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**Legislative Council**

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**Panel on Environmental Affairs**

**Meeting on 20 December 2010**

**Updated background brief on the provision of a  
District Cooling System at the Kai Tak Development  
(Position as at 14 December 2010)**

**Purpose**

This paper gives a brief account on the previous discussions on the provision of a District Cooling System (DCS)<sup>Note<sup>1</sup></sup> at Kai Tak Development (KTD) (formerly known as 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 (EMSD) 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

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<sup>Note<sup>1</sup></sup> 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.

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 the then SEKD.

3. KTD, 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 KTD 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.

### **Implementation of DCS at KTD**

4. The consultancy study found the DCS project technically viable. Energy saved at KTD as a result of the use of DCS was 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 would 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 was \$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<sup>Note2</sup>. However, there would be a number of risks and uncertainties that the DCS operator and DCS users might encounter. From the operator's prospective, its major risks would be the uncertainty in the subscription rate, the intensive upfront capital outlays, and the long payback period. For DCS users, the main concerns would be 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 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.

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<sup>Note2</sup> 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.

5. When the key findings and recommendations of the consultancy study as well as the progress of development of DCS at KTD were discussed at the Panel meetings on 10 February 2000, 2 March 2000, and 20 December 2002, members raised questions on the environmental, technical and financial aspects of DCS. 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.

6. In December 2008, the Panel was briefed on the proposal to upgrade the DCS project at KTD to Category A at an estimated cost of about \$1,402 million. The Panel noted that all public developments in KTD would connect to DCS if their implementation could match the development schedule of DCS. The connection to DCS for private developments would be on a voluntary basis. The private sector would be engaged for the design, construction and operation of DCS under a Design-Build-Operate (DBO)<sup>Note3</sup> model contract spanning over 17 years. The project would be developed and commissioned for operation in three phases to suit the three major groups of developments with potential of using DCS services. Some members were concerned that it would be difficult to work out the design capacity of DCS if connection to it was on a voluntary basis. Besides, it would be a waste of resources if only public developments would connect to DCS. To attract more private users, the tariff should be set at a reasonable level and incentives should be provided to encourage connection to DCS. Consideration might also be given to making the use of DCS mandatory. The relevant funding proposal was endorsed by the Public Works Subcommittee and Finance Committee on 6 May and 5 June 2009 respectively.

### **Alternative procurement strategy**

7. Tender procedures for the project were initiated in July 2009 upon funding approval by the Finance Committee. According to the Administration, the returned tender prices of both project costs and operation costs have far exceeded the original estimates. These might due to the fact that tenderers have included a very high risk premium in the tender price to cater for uncertainties (including price inflation over the long operation period of 17

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<sup>Note3</sup> Under the proposed “design-build-operate” contract, the DCS operator would be required to design, construct and operate DCS for 17 years. The ownership of DCS will remain with the Government throughout the contract duration. DCS will be handed back to the Government free of any charges upon expiry of the operational phase specified in the contract.

years and allowances for any unexpected site constraints as well as complication in design and construction of DCS), meeting design development and construction requirements from interfacing works between DCS system and other underground facilities, and reinforcement works to allow room for future developments on the ground level. In view of the tender outcome, the Administration has reviewed the original procurement strategy with a view to building in flexibility to meet with future adjustments in the development of individual projects.

8. Under the alternative procurement strategy, the Administration will commence with the overall design of DCS to ensure the integrity of the system, but will implement DCS with separate works contracts to better cater for the progress of major development and infrastructural projects at KTD. The revised approach to procure the DCS development and operation by phases will provide fairer and more reasonable costs though the actual project estimates will be subject to the outcome of the tendering. Details of the alternative procurement strategy are set out in LC Paper No. CB(1) 2324/09-10(05) which is hyperlinked below for ease of reference.

9. When the latest development of DCS at KTD and the revised procurement strategy were discussed at the Panel meeting on 28 June 2010, members found it difficult to support the alternative procurement strategy in the absence of information, including tender prices under the original procurement mode, the cost estimates for different phases under the alternative procurement strategy etc. They also questioned the viability of adopting DBO procurement mode for DCS given that the DBO approach had been found to be problematic in a number of sewerage projects. Noting that the relevant funding proposal would only be submitted for endorsement by PWSC/FC in the next legislative session, members considered that there was ample time for the Administration to provide the requisite information. They also agreed to hold an informal meeting on 12 July 2010 to consider any confidential/sensitive information relating to the tender of DCS at KTD.

## **Progress**

10. At the Panel's request, the Administration has provided further information on DBO model, financial viability of DCS and mandatory subscription to the DCS service by all non-domestic projects in KTD.

11. According to the Administration, it has prepared the scheme design of DCS (covering key components of the system, including the location of the northern and southern chiller plants as well as the seawater pump-house, and the alignments of major pipelines). The contractor would mainly be responsible for the required detailed design (based on the scheme design by the

Administration), building and operation of DCS. Being responsible for the detailed design, the contractor would enjoy a greater flexibility in revising the design during the construction stage in view of any change in circumstances. Moreover, as the contractor is responsible for both building and operation, the DBO model would prevent the constructor from shifting certain costs to the operator in order to reduce construction cost. To maintain the competitiveness of DCS, the Administration has pledged to set the tariff at a level comparable to the charge of water-cooled air-conditioning systems despite any increase in the construction and operating charge. Tariff will be introduced through legislation to facilitate monitoring by the Legislative Council. The Administration is also actively exploring how best to implement the requirement for all non-domestic projects in KTD to subscribe to the DCS service, including the appropriate avenue, means of enforcement, and sanctions against any breach of the relevant conditions. It is anticipated that DCS would stand a chance of breaking even within 21 years instead of the original estimate of 30 years if all air-conditioned floor area of private non-domestic projects in KTD uses the DCS service.

12. When the subject was discussed at the Panel meeting on 21 July 2010, members noted that the Administration had also written to FC explaining the revised phasing approach in procuring DCS. While supporting the concept of DCS, some members remained of the view that the use of DBO approach in procuring the DCS development and operation which spanned over a period of more than 10 years was undesirable, lest the cost of DCS under the revised phasing approach would way exceed the original estimate of \$1,671 million.

### **Latest development**

13. The Administration will report on the tender returns of Phases I and II and propose the way forward for DCS at the Panel meeting on 20 December 2010.

### **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>

Information papers provided by the Administration for the EA Panel meeting on 15 December 2008

<http://www.legco.gov.hk/yr08-09/english/panels/ea/papers/ea1215cb1-363-3-e.pdf>

Minutes of the EA Panel meeting on 15 December 2008

<http://www.legco.gov.hk/yr08-09/english/panels/ea/minutes/ea20081215.pdf>

Information papers provided by the Administration for the EA Panel meeting on 28 June 2010

<http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0628cb1-2324-5-e.pdf>

Minutes of the EA Panel meeting on 28 June 2010

<http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/ea20100628.pdf>

Information papers provided by the Administration for the EA Panel meeting on 21 July 2010

<http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0721cb1-2564-3-e.pdf>

Minutes of the EA Panel meeting on 21 July 2010

<http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/ea20100721.pdf>

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