立法會
Legislative Council

LC Paper No. CB(1)1785/13-14(02)

Ref. : CB1/PL/EA

Panel on Environmental Affairs

Special meeting on 17 July 2014

Updated background brief on "Provision of a District Cooling System at the Kai Tak Development" prepared by the Legislative Council Secretariat

Purpose

This paper provides updated background information on the progress of the provision of a District Cooling System ("DCS")[1] at Kai Tak Development ("KTD") (formerly known as South East Kowloon Development), and gives a brief account of the views and concerns expressed by Members on the subject.

Background

2. DCS is one of the major infrastructure facilities in support of the sustainable and environmentally-friendly development at Kai Tak. To promote energy efficiency and conservation, the Government is constructing a first-of-its-kind DCS at KTD with a planned total of about 1.73 million square metres ("m^2") of non-domestic air-conditioned gross floor areas, requiring about 284 megawatt of refrigeration ("MWr") cooling capacity. According to the Administration, 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. Implementation of a DCS in KTD will bring about significant environmental benefits. Due to better energy efficiency, the maximum annual saving in electricity consumption upon completion of the entire DCS project is estimated to be 85 million kilowatt-hour,

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[1] DCS is a large-scale centralized air-conditioning system. It produces chilled water at the central chiller plants and distributes the chilled water to user buildings for air-conditioning purpose.

with a corresponding reduction of 59 500 tonnes of carbon dioxide emission per annum.

3. The Administration sought the Finance Committee ("FC")'s funding approval for implementing DCS Phases I and II on 18 February 2011 at an approved project estimate ("APE") of $1,861.8 million in money-of-the-day ("MOD") prices[2]. The construction works for Phase I were completed in the first quarter of 2013, and the construction works for Phase II are now underway for target completion in the third quarter of 2014.

Returned tenders for Phase III (Package A)

4. The Administration consulted the Panel on Development ("the DEV Panel") at its meeting on 22 January 2013 to seek its support for the proposal on Phase III (Package A) ("Phase IIIA") of PWP Item No. 45CG DCS at KTD, at an estimated cost of about $1,300 million in MOD prices, to tie in with the latest progress of infrastructure and building developments at Kai Tak. Phase IIIA of the DCS project aimed to provide chilled water supply from DCS to the public developments in KTD, i.e. the Trade and Industry Tower and the Centre of Excellence in Paediatrics. The pipe laying works under Phase IIIA would also facilitate the connection of DCS to future developments located close to the pipes laid in Phase IIIA. DEV Panel members in general supported the submission of the proposal to the Public Works Subcommittee ("PWSC") for consideration.

5. The Administration invited tenders for Phase IIIA works in December 2012, which were returned in February 2013. Based on the returned tenders, the Administration estimated the capital cost of Phase IIIA to be $1,284.1 million in MOD prices. At the meeting on 21 June 2013, FC approved, on the recommendation of PWSC, a funding to increase APE of 45CG by $1,284.1 million from $1,861.8 million to $3,145.9 million in MOD prices for implementing Phase IIIA of the project.

Project estimate

6. The estimated cost of Phases I and II of 45CG is $1,861.8 million in MOD prices. Together with the estimated cost of $1,284.1 million in MOD prices for Phase IIIA under the project, the estimated project cost of 45CG up to current development is $3,145.9 million in MOD prices. For the remaining

[2] FC approved DCS at KTD at an APE of $1,671 million in MOD prices in June 2009. Given that the returned tender price far exceeded the original estimates, and having reviewed the latest development plan of KTD, the Administration adjusted the procurement strategy by implementing DCS in three phases, i.e. Phases I, II and III, which produced more reasonable cost estimates and could better tie in with the development plan of KTD.

works under Phase III, the latest estimated cost is $1,799.6 million in MOD prices. As at May 2013, the estimated project cost for all phases of 45CG would be $4,945.5 million in MOD prices, as compared to $3,646.3 million in MOD prices estimated in January 2011.

