

立法會
Legislative Council

LC Paper No. CB(1)1133/17-18(08)

Ref.: CB1/PL/DEV

Panel on Development

Meeting on 26 June 2018

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

Purpose

This paper provides background information on the provision of a District Cooling System ("DCS")¹ at Kai Tak Development ("KTD"), and gives a brief account of the views expressed by Members of the Legislative Council ("LegCo") on the subject since the 2008-2009 legislative session.

Background

2. To promote energy efficiency and conservation, the Administration is constructing a first-of-its-kind DCS at KTD with a planned total of about 1.73 million square metres of non-domestic air-conditioned gross floor areas, requiring about 284 megawatt of refrigeration cooling capacity. According to the Administration,² DCS will consume 35% and 20% less electricity as compared with traditional air-cooled air-conditioning systems and individual water-cooled air-conditioning systems ("WACS") using cooling towers respectively. Due to better energy efficiency, the maximum annual saving in electricity consumption upon completion of the

¹ DCS 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.

² Source: LC Paper No. [CB\(1\)759/14-15\(05\)](#)

entire DCS project for KTD is estimated to be 85 million kilowatt-hour with a corresponding reduction of 59 500 tonnes of carbon dioxide emission per annum.

3. According to the Administration, DCS for KTD will provide services to public and private non-domestic developments at KTD. Public developments in the region, which account for around 35% of the total air-conditioned area in KTD, will subscribe to the district cooling services. In June 2009 when the Administration sought the Finance Committee ("FC")'s approval for the DCS project,³ it was proposed that private non-domestic developments would be connected to DCS on a voluntary basis.

Procurement of services for developing and operating the District Cooling System

4. On 5 June 2009, FC approved the DCS project at an estimated cost of \$1,671 million in money-of-the-day ("MOD") prices. The Administration originally intended to carry out the project under a single Design, Build and Operate contract spanning over 17 years. Tender procedures for the DCS project were initiated in July 2009. However, according to the Administration,⁴ the returned tender prices of both project costs and operation costs far exceeded the original estimates.

5. On 28 June 2010, the Administration briefed the Panel on Environmental Affairs ("EA Panel") on the refined work requirements for the DCS project and the adjustments to the original procurement strategy. The Administration proposed to implement the project in three phases. An outline of the scope of works under the various phases is in **Appendix I**.

6. Under the alternative procurement strategy proposed by the Administration, 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. EA Panel discussed the alternative procurement strategy on 28 June 2010, 12 and 21 July 2010. The Panel did not raise objection to the Administration's plan to conduct a re-tendering exercise under the alternative procurement strategy.

³ Source: [PWSC\(2009-10\)24](#)

⁴ Source: LC Paper No. [CB\(1\)2324/09-10\(05\)](#)

Funding approvals for the implementation of the project by phases

7. The Administration has since late 2010 sought views from members of EA Panel (in respect of Phases I and II) and the Panel on Development (in respect of Phase III) and endorsement/approval respectively from the Public Works Subcommittee ("PWSC") and FC on a number of funding proposals to increase the approved project estimate ("APE") for implementing the various phases of the DCS project. A summary of the changes to the APE approved so far is given in **Appendix II**. As at April 2016, the APE covering the project costs of I, II, IIIA, IIIB and IIIC is \$3,905.7 million in MOD prices. The latest estimated project cost for all phases (made in April 2015) including the remaining works under Phase III is \$4,945.5 million in MOD prices.

8. According to the Administration in February 2016,⁵ the construction works for Phases I and II of the DCS project were completed in the first quarter of 2013 and the third quarter of 2014 respectively. The Phases IIIA and IIIB works were expected to be completed by end-2017 and end-2018 respectively.

The District Cooling Services Ordinance (Cap. 624)

9. The Administration introduced the District Cooling Services Bill into the LegCo for First Reading on 15 October 2014. The Bill provides for matters relating to district cooling services provided by the Administration, including the conditions under which the Director of Electrical and Mechanical Services Department may approve a consumer, as well as circumstances under which district cooling services to a building may be provided, refused, suspended or terminated, the imposition of charges for the services and other related matters. The Bill was passed at the LegCo meeting of 25 March 2015 and the District Cooling Services Ordinance (Cap. 624) was gazetted on 27 March 2015.

Major views and concerns expressed by Members

10. The major views and concerns expressed by Members in examining the funding proposals on Phases I, II, IIIA, IIIB and IIIC of the DCS project and the District Cooling Services Bill are summarized in the ensuing paragraphs.

