection, a local outfall and biological nutrient removal which is being put forward. Look at the numbers it's a very expensive process. It works well and it's got application but as to whether, once you get on to that line, then you're looking at a greenhouse emissions, it's very energy intensive. And it's a very expensive process. So the question is, sure, it will do a good job, it could do a good job, but the thing is, as I will be showing in a moment whether it is installed in these areas, it would have very little effect to the incidents of the algal blooms and red tides. Because we will see in a moment, the dominance of that comes from the Pearl River Delta. Let's look at the background, sorry to take your time to make it clear. In the supplement to the HATS information, there's a whole lot of data there, which I also won't go into it at the present time. Now I mentioned the International Review Panel, this is very important. They were for the SSDS process and they kicked it off. And what they did in that particular report, they make these statements, which are very sudden. It wasn't in their brief to actually say which should be done but it's a major cause, this regional effort is needed to be done. They're absolutely essential. And the other thing they indicated, stated, and they also stated that it's pressures for situations of one area, one zone or one country investing in the regional problem, which is affecting them investing the other countries to collectively and cleverly work together. I will be finishing it K.C.. Thank you.

In the Pearl River. Pollution loads are seasonal, at the wet season and the dry season. With the Pearl River, the nitrogen is very sophisticated in the...I will give you a very simple overview of some of the mechanisms that work here. Just to give you the indications to where the problem is, what is it's cause and why we should be thinking out of square and going regionally.

Ok, if we look at the issue of total inorganic nitrogen. From the reports that I've read, it's origins are predominantly in the agricultural sector in the catchments of Pearl River Delta. We have similar problems in Australia particularly in estuaries, I know quite a lot about that area, I worked that area. So I'm just showing it basically as here. The spot right through the catchments, coming down here through the estuary. And basically it mixes then with the ocean currents. What we have here is a Hainan current, a warm current; which comes up the warm current affects the gradient. The salt gradients and also temperature gradients in the stratification and causes this high concentration of inorganic nitrogen, to actually move as a cloud within the water.

And then basically in the dry season, we have another cooler current, moving down the coast, having different effects upon stratification. And also you can see that during the dry season, there is no as near as much run off in agricultural areas because it's the wet time which get the run off from the land. It moves down and again predominantly moving out in this direction. No where near as much. When you look at all the data, all the data picks this up.

So basically the regional dimension, what Peter and I are actually proposing is that sometime, like Professor Donald Harleman said, we really have to think of the larger region. Sometime we have to grapple with the major pollution which is being occurred vastly, quickly in developing area. And basically within Hong Kong, it's thinking in the square, a solution in the square can't solve the problem because it is regional. And in conclusion, our paper concludes with two points. And I think with that K.C. I'll conclude, thank you.

Prof. K C LAM: I think we are about on time. And I propose, while thanking Dr. Russell, that we have a 15 minutes break. You can stretch your legs and have a cup of water outside and do come back at a quarter to eleven according to this clock. Ok?

~~~~~ BREAK ~~~~~

\*\*\*\*\* (Translation)\*\*\*\*\*

**Prof. K C LAM:** The discussion is now open to the floor. Before the break, we have five speakers and I would like to invite them to take a seat on the stage now. Mr. Damien KU, I don't know whether you'd like to sit over there or take a seat on the stage as well.

**Mr. Damien KU:** I have some more views to raise....

**Prof. K C LAM:** OK, then let me talk about the arrangement first. Before the break, we have listened to the government's representative and five speakers' valuable views on HATS and they are all on the stage now. Those on the stage are still welcome to further express their view during the discussion. But, being a public hearing, I'd like to let the public to express their views first. Any queries or views, whether or not in relation to the presentations previously made by the speakers on the stage, are welcome. As I said at the beginning, both Cantonese, English and Putonghua can be used. Now, I would like to invite those from the floor to express their views first.

Before you start your presentation, please introduce yourself, name and company, if any. The speech should be as brief as possible and in respect of the HATS consultation paper. Time is now yours. Yes, that gentleman, please.

**Mr. K C LAU:** I am Lau Kam Cheuk, as an individual from the public, not representing any organization or unit. First, I, of course, support HATS, but think that it's the government's duty. It's an impossible mission for us as it is beyond our capability to do so since we are not the sole polluter of the harbour. How about the entire Mainland at large? Could the government really improve the quality of the sea water to a level suitable for swimming, I would bet my head that it couldn't. How can it be done while plenty of sewage is still flowing in from the Pearl Delta? It is impossible. But this does not mean that we have to give up as it is still our social responsibility. Hence, we should first consider how much we have to invest on that and whether it's affordable to us. The blueprint is beautiful but may be impractical. Ever since the implementation of the "polluter pays" principle, virtually all businesses in Hong Kong were destroyed. The laundry business was destroyed. the profit maximization policy in our economic system no longer exists after 1997, can we still afford such kind of investment under the current economic situation? Just like the Electronic Road Pricing Scheme, it was in favour of by many. Very well, if I am rich, I will like the Scheme very much. – as if I can afford it, I'd be most happy to drive on a road without being bothered by the heavy traffic. However, we must consider whether our economy can support the implementation of such a fancy blueprint. In general, I support the scheme but I think the proposed charging system is unreasonable. As Mr. David WU just said, "How does the polluter pay?" We should pay for the operational cost instead of the construction cost. The government is taking the law into its own hand and not playing a fair game. Second, have any discount been made from our rates, which should have already included the charges for handling the solid and liquid waste? Right? I think that the government officials have a pretty good idea of what I am talking about. Another 20 billion dollars are now being asked for the project again. Our society is not as wealthy as it is used to be. Is it worth to implement the project? This is very important. Regarding whether the harbour water quality is improving - the government has never stopped reclamation works and impairing its natural dilution ability. Has the government ever paid us for the damages? No! We hold hands and raised our voice to protect the Victoria Harbour. Did the government hear us? Yes, but it won't do anything. It is because we can make a lot of money by selling land and we are money craving. Right? (The government) wants to protect the environment but also wants us to be the one to pay for it. Hong Kong is not that rich now and cannot carry any additional burden. Should melons from the

yellow hillock continue to be picked where only a few were left? (黃台之瓜，何堪再摘?) . It is pointless to further press on us anymore. Even if I can afford it personally, but how about the general public - for example those in the catering and hotel business? Yes, I have no problem - but I urge the senior government officials to be more considerate towards the general public on whether they can still bear the financial burden these days? Maybe the Government will impose fees on solid and domestic waste tomorrow. Actually, they have all been covered in the rates! Shouldn't you take all these consequence for supplying water to us? Shouldn't you treat it once the water is supplied and consumed? You have got the money through collecting rates – do you remember that? Now once again, you are squeezing money out of us. Today you are talking about the polluter pays for treating sewage today. Tomorrow will be the same for handling domestic and solid waste. How about deducting the fees from the rate and giving a rebate to the public - will the government consider this? This ought to be done if we are to follow the current scheme of water supply and government rates collection. The government always complains of not having enough when collecting fees. It will be a totally different story, however, when we are talking about returning money to the public. Can we as the general public afford the vast amount of money you are spending? The budget deficit is huge even with the imposition of government rent since 1997. The government then covers the overspending by putting the squeezes on the general public. Today, I would like to take this opportunity here to tell you that I basically support (the scheme) as the government must treat the sewage. However, considerations should be given to who is to pay and how much to be paid. I wish that the bill of constructing the entire sewerage system will be settled as public expenditure, i.e. to be charged from the public construction account. Last time...

