

**立法會**  
**Legislative Council**

LC Paper No. CB(1)428/12-13(07)

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**Panel on Development**

**Meeting on 22 January 2013**

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

**Purpose**

This paper sets out the background to and progress of the provision of a District Cooling System ("DCS")<sup>1</sup> at Kai Tak Development ("KTD"), as well as gives a brief account of the views expressed by Members on the subject since the 2008-2009 legislative session.

**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 ("AACCS"). 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 AACCS. The Study also recommended conducting

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<sup>1</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.

territorial and district implementation studies to allow early realization of the potential energy saving.

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. As KTD will be a new district under planning, the Administration considered it 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 ("FC") in May 2000, EMSD commissioned the "Implementation Study for a District Cooling Scheme at South East Kowloon Development" in January 2001.

### **Implementation**

4. Given its high energy efficiency, according to the Administration, the implementation of DCS in KTD can achieve a maximum annual saving in electricity consumption of 85 million kilowatt-hour (or about \$85 million if translated into monetary terms), with a corresponding reduction of 59 500 tonnes of carbon dioxide emission per annum for the planned total public and private non-domestic air-conditioned floor area of about 1.73 million square meters. This will contribute to air quality improvement and the vision of achieving low carbon economy.

5. The proposal to upgrade the DCS project at KTD to Category A was discussed by the Panel on Environmental Affairs ("EA Panel") in December 2008. EA Panel noted that the private sector would be engaged for the design, construction and operation of DCS under a Design-Build-Operate ("DBO")<sup>2</sup> model contract spanning over 17 years. All public developments in KTD would connect to DCS if their implementation could match the development schedule of DCS. As for private developments, the Administration's position in 2008 was that their connection to DCS would be on a voluntary basis. 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. Some members suggested that consideration might be given to making the use of DCS mandatory. The relevant funding proposal at an estimated capital cost of \$1,671 million in money-of-the-day ("MOD") prices was endorsed and

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<sup>2</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.

approved by the Public Works Subcommittee ("PWSC") and FC on 7 May and 5 June 2009 respectively.

### Procurement of services for developing and operating the District Cooling System

6. Tender procedures for the DCS project were initiated in July 2009. According to the Administration, the returned tender prices of both project costs and operation costs had far exceeded the original estimates. In view of the tender outcome and having reviewed the latest development plan of KTD, the Administration briefed EA Panel on 28 June 2010 on the refined work requirements for the project and the adjustments to the original procurement strategy. The Administration proposed to implement the project in three phases. Under the alternative procurement strategy, the Administration would prepare the scheme design of DCS to ensure the integrity of the system, but would implement DCS with separate works contracts to better cater for the progress of major development and infrastructural projects at KTD. The contractors would mainly be responsible for the required detailed design, building and operation of DCS.

7. The Administration considered that the revised approach to procure the DCS development and operation by phases would provide fairer and more reasonable costs, though the actual project estimates would be subject to the outcome of the tendering. As the contractor would be responsible for both building and operation, the DBO model would prevent the constructor from shifting certain costs to the operator. Details of the alternative procurement strategy are set out in LC Paper No. CB(1) 2324/09-10(05).<sup>3</sup>

8. EA Panel 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. EA Panel agreed to hold an informal meeting on 12 July 2010 to consider confidential/sensitive information relating to the tender of DCS at KTD.

9. When the subject was discussed again at the EA 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

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<sup>3</sup> Hyperlink to the paper - <http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0628cb1-2324-5-e.pdf>

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 exceed the original estimate of \$1,671 million. EA Panel did not raise objection to the Administration's plan to conduct a retendering exercise under the alternative procurement strategy.

#### Increased project estimate

10. In August 2010, the Administration initiated the tendering procedures for works under Phases I and II. Based on the returned tenders, the Administration estimated that the capital cost of Phases I and II was about \$1,870 million in MOD price, which had already exceeded the approved project estimate ("APE") for the whole DCS project by about \$200 million. Together with the estimated capital cost of Phase III at about \$1,780 million in MOD prices, the estimated total project cost was about \$3,650 million in MOD prices, which would exceed the APE by about \$1,980 million.

11. The proposal to increase the APE for implementing Phases I and II of DCS from \$1,671 million to \$1,861 million was discussed at the EA Panel meeting on 20 December 2010. According to the Administration, the significant increase in the estimated project cost was due to (i) the latest market situation for major materials, electrical and mechanical equipment and construction works which are specifically adopted for DCS, (ii) the additional costs of works due to project design development and changes in construction requirements, (iii) unexpected site constraints, and (iv) higher provision of price adjustment as a result of the increase in the overall project estimate and rising adjustment factor.