⁵ Source: LC Paper No. [CB\(1\)559/15-16\(05\)](#)

Cost effectiveness and financial viability of the District Cooling System

11. When discussing the proposal to increase the APE for implementing Phases I and II of the DCS project in 2010, some Members expressed grave concern about the significant increase in the estimated total project cost, let alone the operating cost which was unknown at that stage. Some Members questioned the cost-effectiveness of DCS and considered that efforts should be made to identify other equally environmentally-friendly options.

12. In examining the funding proposals for Phase IIIA and IIIC of the DCS project in 2013 and 2016, Members noted that the Administration intended to recover both the capital and operating costs from DCS users over the project life, which was estimated to be 30 years. Some Members considered that, with the full cost of depreciation taken into account, it might be too optimistic for the Administration to set the payback period of DCS at 30 years. The Administration advised that with proper maintenance, the life span of large scale electrical and mechanical facilities that would be used in DCS could be up to 30 years. The 30-year cost-recovery basis had been adopted to fully reflect the expected service life of DCS.

13. In response to Members' enquiry about the actual savings in construction costs for public works projects at KTD with the adoption of DCS, the Administration advised that DCS could reduce the upfront capital cost for installing chiller plants at buildings, which was estimated to be about 5% to 10% of the total building costs. The estimated savings in construction costs against the total building costs for the Trade and Industry Tower, the Centre of Excellence in Paediatrics, Kai Tak Cruise Terminal building and non-residential area of the public housing sites were around 8.8%, 3.2%, 2.4% and 11.9% respectively according to the latest project estimates in June 2013.⁶

14. In considering the funding proposals for Phase IIIB and IIIC of the DCS project in 2015 and 2016, some Members expressed concerns about the cost overrun of the DCS project from the original \$1,671 million in 2009 to the latest estimate at \$4,945.5 million. They also asked about the impact of the delay in the completion of the KTD developments on the cost recovery period of DCS, as well as the operation and maintenance ("O&M") cost of the system.

⁶ Details are set out in [PWSC70/12-13](#) circulated to PWSC and FC members on 18 June 2013.

15. The Administration advised that as the period of full cost recovery was 30 years, minor delay on the progress of KTD would unlikely affect the break-even period. According to the Administration's estimation,⁷ when the DCS project operated in full capacity upon completion of the remaining works under Phase III, the annual O&M cost until the end of its project life would be equivalent to about 1.6% of the total capital cost of the project (i.e. \$4,945.5 million in MOD prices). Having regard to the long period of time required to complete the whole DCS project, the Administration had sought funding from FC to carry out the project in phases. The increase in the DCS project cost was due to an upward trend of market prices and the cost of additional works required due to unexpected site constraints. That said, the Administration considered it unlikely that the total cost of the DCS project would exceed the latest estimate of \$4,945.5 million in MOD prices. During the deliberation on the District Cooling Services Bill, some members of the Bills Committee opined that in view of the rapid technology advancement, DCS might no longer be an energy-efficient system in future, and user buildings might choose not to subscribe to district cooling services. Under these circumstances, the DCS project might turn into a "white elephant project" and the costs of running DCS might eventually be shouldered by a few DCS users.

Provision of district cooling services to other potential users

16. Some Members enquired about the existing and potential users of DCS, in particular, the buildings at KTD that were known to be using DCS in future. The Administration advised that as at February 2016, there were five buildings connected to DCS, namely the Kai Tak Cruise Terminal building, the Trade and Industry Tower, the Ching Long Shopping Centre and two primary schools at KTD. The Administration would require private non-domestic projects at KTD to connect to DCS by prescribing the appropriate provisions in the conditions of land sale.

17. Some Members enquired whether the Administration would allow private residential developments to connect to DCS voluntarily in future so as to fully utilize the capacity of DCS and hence achieving cost-effectiveness. They also enquired whether DCS at KTD could accommodate the demand for district cooling services in the neighbouring areas of KTD like To Kwa Wan and Kowloon City.

⁷ Source: LC Paper No. [CB\(1\)932/14-15\(01\)](#)

18. The Administration advised that while it might not be cost-effective for residential users to connect their buildings to DCS, given that their demand for cooling services would unlikely be sustained throughout the year, the Administration would adopt an open attitude towards the suggestion. Regarding the use of DCS in the neighbouring areas of KTD, the Administration said that while the capacity of DCS at KTD had been designed to cater for additional cooling plant capacity of about 10% in future, additional installations such as underground chilled water distribution pipes would be required to allow users in the neighbouring areas of KTD to connect to DCS. That said, the technical issues of expanding the area coverage of DCS, if needed in future, were not expected to be insurmountable.