Proposed charging arrangements for DCS

7. According to the information provided by the Administration to the Panel on Environmental Affairs ("the EA Panel") in July 2012, all public and private non-domestic developments that use district cooling services will be required to pay the DCS charges to the Government. As DCS is to provide chilled water for central air-conditioning system on a building basis, the DCS tariff will be collected from the building owners of the central air-conditioning systems or their authorized agents such as the building management offices. The tariff will be collected on a monthly basis.

Charging principles

8. The DCS tariff will be set at a competitive level comparable to the cost of individual WACS using cooling towers, which is one of the most cost-effective air-conditioning systems available in the market. The Administration intends to recover both the capital and operating costs from users over the project life, which is estimated to be 30 years, as taxpayers should not subsidize such air-conditioning charges. The Electrical and Mechanical Services Department has commissioned a consultancy study to develop the charging mechanism.

Key tariff components

9. In line with international practices, the proposed tariff of district cooling services will comprise two major components, namely the capacity charge and the consumption charge. The capacity charge will be levied according to the contracted cooling capacity demand, which will be determined by the consumer before the connection of DCS. The consumption charge will be levied to cover costs that will vary according to the demand of the consumer.

10. Apart from the two major tariff components, two other charges (viz. capacity overrun charge and financial penalties for unpaid charge) will be imposed as necessary. Besides, a deposit shall be paid by each consumer to cover any charge due. The deposit shall be paid before the district cooling services are provided, and the amount of deposit is two times of the estimated monthly tariff.

Charging formulae

11. The charging formulae of capacity charge and consumption charge are given below –

(a) Capacity charge:
monthly capacity charge = contracted cooling capacity ("kWr")[3] x capacity charge rate ($/kWr) + capacity overrun charge [4] (if applicable); and

(b) Consumption charge:
monthly consumption charge = measured cooling energy consumption ("kWhr") x consumption charge rate ($/kWhr).

Tariff adjustment mechanism

12. Having regard to the composition of the two charges, the capacity charge rate is proposed to be adjusted annually based on the Composite Consumer Price Index while the consumption charge rate is proposed to be adjusted annually to take account of the change in electricity tariff rate. The tariff adjustment formulae are set out in **Appendix I**.

13. As the actual cost and revenue may deviate from the forecast, apart from the annual tariff adjustments, a regular tariff review will be conducted at least once every 5 years.

<u>The proposed legislative framework</u>

14. To provide the necessary legal backing for the above charging arrangements and other related matters, the Administration intends to introduce a new Bill. The key provisions of the Bill will be as follows –

(a) *Application of the Ordinance*: apart from DCS at KTD, the Bill will provide that it may apply to other DCS that may be constructed by the Government in future as necessary;

(b) *Consumers of DCS*: the Bill will stipulate that consumers should pay the district cooling services charges to the Government, and that the status of consumers should be approved by the Director of

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[3] Contracted cooling capacity is to be confirmed by the consumer prior to the connection of DCS.

[4] A capacity overrun charge of 10% will be levied if the peak cooling capacity demand is higher than the contracted cooling capacity. In other words, a capacity overrun charge is equal to (peak cooling capacity demand - contracted cooling capacity) x capacity charge rate x 1.1.

Electrical and Mechanical Services ("DEMS");

(c) *Charges of DCS*: the various tariff components, the charging formula and the adjustment mechanisms will be stipulated in the legislation;

(d) *Improvement notice*: the Bill will stipulate that DEMS may issue an improvement notice to the consumer if the consumer's behaviour or installation is jeopardizing or will jeopardize the satisfactory operation of DCS. It will also provide that DEMS may suspend the provision of district cooling services to a consumer in case of non-payment of charges or failure to comply with the improvement notices issued by DEMS; and

(e) *Appeal mechanism*: any person aggrieved by the decisions of DEMS may lodge an appeal to the Administrative Appeals Board.

