The District Cooling System (DCS) at the Kai Tak Development

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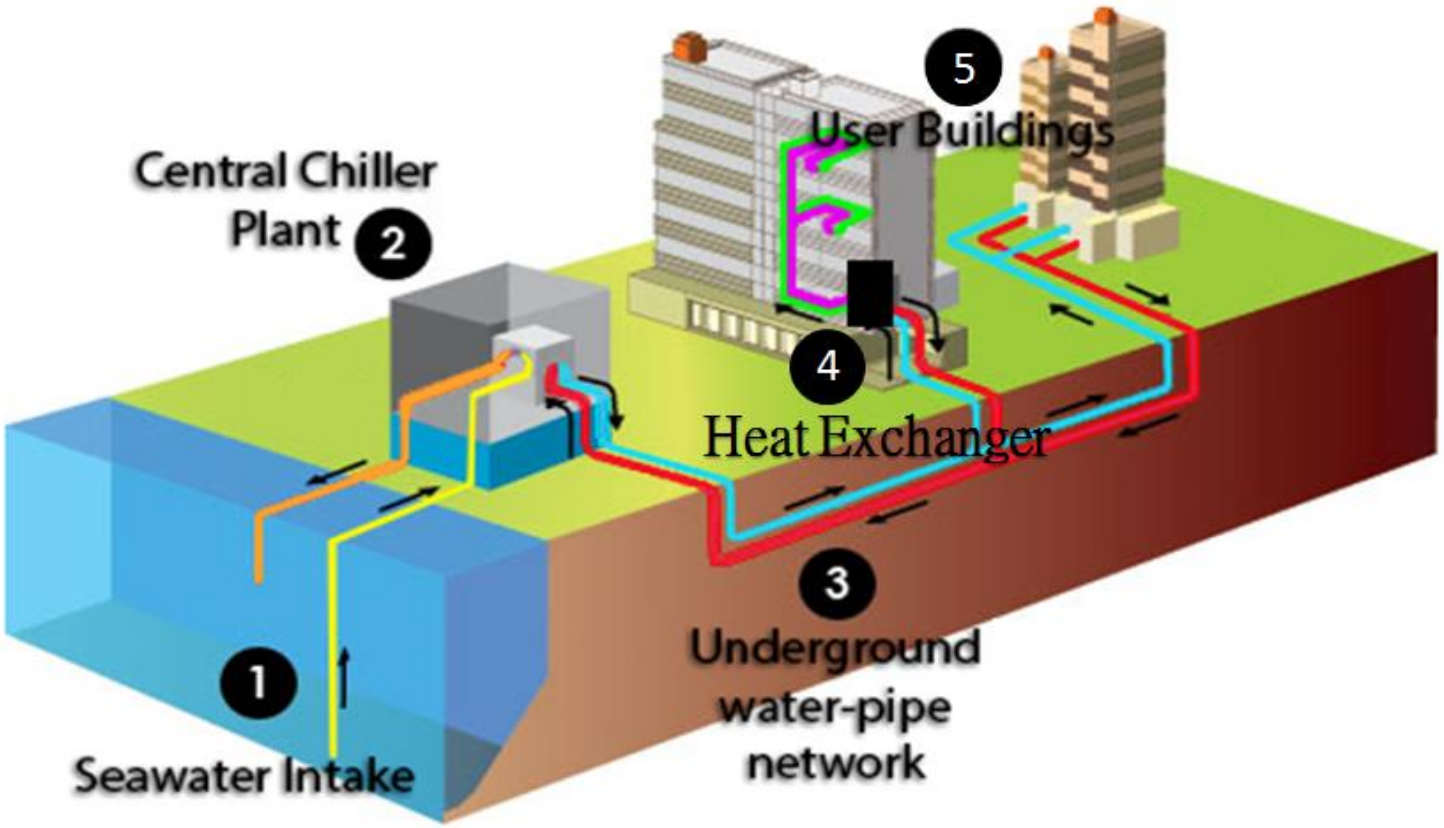
The Kai Tak DCS