**Prof. K C LAM:** Would Mr. Lau please take one more minute to...

**Mr. K C LAU:** Don't worry. I will not exceed the time limit, as I will leave some time for the others.

**Prof. K C LAM:** Thank you very much.

**Mr. K C LAU:** Starting from many years ago, I wished the government can settle this sewage treatment scheme under public works project account, but the government refused to do so. In Stage 1 of the Scheme, we had gone through a hard time. I think the government has not considered this. That is why I would like to take this opportunity to voice out my view here. I hope that you will take record and make a

reply. I also wish the government will consider having a deduction from the rates so as to counterbalance (the increase of sewage charge). I myself would be very pleased to share this social responsibility. I believe Hong Kong citizens are willing to do so too, only that their financial capacity may not be that adequate. I finish here, allowing the opportunity for others to talk. Thank you.

**Prof. K C LAM:** Many thanks for Mr. LAU's views. As I remarked at the beginning, anything spoken today, both on the stage and those from the floor, will be recorded and uploaded to the Internet. I also noticed that the senior government officials were all listening attentively to what Mr. LAU said. I suggest, during this discussion session, we'd better not to provide an immediate answer to the questions raised so that more people may put forward their views. After that, I will let the authorities concerned to clarify any points if needed. Every speaker can have three minutes to express their views. Please be brief. This gentleman, please.

**Mr. K W CHAN:** I am CHAN Ka Wah, the Chairman of the Hong Kong Project Management Exchange Centre. We have submitted our proposal, but I will not make further elaboration here today. I would rather like to express my views on this proposal within the three minutes allocated time.

First, it seems out of proportion to spend 20 billion dollars this time when compared to the scale of Stage 1. Only 8 billion dollars have been spent with so much works done in Stage 1 including the construction of the deep tunnels. Why do we need 20 billion dollars this time? Such detail may be supported by figures but we don't have time to study this for the time being. I hope that the government officials will take a look at it. If the budget of 20 billion has been over estimated as that, it will greatly mislead the public, just as the previous speaker said, "Who pays for such a vast sum?"

The second point is about the four options. The government seems trying to force the public to accept one of them and says that those options are developed by international experts. Being a world class city, I wonder why Hong Kong did not have someone who could be more involved. Are these four options the best? Are the deep tunnels necessary? If we examine the construction cost, we will find that the deep tunnels account for a vast proportion. If there is other better option that can save money in this part, why not give them some considerations?

The third point is about the area being affected by the pollution from the Pearl River Delta as mentioned by Mr. RUSSELL before. Despite that, I very much support this

harbour treatment scheme. If Hong Kong can set an example by adopting a less expensive but more cost-effective method, it will have far-reaching influence on the China at large and even the whole world.

Fourthly, I would like to put forth our proposal. We hope that the government will consider building a sewage treatment facility on a piece of land by the sea, near the former Kai Tak (Airport) in Yau Tong. We can take the advantage of the current trunk upgrading works at the King's Road, a project which has been a nuisance to the public for years, to divert the sewage from the North Point Sewage Works to the new Yau Tong plant. I think this can save us a lot of money. That's all for me at the moment.

**Prof. K C LAM:** Thanks for Mr. CHAN's views. As Mr. CHAN has mentioned, for such an important scheme being so closely related to Hong Kong, we should listen to more views from different people, including those from the community. And that is why we are here today. This hearing is also a latter part of the 5-month consultation exercise. I would like to hear one more from the floor and then see if there is any response from the speakers on the stage and subsequently for the authorities to make responses. The lady in the front? Yes.

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**Ms. Anna NORTHWOOD:** Briefly, my name is Anna Northwood. I am obviously not terribly Cantonese, hopefully slightly, because I have just recently qualified to be a permanent citizen here. My point though I am being here because I have two young children. And recently, we have started thinking leaving Hong Kong because of the massive levels of pollution that we see here. And that saddens me because I love Hong Kong very much. I worked for the government here and would hate to see it turning to an island that is surrounded by bad smells. Which we can see it's happening here today, I don't think that is hard to imagine. Ok, so we all accept it is a very complicated issue. The first issue on everybody's mind seems to be the issue of cost. But I think there are a lot of things that has put forward in terms of what the costs are. What I think that is another view to put into it is that we can't actually think of all the benefit of this can be. Just as the 20 billion, yes, it is very expensive, incredibly expensive, but it has been a long time coming up. There have been many people involved in this for more than 10 to 15 years. And maybe it is something that should have started a long time ago, and wouldn't been facing as huge expenditure. So we are talking about cost-effective, the keyword should be 'effective'. It's hard to mention the pros and cons but here is something to bear in mind. In terms of health,

we talk about health. I have children. I know other people have children. Here, everybody's children are always sick. What is the cost of that?

Secondly, tourism, I speak to visitors all the time. One of the things they find stunning is going on the Star Ferry looking out, and they are like 'the water smells bad, it's just smells bad'. You know, 'fragrant harbour'. That's hilarious. It really is fragrant! So we are talking of two areas where there are costs everyday, in terms of cost in health and in terms of tourism. People don't want to come back to a place just basically smells bad. I guess.

Fishing, I don't buy fish from Hong Kong. It seems the Park'n Shop fish I get, they come from Vietnam, they come from other areas. Fishing is a huge industry here and there are so many people depending on it not only for their livelihood but also their health. So there is another benefit. Yes, there is 20 billion dollars out flow in terms of that. But what about the inflow? The benefit of health, of tourism, of fishing that Hong Kong is dependent on.

Business, an example, I recently visited San Francisco. I spent time in Sydney. I was rowing on Sydney harbour. A fur seal came up beside me. It is very sensitive to pollution. And in San Francisco, I was sitting on the side and I am seeing a seal there. These are places that get massive revenues from having harbour side businesses and cafes, and Hong Kong people love to eat and love to enjoy their time here. If we can make this harbour a livable place to be near, we can really benefit from this business. I know that people in Hong Kong understand business. In terms of my opinions

**Prof. K C LAM:** can you wrap it up in one minute?

**Ms. Anna NORTHWOOD:** I can wrap it up in one minute. (Prof. K C LAM: thank you) In terms of my views in what has been said today. I am a big fan of Chinese medicine because of biological approach it takes and I have benefited from myself, having spent a lot of money on western medicine. But artificial chemicals have side effects and I think we should be aware of the effect that we can't see where that goes. Regional? Of course, it would be lovely to be regional. But I think we have to start in our backyards. So questions option A or B, B seems preferable by our esteemed colleagues, so I am about to that. Two phases, yes, fine if necessarily but the thing is cleaner water, sooner we can see the benefit across the why spend money on phase one if we are going to have reverse it in phase two. So in terms of being integrated, I think integration is good. Disinfection, of course biological, pertaining to my earlier

Polluter Pays, of course, it must be reasonable though at an acceptable level. So an acceptable level, here is an option, wrapping up on this one. Just an option, what if we access there should be an acceptable level for businesses like laundries and things like that. If they go over the acceptable level, then they pay a fine which should be in accordance with the amount that they go over. Under that, it should be the tax payer, that would face that. Because we must encourage people to decrease their amount of pollutant. People who do pollute must be encouraged to decrease that. So in my final point with this is not so much what we can actually count today in terms of costing, in terms of what our esteemed colleagues here know, but what we don't know that we can achieve by having cleaner water encouraging business, encouraging health, encouraging fishing, encouraging tourism. And that's all I have to say.