Deliberation by Members

Discussion by the Panel on Environmental Affairs

15. The EA Panel was consulted on the legislative framework of the proposed charging arrangements for DCS at its meeting on 4 July 2012. The major views and concerns expressed by members are summarized in the ensuing paragraphs.

Charging principles

16. Given the high estimated project cost of about $3,650 million of DCS, some members were not convinced that the level of tariff could be set at a competitive level if the Administration intended to break even within 30 years. To facilitate reference by both members and prospective consumers, some members opined that the Administration should have worked out the expected level of tariff on the basis that KTD would have around 1.73 million m^2 of non-domestic air-conditioned floor areas requiring about 284 MWr cooling capacity.

Key tariff components

17. Given that economic activities would hinge on the overall business environment, some members held the view that it would not be easy for building owners to project the cooling capacity of their developments. Instead of imposing a capacity overrun charge, some members suggested that financial

incentives should be provided to those consumers whose cooling capacity demand was lower than the contracted cooling capacity to encourage conservation of energy.

Tariff adjustment mechanism

18. Some members commented that the implementation of DCS had turned out to be far more complicated than expected. There were also concerns on the reliability of DCS and the setting of DCS tariff. They opined that the DCS rate adjustment formula was very difficult to comprehend.

19. Noting that the consultation exercise on the tariff charging mechanism and relevant arrangements conducted in April to June 2012 only involved professional bodies, developer association, business chambers and advisory committee, some members were concerned that the proposed charging mechanism failed to take into account the affordability of consumers who were the actual users of DCS. They found it difficult to support the proposed charging arrangements for DCS as it failed to take into account the affordability of users or set out the expected level of tariff.

Discussion by the Panel on Development

20. At its meeting on 22 January 2013, the DEV Panel considered the funding proposal related to Phase IIIA of DCS.

Charging arrangements for district cooling services

21. Some members held the view that the Administration should consider whether users of district cooling services should be given a choice to pay the capacity charge either in a lump sum or by instalments.

22. While expressing support for the DCS project, some members stressed the importance for the Administration to enhance the transparency of the charging arrangements for district cooling services. The considered that the Administration should set up the charging mechanism, including the arrangement for tariff adjustments, as early as possible to facilitate relevant stakeholders to estimate their affordability in subscribing to such services.

Tariff level for district cooling services

23. Noting that two primary schools would be users of district cooling services, some members expressed concern about their affordability in paying the tariffs. According to some school sponsoring bodies, the additional expenditure to be incurred by a primary school for use of district cooling

services would be up to a few thousand dollars per student per annum. They urged the Administration to ensure that schools at KTD would not be required to pay the district cooling services tariffs at a level higher than the cost of using other air-conditioning systems. As a matter of fairness, similar considerations should apply for working out the level of tariff to be imposed on commercial users.

24. Some members cautioned that since DCS to be provided at KTD was the first-of-its-kind in Hong Kong, the Administration should pay due regard to the needs and concerns of users in the implementation of the project. They opined that in determining the tariff level for district cooling services, the Administration should take into account not only the prevailing market prices but also the individual affordability of the actual users, such as schools and shop operators.

Latest development

25. The Administration will brief members on the legislative framework of the proposed charging arrangements for DCS at KTD at the special meeting on 17 July 2014.

Relevant papers

26. A list of relevant papers since the fourth Legislative Council is in **Appendix II**.

Council Business Division 1
Legislative Council Secretariat
15 July 2014

Appendix I

District cooling services rate adjustment formula

a) Capacity charge rate adjustment

The capacity charge rate is proposed to be adjusted annually with the formula below –

$$C_{n+1} = C_n (1 + CPI_n)$$

where

C_{n+1} = *Capacity charge rate ($/kWr/month) at $(n+1)^{th}$ period*
C_n = *Capacity charge rate ($/kWr/month) at n^{th} period*
CPI_n = *Composite Consumer Price Index at n^{th} period*

b) Consumption charge rate adjustment

The consumption charge rate is proposed to be adjusted annually with the formula below –

$$EC_{n+1} = EC_n (E_{n+1} / E_n)$$

where

EC_{n+1} = *Consumption charge rate ($/kWhr) at $(n+1)^{th}$ period*
EC_n = *Consumption charge rate ($/kWhr) at n^{th} period*
E_{n+1} = *Electricity tariff rate ($/kWh) chargeable by the power company providing power supply at $(n+1)^{th}$ period*
E_n = *Electricity tariff rate ($/kWh) chargeable by the power company providing power supply at n^{th} period*

