

ITEM FOR FINANCE COMMITTEE

HEAD 42 - ELECTRICAL AND MECHANICAL SERVICES DEPARTMENT

Subhead 700 General other non-recurrent

New Item “Implementation Study for a District Cooling System at South East Kowloon Development”

Members are invited to approve the creation of a new commitment of \$11 million for conducting a study to facilitate the implementation of a District Cooling System at the South East Kowloon Development.

PROBLEM

We need to ascertain and define the technical, environmental, financial, regulatory and institutional requirements and to undertake planning work for the implementation of a District Cooling System (DCS)¹ at the South East Kowloon Development (SEKD).

PROPOSAL

2. The Director of Electrical and Mechanical Services (DEMS), with the support of the Secretary for the Environment and Food, proposes to engage consultants to undertake a district-based study to ascertain and define the technical, environmental, financial, regulatory and institutional requirements in detail and to draw up plans for the implementation of a DCS at the SEKD.

/JUSTIFICATION

¹ District Cooling System (DCS) is a system that may employ sea water cooled once through condensers, or fresh water or sea water cooling towers to provide a **central supply of chilled water** to the connected building group. This system is suitable for large developments, where a large central chiller plant is normally located within close proximity of the district or buildings being served via a closed loop pipe network. The chilled water is pumped to individual buildings and then returned to the central chiller plant for re-chilling.

JUSTIFICATION

3. The Preliminary Phase Consultancy Study on Wider Use of Water-cooled Air Conditioning System (WACS) in Hong Kong has established that the DCS is economically and financially viable in developments which have cooling capacities from 40 up to 200 cooling Megawatt (MWc). Two major technical concerns are whether there are constraints for specific areas to lay the large diameter pipelines and to use sea water for once-through condenser cooling. These constraints are less likely to be problems in newly developed reclamation areas. The SEKD is the single largest urban development proposed in recent years. It is estimated that the development will have a non-domestic gross floor area of 2 200 000 square metres and an associated cooling demand in the order of approximately 200 cooling MWc. These characteristics of the SEKD offer an excellent opportunity for the implementation of a DCS.

4. Depending on the type of DCS used and the actual air-conditioned floor area to be built, the environmental and financial/economic benefits arising from implementation of DCS in the SEKD as compared to the use of individual air-cooled air conditioning systems can be quantified as follows -

- (a) reducing carbon dioxide emissions (the main greenhouse gas) per annum by 24 860 tonnes;
- (b) energy savings of 32% for air conditioning in non-domestic buildings, equivalent to 44 gigawatt-hour per year. At the current unit electricity price of about \$0.9 per kilowatt-hour, the monetary savings would be about \$40 million per year; and
- (c) reducing 12 Megawatt of electricity generation and distribution capacity required for air conditioning systems in the district.

5. A number of concerns and constraints may affect our ability to achieve these benefits and these are as follows -

- (a) property developers and building owners would have to rely solely on the DCS service to provide air conditioning and would be concerned about the reliability and pricing of the DCS service;
- (b) the DCS service provider would require property developers and building owners to enter into long term contracts to minimize its financing risk, etc.;

- (c) the DCS service provider is expected to ask for concessions (e.g. land premium) from the Government to ensure a commercially attractive return on the high capital investment; and
- (d) the Government would need to be satisfied with the performance of the service provider, the efficient use of land resources, the institutional and regulatory and pricing frameworks to address the concerns of the various parties and to prevent unfair practices.

The above considerations need to be evaluated in detail and resolved in order to achieve the energy saving potential.

6. Since a DCS requires extensive capital investment by the service provider and long-term commitment between the service provider and the building developers, we need to examine the contractual arrangements as well as the performance obligations and price control framework. The implementation of DCS also has to tie in with the overall development programme for the SEKD. The proposed study will therefore -

- (a) examine and define the technical requirements, environmental impacts, financial, programming, land allocation, and property right implications;
- (b) examine and select appropriate contract strategies;
- (c) prepare a regulatory framework involving performance obligations and price-setting policy;
- (d) develop evaluation criteria and tools for tender evaluation;
- (e) invite and pre-qualify experienced local and overseas tenderers;
- (f) produce master tender document applicable to the SEKD and other similar developments; and
- (g) assist in public relations work.

7. Implementing a DCS system requires a long lead-time for the service provider to plan and construct the associated infrastructure. This has to be completed before non-domestic developments begin operation. If the proposed study is deferred, we will not be able to invite private sector participation in time to tie in with the programme for the SEKD. We cannot, therefore, afford to wait

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for completion of the territory-wide study on WACS implementation approved by Members on 28 April 2000 before starting this detailed implementation study for the SEKD.

8. DEMS has carefully assessed the capability of his department to undertake the study in-house. In addition to promoting energy efficiency in air conditioning systems, the study will cover other areas including financing, environmental protection, drainage, lands and properties, as well as price regulatory issues. He has concluded that this wide range of issues fall beyond the expertise and knowledge of his department. In addition, the department will not be able to complete the study within the prescribed time frame of 12 months without affecting the delivery of its other commitments and services.

