

# **立法會**

## ***Legislative Council***

LC Paper No. CB(1)647/2025(04)

Ref.: CB1/PL/EA

### **Panel on Environmental Affairs**

**Meeting on 28 April 2025**

### **Background brief on District Cooling System**

#### **Purpose**

This paper provides background information on District Cooling System (“DCS”). It also gives a brief account of the major views and concerns expressed by Members when related issues were discussed by relevant committees of the Legislative Council (“LegCo”) in recent years.

#### **Background**

2. DCS is an energy-efficient air-conditioning system as it consumes 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. The technology has been widely adopted in other parts of the world, such as Singapore, Europe and the United States. Apart from energy saving, DCS would bring about the following benefits for individual users:

- (a) reduction in upfront capital cost for installing chiller plants at their buildings;
- (b) more flexible building designs for user buildings as they do not need to install their own chillers and the associated electrical equipment;
- (c) reduced heat island effects;
- (d) no noise and vibration arising from the operation of heat rejection equipment and chillers of air-conditioning plants in buildings, as the above-mentioned equipment will no longer be necessary for buildings adopting DCS;

- (e) DCS can contribute to air quality improvement and the vision of achieving low carbon economy; and
- (f) a more adaptable air-conditioning system to the varying demand as compared to individual air-conditioning systems. For each individual building, cooling capacity can be increased by requesting additional cooling capacity from DCS without carrying out extensive modification works for the building in question.

### *District Cooling Services Ordinance*

3. The Administration introduced the District Cooling Services Bill (“the Bill”) into LegCo in 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 may approve a consumer; the circumstances under which district cooling services to a building may be provided, refused, suspended or terminated; and the imposition of charges for the services and other related matters. The Bill was passed at the Council meeting of 25 March 2015.

### *District Cooling System at the Kai Tak Development and other New Development Areas*

4. The DCS at the Kai Tak Development (“KTD”) (“KTDCS”) is the first of its kind in Hong Kong,<sup>1</sup> which commenced operation on 29 January 2013 and the provision of district cooling services to user buildings within KTDCS’s service area had commenced progressively since February 2013. All public developments (i.e. all government premises and facilities of public bodies which are not for domestic use) at KTD are mandated to connect and subscribe to the district cooling services, and all private non-domestic developments at KTD are also required to connect to KTDCS. The Electrical and Mechanical Services Department (“EMSD”) is responsible for the planning, design, construction, operation and maintenance of DCS, and the Environment and Ecology Bureau is responsible for policy matters on energy efficiency and conservation, and for overseeing the operation of EMSD on the implementation of DCS.

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<sup>1</sup> A total funding of \$4,945.5 million (in money-of-the-day (“MOD”) prices) was approved by the Finance Committee (“FC”) for the KTDCS project in June 2009, February 2011, May 2013, July 2015 and January 2019 respectively. Currently, the Phase I, Phase II, Phase III (Package A), Phase III (Package B) and Phase III (Package C) Works of KTDCS are completed and the Remaining Works under Phase III were commenced in January 2019 for completion in December 2025. In addition, FC approved a funding of \$4,269.3 million (in MOD prices) for the provision of an additional DCS at KTD.

5. The 2022 Policy Address has announced that the Administration will accelerate the incorporation of DCS in New Development Areas (“NDAs”) to reduce energy consumption, while helping Hong Kong achieve the goal of carbon neutrality by 2050. DCS was subsequently implemented at the Kwu Tung North NDA, Tung Chung New Town Extension (East) and Hung Shui Kiu/Ha Tsuen NDA.<sup>2</sup> The Administration also advised that the implementation of DCS in other NDAs, including the Northern Metropolis, would be accelerated.

*Charging principles and levels for District Cooling Services*

6. Under the District Cooling Services Ordinance (Cap. 624), the district cooling services charges comprise the capacity charge (for covering the capital cost and the operation and maintenance costs of DCS), the consumption charge (for covering costs that vary with the actual consumption of district cooling services by occupiers/tenants), the capacity overrun charge<sup>3</sup> and the surcharges for unpaid charges.<sup>4</sup> The charging principles for district cooling services are as follows:

- (a) setting the district cooling services tariff at a competitive level comparable to the cost of individual WACS using cooling towers;
- (b) the Administration intends to recover both the capital and operating costs of DCS from building owners or their authorized agents over the project life, which is estimated to be 30 years, as taxpayers should not subsidize such air-conditioning charges; and
- (c) the proposed charging mechanism is designed towards achieving the objectives of providing price stability and a simple charging regime with common charge rates for all buildings regardless of their load profiles.

