Ove Arup & Partners
奧 雅 納 工 程 顧 問

Level 5, Festival Walk
80 Tat Chee Avenue
Kowloon Tong, Kowloon
Hong Kong
Tel +852 2528 3031
Fax +852 2268 3958
Direct Tel +852 2268 3627

www.arup.com

Our ref 23165/1.12/RMY/TKDL/wc/0444
Date 29 January 2003

BY FAX & BY POST

Electrical & Mechanical Services Department
Energy Efficiency Office
11/F 111 Leighton Road
Causeway Bay
Hong Kong

Attention : Mr K K Li, CBSE/EEB

Dear Sir

Agreement No. CE51/2000
Implementation Study for a District Cooling Scheme at South East Kowloon Development
EA Panel Meeting on 20 December 2002
Supplementary Information

Further to the minutes of the EA Panel Meeting on 20 December 2002 and subsequent discussions, we enclose herewith the supplementary information as requested.

Yours faithfully

Davis Lee

cc ETWB - Mr Fletch Chan, AS(E)1B (Fax : 2136 3347 & Post)

Response required	:	No
Date required	:	N/A
Attachments	:	Yes

LegCo Panel on Environmental Affairs
Meeting on 20 December 2002
Agenda Item IV (DCS at SEKD)

Supplementary Information (the minutes of meeting refers)

Technical Considerations

9th Paragraph, 13th line –
"….. to provide the findings of the modelling studies with regard to changes in water temperature of the receiving waters; heat loss during distribution of chilled water; and overseas experience on DCS with a similar scale service area as that to be served by the proposed DCS and difference in temperature of the receiving waters for the four seasons to enable a more exact comparison."

Response:
The energy loss in the underground chilled water network will be insignificant when compared with the overall energy saving of the system. It has been assumed that the pipe networks for SEKD will be insulated and the estimated heat gain (energy loss) for the whole DCS network for SEKD during the summer season (the worst case scenario) will be about 0.9MW. This is around 0.5% of the total cooling demand for the SEKD DCS. The temperature rises at the farthest point will be limited to less than 0.5 deg C which is insignificant to the operation of the system.

The total design cooling load of SEKD is estimated to be some 200MW serving an area of 461 hectares. There are several similar overseas DCS systems of comparable scale of service as the one proposed in SEKD. These include:

- DCS of MM21 in Yokohama, Japan with a total design cooling load of 301MW serving an area of about 180 hectares.
- DCS of Rinkai in Tokyo, Japan with a total design cooling load of 145MW serving an area of about 442 hectares.
- DCS of Downtown Chicago with a total design cooling load of 349MW serving an area of about 100 hectares.
- Climescape DCS in Paris with a total design cooling load of 92MW serving an area of about 250 hectares.

We do not have the energy loss data for the above projects but the energy loss of a DCS system at St. Paul in Minnesota, USA is only about 2-3% on an annual basis even without any insulation of the pipe. In Singapore, only half of the pipe is insulated in the DCS plant of Changi Business Park and the operation of the plant is not sensitive to the change in climatic temperature. It is also noted that underground pipes will be insulated by the surrounding soil which insulates the pipe networks against seasonal variation in temperature.

10th Paragraph, 4th line –
"….. to provide information on the adaptability of DCS to new technologies….."

Response:
The basic concepts of cooling have not changed much over the past 50 years. There have been continuous developments in the design of cooling machines and cooling technology to make them more energy efficient. Based on historical trends, it is very likely for improvement to be limited to energy efficiencies and the benefits of DCS cooling over individual systems would be maintained.

A DCS operator with technical expertise, economy of scale and capability will in general be more able to take advantage of any advancement in technology and innovation and therefore maintain higher efficiencies than individual systems. Given that energy savings will directly contribute to the profit of a DCS operator there will be a good business case, and therefore incentive, to maintain and improve efficiency.

10th Paragraph, 7th line –
" ….. to provide overseas experience on energy savings as a result of implementing DCS."

Response:
Overseas experience shows that the energy saving as a result of implementing DCS is roughly 30% to 40% as compared to conventional air conditioning system, depending on the design and operating conditions of the systems. For example, the overall average annual energy savings of the major DCS systems in Japan are as follows:

- DCS of MM21 in Yokohama has an annual energy saving of 31%;
- DCS of Tokyo Waterfront City has an annual energy saving of 29%;
- DCS of Osaka Cosmo Square has an annual energy saving of 36%;
- DCS of OAP Tower has an annual energy saving of 38%.

Because of their higher energy efficiency, there is a trend towards centralised systems worldwide. According to the statistics from The Japan Heat Service Utilities Association, the number of District Heating and Cooling systems installed in Japan between 1985 and 1999 has increased by an average of 7 per year.

12th Paragraph, 11th line –
"….. to provide the cost difference between building one centralized pump house and two separate ones."

Response:
If two seawater pumphouses are used instead of one, the construction cost (excluding land) will be 15% more than the proposed single pumphouse. In addition, the operating cost for two separate pumphouses would be HK$0.8M higher per annum.

The DCS scheme in SEKD is proposed based on multiple pump sets in one pumphouse. This will minimise the construction of emergency / standby facilities required for two separate pumphouses. Reliability can be achieved with solely one pumphouse with standby pumps.

<u>Financial Viability</u>

17th Paragraph, 3rd line –
"…..to provide a more detailed breakdown on the opportunity cost incurred by the Government if it was to waive the land cost for DCS facilities and for laying distribution of pipes on Government land….."

Response:
DCS will require land for chiller plants and seawater pumphouse and licence fees for installing the underground pipe network.

The DCS plant at Site 1N will occupy an area of 0.32 hectares. This site will be surrounded by a road tunnel, CLP Substation and Kai Tak Nullah and would have been used as a highway depot. As the development potential of Site 1N is highly constrained by its own small size and its surrounding land uses, it will not attract a high land premium and the opportunity cost is therefore very low. The DCS plant (0.44 hectares) at Site 5B and the pumphouse (0.32 hectares) near the waterfront were both selected on sites zoned as open space. Since the plants will be largely underground, the land above can continue to be used for its original purpose, and the opportunity cost to Government will again be minimal.

The opportunity cost of the underground space used for installing DCS pipes will be minimal. If DCS is not implemented, the space will generally be occupied by public utilities which currently enjoy concessions and pay Government only a nominal licence fee.