12. While supporting the provision of DCS given its environmental benefits, members expressed grave concern about the significant increase in the estimated project cost to about \$3,650 million, let alone the operating cost which was unknown at the present stage. Some members stressed that if Phase III was an essential part of DCS, this should be implemented as soon as practicable as further delay would only result in further increase in the project cost. Some other members however were concerned that with the evolving technology in cooling system, Phase III might become obsolete. These members also questioned the cost-effectiveness of DCS if the annual electricity savings to be achieved was only \$85 million as opposed to the total project cost of DCS at around \$3,650 million. Apart from DCS, efforts should be made to identify other equally environment-friendly options, including those which could be applied on a localized basis rather than a district basis and provision of financial incentives to encourage reduction in energy consumption.

### Requirement for private non-domestic projects at Kai Tak Development to connect to the District Cooling System

13. To ensure the financial viability of DCS, the Administration advised EA Panel on 20 December 2010 that it would require all private non-domestic projects in KTD to connect to DCS through inclusion of such a requirement in the land lease conditions. It was estimated that DCS would break even within 25 years<sup>4</sup> (instead of the original estimate of 30 years) if all air-conditioned floor area of private non-domestic projects in the KTD were required to use the DCS service.

14. Some members expressed concern about possible legal challenges by private developers who were unwilling to abide by the mandatory subscription to DCS under the land lease. Given the uncertainties over the proposed mandatory subscription to DCS by private non-domestic projects at KTD, the compatibility of construction requirements for buildings at KTD, and the need to resolve the back-up systems for DCS with developers, some other members questioned the basis upon which the projection that DCS was expected to break even within 25 years was arrived at. To increase the subscription rate of DCS, some members opined that consideration should be given to extending DCS to residential premises, including public housing estates in KTD.

### Approval of the increased project estimate

15. The funding proposal for increasing the APE for implementing Phases I and II of DCS to \$1,861 million was approved by FC on 18 February 2011. Construction works for Phases I and II of DCS are in progress. Completion of Phase I is targeted at 2013 for serving the Cruise Terminal and public housing developments. In the relevant PWSC paper,<sup>5</sup> the Administration indicated that based on the outcome of the tender exercise for Phase III, it would seek approval from PWSC and FC for further increasing the APE to cover Phase III works.

### Proposed charging arrangements

16. As all public and private non-domestic developments that use district cooling services in KTD will be required to pay the DCS charges to the Government, the Administration has formulated a framework for the proposed charging mechanism and briefed EA Panel on the framework on 4 July 2011. The key components of the proposed tariff of district cooling services comprise the capacity charge, the consumption charge, the capacity overrun charge and

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<sup>4</sup> Counting from 2010/11 with a 100% subscription rate for connection to DCS at KTD.

<sup>5</sup> PWSC(2010-11)31 (<http://www.legco.gov.hk/yr10-11/english/fc/pwsc/papers/p10-31e.pdf>)

the financial penalties for unpaid charge.<sup>6</sup> To provide the necessary legal backing for the charging arrangements and other related matters, the Administration will prepare a Bill and introduce it into LegCo for scrutiny.

17. Regarding the tariff component of "capacity overrun charge", which is meant to discourage consumers from deliberately underestimating their contracted cooling capacity, some EA Panel members were concerned that it would be difficult for consumers to estimate their demand accurately and for the Government to establish whether consumers had deliberately underestimated their demand. Some members considered that the rate adjustment formulae presented by the Administration were difficult to comprehend. In response, the Administration said that it would consider how the formulae could be better presented in the Bill.

### **Latest development**

18. The Administration has proposed to brief the Panel on Development, at its meeting on 22 January 2013, on a funding proposal for the proposed implementation of DCS Phase III. Members of EA Panel have been invited to join the meeting.

### **Relevant papers**

19. A list of relevant papers is at the **Appendix**.

Council Business Division 1  
Legislative Council Secretariat  
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<sup>6</sup> Details are given in the Administration's paper on the subject (LC Paper No. CB(1)2256/11-12(03)) (<http://www.legco.gov.hk/yr11-12/english/panels/ea/papers/ea0704cb1-2256-3-e.pdf>).