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<sup>2</sup> FC approved funding of \$5,787.7 million (in MOD prices) and \$3,918.2 million (in MOD prices) in February 2021 for the provision of DCS at the Kwu Tung North NDA and Tung Chung New Town Extension (East) respectively. FC subsequently approved funding of \$3,216.3 million (in MOD prices) in April 2024 for the provision of Phase I of DCS at the Hung Shui Kiu/Ha Tsuen NDA.

<sup>3</sup> 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 underestimating 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.

<sup>4</sup> 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.

## Value for Money Audit Report No. 77 of the Director of Audit

7. The Director of Audit tabled in LegCo the Value for Money Audit Report No. 77 in April 2021, which included a number of recommendations on KTDCS. The key recommendations are set out in [Appendix 1](#). The Public Accounts Committee did not hold any public hearing on this subject. Instead, it asked for written responses regarding EMSD's work in the administration and monitoring of the operation of KTDCS as well as the provision of district cooling services.<sup>5</sup>

### **Major views and concerns expressed by Members**

8. Members' major views and concerns are summarized in the ensuing paragraphs.

### Cost-effectiveness and financial viability of the District Cooling System

9. Members expressed concern about **the significant increase in the total project cost of KTDCS**, with the approved project estimate increased from \$1,671 million (in MOD prices) in 2009 to \$4,945.5 million in 2015 (in MOD prices), and a further funding of \$4,269.3 million (in MOD prices) was sought in 2020 for the construction of an additional DCS at KTD to accommodate an increase in cooling demand. Members enquired about:

- (a) **the cost-effectiveness of DCS;**
- (b) **the appropriateness of setting the period for recovering the capital and operating costs of the projects at 30 years;**
- (c) **the actual savings in capital costs** for public works projects at KTD with the adoption of DCS; and
- (d) **the energy efficiency** of KTDCS, including **the savings in electricity cost** due to the adoption of the system.

10. The Administration advised that:

- (a) having regard to the long period of time required to complete the KTDCS project, the Administration had sought funding from FC to carry out the project in phases. The increase in the project cost was due to **an upward trend of market prices and** the cost of additional

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<sup>5</sup> For details, please refer to [Chapter 2 of Part 7](#) and [Appendix 10](#) of P.A.C. Report No. 77.

works required due to **unexpected site constraints**;

- (b) **the design** of the cooling system **must be unique** for each district (including the number of plants and pipe routes) **having regard to its local conditions, distribution of user buildings and underground conditions**, thereby resulting in varying costs;
- (c) 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**;
- (d) 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 (subsequently named as the “Hong Kong Children’s Hospital”), 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;<sup>6</sup> and
- (e) in general, DCS **saved a maximum of about 35% electricity consumption** as compared with conventional central air-conditioning systems separately installed in individual buildings, thus reducing carbon emissions. It was therefore an environmental infrastructure to combat climate change and save energy. **The total estimated electricity saving from the commencement of operation of KTDCS in 2013 to 2021-2022 was about 40 million kWh** and the total electricity cost saving was about \$49 million (calculated on the basis of \$1.2 per kWh on average).

#### Provision of district cooling services to other potential users

11. Members enquired whether the Administration **would allow private residential developments to connect to DCS voluntarily** in the future so as to fully utilize the capacity of DCS. They also enquired whether KTDCS could **accommodate the demand for district cooling services in the neighbouring areas of KTD** like To Kwa Wan and Kowloon City.

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<sup>6</sup> Details are set out in the Administration’s [paper](#) circulated to members of the Public Works Subcommittee and FC on 18 June 2013.

12. 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. While the capacity of KTDCS had been designed to cater for additional cooling plant capacity of about 10%, **additional installations such as underground chilled water distribution pipes** would be **required to expand the area coverage** of DCS in the future.

#### Adopting district cooling systems in new development areas

13. Members considered that the Administration **should review** the operation and **cost-effectiveness** of existing DCSs and report the details to LegCo, including the DCSs' **operating and maintenance costs as well as rates of return on investment**, with a view to examining whether there would be a good business case for constructing new DCSs in new development areas/projects.

14. The Administration advised that it would examine on a case-by-case basis which NDAs would require DCS. As DCS was mainly targeted at non-domestic users such as offices, schools or hospitals, the cost-effectiveness of adopting DCS would be considered by **assessing the air-conditioning demand of non-domestic users in the districts when planning for NDAs**.

#### District cooling services charges

15. Members noted that the capacity charge rate effective from 27 March 2015 was \$112.11 per kilowatt refrigeration and the consumption charge rate was \$0.19 per kilowatt-hour refrigeration.<sup>7</sup> The Administration advised that it would conduct a comprehensive review of the level of district cooling services charges once every five years. Some Members considered it necessary for the Government to **conduct more frequent reviews of district cooling services charges to ensure the competitiveness of the charges**.

