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Panel on Environmental Affairs

Meeting on 22 January 2007

**Updated background brief on renewable energy
(Position as at 16 January 2007)**

Introduction

The provision of sufficient, reliable and reasonably priced supplies of energy is vital to economic and social development. With no indigenous energy resources, such as oil, gas or coal, Hong Kong has been relying on imported fossil fuels to support its energy sector^{Note1}. In terms of electricity supply, two independent power companies, namely CLP Power Limited and Hongkong Electric Company Limited, each providing generation, transmission, distribution and retailing of electricity, serve all major residential, commercial and industrial developments in Hong Kong. Coal and, more recently, natural gas are imported to generate electricity locally.

2. The burning of fossil fuels emits greenhouse gas, such as carbon dioxide. Hence, the energy sector is the largest contributor to Hong Kong's carbon dioxide emissions, responsible for about 97% of the total carbon dioxide emissions, most of which comes from electricity generation. As public awareness of energy efficiency and environmental protection increases, the need to reduce emissions from power plants becomes more prominent and is a major discussion item at meetings of the Council, Panel on Economic Services (ES Panel) and Panel on Environmental Affairs (EA Panel). While all new power plants commissioned after 1996 are required to use natural gas as fuel, which emits about 50% less carbon dioxide than coal, Members hold that view that other measures, including the use of alternative fuels and renewable energy (RE)^{Note2} sources, should be explored to help to contain external purchase of fuels and greenhouse gas emissions.

Note1 Energy sector includes electricity generation, manufacturing and construction, transport and other fuel combustion industries.

Note2 Renewable energy is a general term covering those energy flows that occur naturally and repeatedly in the environment and can be harnessed for human benefit. Examples of renewable energy resources are solar, wind, biomass and geothermal.

Study on the Potential Applications of RE in Hong Kong

3. In June 2000, the Finance Committee approved funding of \$16.5 million for the Electrical and Mechanical Services Department (EMSD) to engage consultants to undertake a comprehensive study to investigate the viability of using RE technologies in Hong Kong and to make recommendations for formulation of an implementation strategy. The study commenced in November 2001 for completion in 2003.

4. The study comprised two stages. Stage 1 involved the collection and analysis of information on RE technologies which included the following key tasks -

- (a) evaluating the different RE technologies to identify those appropriate for Hong Kong conditions, establish requirements and specifications for suitable RE equipment and provide an estimate of the potential scale of application;
- (b) identifying the practical arrangements to support the introduction and maintenance of new RE technologies; and
- (c) devising a plan to address the priorities and preferences relating to the promotion of cost-effective RE technologies.

Stage 2 involved a design and build pilot project to install photovoltaic^{Note3} panels in existing government building(s) to provide technical data to assess the use of Building Integrated Photovoltaic (BIPV) systems.

Discussion on RE

5. Given that the limited reserves of fossil fuels would render their prices susceptible to changes in supply and demand in the world market or manipulation by certain countries and organizations, and that the consumption of such fuels would also lead to environmental pollution, the Council passed a motion moved by Ir Dr Hon Raymond HO on 17 January 2001 urging the Government to adopt the following measures as soon as possible to expedite the development of RE resources and their introduction in Hong Kong -

- (a) actively formulating a policy on the development of renewable resources, and making use of Hong Kong's advantages on various fronts, including its natural environment, availability of the relevant scientific and technological research talents, free flow of information, advanced communication equipment, sound financing services and close co-operation with the Mainland in scientific and technological research and development, so that Hong Kong will become a leader rather than just a follower in the development and utilization of RE resources; and

Note3 Photovoltaic panel is a panel completed with built-in specially prepared semi-conductors that allow the direct conversion of light energy from the sun into electricity.

- (b) apart from policy support, providing sufficient financial support to facilitate researches in and development of RE resources, and promoting the necessary pilot projects.”

6. On 30 October 2002, the Council passed another motion by Dr LAW Chi-kwong urging the Government to expeditiously formulate and implement the policy on RE development so as to achieve the objectives in energy resources, environmental protection and economic aspects. The implementation of strategies for RE resources should include -

- (a) increasing the use of RE resources and setting a practicable target in this regard;
- (b) formulating corresponding legislation and administrative framework to facilitate the research and development and application of RE resources;
- (c) providing support and incentives to promote the scientific and technological research and market development of RE resources;
- (d) incorporating the policy on RE resources into town planning and urban development strategies and making it one of the key factors to be taken into account;
- (e) collaborating actively with the Pearl River Delta authorities and the Guangdong Provincial Government in studying the feasibility of developing and introducing RE resources; and
- (f) promoting education, professional training and publicity, with a view to enhancing the public’s understanding of RE resources and their application skills.”