**Prof. K C LAM:** Thank you. That was the voice from a mother. I am pleased to hear that. All right, one more, Mr KU. Please.

\*\*\*\*\* (Translation)\*\*\*\*\*

**Mr. Damien KU:** I am KU Chi Chung, the international vice president of Chartered Institution of Water and Environmental Management. I would like to talk about a few points here. First, the scheme is in generally supported by the public. This forum is a very good mean to collect opinions and we should make good use of it. I am strongly in favour of creative ideas. No matter what they are, we should still give them some considerations first. Second, we have to be careful in our grounds of argument, ie, to be objective, professional and to the point. Not only just to mention 'I would like this or that to be done'. They must be supported by scientific arguments. Third, in-depth study must be conducted, and to take into consideration the views collected from all over the world. We also have to be pro-active. As I mentioned just now, a number of government departments have to be involved. And the most important point is we have to spend the money effectively. Regarding the creative ideas, many proposals are worth considering. One of which I am going to discuss here is 'the idea of water reuse' (中水重用), especially the grey water. What I am referring to here is the used water from laundry and rinsing, not the flushing water. Our local water supply system is very unique - we use sea water for flushing and fresh water for other purposes. If we can collect the used fresh water from laundry for flushing, sea water will be saved. People always think that sea water is cheap, but its supply system costs us more than two dollars per cubic metre. This reused water can also be used for irrigation apart from flushing. We do not have to use it as drinking water, but for irrigation purpose. As you can see we are currently using tap water, the fresh water, for irrigation. Of

course, sea water cannot serve the purpose. In fact fresh water here is very expensive. We have to pay for the water from Dongjiang. Whereas the water source of Dongjiang may not be adequate. When the water arrives at our side, we receive it at Muk Wu, and from there we have to transport the water to every part of Hong Kong. So if we try to figure out the cost of transporting the water from Muk Wu in the north all the way to the southernmost part of Hong Kong Island, the cost is so high that it may become comparable to that of a water reuse system. The second point I want to raise is that we should learn from our Stage 1 experience. For example, we should further study the deep tunnel system that was built for Stage 1 and make good use of them. We can also investigate the feasibility of incorporating oxidation in the tunnels so that biological treatment can start earlier. This is because oxygen is very effective in removing nutrients and it will be beneficial to us if we can slightly modify our transportation system so that part of the biological treatment can be provided there first. We have just mentioned decentralized discharge, it is much better than discharge at a single point. So we could consider some ways to rearrange the discharge at different locations, even without spending lots of money. In addition we need to monitor the ecological changes. Mr Wong Man-kon is here. He has given many reports. Only with a understanding of the ecological system in our ocean that we will be able to know how much it can sustain. Nature has the ability of self-purification, as long as we do not despoil it by overuse and abuse. These are the few points I would like to mention here. I hope that new ideas would be raised in the future. I hope that when this scheme is completed, Hong Kong can be proud of it and promote it to the rest of the world.

**Prof. K C LAM:** Thank you, Mr. KU. Now we have heard the views of four speakers from the public. I think we should back to the stage now. Let's see if any of our guests on the stage have any views to express. One minute per person. It does not matter if you don't have any comments to add. One minute for response to what has been mentioned. Yes, Mr. Yeung.

**Mr. T T YEUNG:** In fact, I have already mentioned the issues just raised to the government by the two gentlemen and the lady. Isn't it true that we can save a lot of money if the government does not need to pay this \$20 billion? We can also save a lot of money if the recurrent cost is reduced. I have asked the government whether the "quality" or "quantity" of sewage is of much concern. Industries such as restaurants, laundry and dyeing have to use a lot of water. However, if they each have an individual system, then the water they discharge is almost clean water and therefore the sewage treatment plant has not much to do. This is in fact the real solution to the

problem. All over the world, people move from place to place, and so will industries. Only when each building is equipped with the system will the problem be solved. If not, today you build one tunnel, two tunnels or even three, the same has to be repeated years later. Then the same problem will emerge, ozone...

**Prof. K C LAM:** Mr. Yeung, perhaps we need to devote some time to discuss in details such a small system in buildings. By the way, does it mean that apart from disinfection, we can also purify the sewage and other ...

**Mr. T T YEUNG:** Disinfection, the whole world knows the functions of ozone, it's capable of disinfecting heavy metals (**Prof K.C. LAM:** nutrients) yes, also nutrients, all problems will be solved. That means it is a very outstanding...

**Prof. K C LAM:** I think I have to seek more advice from experts. Any responses, H.F.?

**Mr. Raistlin LAU:** Many of you have mentioned about sewage charge just now. I would like to supplement some information here. The current sewage charge covers the operation cost for the addition of chemicals or biological agents during the sewage treatment process. In fact every household now is paying an average of \$11 as sewage charge. It will rise to \$14 and \$21 after completion of Stage 2A and Stage 2B respectively. Compared with the rest of the world, this is still a very low figure: in Mainland China, the sewage charge is \$8 to \$10. In Japan, it is \$6 to \$70, and Europe \$100 to \$300. In Taiwan, it is more than \$60. So, our operation is in fact very efficient. I have explained this to the public that after the completion of this scheme, we will review our charging system again, by then everyone can comment on the new charges.

**Mr. T T YEUNG:** It seems that you have omitted the charges for the commercial side.

**Mr. Raistlin LAU:** As for the commercial sewage charge... (**Mr. T T YEUNG:** Can the different businesses afford it?) I also got some brief information here. The sewage charge currently paid by the restaurants cover less than one percent of our operating cost. Since the effluent discharged from restaurants is rather strong (in pollutant content), so we need more resources to handle that. The charge incurred now is thus not unreasonable.

**Prof. K C LAM:** OK, David, any....

**Mr. David WU:** Nothing in particular. As for what Mr KU said just now... our association is totally agreed with what he said.

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**Prof. K C LAM:** John, any response?

**Dr. John RUSSELL:** yes.

**Prof. K C LAM:** yes, ok, a quick one.

**Dr. John RUSSELL:** Quick as a minute response. (**PROF. K C LAM:** yes) I understand that the household rates and charges would be double for HATS 2A and 2B. Perhaps in a of world scale that would not be a large amount but I understand that would be about double. The issue for me is really are you getting the value for money, which I think that you are not getting value for money because basically

**Prof. K C LAM:** oh, please speak to the microphone so that it can be interpreted.

**Dr. John RUSSELL:** K.C., can I have another minute? (**PROF. K C LAM:** ok)

**Prof. K C LAM:** Ok, that's second round.

**Dr. John RUSSELL:** The Gentleman at the top raises the issue of cost initially, I understand that the household charges per month for HATS 2A and 2B would be doubled. That number compared to the world ranking, it is not going to be high. The issue for me is, basically, value for money. When you look, as we have attempted to look very closely, basically you are not getting value for money. Because the background levels coming in the wet season from the Pearl River Delta, they are just so high, they mask everything else, all the other good works done and there would be algal blooms, red tides, low dissolved oxygen for the marine life and the rest. That would continue on and get worse, unless the background problems are fundamentally addressed. It has to start sometime, your children will have grandchildren; they will be the beneficiaries. When is the decision to be taken and when is it going to happen? Finish.