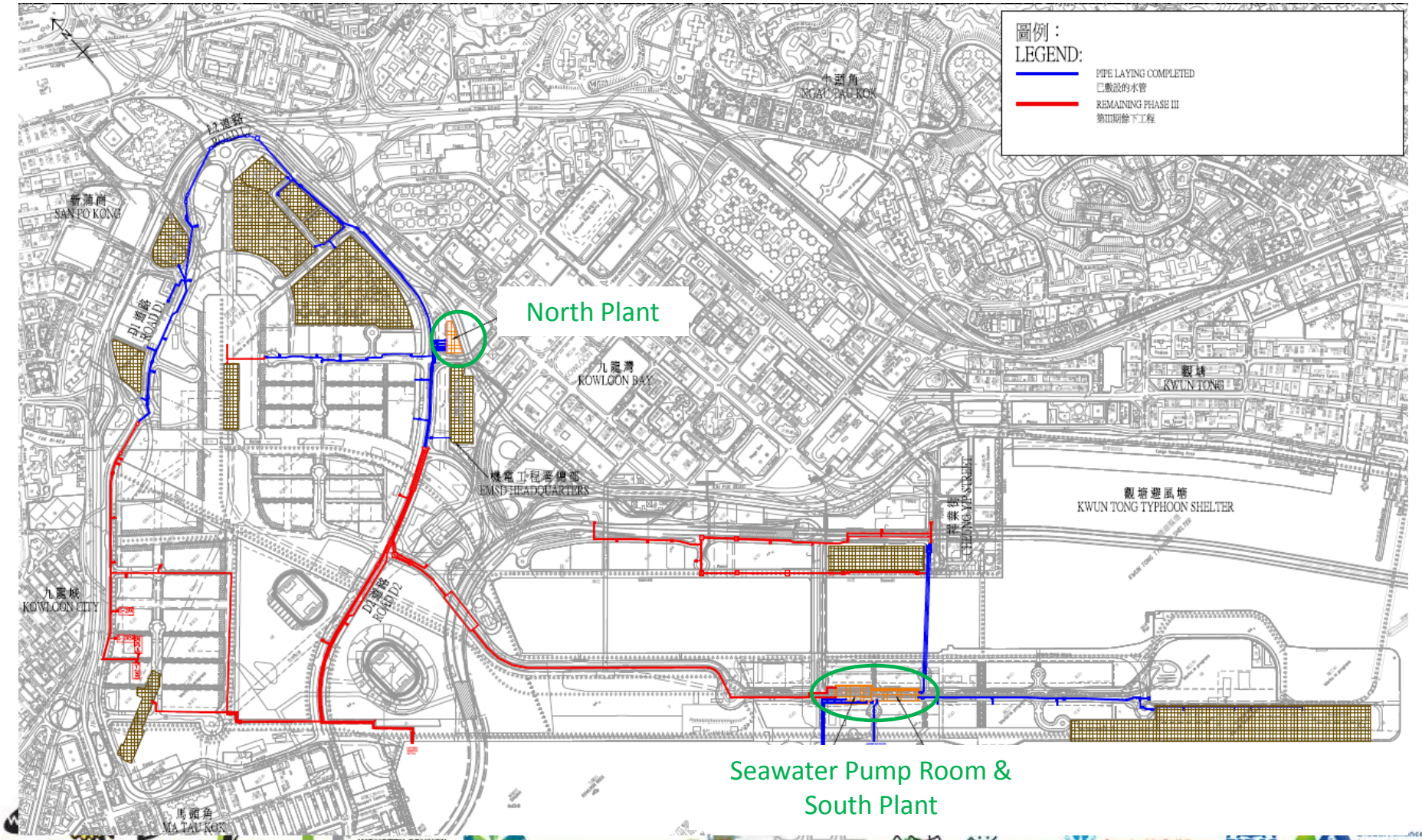
District Cooling System (DCS)



The Kai Tak DCS

- First-of-its-kind DCS in HK
- Total area over 320 hectares
- Total AC floor area 1.73 million m^2
- 284 megawatt of refrigeration (MWr) AC demand