Members also unanimously agreed that efforts should be stepped up to facilitate the application of RE with a view to resolving the problems associated with the use of fossil fuels. They held the view that the Government should offer support and incentives to promote scientific and technological research and to nurture a market for RE. Education and publicity campaigns should be enhanced to promote public awareness of RE. Consideration should also be given to implementing RE with the collaboration of the Guangdong Provincial Government and the Pearl River Delta authorities.

7. Prior to the release of the findings and recommendations for Stage 1 of the “Study on the Potential Applications of RE in Hong Kong”, the EA Panel received an on-site briefing on the newly installed BIPV on 4 February 2003. Members noted that with the completion of installation works for BIPV systems under Stage 2 Study, the performance of the various types of panels, including rack type on the roof top, sunshade type from 1st to 12th floors and skylight type at the front entrance hall in

Wanchai Tower, would be monitored until early 2004. Technical data collected would be used to assess the efficiency, stability and safety of such systems under Hong Kong's weather conditions.

8. On 6 February 2003, the EA Panel discussed the outcome of the Stage 1 Study, the key findings of which are in the **Appendix**. In gist, there were four types of RE, namely solar power, wind power, building integrated fuel cell and energy from waste, which were considered potentially feasible for wide-scale application in Hong Kong. However, there were institutional, economic and land constraints to be resolved before solar and wind energy systems could be employed on a large scale in Hong Kong. While acknowledging the constraints, members held the view that the consultant's recommended targets of contribution from RE to annual electricity demand at 1% in 2012, 2% in 2017 and 3% in 2022 were too conservative. They considered it necessary for the Administration to review the targets to meet the latest aspiration of the community. It should also discuss issues relating to the development of RE in the course of reviewing the Scheme of Control Agreements (SCA) with the two power companies in mid 2003.

9. The EA Panel and the ES Panel held two joint meetings on 28 April and 18 July 2003 to discuss the development of RE in the context of the 2003 SCA Interim Review. Members agreed that the Administration should encourage the two power companies to fund more RE projects or take on such projects themselves as well as make it easier for access of third party pilot RE projects to their electricity grid. They also urged the Administration to review the targets of RE contribution to electricity demand and setting a concrete timetable for the development and wide-scale application of RE. As part of the outcome of the interim review, the Administration had made an agreement with each of the two power companies to set up a pilot production-scale wind turbine for public demonstration and evaluation on the use of wind energy.

10. The EA Panel held a special meeting on 29 September 2005 to discuss the environmental aspects of the financial plans of the two power companies. Representatives of the Administration and the two power companies as well as green groups were invited to exchange views on the subject. The development of RE on a wider scale was raised. While supporting the development of RE by the two power companies, concerns about the constraints on RE supply, particularly the land requirement in developing wind energy through the use of wind turbines and the reliability of RE supply were raised. In this connection, the Government was requested to consider providing assistance and financial incentives to encourage the development of RE. The two power companies should also explore the possibility of collaborating with the Mainland in the development of RE.

11. To further improve the air quality and reduce greenhouse gas emission, the Administration has proposed to implement the following measures to promote the use of RE in the Stage II Consultation Paper on future development of the electricity market in Hong Kong published by the Economic Development and Labour Bureau in December 2005 –

- (a) To give a higher rate of return for RE infrastructure than all other assets so as to provide financial incentives to the power companies;
- (b) To provide “bonus” return to the power companies if they achieve the target for using RE;
- (c) To institute a standard arrangement for RE users to connect to the grid for backup supply; and to seek the agreement of power companies to extend the arrangement to cover RE systems with capacities above 200 kilowatts and to waive the nominal administrative fees for grid connection by RE users;
- (d) To seek the agreement of the power companies to provide connection/access to their grids for generating facilities employing RE, and to facilitate these facilities to connect and feed electricity to their grids; and
- (e) To have grid connection/access for RE users/generating facilities using RE negotiated between the prospective grid user and the respective power company, and the Government will assist where necessary and when requested by either party, including assisting in arriving at mutually agreed access charges.