19. Some Members enquired whether the Administration had gauged enough operational data to evaluate the cost effectiveness and energy efficiency of DCS. The Administration advised that DCS at KTD was still at an initial stage of operation and user numbers would rise upon the full commencement of the system. Further, experience of overseas countries had demonstrated that district cooling system was a cost-effective and energy-efficient system.

Charging arrangements and tariff levels for district cooling services

20. Under the District Cooling Services Ordinance, the district cooling services charges comprised: (a) the capacity charge (to cover the capital cost and the O&M cost of DCS); (b) the consumption charge (to cover the costs that vary with the actual consumption of district cooling services by the occupiers/tenants); (c) the capacity overrun charge;⁸ and (d) the surcharges for unpaid charges.⁹ The capacity charge rate effective from 27 March 2015 is \$112.11 per kilowatt refrigeration and the consumption charge rate is \$0.19 per kilowatt-hour refrigeration.¹⁰ According to the Administration, the tariff of district cooling services had been set at a

⁸ The capacity overrun charge will be levied if the highest actual cooling capacity demand exceeds the contract cooling capacity to discourage consumers of buildings from deliberately under-estimating their contract cooling capacity for the purpose of driving down the capacity charge. Consumers will have to pay an extra 10% for the capacity charges for the overrun part.

⁹ A surcharge equal to 5% of the unpaid amount will be charged after the payment due date. If the amount remains unpaid for six months after the payment due date, a further surcharge that equals 10% of the total unpaid amount will be imposed.

¹⁰ Source: Schedule 2 to the District Cooling Services Ordinance (Cap. 624)

competitive level comparable to the cost of WACS, which was one of the most cost-effective air-conditioning systems available in the market. For all types of buildings at KTD, the unit costs of DCS were lower than those of WACS.¹¹

21. While the Administration advised that it would conduct a comprehensive review of the level of district cooling services charges once every five years, some Members held the view that more frequent reviews of the tariff were necessary to ensure the competitiveness of the district cooling services charges.

22. Noting that two primary schools at KTD would be users of DCS under a pilot scheme, some Members expressed concern about the affordability of the DCS tariffs to these schools, and why the pilot scheme was not extended to secondary schools. They also enquired about any tariff concessions or subsidies and the latest charging arrangements for the schools at KTD.

23. According to the supplementary information provided by the Administration in March 2016,¹² a subsidy was granted to the two pilot schools in KTD by the Education Bureau. As the primary schools under the pilot scheme had not yet commenced operation, the Administration did not have sufficient operational data to ascertain if DCS would be the most suitable air-conditioning system for all the schools at KTD.

24. Some Members sought information about the charges for district cooling services at KTD and a comparison between the charges for such services and those for the services provided by other air-conditioning systems available in the market.

25. According to the Administration in March 2016,¹³ the capacity charge rate for DCS at KTD in 2015-2016 was \$116.03 per kilowatt refrigeration and the consumption charge rate was \$0.1959 per kilowatt-hour refrigeration. The capacity charge rate would be adjusted annually based on the Composite Consumer Price Index, and the consumption charge rate would be adjusted annually to take into account the change in electricity tariff rate. Regarding the charge comparison, the DCS tariff should be set at a competitive level comparable to the cost of

¹¹ Source: Annex 2 to LC Paper No. [CB\(1\)759/14-15\(05\)](#)

¹² Source: LC Paper No. [CB\(1\)669/15-16\(01\)](#)

¹³ Source: LC Paper No. [CB\(1\)669/15-16\(01\)](#)

individual WACS. The current DCS tariff rate level was lower than that of WACS.

System reliability

26. Some Members expressed concern about the reliability of DCS and the possibility of the breakdown of some major DCS components before they reached the end of their service lives. They also enquired whether any back-up facilities would be provided for DCS in case of system failure and whether the Administration would review the replacement schedule for the equipment on a regular basis.

27. The Administration advised that DCS was a highly reliable air-conditioning system widely used in other countries. While sufficient back-up facilities would be provided for DCS, users might install their own back-up air-conditioning systems. As regards the replacement schedule, as the DCS project would be implemented in phases, different pieces of equipment would be procured in phases as necessary and they would not reach the end of service lives at the same time.

Latest development

28. At the meeting of DEV Panel to be held on 26 June 2018, the Administration will seek the Panel's support for a proposed increase in the APE of the DCS project to implement the remaining works under Phase III of the project.