FINANCIAL IMPLICATIONS

9. We estimate the total cost of the study to be \$11 million, made up as follows -

	\$ million
(a) Consultant's staff costs -	
(i) collecting and collating baseline data and information	1.46
(ii) assessing demand, financial and environmental impacts	3.39
(iii) formulating infrastructure plans, implementation programme, contract strategy and regulatory requirements	1.65
(iv) developing master tender document and evaluation tool	1.46
(v) assisting in public relations work and pre-qualification	1.46
(b) Hire of computer software	0.80
(c) Contingencies	0.80
Total	11.02
Say	<u>\$11 million</u>

Encl. A detailed breakdown of the estimated study fees is at the [Enclosure](#). We will commission the study on a lump sum fixed price basis.

10. Subject to Members' approval, we plan to phase expenditure as follows -

Year	\$ million
2000-01	4.0
2001-02	7.0
Total	<hr/> 11.0 <hr/>

11. The proposal has no recurrent financial implications. DEMS will oversee the study with guidance from an inter-departmental steering group to be formed.

12. Subject to Members' approval, we shall offset supplementary provision required in 2000-01 by deleting an equivalent amount from Head 106 Miscellaneous Services Subhead 789 Additional commitments.

BACKGROUND INFORMATION

13. The preliminary phase of the consultancy study conducted by the then Planning, Environment and Lands Bureau has established that the DCS is the most energy-efficient option of WACS and has the highest environmental, economic and financial benefits. It also advised that further detailed assessments are required. Detailed studies at specific locations including the SEKD are required to examine the environmental, regulatory, financial, institutional, infrastructural, and landuse requirements and to establish the contract form and process for implementation of DCS. The findings and recommendations of the preliminary study were endorsed by the Energy Efficiency and Conservation Subcommittee in October 1999.

14. At the Public Accounts Committee (PAC) hearing in December 1999, Members supported the use of energy efficient air conditioning systems and concurred with the view that air conditioning in commercial premises was no longer simply for comfort. PAC requested to be kept informed of the findings of the implementation study for the DCS at the SEKD.

15. We briefed the Legislative Council Environmental Affairs Panel on the proposed study on 10 February 2000 and 2 March 2000. Members supported the proposal.

16. Members approved on 28 April 2000 a proposal to create a new commitment of \$13.6 million to conduct a territory-wide implementation study for water-cooled air conditioning systems in Hong Kong. The Establishment Subcommittee endorsed on 10 May 2000 a proposal to create a permanent directorate post of Chief Building Services Engineer (D1) to promote the wider use of WACS and undertake other duties relating to energy efficiency.

Environment and Food Bureau
May 2000

Enclosure to FCR(2000-01)16

Detailed Breakdown of the Study Fees

Consultants' study costs		Estimated man months²	Average MPS salary point¹	Multiplier factor¹	Estimated fee (\$million)
(a) Baseline information					
1. Collection of information	Professional	4	38	2.4	0.55
	Technical	4	14	2.4	0.18
2. Analysis of information	Professional	4	38	2.4	0.55
	Technical	4	14	2.4	0.18
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					1.46
(b) Assessment of demand, financial and environmental impact					
1. Demand prediction	Professional	8	38	2.4	1.10
	Technical	4	14	2.4	0.18
2. Environmental impact prediction	Professional	5	38	2.4	0.69
	Technical	3	14	2.4	0.14
3. Financial analysis	Professional	8	38	2.4	1.10
	Technical	4	14	2.4	0.18
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					3.39
(c) Formulate contract strategy, regulatory requirement, infrastructure plan and programme					
1. Contract strategy and regulatory requirement	Professional	6	38	2.4	0.83
	Technical	3	14	2.4	0.14
2. Infrastructure plan and programme	Professional	3	38	2.4	0.41
	Technical	6	14	2.4	0.27
					<hr/>
					1.65

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Consultants' study costs		Estimated man months²	Average MPS salary point¹	Multiplier factor¹	Estimated fee (\$million)
(d) Develop master tender and contract package and evaluation tool					
1. Tender and contract package	Professional	4	38	2.4	0.55
	Technical	4	14	2.4	0.18
2. Tender evaluation tool	Professional	4	38	2.4	0.55
	Technical	4	14	2.4	0.18
					1.46
(e) Assist in public relations work and pre-qualification					
1. Public relations work	Professional	3	38	2.4	0.41
	Technical	3	14	2.4	0.14
2. Tender invitation and preparation	Professional	3	38	2.4	0.41
	Technical	3	14	2.4	0.14
3. Pre-qualification	Professional	2	38	2.4	0.27
	Technical	2	14	2.4	0.09
					1.46
Total staff costs					9.42
Hire of computer software					0.80
Contingencies					0.80
Total					11.02
Say					\$11 million

Notes -

1. A multiplier factor of 2.4 is applied to the average Master Pay Scale (MPS) point to arrive at the full staff cost including the consultant's overheads, and profit. The staff will be employed in the consultant's offices. (At present, MPS Point 38 is \$57,525 per month and MPS Point 14 is \$19,055 per month.)
2. These are only estimates. The actual man months and actual fees required will be known when we have selected the consultant through the usual competitive bidding system on a lump sum fixed price basis.