## District Cooling System at Kai Tak Development

## List of relevant papers

Council/ Committee	Date of meeting	Paper
EA Panel	10 February 2000	<p>Information paper on "Energy Efficiency and Conservation Initiatives for 2000/01" provided by the Administration (LC Paper No. CB(2)1020/99-00(03))  <a href="http://www.legco.gov.hk/yr99-00/english/panels/ea/papers/1020e03.pdf">http://www.legco.gov.hk/yr99-00/english/panels/ea/papers/1020e03.pdf</a></p> <p>Minutes of meeting (LC Paper No. CB(2)1604/99-00)  <a href="http://www.legco.gov.hk/yr99-00/english/panels/ea/minutes/ea100200.pdf">http://www.legco.gov.hk/yr99-00/english/panels/ea/minutes/ea100200.pdf</a></p>
EA Panel	2 March 2000	<p>Information paper on "Water-cooled Air Conditioning Systems" provided by the Administration (LC Paper No. CB(2)1232/99-00(06))  <a href="http://www.legco.gov.hk/yr99-00/english/panels/ea/papers/1232e06.pdf">http://www.legco.gov.hk/yr99-00/english/panels/ea/papers/1232e06.pdf</a></p> <p>Minutes of meeting (LC Paper No. CB(2)1605/99-00)  <a href="http://www.legco.gov.hk/yr99-00/english/panels/ea/minutes/ea020300.pdf">http://www.legco.gov.hk/yr99-00/english/panels/ea/minutes/ea020300.pdf</a></p>
EA Panel	20 December 2002	<p>Information paper on "Implementation of District Cooling System at South East Kowloon Development" provided by the Administration (LC Paper No. CB(1)548/02-03(03))  <a href="http://www.legco.gov.hk/yr02-03/english/panels/ea/papers/ea1220cb1-548-3-e.pdf">http://www.legco.gov.hk/yr02-03/english/panels/ea/papers/ea1220cb1-548-3-e.pdf</a></p> <p>Response to members' questions from the consultant (LC Paper No. CB(1)930/02-03)  <a href="http://www.legco.gov.hk/yr02-03/english/panels/ea/papers/ea1220cb1-930-e.pdf">http://www.legco.gov.hk/yr02-03/english/panels/ea/papers/ea1220cb1-930-e.pdf</a></p> <p>Minutes of meeting (LC Paper No. CB(1)826/02-03)  <a href="http://www.legco.gov.hk/yr02-03/english/panels/ea/minutes/ea021220.pdf">http://www.legco.gov.hk/yr02-03/english/panels/ea/minutes/ea021220.pdf</a></p>

Council/ Committee	Date of meeting	Paper
EA Panel	15 December 2008	<p>Information paper on "District Cooling System at the Kai Tak Development" provided by the Administration (LC Paper No. CB(1)363/08-09(03))  <a href="http://www.legco.gov.hk/yr08-09/english/panels/ea/papers/ea1215cb1-363-3-e.pdf">http://www.legco.gov.hk/yr08-09/english/panels/ea/papers/ea1215cb1-363-3-e.pdf</a></p> <p>Minutes of meeting (LC Paper No. CB(1)604/08-09)  <a href="http://www.legco.gov.hk/yr08-09/english/panels/ea/minutes/ea20081215.pdf">http://www.legco.gov.hk/yr08-09/english/panels/ea/minutes/ea20081215.pdf</a></p>
PWSC	7 May 2009	<p>Discussion paper on "HEAD 705 -- CIVIL ENGINEERING - 45CG - District Cooling System at the Kai Tak Development" provided by the Administration (LC Paper No. PWSC(2009-10)24)  <a href="http://www.legco.gov.hk/yr08-09/english/fc/pwsc/papers/p09-24e.pdf">http://www.legco.gov.hk/yr08-09/english/fc/pwsc/papers/p09-24e.pdf</a></p> <p>Minutes of meeting (LC Paper No. PWSC112/08-09)  <a href="http://www.legco.gov.hk/yr08-09/english/fc/pwsc/minutes/pwsc20090507.pdf">http://www.legco.gov.hk/yr08-09/english/fc/pwsc/minutes/pwsc20090507.pdf</a></p>
FC	5 June 2009	<p>Minutes of meeting (LC Paper No. FC7/09-10)  <a href="http://www.legco.gov.hk/yr08-09/english/fc/fc/minutes/fc20090605.pdf">http://www.legco.gov.hk/yr08-09/english/fc/fc/minutes/fc20090605.pdf</a></p>
EA Panel	28 June 2010	<p>Information paper on "District Cooling System at the Kai Tak Development" provided by the Administration (LC Paper No. CB(1)2324/09-10(05))  <a href="http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0628cb1-2324-5-e.pdf">http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0628cb1-2324-5-e.pdf</a></p> <p>Minutes of meeting (LC Paper No. CB(1)2956/09-10)  <a href="http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/ea20100628.pdf">http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/ea20100628.pdf</a></p>
EA Panel	21 July 2010	<p>Information paper on "District Cooling System at the Kai Tak Development" provided by the Administration (LC Paper No. CB(1)2564/09-10(03))  <a href="http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0721cb1-2564-3-e.pdf">http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0721cb1-2564-3-e.pdf</a></p> <p>Minutes of meeting (LC Paper No. CB(1)31/10-11)  <a href="http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/ea20100721.pdf">http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/ea20100721.pdf</a></p>