The Kai Tak DCS



The DCS Plants

The North Plant located at Shing Kai Road

The South Plant located at underground of former-runway of Kai Tak Airport

Bank of Chillers in DCS Plants

The installed 1.4MWr and 4.3MWr Chillers at the North Plant

The installed 17.5MWr Chiller at the South Plant

Chilled Water Piping Network

3-Pipe System of Underground Chilled Water Piping in Open Trench

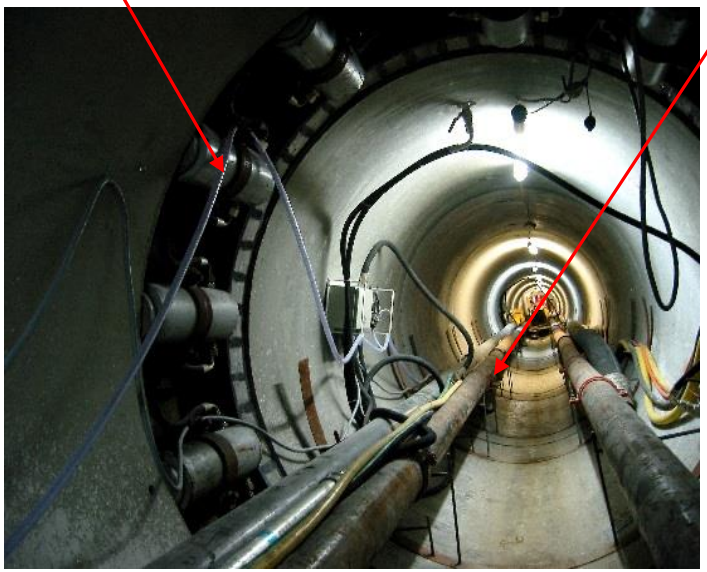
DCS Pipes Laying inside the Underground Tunnel