16. Noting the above views, the Administration stressed that the district cooling services charges had been set at a 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**.

17. Members enquired **whether** the DCSs provided at different NDAs (e.g. the Kwu Tung North NDA, KTD and Tung Chung New Town Extension (East)) **differed** from one another **in terms of capital cost and unit cost of**

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<sup>7</sup> See [Schedule 2](#) to the District Cooling Services Ordinance for details.

**air-conditioning** given their use of different technologies for heat exchange and the difference in their scale of service, thus resulting in **varying charging levels**.

18. The Administration advised that the project costs of DCSs at different NDAs were **subject to its development scale, construction time and the returned tender prices**. For instance, the DCS at Tung Chung New Town Extension (East) would incur additional costs as it was built in a reclaimed area and required founding of piles at greater depths. Nevertheless, **the unit costs of air-conditioning of DCSs were expected to be similar** despite their difference in capital costs. Therefore, **the difference in charging levels would be small**. The calculation of the charging level of DCS was provided for through the enactment of the District Cooling Services Ordinance. EMSD planned to propose amendments to the Ordinance in due course to promulgate the charging level of the proposed DCS at the Kwu Tung North NDA.

#### System reliability

19. Members expressed concern about **the reliability** of DCS, and **whether any back-up facilities would be provided** in case of system failure. Members suggested that the Administration **review the replacement schedule for the DCS equipment** on a regular basis.

20. The Administration advised that DCS was a **highly reliable air-conditioning system**. While sufficient back-up facilities would be provided for DCS, users might install their own back-up air-conditioning systems. 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. The Administration attached great importance to the reliability of DCS; in the unlikely event that a unit broke down, **a back-up unit would be available to ensure that the overall operation of the plant would not be affected**.

#### Monitoring mechanism

21. Members enquired whether the Administration had **monitored and assessed** if the performance of KTDCS **complied with the key performance indicators (“KPIs”)**.

22. The Administration advised that according to the contract provisions, EMSD monitored the contractor’s performance in operating KTDCS mainly by using two **KPIs**, including **maintaining the chilled water supply temperature at the primary and secondary sides**, so as to monitor the operational performances of the cooling system and the heat exchanger respectively. When a substation’s measured Counts of Non-compliance for a KPI in a month

exceeded 20, EMSD would investigate the cause of non-compliance. If the actual performance of the contractor was found to be unsatisfactory, apart from deducting the contractor's operating income in accordance with the mechanism, EMSD would **issue advisory letter or warning letter to the contractor** as necessary, and would duly reflect the contractor's performance in its performance appraisal report.

### District cooling techniques

23. Members enquired whether the Administration had considered adopting **new cooling technologies** from the Mainland or elsewhere to **reduce the capital and operating costs**. The Administration advised that it had visited Qianhai to inspect its large-scale DCS under construction, which also adopted the water cooling tower technology. The Administration had been **maintaining close liaison and sharing experience with DCS operators in Qianhai**, with a view to performing better in construction, design, operation, etc. The Administration also pointed out that the design, financing and procurement mode of the DCS in Qianhai were different from those in Hong Kong, making it difficult to compare the capital and operating costs of DCSs in the two places.

### **Council questions**

24. Members raised questions related to DCS at Council meetings in recent years. The questions and the Administration's replies are hyperlinked in [Appendix 2](#).

### **Relevant papers**

25. A list of relevant papers is set out in [Appendix 2](#).

Council Business Divisions  
Legislative Council Secretariat  
23 April 2025



**Key recommendations on the Kai Tak District Cooling System  
in the Value for Money Audit Report No. 77 of the Director of Audit**

Administration of Kai Tak District Cooling System project

- (a) in implementing District Cooling System (“DCS”) projects in future, continue to improve the pre-tender site investigations on underground utilities and enhance the phasing arrangement of construction works before inviting tenders;
- (b) complete the defects rectification works of installing the noise logger system on schedule and keep under review its performance;

Monitoring of operation of Kai Tak District Cooling System

- (c) make continued efforts to closely monitor the performance of the Contractor in operating Kai Tak District Cooling System (“KTDCS”);
- (d) enhance the operation payment adjustment mechanism in future contracts for operating KTDCS and consider incorporating new key performance indicators into contracts;
- (e) keep under review the impact of low chilled water return temperatures on the operation and reliability of KTDCS, and the effectiveness of the measures taken to address the issue;
- (f) keep under review the operation of KTDCS and implement the fully automatic operating mode as and when appropriate;
- (g) enhance the monitoring of the Contractor’s compliance with the incident reporting requirements;

Provision of district cooling services and other related issues

- (h) include in the list of development sites for connection to KTDCS information for following up developments at the sites for provision of district cooling services;
- (i) closely liaise and explore with the relevant bureaux/departments and the responsible parties of the relevant developments for provision of district cooling services and the feasibility of connecting their developments to KTDCS when opportunities arise;
- (j) keep under review the cooling demand of developments at Kai Tak Development with a view to matching the demand by KTDCS;
- (k) complete the interim tariff review for KTDCS as scheduled and conduct regular tariff reviews, taking into account all relevant data and latest developments relating to KTDCS; and
- (l) in implementing DCS projects in future, take measures to ensure that the project costs are estimated as accurately as possible.