\*\*\*\*\* (Translation)\*\*\*\*\*

**Prof. K C LAM:** Ok, thank you, John. Mr Choi, anything to add on what has just been discussed?

**Mr. C S CHOI:** Ok, I think we should also think about how to avoid the further increase of pollution sources during the process of sewage treatment.

**Prof. K C LAM:** Ok, thanks. Dr Chan?

**Dr. H F CHAN:** First, I'd like to briefly respond to Mr. KU's opinion. The HKIE has not yet discussed the reuse of grey water (in respect of the consultation), but we had some discussions (on the subject in general) before. We agree with this idea in principle, but we have to bear in mind that, for this to be done, we have to build completely separate collection and treatment systems for grey and black water. Thus the whole drainage structure in Hong Kong has to be rebuilt. The amount of resources required will not be trivial. Nevertheless, I still agree with its principle and the idea of making savings from the Dongjiang water. Moreover, we have to take into consideration that the project cost will also be substantive. That's what I'd like to supplement here.

**Prof. K C LAM:** Good.

**Mr. Raistlin LAU:** We have just discussed the topic on pollution source. As a matter of fact, the government has done a lot of studies, proving that the water quality problem in the Victoria Harbour is in fact mainly due to the sewage generated by us. Thus we must first deal with the sewage we generated before the water quality of the Victoria Harbour can be improved. Yes, to certain extent, our water has also been affected by the water from the Pearl River Delta. However, the greatest impact still comes from our own sewage. Apart from that, Mr Chan just queried why the whole Stage 2 was so expensive. Actually, Stage 2A included expansion of the existing chemical treatment plant and the construction of the deep tunnels. Stage 2A itself costs only 8.2 billion dollars, and the remaining about 11 billion dollars is for the biological treatment process in Stage 2B, which is the most expensive part. And that is also why the government proposes to have the whole project implemented in two phrases such that the more expensive part of the system will be introduced only when we see that there is such a need. Thank you.

**Prof. K C LAM:** I think we had to hear more from the public. This is a public hearing and we hope that more people from the public would give us their opinion. Let me see if there are any hands raised and I will set the order. Ok, this gentleman first and then Mr Wong at the very back. As Mr KU has already given his opinion, if there is no more, he will be the third, all right? Ok. The gentleman in the middle.

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**Mr. Jeff HARRIS:** Apologies, I have to speak in English. My name is Jeff Harris. I am a civil engineer but I speak as an individual. I think it is imperative that this scheme proceeds. My background is mainly steel and concrete, these processes are not overly familiar to me. What I would like to say though, it is clear that in a number parts of the world, the private sector has brought its expertise very successfully to in wastewater treatment. And I would urge Hong Kong to maximize the benefit the private sector has to offer. The key issues as it appears to me to be cost and process. Different elements in the private sector have different areas of expertise. The process is different. It would be difficult to set up a selection system, where all you were considering was where the process was fixed. What I would urge the government to consider is that the private sector is given the widest possible latitude to put forward a package in order to achieve the water quality objectives. And that may mean carrying out, for instance, other developments in parallel. This is something the railway companies in Hong Kong have been doing for sometime. They put developments above the stations. It helps their cash flow during construction, and it keeps the costs of traveling down. For some reasons they get criticized, I don't know why, because it is a win-win situation as far as I can see. And so I think the simple message is: government, you have to proceed with it for all the reasons that have been stated particular by this lady. There are benefits. We have to. The regional issues are obvious. But you have to start somewhere. Give the private sector, the widest possible latitude. And I would hope the government could go beyond its normal procurement procedures.

\*\*\*\*\* (Translation)\*\*\*\*\*

**Prof. K C LAM :** Thank you. Next will be Dr. Wong at the back? Yes.

**Dr. John WONG:** Thank you, Chairman, I am Wong Man-kon, Chairman of Hong Kong Marine Conservation Society. We have provided our opinions on HATS several times already. I am very glad to see that so many people from the public have given

their views today. Several speakers mentioned just now, they hope to see that, besides Hong Kong, other places such as the Pearl River Delta Area can also work together. Also Mr KU has provided us with his views which are rather new and long-term. For Hong Kong, time is very crucial. In respect of HATS, formerly called the SSDS, was a proposal of 60s and 70s. Since 1989, we have been watching closely its development. As far as I can see, the HATS scheme is now more widely accepted and I also believe that many members of the public support this scheme now. As for the cost, I hope the government or maybe the Audit Commission can be more involved with its monitoring. According to the experience with Stage 1, there were some unforeseeable problems encountered during the construction of the tunnels. I hope we can learn and gain from that. Regarding the biological monitor...let me repeat, we only focus on water now. For water quality, we normally employ the use of chemical indicators. I was a bit late for this event but I heard that some photos about the marine life in the Victoria Harbour were shown. Actually biological indicators such as coral and fish are also very good indicators. It will also be a good indicator for improvement of water quality if we can swim in the harbour without getting any skin diseases. We used to have only chemical indicators, I hope the government will also consider using biological monitoring as well, in fact, the fish in our Harbour are a very good indicator. Many people have just mentioned that they hope to see a diversification of discharge points. As a matter of fact, I would not like to see this happen. It was once proposed to have a long outfall for the discharge somewhere near Lamma Island. It would better to have it in Victoria Harbour so that just in case of emergency, we can respond to it immediately. Also our existing outfall is not long enough. We should consider using the water current at Ma Wan for dilution. The dilution factor there may be over 100. At Ma Wan, there are also a lot of ships and the dilution effect is even higher with the ships' propellers. Some overseas experiments found that discharge at the back of the ship can even have a dilution factor of up to 1000 times. I wish this can be done as soon as possible as it shouldn't take much time. We have been talking on the project for nearly twenty years already. We can see the result from Stage 1 now. For Stage 2A, I believe after finished building the tunnels and the expansion of Stonecutters Island, we will be able to see more corals when checking up the biological monitors underwater. Now the seahorses are breeding. We found seahorses breeding at Stonecutters Island. I hope we can start looking into the water more. Now we are talking about the discharge...All the waste will eventually go into the water. If marine life cannot survive, it is doubtful that we can. Thus I hope the government will involve more marine scientists in the planning stage, and also for the long term monitoring. As for disinfection of Stage 2B, this is very expensive and it affects a lot of people, all of us will be affected. We hope the government can set up a

small working group, something like a monitoring group. For example chlorination, we will put additives, something artificial, into the harbour. I hope we can use natural products. Then the cost will be lower as well. We have to remember that the harbour, by nature, has... if we do not overload it, it can restore by itself. Thank you.

**Prof. K C LAM:** Thank you very much, Dr Wong. He emphasized on the timing, and also looked at the effect from the angle of marine life. He asked us to look into the water. I also hope that I will have an opportunity to see the underwater world with Dr Wong. Yes, Mr. KU.