Tunnel Formed by Pipejacking

Intermediate Jack

Slurry Pipes and Electric Cables

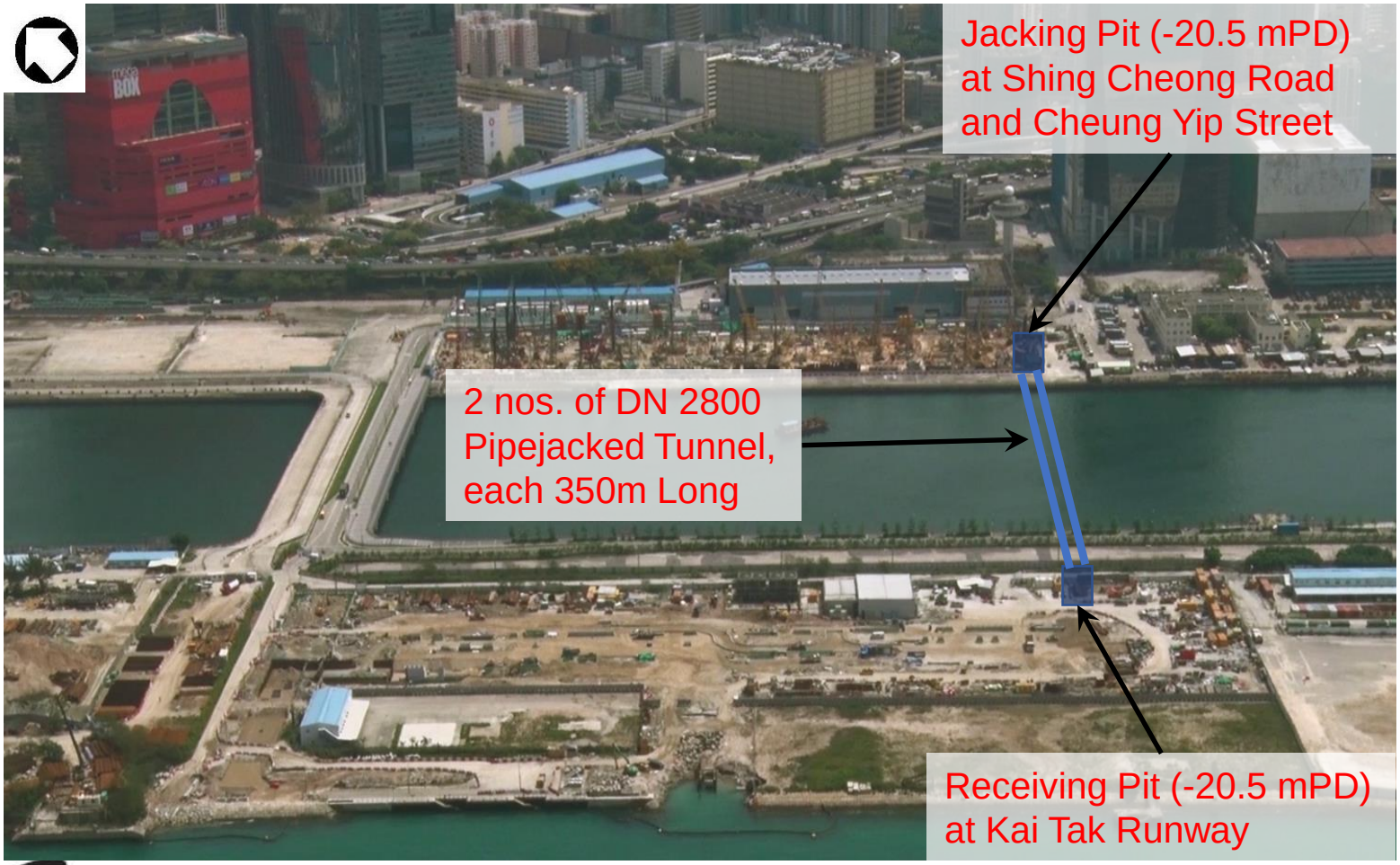
Lifting eye / Grout Hole



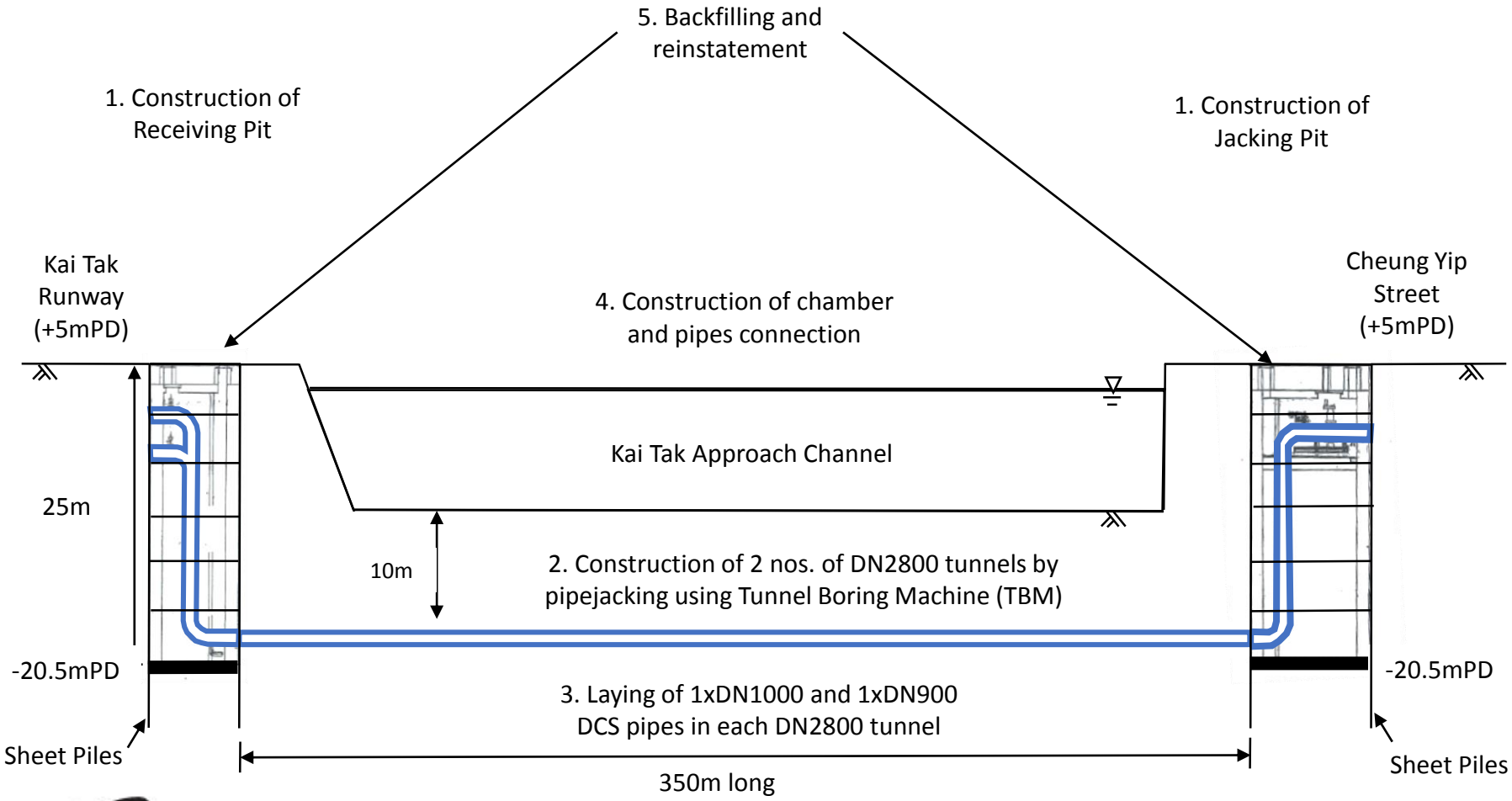
Tunnel Formed by Precast Concrete Pipes

Condition of Completed Tunnel

Sub-sea Construction

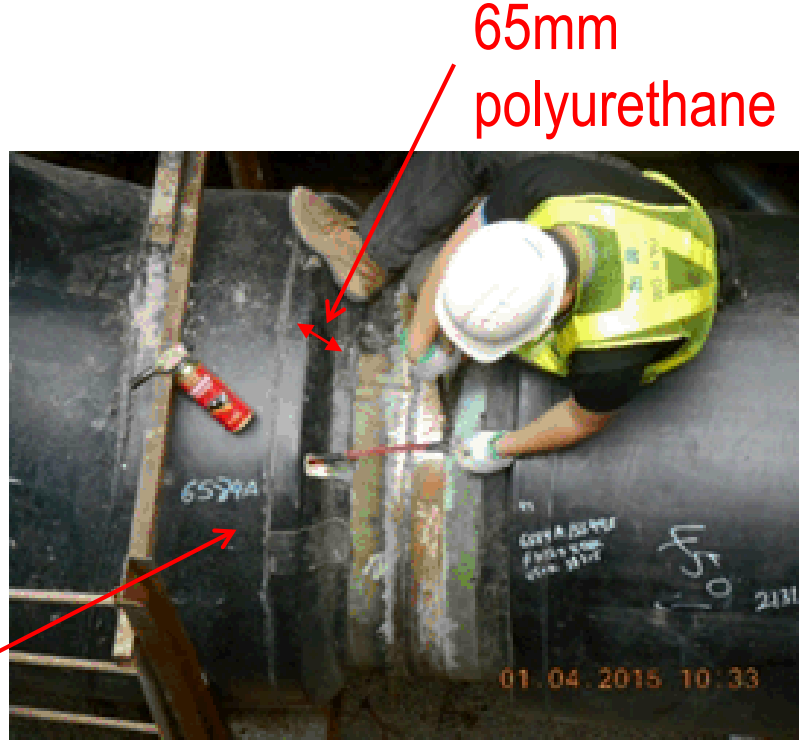


Sub-sea Construction Sequence



DCS Pipes Protection

- Factory-prefabricated insulation with 65mm thick polyurethane and external jacket with high density polyethylene (HDPE)



Consumer Substation