[Source: Extracted from paragraph 18 of the [Executive Summary](#) of the Value for Money Audit Report No. 77 of the Director of Audit.]

## District Cooling System

### List of relevant papers

Committee	Date of meeting	Paper
Panel on Development	26 June 2018	<a href="#">Agenda</a> Item V: PWP Item No. 45CG - District Cooling System at the Kai Tak Development <a href="#">Minutes</a>
	26 February 2019	<a href="#">Agenda</a> Item III: Kai Tak development (“KTD”) - infrastructure at former north apron area of Kai Tak Airport, additional district cooling system and progress report on KTD <a href="#">Minutes</a>
	24 November 2020	<a href="#">Agenda</a> Item IV: Tung Chung New Town Extension - Site formation and infrastructure works, and the District Cooling System for Tung Chung East area <a href="#">Minutes</a>  <a href="#">Agenda</a> Item V: PWP Item No. 51CG - District Cooling System at the Kwu Tung North New Development Area <a href="#">Minutes</a>
Public Works Subcommittee	17 May 2019	<a href="#">Agenda</a> Item 1: 50CG - Provision of an Additional District Cooling System at the Kai Tak Development <a href="#">Minutes</a>
	13 January 2021	<a href="#">Agenda</a> Item 1: 786CL - Tung Chung New Town Extension, 782CL - Engineering Study on Road P1 (Tai Ho - Sunny Bay Section) and 49CG - The District Cooling System for Tung Chung New Town Extension (East) <a href="#">Minutes</a>

Committee	Date of meeting	Paper
		<a href="#">Agenda</a> Item 2: 51CG - District Cooling System at the Kwu Tung North New Development Area <a href="#">Minutes</a>
	10 April 2024	<a href="#">Agenda</a> Item 1: 787CL - Hung Shui Kiu/Ha Tsuen New Development Area Advance Works Phase 3, 892CL - Hung Shui Kiu/Ha Tsuen New Development Area Stage 2 Works, 54CG - The District Cooling System for Hung Shui Kiu/Ha Tsuen New Development Area, Phase 1 and 38CA - Special Ex-gratia Cash Allowance for the Second Phase development for the Hung Shui Kiu/Ha Tsuen New Development Area <a href="#">Minutes</a>
Public Accounts Committee	July 2022*	<a href="#">Chapter 2 of Part 7</a> and <a href="#">Appendix 10</a> of Report No. 77
Finance Committee	26 June 2020	<a href="#">Agenda</a> Item 6: Recommendation of the Public Works Subcommittee made on 17 May 2019 (50CG - Provision of an Additional District Cooling System at the Kai Tak Development) <a href="#">Minutes</a>
	5 February 2021	<a href="#">Agenda</a> Item 1: Recommendation of the Public Works Subcommittee made on 13 January 2021 (51CG - District Cooling System at the Kwu Tung North New Development Area) <a href="#">Minutes</a>
	19 February 2021	<a href="#">Agenda</a> Item 4: Recommendation of the Public Works Subcommittee made on 13 January 2021 (Including 49CG - The District Cooling System for Tung Chung New Town Extension (East)) <a href="#">Minutes</a>

Committee	Date of meeting	Paper
	13 April 2023	<a href="#">Administration's written replies to Members' initial questions on the Estimates of Expenditure 2023-2024</a> (Reply serial numbers: EEB(E)029, 032, 120, 133, 144, 145 and 163)
	17 April 2024	<a href="#">Administration's written replies to Members' initial questions on the Estimates of Expenditure 2024-2025</a> (Reply serial number: EEB(E)182)
	10 May 2024	<a href="#">Agenda</a> Item 1: Recommendation of the Public Works Subcommittee made on 10 April 2024 (Including 54CG - The District Cooling System for Hung Shui Kiu/Ha Tsuen New Development Area, Phase 1) <a href="#">Minutes</a>

\*Date of issue

Council meeting	Paper
13 January 2021	<a href="#">Council question 16</a> : District Cooling Systems

### Other relevant document

Government Bureau/Department	Document
30 November 2021	<a href="#">Chapter 2 of the Value for Money Audit Report No. 77 of the Director of Audit</a>