Appendix II

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)) http://www.legco.gov.hk/yr08-09/english/panels/ea/papers/ea1215cb1-363-3-e.pdf Minutes of meeting (LC Paper No. CB(1)604/08-09) http://www.legco.gov.hk/yr08-09/english/panels/ea/minutes/ea20081215.pdf
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)) http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0628cb1-2324-5-e.pdf Minutes of meeting (LC Paper No. CB(1)2956/09-10) http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/ea20100628.pdf
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)) http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0721cb1-2564-3-e.pdf Minutes of meeting (LC Paper No. CB(1)31/10-11) http://www.legco.gov.hk/yr09-10/english/panels/ea/minutes/ea20100721.pdf

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)) http://www.legco.gov.hk/yr10-11/english/panels/ea/papers/ea1220cb1-782-5-e.pdf Updated background brief on the provision of a District Cooling System at the Kai Tak Development prepared by the Legislative Council Secretariat (LC Paper No. CB(1)782/10-11(06)) http://www.legco.gov.hk/yr10-11/english/panels/ea/papers/ea1220cb1-782-6-e.pdf Minutes of meeting (LC Paper No. CB(1)1229/10-11) http://www.legco.gov.hk/yr10-11/english/panels/ea/minutes/ea20101220.pdf
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)) http://www.legco.gov.hk/yr11-12/english/panels/ea/papers/ea0704cb1-2256-3-e.pdf Updated background brief on the provision of a District Cooling System at the Kai Tak Development prepared by the Legislative Council Secretariat (LC Paper No. CB(1)2256/11-12(04)) http://www.legco.gov.hk/yr11-12/english/panels/ea/papers/ea0704cb1-2256-4-e.pdf Minutes of meeting (LC Paper No. CB(1)2560/11-12) http://www.legco.gov.hk/yr11-12/english/panels/ea/minutes/ea20120704.pdf

Council/ Committee	Date of meeting	Paper
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)) http://www.legco.gov.hk/yr12-13/english/panels/dev/papers/dev0122cb1-428-6-e.pdf Updated background brief on the provision of a District Cooling System at the Kai Tak Development prepared by the Legislative Council Secretariat (LC Paper No. CB(1)428/12-13(07)) http://www.legco.gov.hk/yr12-13/english/panels/dev/papers/dev0122cb1-428-7-e.pdf Minutes of meeting (LC Paper No. CB(1)735/12-13) http://www.legco.gov.hk/yr12-13/english/panels/dev/minutes/dev20130122.pdf
Public Works Subcommittee	28 May 2013	Funding proposal on Head 705 – Civil Engineering 45CG - District Cooling System at the Kai Tak Development (LC Paper No. PWSC(2013-14)12) http://www.legco.gov.hk/yr12-13/english/fc/pwsc/papers/p13-12e.pdf Minutes of meeting (LC Paper No. PWSC73/12-13) http://www.legco.gov.hk/yr12-13/english/fc/pwsc/minutes/pwsc20130528.pdf
Finance Committee	21 June 2013	Recommendations of the Public Works Subcommittee made on 28 May 2013 (LC Paper No. FCR(2013-14)19) http://www.legco.gov.hk/yr12-13/english/fc/fc/papers/f13-19e.pdf Minutes of meeting at 3:30 pm (LC Paper No. FC23/13-14) http://www.legco.gov.hk/yr12-13/english/fc/fc/minutes/fc20130621.pdf