Relevant papers

29. A list of relevant papers with their hyperlinks is in **Appendix III**.

**Scope of Works under Various Phases of the Project of
Provision of a District Cooling System at Kai Tak Development
(as at February 2016)**

Phase	Period	Scope of Works
Phase I – Works contract for the pipe laying work for part of the Kai Tak Development ("KTD") Package I	2010/11 – 2012/13	<ul style="list-style-type: none"> ● Pipe laying from northern chiller plant room for provision of chilled water to public rental housing site project to meet the roadwork programme in the North Apron
Phase II – District Cooling System ("DCS") core services under the Design, Build and Operate arrangement	2010/11 – 2019/20 (with an option for extending the operation period for eight years)	<ul style="list-style-type: none"> ● Design for the whole DCS ● Building and engineering works, the northern chiller plant room, the southern underground chiller plant room and the seawater pumphouse to support the operation of the entire DCS ● Laying of chilled water distribution pipes not covered in Phase I for Package I users (Kai Tak Cruise Terminal building) ● Electrical and Mechanical ("E&M") equipment for KTD Package I users ● Operation of DCS up to 2019/20, and possibly for eight more years (for users of all packages) assuming extension of operation contract
Phase III (Package A) – E&M installations and pipe laying for part of KTD Packages II and III	2013/14 – 2017/18	<ul style="list-style-type: none"> ● Pipe laying works to match with the programme of road construction and upcoming building developments including the Trade and Industry Tower and the Hong Kong Children's Hospital ● Provision of E&M equipment for the above building developments and two schools

Phase	Period	Scope of Works
<p>Phase III (Package B) – E&M installations and pipe laying for part of KTD Packages II and III</p>	<p>2015/16 – 2018/19</p>	<ul style="list-style-type: none"> ● Pipe laying works to match with the programme of road construction and upcoming building developments including the Electrical and Mechanical Services Department Headquarters, To Kwa Wan Station and Kai Tak Station of the Shatin to Central Link, and the proposed Kowloon East Regional Headquarters and Operational Base cum Ngau Tau Kok Divisional Police Station ● Provision of E&M equipment for the above building developments ● Consultancy services for pre-construction stage (design) of the remaining Phase III works to tie in with the ongoing and upcoming programmes on the developments and infrastructure works carried out by the Civil Engineering and Development Department
<p>Phase III (Package C) – pipe laying for part of KTD Packages II and III</p>	<p>2016/17 – 2019/20</p>	<ul style="list-style-type: none"> ● Pipe laying works to match with the programme of road construction of Road D1 and Road L7.
<p>Other works under Phase III – E&M installations and pipe laying for the remaining KTD Packages II and III</p>	<p>2017/18 – 2021/22</p>	<ul style="list-style-type: none"> ● Pipe laying works for remaining works in KTD to match with the overall development programme ● Provision of E&M equipment for the above developments

Appendix II

A summary on the approved changes to the cost estimate for the District Cooling System project (up to April 2016)

	In money-of-the-day ("MOD") prices	Remarks
Original approved project estimate ("APE") for the whole project	HK\$1,671 million	Approved by FC in June 2009
First revision of the APE	(Increased to) HK\$1,861.8 million	To cover the project costs of Phases I and II only Approved by FC in February 2011
Second revision of the APE	(Increased to) HK\$3,145.9 million	To cover the project costs of Phases I, II and IIIA only Approved by FC in June 2013
Third revision of the APE	(Increased to) HK\$3,752 million	To cover the project costs of Phases I, II, IIIA and IIIB only Approved by FC in July 2015
Fourth revision of the APE	(Increased to) HK\$3,905.7 million	To cover the project costs of Phases I, II, IIIA, IIIB and IIIC only Approved by FC in April 2016
The latest cost estimate (made in April 2015) for the whole project (including the remaining works under Phase III) is HK\$4,945.5 million in MOD prices.		

Provision of a District Cooling System at Kai Tak Development

List of relevant papers

Council/ Committee	Date of meeting	Paper
Panel on Environmental Affairs	15 December 2008	Administration's paper on "District Cooling System at the Kai Tak Development" [LC Paper No. CB(1)363/08-09(03)] Minutes of meeting [LC Paper No. CB(1)604/08-09]
Public Works Subcommittee	7 May 2009	Administration's paper on "Head 705 — Civil Engineering 45CG — District Cooling System at the Kai Tak Development" [LC Paper No. PWSC(2009-10)24] Minutes of meeting [LC Paper No. PWSC112/08-09]
Finance Committee	5 June 2009	Minutes of meeting [LC Paper No. FC7/09-10]
Panel on Environmental Affairs	28 June 2010	Administration's paper on "District Cooling System at the Kai Tak Development" [LC Paper No. CB(1)2324/09-10(05)] Minutes of meeting [LC Paper No. CB(1)2956/09-10]
Panel on Environmental Affairs	21 July 2010	Administration's paper on "District Cooling System at the Kai Tak Development" [LC Paper No. CB(1)2564/09-10(03)] Minutes of meeting [LC Paper No. CB(1)31/10-11]