12. The proposals were discussed by the EA Panel at its meeting on 27 March 2006 at which relevant stakeholders were invited to express their views. There was general support for the provision of grid access as a start because in this way, the two power companies could compete with each other. Apart from allowing RE users to connect to the grid for backup supply from the power companies, consideration should also be given to setting up a regulatory framework on grid access to allow small-scale RE producers to feed electricity back into the grids of the power companies. According to the Administration, the Consultation Paper contained proposals of allowing RE users to have grid connection for backup electricity supply from power companies. Technical guidelines on the connection of small-scale RE systems to the grids had been worked out by the EMSD in consultation with the power companies and interested groups. These guidelines would be further improved to cater for the feeding back of electricity from RE sources into the grid. As regards members’ enquiry on the time frame for the provision of connection/access to the grids, the Administration’s explanation was that it would have greater participation in the planning for the opening of the electricity market. Clear guidelines would be set on grid access/connection to ensure the safety and reliability of electricity supply. An accounting and settlement system would also need to be worked out for power transactions. The Administration would continue regulating the electricity market by means of bilateral agreements which would remain the regulatory vehicle for the next 10 to 15 years.

Key Findings of Stage 1 Study on the Potential Applications of RE in Hong Kong

The following sets out the consultant's key findings and recommendations:

- (a) Upon reviewing current technological trends and applications, and taking into account Hong Kong's local characteristics, RE (RE) that are considered potentially feasible^{note1} for wide-scale application in Hong Kong include –
 - (i) solar power;
 - (ii) wind power;
 - (iii) building integrated fuel cells; and
 - (iv) energy from waste.

- (b) Major issues that may hinder wide-scale development of RE in Hong Kong include –
 - (i) there may not be suitable sites for implementing large scale RE projects;
 - (ii) there may be concerns about the visual, noise and possibly safety impacts of some RE systems (e.g. wind turbines);
 - (iii) the current pricing of power supply has not taken into account the environmental costs associated with combustion of fossil fuel, which remains a major fuel source for energy production. Thus power generated by the more environmental-friendly RE appears to be comparatively more expensive than that coming from conventional fossil fuel. In addition, the prevailing regulatory framework tends to drive investment of power companies towards the 'cheaper' conventional method of power generation; and
 - (iv) terms and conditions for accessing the electricity grid by third party including RE providers are currently set at the sole discretion of the existing power companies.

Note 1 Other new and RE sources / systems reviewed include energy from biomass, small scale hydroelectric systems, geothermal energy, tidal and wave power, and independent energy storage systems (which permits excess electricity generated during the periods of high availability of RE and lower power demand to be transported and stored, and released later during periods of lower resources availability and high power demand).

- (c) In order to create a positive market environment for wide-scale application of RE, the consultant recommends the following measures:
- (i) to put in place a mechanism which would enable investors in RE schemes to earn a reasonable or reasonably attractive return;
 - (ii) to conduct necessary studies and develop guidelines and standards to address potential concerns to be brought about by specific RE systems;
 - (iii) to promote the public awareness of RE sources and technologies; and
 - (iv) to improve the access of RE schemes to the existing power grid.
- (d) The two power companies in Hong Kong are each operating under a Scheme of Control (SOC) Agreements with the Government, which will expire in 2008. The SOC Agreements provide a framework for monitoring the performance of power companies so as to protect the interests of consumers. Under the current SOC Agreements, power companies have no obligation to generate electricity from RE sources or to offer grid access to independent RE generators. The interim review on the current SOC Agreements scheduled for 2003 gives an opportunity for the Government and the power companies to discuss issues relating to the development of RE in Hong Kong.
- (e) Taking into account the constraints of development of RE in Hong Kong and the estimation of possible RE projects coming on stream, the consultant recommends that the targets of contribution from RE produced locally to annual electricity demand (against the baseline year of 1999) should tentatively be set at 1% (355 Giga Watt hour, GWh) in 2012, 2% (710e GWh) in 2017 and 3% (1065 GWh) by 2022 respectively. These targets should then be reviewed periodically in the light of RE developments in Hong Kong and advancement in RE technologies in the international market.