Council/ Committee	Date of meeting	Paper
EA Panel	20 December 2010	<p>Information paper on "District Cooling System at the Kai Tak Development" provided by the Administration (LC Paper No. CB(1)782/10-11(05))  <a href="http://www.legco.gov.hk/yr10-11/english/panels/ea/papers/ea1220cb1-782-5-e.pdf">http://www.legco.gov.hk/yr10-11/english/panels/ea/papers/ea1220cb1-782-5-e.pdf</a></p> <p>Paper on the provision of a District Cooling System at the Kai Tak Development prepared by the Legislative Council Secretariat (updated background brief) (LC Paper No. CB(1)782/10-11(06))  <a href="http://www.legco.gov.hk/yr10-11/english/panels/ea/papers/ea1220cb1-782-6-e.pdf">http://www.legco.gov.hk/yr10-11/english/panels/ea/papers/ea1220cb1-782-6-e.pdf</a></p> <p>Minutes of meeting (LC Paper No. CB(1)1229/10-11)  <a href="http://www.legco.gov.hk/yr10-11/english/panels/ea/minutes/ea20101220.pdf">http://www.legco.gov.hk/yr10-11/english/panels/ea/minutes/ea20101220.pdf</a></p>
PWSC	19 January 2011	<p>Discussion paper on "HEAD 705 -- CIVIL ENGINEERING - 45CG - District Cooling System at the Kai Tak Development" provided by the Administration (LC Paper No. PWSC(2010-11)31)  <a href="http://www.legco.gov.hk/yr10-11/english/fc/pwsc/papers/p10-31e.pdf">http://www.legco.gov.hk/yr10-11/english/fc/pwsc/papers/p10-31e.pdf</a></p> <p>Minutes of meeting (LC Paper No. PWSC39/10-11)  <a href="http://www.legco.gov.hk/yr10-11/english/fc/pwsc/minutes/pwsc20110119.pdf">http://www.legco.gov.hk/yr10-11/english/fc/pwsc/minutes/pwsc20110119.pdf</a></p>
FC	18 February 2011	<p>Minutes of meeting (LC Paper No. FC21/11-12)  <a href="http://www.legco.gov.hk/yr10-11/english/fc/fc/minutes/fc20110218.pdf">http://www.legco.gov.hk/yr10-11/english/fc/fc/minutes/fc20110218.pdf</a></p>
EA Panel	4 July 2012	<p>Information paper on "Legislative framework of the proposed charging arrangements for the District Cooling System at the Kai Tak Development" provided by the Administration (LC Paper No. CB(1)2256/11-12(03))  <a href="http://www.legco.gov.hk/yr11-12/english/panels/ea/papers/ea0704cb1-2256-3-e.pdf">http://www.legco.gov.hk/yr11-12/english/panels/ea/papers/ea0704cb1-2256-3-e.pdf</a></p> <p>Paper on the provision of a District Cooling System at the Kai Tak Development prepared by the Legislative Council Secretariat (updated background brief) (LC Paper No. CB(1)2256/11-12(04))  <a href="http://www.legco.gov.hk/yr11-12/english/panels/ea/papers/ea0704cb1-2256-4-e.pdf">http://www.legco.gov.hk/yr11-12/english/panels/ea/papers/ea0704cb1-2256-4-e.pdf</a></p>

<b>Council/ Committee</b>	<b>Date of meeting</b>	<b>Paper</b>
		Minutes of meeting (LC Paper No. CB(1)2560/11-12) <a href="http://www.legco.gov.hk/yr11-12/english/panels/ea/minutes/ea20120704.pdf">http://www.legco.gov.hk/yr11-12/english/panels/ea/minutes/ea20120704.pdf</a>