**Mr. Damien KU:** I am sorry, Chairman. I have to take up some more time. I would like to have some more supplements here. When we look at a scheme or a system, we should look at it from a holistic angle of water resources, from the angle of total water management. I just now mentioned briefly that the water that we used in Hong Kong consists of sea water and fresh water. If we can make good use of every link between where we use the water and where the sewage was discharged, then the whole system can become highly cost effective. For example, people may think, in the first instance, the grey water reuse system is very expensive and I just explained why it might not be. If we can re-use the grey water, then we can substantially reduce the quantity of sewage required to be handled by our facilities. Flushing water, for example, is equivalent to only about 25% of the water we use every day. If we can treat the remaining 70 % or slightly more and put it into other usage, say for flushing, then the water that has to be treated will then be reduced. Furthermore, if the wastewater is to be treated on site, then the need for a transfer system will be less. I will not go into details here but I want to bring out one point: For every proposal, we have to consider its principle and concept first. If it is good, then we can go further to consider how to tackle the problems that will be encountered. For example the cost, we can in fact take the opportunity to lay an additional pipe for grey water during the replacement of old pipes when buildings are being reconstructed. Normally, pipes in building need replacement after around twenty years. If an additional pipe is laid at the same time, the cost will be rather low. The next step is how to treat the grey water properly. There must be many new technologies for on-site sewage treatment. The treated sewage can then be diverted back to the normal sewerage system for discharge. So, we can further work out how to reduce the cost. In fact, there is another important point. Last year, we had the problem of SARS, and the cause was that we connect all the foul water drains to the same soil stack. As a result, harmful things such as the bacteria that we discharge into the toilet drains are brought back into the house through the (grey) water system. So when there is no water in the in the U-shape trap, the bacteria will

take the opportunity to move in. Thus in all aspects, we made a proposal... not only tackling one problem, but solve many issues as a whole...so we (**Prof KC LAM**: last 30 seconds, Mr KU) should tackle it in such a way.

**Prof. K C LAM:** OK, thanks. He finished in just 5 seconds. Well, we still have 30 minutes. I will try to let as many public members to express their views as possible. Perhaps we can go for one more round. Then we will concentrate our discussion on those main issues and focuses of the scheme, for example, centralized or decentralized treatment, phased implementation, or disinfection, etc and maybe any clarification from the government. Finally, each guest on the stage will have another minute, so that we can wrap up the whole discussion in three to five minutes. Ok, that gentleman over there.

**Member A from the public.** I agree with the idea of grey water reuse. It just mentioned that flushing water only amounts to 20 or 30% of the total water we use. So this in fact involves urban planning and building design. Just brainstorming, maybe the government can amend the legislation such that each new or reconstructed building would be required to reserve a certain space, floor, or the top floor for a grey water treatment tank. Then each building will have the capability of treating its grey water and be able to cope with any new technological development in the future, say ozone for example. There will then be such a system in each building to treat and reuse the grey water for flushing within the building. Undoubtedly, this will reduce the amount of sewage going to the treatment plant. With this, we can also maintain a resiliency in applying the latest technology when it is available. This is my idea.

**Prof. K C LAM:** Ok, thank you. Does anyone have other comments or questions? The one at the back.

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**Mr. Clarus CHU:** Chairman, my name is Clarus Chu. I represent for World Wide Fund for nature Hong Kong, WWF. Well, basically I have only three things I want to mention. We do agree with Professor Russell that the whole marine water environmental problem is basically is regional problem rather than our own problem. And we do agree with it. But we do believe Hong Kong should make ourselves as a model to take the first step to treat our water, to treat our waste first. And then we demonstrate this model to our neighbours. We understand now the air pollution problem is regional, then now we need to also give this message to the general public

that marine issue is also regional. We share the same sky and also share the same sea. That's why we do believe we have to take our action first. The second point is about the biological treatment. From the consultation paper, all the benefits given by the HATS project is based on the completion of the secondary treatment or some people call it biological treatment. But if we don't put all the processes: Stage 2A and 2B together, then we won't be able to achieve that goal. We have to put the whole thing together. We do believe if there are other methods that can achieve the same goal, we do have the open mind to discuss it. But we know that probably the HATS project is talking about quite a long-term project, then probably the government should have a very concrete time frame for the HATS project. The third thing is about the disinfection. There are lots of discussions about whether chlorination is the best option for the removing the *E-coli* or other pathogens. We believe if there is still a doubt whether this chlorination is harmful to the marine environment or not, we think the government should have a careful look at this issue, or to see whether if on the completion of the second 2B stage, whether disinfection is that important or not. If the completion of second 2B could achieve to remove most of the pathogens, may be we can speed up the second 2B rather than just jump for the disinfection process. Thank you.

\*\*\*\*\* (Translation)\*\*\*\*\*

**Prof. K C LAM:** OK. Thank you. Anyone else wants to raise any point, the lady in the third row, please.

**Miss LEUNG:** My surname is Leung. I want to ask how much pollution (pollutants) will be reduced after the completion of Stage 2B.

**Prof. K C LAM:** Fine. In fact, some questions have been raised in the discussion just now. I think we should let the Administration make some clarifications now. Questions like whether we can have Stage 2A and 2B started together, the issues of cost and disinfection, etc. It seems that most of you are all very concerned about these. Could the Administration use no more than five minutes to clarify the issues so that we can continue with our discussion.

**Dr. Samuel CHUI:** Yes, thank you, Chairman. Some members of the public have just asked about the issue of disinfection, i.e. chlorination and de-chlorination disinfection. So thank you very much indeed for giving us an opportunity to explain here on what have been done and what the rationale is. Actually, I'm only trying to

present the facts here. At this stage, we want to listen to the public's views on whether we should do it (disinfection) or not. We can see from this diagram that, after commissioning of Stage 1, the *E. coli* levels have increased 200 times, ... or 200% actually, in the western part. This is equivalent to increasing the level from 100 to about 1 000. Our outfall is located here. That's the same location as the existing outfall off Stonecutters Island. With the current reaching up here, all these beaches in Tsuen Wan are being affected. But we should also consider the previous condition of each of these beaches. Let's look at this figure first. In the past, there were some outfalls here discharging to the middle of this area together with what we call storm water runoff, i.e. the discharge of pollutants from storm water drain. In fact, the *E. coli* levels in these waters, in the western part, have reduced. In other words, not the whole area in the western part has deteriorated in water quality. Improvement has been seen in some beaches in these areas, but those over there have worsened. How about those beaches in between these two areas? The water quality is almost the same before as after the commissioning of the project. And of course some problems had been encountered in Stage 1 when the tunnels were being constructed. In 1997, when only half of the Stage 1 was completed, we found that the *E. coli* levels at those beaches along the coast, for example at Approach, have reduced and then gradually kept at that level. After HATS Stage 1 was fully commissioned in 2001, the *E. coli* levels have seen a small rise but are still lower than the original levels. For those beaches located at the outer areas, the *E. coli* levels have significantly increased after Stage 1 was fully commissioned in 2001. So this shows that there are indeed some beaches which are affected by the discharge from HATS.

