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Enclosure

**Views from the Hong Kong Institution of Engineers  
on “Measures to reduce greenhouse gas emission”  
for submission to LegCo Panel on Environmental Affairs**

Study (Leung and Lee 2000<sup>1</sup>) indicated that carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) are the two most significant greenhouse gases (GHGs) in Hong Kong, with CO<sub>2</sub> accounts for about 90% of the total local GHG emissions. Amongst the various types of fuels, coal is identified to be the major source of CO<sub>2</sub> emission. The use of coal also constitutes about 50% by fuel type. On the other hand, CH<sub>4</sub>, which mainly comes from waste decomposition, contributes about 5% of the total GHG emissions. Electricity generation and transportation are the two largest sectors using fossil fuels and hence producing the greatest amount of greenhouse gases.

2. According to the Electrical and Mechanical Services Department (EMSD) if our energy consumption continues to increase at the existing levels, projected CO<sub>2</sub> emissions generated for the year 2010 are expected to grow by 39% from the 2000 level (EMSD website<sup>2</sup>).

3. The Institution believes that collective effort from all sectors of the society, including the power supply companies, the businesses, the consumers and the regulator is of paramount importance to alleviate the situation. Hong Kong, being part of China, which is one of the signatories of the Kyoto Protocol, concededly has the mission to reduce emissions of CO<sub>2</sub>, CH<sub>4</sub>, Nitrous oxide (N<sub>2</sub>O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF<sub>6</sub>) in order to maintain a better living environment for the citizens and promote sustainable development.

4. We appreciate Government's effort in taking measures to reduce gas emission since early 90s. However, with the rapid development of Hong Kong over these years and the increase in society's need on electricity and transportation, new measures must be promulgated at once to address this global matter of concern. To achieve this, the HKIE would like to suggest the below measures to reduce greenhouse gas emission for the consideration of the Administration.

### **Ways to reduce greenhouse gas emissions**

*Maximize the use of renewable energy as far as practicable*

5. Government should set practical and yet aggressive targets on the proportion of renewable energy to be developed in Hong Kong. The following possible sources of renewable energy are worth considering:

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<sup>1</sup> Leung, Y.C. & Lee, Y.T., "Greenhouse gas emission in Hong Kong", Atmo. Env. V34, 4487-4498, 2000.

<sup>2</sup> Electrical and Mechanical Services Department: "New and Renewable Energy",  
<http://www.emsd.gov.hk/emsd/eng/pee/nre.shtml>

(i) Wind energy

In the EMSD consultant study report (EMSD 2002<sup>3</sup>), wind energy is identified to be a renewable energy suitable for Hong Kong. The technology has been continuously developed and well adopted in many parts of the world. The demand of wind turbines has grown tremendously in recent years. However, study indicated that there are not too many places in Hong Kong that has sufficient wind resource potential suitable for wind turbine electricity generation. It is worthwhile to note the wind potential at high grounds, remote islands and off-shore areas is often much higher than inland. Hence, construction of large-scale wind farms offshore could help to reduce the fossil fuels consumption and greenhouse gas emissions in Hong Kong. We therefore invite Government to consider attracting investors to build large-scale wind turbines and wind farm in Hong Kong.

(ii) Biofuels

Biofuels are fuels produced from biomass or its derived products and are CO<sub>2</sub> free. The most common biofuels in the market are biodiesel and ethanol. Biofuels usage is fairly common in Europe, the USA and South America (e.g. Brazil). In fact the usage of biofuels has been adopted as a means of reducing greenhouse gases under the Kyoto Protocol by many countries. Biofuel technologies are well developed and market tested in overseas for more than a decade, and therefore could be readily introduced into Hong Kong. In 2000 the Environmental Protection Department (EPD) had commissioned a study on the feasibility of biodiesel fuel usage in Hong Kong (Leung 2004<sup>4</sup>). The study highlighted the benefit and evaluated the technical aspects of introducing such to Hong Kong, in particular for the transportation sector. In sum, engine modification is not required for a 5 to 10% biofuels added to conventional petroleum fuels. In practice, there would not be any deterring difficulty for the existing gas stations to handle the fuel. In this connection, we highly recommend Government to consider promoting the use of biofuels in Hong Kong to improve the environment and reduce the greenhouse gas emission globally. As a good start, the Administration might wish to demonstrate its commitment by inaugurating its application on some of the vehicles fleet.

(iii) Solar energy

Promote the use of Solar Hot Water System for Domestic Hot Water as well as Solar Absorption Air Conditioning System which are widely used in other countries such as Japan and Germany. This will complement the use of Building Integrated Photovoltaic (BIPV) Cells for domestic and commercial buildings in reducing CO<sub>2</sub> emission. Application of this in Hong Kong may not as rewarding as places with low rises and long daytime hours.

6. Besides the above-mentioned sources of renewable energy, Government should also consider promoting the use of natural gas and fuel cell.

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<sup>3</sup> "Study on potential applications of renewable energy in Hong Kong" Consultant study report, Stage 1 study submitted to EMSD, December 2002.

<sup>4</sup> Leung Y.C., "Feasibility of biodiesel being an automotive fuel in Hong Kong" Final Report submitted to EPD under a contract no. MV 00-153, December 2003.

(i) Natural gas

The introduction of natural gas as a feedstock to partially substitute naphtha for the production of town gas has realised significant reduction in CO<sub>2</sub> emission as the C/H ratio of natural gas is much lower than that of naphtha.

(ii) Fuel cell

Fuel cell and related product should be promoted and more effort must be placed to accelerate the commercial application to cut down CO<sub>2</sub> and stall the global warming impact.

*Natural gas vs coal for electricity generation*

7. Our power plants use both coal and natural gas for electricity generation. Power generated from natural gas is more efficient than that of coal and produces half as much carbon dioxide, less than a third as much nitrogen oxides, and much less sulfur oxide. If to pursue these benefits, Government should set a clear energy policy enabling the power plants companies in Hong Kong to develop a plan of increasing the proportion of electricity generated by natural gas and in the long-term reviewing the role of coal-fired power plant taking into account the latest technology development.

*Energy conservation*

8. Energy conservation can be one of the most efficient ways to reduce electricity consumption and hence greenhouse gas emissions. The concept of energy conservation should be promoted to all citizens and companies in Hong Kong. Energy conservation scheme for all government buildings and offices should be developed.

Right now the EMSD operates a voluntary Energy Efficiency Labelling Scheme (EELS) for appliances and equipment used both at homes and offices as well as for vehicles. To make it more effective, the scheme can be extended to cover more appliances and equipment, and make it mandatory for intensive energy appliances and equipment like air conditioners and passenger cars so that it is easier for the public to choose energy efficient products. The price of an energy efficient car (such as a hybrid car) is still more expensive than a conventional car. Government should give more incentives to encourage purchasing energy efficient products.

On the other hand, Government may consider introducing “energy tax (or carbon tax)” to further encourage energy conservation. This will also broaden the tax base as well as induce new business opportunities.

*Other measures*

9. Although CO<sub>2</sub> is the major greenhouse gas in Hong Kong, another greenhouse gas, i.e. CH<sub>4</sub> should not be neglected as the greenhouse effect arisen from CH<sub>4</sub> is twenty times that of CO<sub>2</sub>. CH<sub>4</sub> mainly emitted from landfill during the decay of organic materials. Reuse of landfill gas seems to be the best practical way of reducing greenhouse gas emission from landfill site, which can also provide a source of clean energy for power generation.