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Panel on Environmental Affairs

Meeting on 15 December 2008

**Background brief on the provision of a
District Cooling System at the Kai Tak Development**

Purpose

This paper gives a brief account on the previous discussion on the provision of a District Cooling System (DCS)^{Note1} at South East Kowloon Development (SEKD) by the Panel on Environmental Affairs (the Panel).

Background

2. Air conditioning accounts for 32% of Hong Kong's electricity consumption. The use of more efficient air conditioning systems would be an effective measure to conserve energy. In October 1998, the Electrical and Mechanical Services Department commissioned a Preliminary Phase Consultancy Study for Wider Use of Water-cooled Air Conditioning Systems in Hong Kong, which established the viability as well as economic and environmental benefits of the water-cooled air conditioning system (WACS) as compared with the conventional air-cooled air conditioning system (AACS). Of the three basic concepts of WACS, viz Centralized Piped Supply System for Condenser Cooling, Centralized Piped Supply System for Cooling Towers, and DCS, the Study found DCS most energy efficient as it could save up to 35% of energy when compared with ACCS. The Study also recommended conducting territorial and district implementation studies to allow early realization of the potential energy saving. One of the studies proposed was on the implementation of DCS at SEKD.

^{Note1} District Cooling System is a very large-scale centralized air conditioning system. It consists of one or more chiller plants to produce chilled water, and a closed loop network of underground pipes for distributing the chilled water to buildings within its service area for air conditioning purpose. The chilled water is pumped to individual buildings for use in their air conditioning systems and is then returned to the central chiller plant for re-chilling.

3. SEKD, with a total site area of over 461 hectares including mainly the former Kai Tak Airport, will be one of the largest urban redevelopment programmes in Hong Kong in the coming years and will be developed in phases. As SEKD will be a new district under planning, it offers an excellent opportunity for implementing the more energy-efficient DCS to meet the demand of air conditioning in the area. With the approval of funding by the Finance Committee in May 2000, EMSD commissioned the "Implementation Study for a District Cooling Scheme at South East Kowloon Development" in January 2001. The Study aimed at examining detailed technical, environmental, regulatory, financial, institutional, contractual, infrastructural, and land use requirements for implementation of DCS, and to draw up an implantation plan.

Key findings and recommendations of the consultancy study on implementation of DCS at SEKD

4. The consultancy study found the DCS project technically viable. Energy saved at SEKD as a result of the use of DCS is estimated to be 90 000 MWh per year, equivalent to roughly 0.24% of the total electricity demand in Hong Kong in 2001. The estimated energy saved will also result in an annual reduction of about 53 000 tonnes of carbon dioxide, equivalent to about 0.15% of the total carbon dioxide emission in Hong Kong in 2000. The estimated total capital investment for the DCS project is \$655 million at 2001 price level. The private sector could be involved in taking forward the DCS project, possibly by means of a "build-operate-transfer" (BOT) contract^{Note2}. However, there are a number of risks and uncertainties that the DCS operator and DCS users might encounter. From the operator's prospective, its major risks are the uncertainty in the subscription rate, the intensive upfront capital outlays, and the long payback period. For DCS users, the main concerns are their limited bargaining power and control over the services provided by the operator once they opt to subscribe to the DCS service. In order to ensure that the project can remain reasonably attractive to the private sector, the consultant has suggested that the Government should consider providing some support, for instance, by reducing the project risk through requiring all Government, Institution or Community facilities under the Government's direct control to subscribe to the DCS service, and by waiving the land costs for the DCS facilities and distribution pipes.

Discussion by the Panel

5. The progress of development of DCS at SKED was discussed at the Panel meetings on 10 February and 2 March 2000 as well as 20 December 2002. While supporting in general the use of a more energy efficient DCS, members raised questions on the environmental, technical and financial aspects of DCS.

^{Note2} Under the proposed "build-operate-transfer" contract, the DCS operator would be allowed to operate the facilities for 30 years. After the expiry of the contract, ownership of the whole system would be returned to the Government subject to the latter paying the residual value of the assets to the operator.

6. On environmental aspect, members were concerned about the impact on marine ecology as a result of changes in temperature of the receiving waters associated with the operation of DCS, which was expected to implement on a large scale.

7. On technical aspect, members opined that as chilled water would be distributed through an extended close loop network of underground pipes for air conditioning purpose, measures had to be taken to prevent heat loss during the operation of DCS. There were also questions on the technical viability and energy efficiency of DCS, particularly when the technological risks had not been fully explained.

8. On financial aspect, some members pointed out that the BOT approach was at variance with the prevailing arrangement whereby a new facility would be operated by the Government at first and transferred to a private operator at a later stage. There were also questions on the basis upon which the contract period of 30 years was arrived at, limited bargaining power of DCS users, cost-effectiveness of the DCS project given the heavy subsidies on land cost, and opportunity cost incurred by the Government if the land cost for DCS facilities on Government land was waived.

Latest development

9. The Administration intends to brief the Panel on the provision of a DCS at the Kai Tak Development. The subject has been scheduled for discussion at the Panel meeting on 15 December 2008.

Relevant papers

Information papers provided by the Administration for the EA Panel meeting on 10 February 2000

<http://www.legco.gov.hk/yr99-00/english/panels/ea/papers/1020e03.pdf>

Minutes of the EA Panel meeting on 10 February 2000

<http://www.legco.gov.hk/yr99-00/english/panels/ea/minutes/ea100200.pdf>

Information papers provided by the Administration for the EA Panel meeting on 2 March 2000

<http://www.legco.gov.hk/yr99-00/english/panels/ea/papers/1232e06.pdf>

Minutes of the EA Panel meeting on 2 March 2000

<http://www.legco.gov.hk/yr99-00/english/panels/ea/minutes/ea020300.pdf>

Information papers provided by the Administration for the EA Panel meeting on 20 December 2002

<http://www.legco.gov.hk/yr02-03/english/panels/ea/papers/ea1220cb1-548-3-e.pdf>

Response to members' questions from the consultant

<http://www.legco.gov.hk/yr02-03/english/panels/ea/papers/ea1220cb1-930-e.pdf>

Minutes of the EA Panel meeting on 20 December 2002

<http://www.legco.gov.hk/yr02-03/english/panels/ea/minutes/ea021220.pdf>

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