Regarding those beaches located somewhere in the middle. When HATS Stage 1 was only partially implemented, the *E. coli* levels dropped. Following the full commission in 2001, the level rose again, showing that HATS does affect our beaches. Also, we have to look at the *E. coli* level. An increase from 1 000 to 10 000 is by means of a log scale. In other words, even if we deal with ... around the beaches, even when the entire HATS is fully implemented and with all the work done ... there is in fact the background level, this is what we get. The discharges from the vicinity are actually affecting the water quality of these beaches. However, if we do nothing, it'll go up to that level. What if only HATS is in place? The level will still be up here, no good as well. Therefore, we should therefore deal with the problem in both ways. Can we just simply remove the local discharges without HATS? The answer is also no as we are talking about a log scale change, that means even if the local pollutant level can be brought down to zero, it'll still return to this level if the pollution level is high in other area. In other words, the beach is inevitably affected. So HATS is a must and this is

why we think that disinfection is necessary as well. Can the introduction of secondary treatment and biological treatment remove all the *E. coli*? Some say that biological treatment can remove 3 log q of *E. coli*, i.e. 99.9% or even higher. But even at our largest plant, the discharge is up to 30 000- 70 000. So can the problem be solved with the implementation of HATS Stage 2 only? In fact, chlorination is being adopted in many sewage treatment plants around the world. In USA, there are over 500 sewage treatment plants using chlorination (for disinfection). Also in future, we will not only use the outfall as a contact tank but will build a properly designed contact tank for chlorination as well.

We have also done some ecological impact assessments and made reference to the relevant literature. Much of the literature has focused on the impact of total residual chlorine on marine environment. Basically, there won't be any problem if the total residual chlorine is properly treated. On the other hand, talking about chlorinated by-products, in fact in effluent...we don't want to go into details here, but the results show that the level measured can even meet the same standard as our drinking water. In other words, there's no problem even for drinking, if chlorinated by-products are the only concern. This is shown in literature reviews. But of course we should continue and do more. More in-depth assessment should be carried out in the process of EIA. This is the factual information that I want to present here. Thank you, Chairman.

**Prof. K C LAM:** As I said before, in the latter part of this public hearing, I'd like to focus our discussion on the major issues. As Mr. CHUI has just made the presentation on chlorination and de-chlorination in the process of disinfection, I'd like to know if there is any view from the public or those on the stage. Please keep your speech brief, in one minute as far as possible. Mr LAU, you have some burning issues to be raised?

**Mr. Raistlin LAU:** Yes. Just now, a member of the public has queried whether Stage 2B is needed because Stage 2A cannot achieve the result. It's not the case. We will have many benefits after the completion of Stage 2A: we can meet most of the water quality objectives and our harbour will be suitable for organizing many activities again. Some have also expressed concern on how water quality is affected by different treatment levels. The table on Page 8 of the consultation document illustrates the removal efficiencies with different treatment levels. To put it simply, the chemical treatment that we are using now can already achieve about 90% of the removal efficiency of a biological treatment, very effective, indeed. Only a marginal benefit can be obtained for a further substantial sum of money invested. So why

should we need to further invest hundreds of millions to provide biological treatment? It's because when our population continue to grow to a substantial level, effluent discharged into the sea would still contain a lot of pollutant even with the chemical treatment of such a high efficiency. We, therefore, must have biological treatment. However, if the population growth is not that fast, biological treatment can be implemented only in a later stage.

**Prof. K C LAM:** OK, Dr WONG, one minute for you.

**Dr. John WONG:** Thank you, Chairman. I'd like to add something on the issue of disinfection. It seems that the Government tends to use chlorination at the moment. However, among the disinfection methods mentioned, ozone - the use of gaseous substance, has not been considered. It's a method that, relatively speaking, involves no addition of residuals into the sea. Mr. LAU just referred to biological treatment as on page 8 of the document. Why do we prefer completing Stage 2A first before considering whether Stage 2B is needed? Actually, the terminology (with a clearly defined Stage 1, 2 and 3) that we're now using is outdated. In fact, the existing CEPT does not belong to any of the Stage 1, 2 or 3. Some of our existing work is not covered by the terminology we used in the past. We may not need to wait for the biological treatment before we can achieve our target. The use of oxidation can have the same result as that of secondary treatment or biological treatment. Besides, the use of new technology such as osmosis or resin can also bring about the same benefits as secondary/biological treatment. I believe some universities are doing researches on that already. That's why I don't think we should, at such an early stage, commit ourselves to do something which will cost us about \$10 billion to build and with a recurrent expenditure of almost \$700 million. We may achieve the same at perhaps only one-tenth of the expenditure. I hope we can keep an open mind on that, not be misled by the idea of secondary treatment or biological treatment, thinking that we can meet our target only if we adopt these treatments. In fact, our natural environment including our waters has the ability to disinfect. For example, *E. coli* and pathogens in the sea are unable to survive for more than 30 days. Bacteria usually die in 20 days because some micros in seawater will eat bacteria. I hope that more studies will be carried out in this respect so as to save us from spending a substantive but unnecessary sum of money. Also, we've loaded the sea with enough stuff and we should avoid putting more additives into the sea as far as possible. Thank you.

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**Prof. K C LAM:** OK, John?

**Dr. John RUSSELL:** Mr. Chairman, I would like to take the opportunity to say that what Peter Wong and I are actually proposing is basically HATS 2A be installed in a timely way now. It's what Dr. Wong said. But basically only put a long outfall. That means then that 2B is not necessary and it is not effective anyway because of the background pollution. So if 2B is not going to be built at a very high, expensive price, some of that money can be re-invested in the region. That's the core of what we want to do.

**Prof. K C LAM:** Ok, thank you.

**Mr. T T YEUNG:** Maybe it is better off for me to speak in English; because there are some of the points that the gentleman has mentioned that I have mentioned ozone. Ozone is the only key, is environmental safe, is economical and no residue to the pathogens. This is the only...only way, why are we still discussing something that doesn't work. Biological treatment? Cause it can't treat a lot of stuff, like heavy metals. Chlorine, do you know why we are losing a lot of hair? Because we are drinking chlorine water everyday, the matter stays in our body and we can't get rid of it. That's why it's toxic. Ozone is the only substance, ok – if it does oxidize within 30 minutes and it turns back to O<sub>2</sub>. It's natural, that's what we breathe. It's the most natural stuff. And it's free. It's in air. Why are we considering something that doesn't work? And if every big building has a system to clean up all the water, why are we worrying about the discharging? Because they would (be) discharging clean water. We don't have any problem anymore, forever! It takes us forever. Why are we still discussing about something else? This is the time we set up as a good example for China and our neighbours. It can become a major industry in Hong Kong and we show the other countries; because we are going to have a best port in the world. Best environment. If we start it, if we don't improve, that's it. It's not for humans. Thank you.

\*\*\*\*\* (Translation)\*\*\*\*\*

**Prof. K C LAM:** Thank you. Could I take this opportunity to ask Mr YEUNG how much organic matter and nutrient can be removed if we adopted Ozone, as you just mentioned?

**Mr. T T YEUNG:** The oxidation potential of the chlorine being used is 1.46V whereas Ozone is 2.07V, only second to fluorine which has the strongest oxidation potential. It's also the only substance that leaves no residue and of no harm. It's the only stuff that can be used in any treatment methods. Why don't we use it? We should spend more time in studying it. With the support of the Government, the crisis we're now facing may be turned into an opportunity for private industry, an industry for the people. If developed with our concerted efforts, it will become a technology of Hong Kong!