Council/ Committee	Date of meeting	Paper
Panel on Environmental Affairs	20 December 2010	Administration's paper on "District Cooling System at the Kai Tak Development" [LC Paper No. CB(1)782/10-11(05)] Minutes of meeting [LC Paper No. CB(1)1229/10-11]
Public Works Subcommittee	19 January 2011	Administration's paper on "Head 705 — Civil Engineering 45CG — District Cooling System at the Kai Tak Development" [LC Paper No. PWSC(2010-11)31] Minutes of meeting [LC Paper No. PWSC39/10-11]
Finance Committee	18 February 2011	Minutes of meeting (at 3:00 pm) [LC Paper No. FC21/11-12]
Panel on Environmental Affairs	4 July 2012	Administration's paper on "Legislative framework of the proposed charging arrangements for the District Cooling System at the Kai Tak Development" [LC Paper No. CB(1)2256/11-12(03)] Minutes of meeting [LC Paper No. CB(1)2560/11-12]
Panel on Development	22 January 2013	Administration's paper on "PWP Item No. 45CG -- District Cooling System at the Kai Tak Development" [LC Paper No. CB(1)428/12-13(06)] Minutes of meeting [LC Paper No. CB(1)735/12-13]
Public Works Subcommittee	28 May 2013	Discussion paper on "Head 705 — Civil Engineering 45CG — District Cooling System at the Kai Tak Development" [LC Paper No. PWSC(2013-14)12]

Council/ Committee	Date of meeting	Paper
		<p>Supplementary paper provided by the Administration [LC Paper No. PWSC70/12-13(01)]</p> <p>Minutes of meeting [LC Paper No. PWSC73/12-13]</p>
Finance Committee	21 June 2013	Minutes of meeting (at 3:30 pm) [LC Paper No. FC23/13-14]
Panel on Environmental Affairs	17 July 2014	<p>Administration's paper on "Collection of charges for District Cooling System at the Kai Tak Development" [LC Paper No. CB(1)1785/13-14(01)]</p> <p>Supplementary paper provided by the Administration [LC Paper No. CB(1)1903/13-14(01)]</p> <p>Minutes of special meeting [LC Paper No. CB(1)179/14-15]</p>
Bills Committee on District Cooling Services Bill	25 November 2014 to 26 February 2015	Report of the Bills Committee [LC Paper No. CB(1)649/14-15]
Council meeting	25 March 2015	District Cooling Services Bill — Resumption of Second Reading Debate and Third Reading Hansard (p. 8038 - 8060)
Panel on Development	28 April 2015	<p>Administration's paper on "45CG — District Cooling System at the Kai Tak Development" [LC Paper No. CB(1)759/14-15(05)]</p> <p>Supplementary paper provided by the Administration [LC Paper No. CB(1)932/14-15(01)]</p> <p>Minutes of meeting [LC Paper No. CB(1)1107/14-15]</p>

Council/ Committee	Date of meeting	Paper
Public Works Subcommittee	16 June 2015	Administration's paper on "Head 705 — Civil Engineering 45CG — District Cooling System at the Kai Tak Development" [LC Paper No. PWSC(2015-16)29] Minutes of meeting [LC Paper No. PWSC240/14-15]
Finance Committee	14 July 2015	Minutes of meeting (at 9:00 am) [LC Paper No. FC50/15-16] Minutes of meeting (at 11:10 am) [LC Paper No. FC51/15-16]
Panel on Development	23 February 2016	Administration's paper on "45CG — District Cooling System at the Kai Tak Development" [LC Paper No. CB(1)559/15-16(05)] Supplementary paper provided by the Administration [LC Paper No. CB(1)669/15-16(01)] Minutes of meeting [LC Paper No. CB(1)931/15-16]
Public Works Subcommittee	13 April 2016	Administration's paper on "Head 705 — Civil Engineering 45CG — Multi-purpose District Cooling System at the Kai Tak Development" [LC Paper No. PWSC(2015-16)62] Supplementary paper provided by the Administration [LC Paper No. PWSC190/15-16(01)] Minutes of meeting [LC Paper No. PWSC195/15-16]
Finance Committee	29 April 2016	Minutes of meeting (at 3:00 pm) [LC Paper No. FC287/15-16]