**Mr. Alex KWAN:** I'd like to comment on the issue of ozone. The use of Ozonation as a sewage disinfection process was adopted by USA and Europe between 70's and 80's. Ozone simply exists in the air and that means it can be found in nature. But if ozone is to be used, some traditional (processes) may have to be employed, such as a waste lagoon. The way to do this is, say, for example, in some Middle East countries, they collect the sewage in a shallow lagoon and let it be disinfected slowly by those ozone in the sunlight. Such an approach is not feasible in urban areas given its need for a large piece of land. In fact, Hong Kong is also using ozone for disinfection, say in the Water Supplies Department's water treatment plant at Ngau Tam Mei. This disinfection method is also being used in many public swimming pools. But for the use of ozone on sewage disinfection, it has been tried out in USA between 70's and 80's. It was considered under an innovation fund but it's not used in USA at all now. What are the major reasons for not using ozone? First is the high capital and operating cost. We cannot use the natural ozone as I said before. It requires the use of electricity to...the use of electrical discharge to generate ozone. There're two ways to generate ozone: by using air or pure oxygen. But for these two methods, first, operation is complicated and second, operation cost is very high. That's why between 70's and 80's in USA, around 700 sewage treatment plants in Florida which had adopted this method were all decommissioned. These are the reasons. So that is to say...**[Prof. KC LAM:** Could you please finish in 30 seconds?] OK, in fact that's all I want to say.

**Prof. K C LAM :** Okay, I think we have already spent quite a long time on the discussion of disinfection. I would like to see if we could change to other topics in the remaining time. As I said just now, each person on stage would be given another one minute before this public hearing ends. Oh, sorry, the gentleman at the back now.

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**Mr. Clarus CHU:** Thank you, chairman. I just want to respond to the government

that the page 8. Yes, it's right. When you talk about the total nitrogen content, but without secondary treatment, the ammonia produced, which is very harmful and hazard to marine life, will cause a great damage. Well, basically what you can see on page 8, is the total nitrogen level which could mean ammonia, nitrate, nitrite whatever contain nitrogen. So I would say - it's different. It's just the way you present it on that page 8, but it does not reflect that the ammonia is removed or reduced.

\*\*\*\*\* (Translation)\*\*\*\*\*

**Prof. K C LAM:** Any quick response? Very quick one. Yes, ok.

**Dr. Samuel Chui :** I'll make a brief response here. Regarding ammonia, nitrate and nitrogen, the 25% removal in connection with the chemical treatment mentioned on page 8 is basically organic nitrogen. In fact, the organic nitrogen will all change to ammonia nitrogen once discharged into the sea. This is why we observe that the ammonia nitrogen level has decreased by 25% after Stage 1 was commissioned. This is the factual information. Secondary treatment cannot, in fact, deal with ammonia. Unless we go one step further to carry out biological nutrient removal and nitrification, which means applying tertiary treatment, we can then achieve nitrogen removal or ammonia removal. Of course you can achieve an efficiency of some 80 or even 90 percent, depends on how much you invest.

Another question is that even if we look at our own water quality objectives now, we have already met the water quality objective for ammonia applicable to Hong Kong. As for the future, that is, when Stage 2A is completed, we can still well meet our own water quality objectives. This means we can even meet the water quality objective of 0.021 currently adopted by European countries. The question is whether we need more in-depth, comprehensive and stringent water quality objectives. This question is still under debate by the academics. Just as Professor Rudolf Wu once criticized us openly that "will it be too stringent if we adopt the same objective?" We are open-minded in this respect, but I just like to report the outcome here. Thank you.

**Prof. K C LAM :** Well, I think the public should be given more opportunity to speak today. Ms. WONG, it's your turn, followed by the lady over that side at the back. Yes, okay.

**Ms. Lucianna WONG:** The government told us that with disinfection, the beaches in Tsuen Wan can be open for swimming again. I would like to ask whether the

government has any data bank recording the number of persons who got diseases like dermatitis or other illness because of swimming. Seems that we tend to use chlorination for disinfection at the moment, so can we tell the Hong Kong people that it will be safe to swim and that no one will get dermatitis, “red eyes” or other similar diseases after we had chlorination for sewage treatment.

**Prof. K C LAM:** OK, we have a lot of questions. We’d better listen to all of them before we make the responses. The lady on that side, yes, the one in red, please. You don't have anything to say? Oh, I'm sorry. Lady in the front then.

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**Ms. Anna NORTHWOOD:** My question to the experts that we have here is that there has been a lot of talk about what is best and providing a model here. What country is setting the standard here? Which country has the best water treatment in the world? I am curious how we can benefit from other people’s mistakes. And see who has gone through and has achieved the best processes in the world. I don’t know who is the best to answer that question.

**Prof. K C LAM:** OK, David. What...so...excuse me.

**Mr. T T YEUNG:** ...the international standard or ...

**Prof. K C LAM:** Excuse me, David. yes.

**Ms. Anna NORTHWOOD:** Who has the best results and are they achieving it?

**Mr. T T YEUNG:** It depends.

**Ms. Anna NORTHWOOD:** In terms of water quality ...

**Mr. Raistlin LAU:** Actually, different places apply different technologies and also different standard to the wastewater. The most important factor is the ultimate use of the water body. If you are going to use the water body for swimming purpose, then of course you need to set more stringent standards and apply more comprehensive technology. If you are going to use it as a port, then it is a different story. So different cities, different places in the world have different methods and also different schemes to treat their wastewater. There is no universal standard, unfortunately. And you need

to take into account the sewage characteristics of different places. So it is a very complex issue which cannot be explained in terms of simple international standard.

**Ms. Anna NORTHWOOD:** ok, I am sorry. I will be very quick. My understanding is that we want cleaner water sooner, cleanest water sooner. We want a place where, we are talking about swimming in it. And it seems to be an issue. So the first part of your question I think is not about having a port but a place people can swim. The second thing is that there must be things that in the sewage characteristics we can match with Hong Kong that we can get the benefit out of that. So there must be that we can benefit from previous thinking.

**Prof. K C LAM:** OK, John? I am sorry.

**Dr. John RUSSELL:** In response to your question about water standards, the international review panel, they stated that the dissolved oxygen standards in Hong Kong's marine waters are the lowest in the world. And they offered that as serious criticism. What Peter Wong and I are saying is that there have to be lowest in the world because of the regional problem. You cannot escape the regional problem and overlook the background.

\*\*\*\*\* (Translation)\*\*\*\*\*

**Prof. K C LAM:** OK, right. Anymore.. I see two hands. Since time is running short, we will limit each speech to strictly one minute. That gentleman first, and Dr. Wong next. Then, I think I will leave some time for the speakers on the stage. OK.

**Mr. K C LAU :** I'm sorry that it's me again, just a few more minutes. First, this Harbour Area Treatment Scheme is a feint. It is in fact a sewage treatment scheme, right? Please don't mislead the public. Second, even if we treat our sewage before discharge, no one can guarantee that we can swim in the Victoria Harbour again as it can never restore it to the same state that that it was when we used to swim there . Don't expect that we can swim in the beaches in Tsuen Wan. This is a social responsibility, but it's something we can never achieve. It is because in the Mainland, our neighbour, as suggested by Dr. Russell, the effluent is discharged without treatment. Their pollutants will flow down to Hong Kong. We share the same sea! As such, we will achieve nothing with the money we spent. Having said that, I agree that we should proceed with HATS as this is our social responsibility, the public responsibility. But please don't expect that we can swim in the Victoria Harbour!

Don't swim in Shatin! Don't do that! Don't swim in Tsuen Wan. Only some beaches are suitable for swimming. I hope that we can get the most with the least money invested. Thank you.

**Prof. K C LAM:** OK, thank you, Mr. LAU. In fact, we are using different angles to look at the issue today. Dr. WONG.

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**Dr. John WONG :** Yes ... thank you. I would like to talk about water, and the purposes of all the things we are doing. Just like ...just the lady said, if we want a safe water, safe for the seafood, safe for us to swim in. We are not using the Victoria harbour as a port. We are using it as a multi-purpose. When we were young in the 1950s, there were whale entering the Victoria Harbour. In the 1970s, we have the dolphins, reports of 40 dolphins in the Victoria Harbour. And just when we started the fish ban season in the early the year 2000, we had tuna fish in our Victoria Harbour. So our harbour actually can support live, can support recreation activities. But it is just our habit that actually, dishing, using our Victoria Harbour as a sink, as a sewage pump. Now we have to change this mind, so we have to minimize any further additives into the Victoria harbour. So about the beaches in Tsuen Wan, that is the management problem. Actually, if we can extend the pipe further to the Ma Wan Channel, and also if we can clear the obstructions between Tsuen Wan and Tsing Yi. There are a lot of obstructions there, if you go and see there. There are a lot of buoys for the ferries but they actually hardly used. All those obstructions actually contributing all these and increased pathogens in the beaches. If we can put some sort of biological artificial reef that will speed up the filtration of the seawater, we are using filter...I mean filtration organisms in the sea. These should be further investigated. Thank you.

\*\*\*\*\* (Translation)\*\*\*\*\*

**Prof. K C LAM:** OK, thank you, Dr. Wong. Because of the time, we cannot ask for more comments from the floor again. As far as I know, the public consultation is going to end in two weeks. I believe all of you still have a lot to say on the subject. You may give us your opinions through the Government homepage where there are channels for this purpose. If you have further comments, or even if you have already voiced your views today and want to give more, you are welcome to write to us. As time is running short, I would now like to see if our guests on the stage would have

anything to add before concluding this session. I am sorry - each of you can only have no more than 30 seconds to reiterate your main points again. Let's start from that side. Mr. Choi, do you have anything to say? Yes.

**Mr. C S CHOI :** No.

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**Prof. K C LAM:** Yes. John? Thirty seconds.

**Dr. John RUSSELL:** Thirty seconds is not long. One catch. The HATS 2B would be a milestone around community of Hong Kong's neck. It must not be built. HATS 2A must be built soon, it must have a long outfall and basically the saving on HATS 2A must go towards the long-term security of our children and the region.

**Mr. David WU:** I think the main...the salient point of my presentation, is you have to think about disinfection very carefully on technical grounds. Very likely you will overdose and you will cost environmental damage to the Victoria Harbour. Thank you.

**Mr. Raistlin LAU:** The government has conducted a lot of studies and trials in order to come up with the present scheme, which we recommend to the public. We are confident that by implementing the scheme we will be able to reach a good compromise among a number of complicated factors, such as cost-effectiveness, protection to our environment, ensuring that our harbour is fit for multi-purposes, and also to set a world-class model for the rest of the China. So we believe it is very balanced and a well developed scheme. But we, of course, welcome more opinions from the public. Thank you.

\*\*\*\*\* (Translation)\*\*\*\*\*

**Dr. H F CHAN:** Considering the importance of the Victoria Harbour to Hong Kong, I would like to see its water quality meeting a very high standard even though it is generally used for navigation purpose. Therefore, in this respect, the Hong Kong Institution of Engineers strongly hopes that the Government would adopt a scheme that would include secondary treatment to improve its water quality. We do not want to see the Government using quality objectives to claim that there is no need for 2B. We hope to see a comprehensive programme for the whole project. As for how to save

cost, in using chlorine for disinfection, we may perhaps adopt something similar to what CIWEM said. We should consider carefully whether there is a need for it or cut down its scale a bit to save money.

**Mr. T T YEUNG:** Just then the gentlemen talked about ozonation. What he said is the situation 70 to 80 years ago. With the latest technology, our system performs excellently and is widely adopted all over the world. If you are interested, I'm most happy to provide you with more information and discuss with you. This is the only way that we can solve the problem once and for all. If we do not make a real change, the problem would remain unresolved and would emerge again and again. This technology is the only one that can increase the oxygen level in water and can detoxify substance so that they will no longer be harmful to human beings. This is the only solution.

**Prof. K C LAM:** I have been sitting for two to three hours already, so I'd prefer to stand up. OK, owing to the time, I can only have 3-5 minutes to make a brief conclusion now. Today, we have a quite vigorous discussion and have heard many different opinions. Among which, I notice a common point - we all need to do something for our Victoria Harbour. We need to bring life back to the Victoria Harbour. This is extremely important not only to the health of the people in Hong Kong, but also to the image of Hong Kong as being a world-class city. This is also conducive to our tourism as well. During the discussion, I noted another common point, that is, we all feel that the Administration is determined and has a firm commitment to do something. For all the opinions heard during the discussion, I seem to feel that we want to see ... if we can view it in a more definite and long-range perspective, to know what the way forward is. This is exactly why we organize such an opportunity for the public to voice their views to the Administration. We are now living in a changing world: our economy, population and even treatment technologies are ever changing. That's why we heard about so many different technologies these days. I believe the Administration will consider all these public opinions carefully. Some speakers even put us in the blueprint of the entire region: What is our relationship with the surrounding areas? Having such a vision is essential. It is then that we can see in a full perspective what level of water quality can be achieved in the long to middle term and in the long run. Of course, I also heard something about costing during the discussion. What is in front of us is the cost needed for the HATS Stage 2. The initial investment will be about 20 billion dollars, while the operational cost will be 1.1 to 1.2 billion dollars each year. This is in fact a considerable amount of money. We have also heard that there is a cost notwithstanding, whether we put the

plan into action or not. If we put the plan on shelf, it would be at the expense of our economy, environment and public health. That's why we have to think about this issue carefully. The problem we face today is what Hong Kong has been facing for more than a decade, and the debate on it has been carrying on for more than a decade. I hope to have support from you all that we really have to do something this time. This will be beneficial to 6.8 million people in Hong Kong and essential to the long-term development of the territory. I believe, during the implementation, that the Administration would be able to see how to take it forward. As for the question of whether the public sector and the private sector can work together? It has to be for the Administration to consider. I said at the beginning that my task today is not a difficult one as I don't have to make a decision. The Administration should consider all your views before making this important decision. And I believe the Administration has taken today's opportunity to hear your opinions. I hope that after the consultation, they can sum up the diverse opinions to devise a sustainable strategy for immediate and long-term measures to improve the water quality in Hong Kong.

Here I would like to take this opportunity to thank the several people on the stage. I would also like to thank those of you, who although did not manage to sign up for a presentation, but still actively participated in the discussion. Thanks all of you for sharing your views with us and make my job a pleasant one. Thanks everybody. I earnestly hope that the Administration will soon develop a strategy and explain the reasons behind the decisions to you soon. Thank you.

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