At primary chilled water side:

- Supply Temperature = 5℃
- Return Temperature = 13℃

At secondary chilled water side:

- Supply Temperature = 6℃
- Return Temperature = 14℃

Heat Exchangers in DCS Substation

Energy Meter

Energy Management and Monitoring

- Automatic computerised system
- District Cooling Instrumentation, Control and Communication Systems (DCICCS)

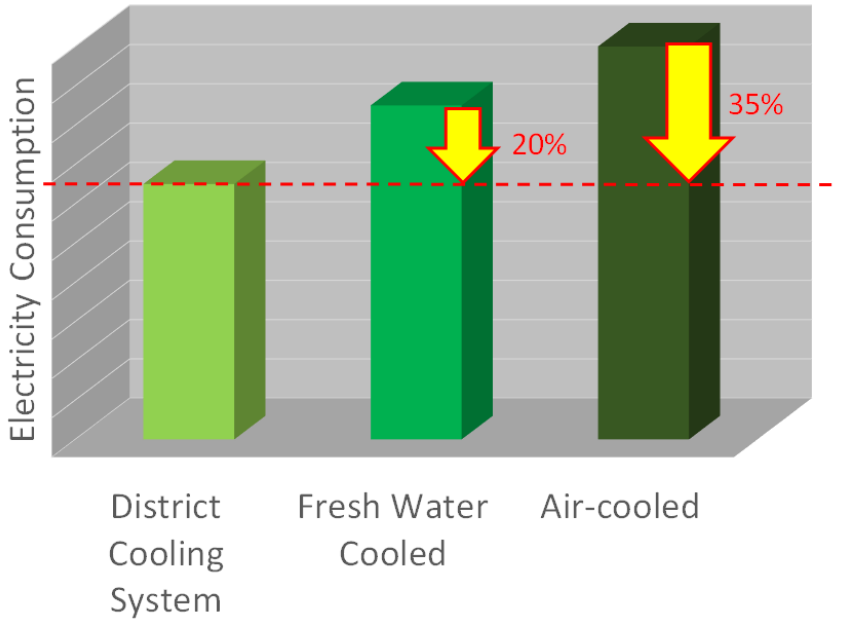
DCS Control Room

Benefits of the DCS

Benefits of the DCS

Most energy efficient centralized air-conditioning system

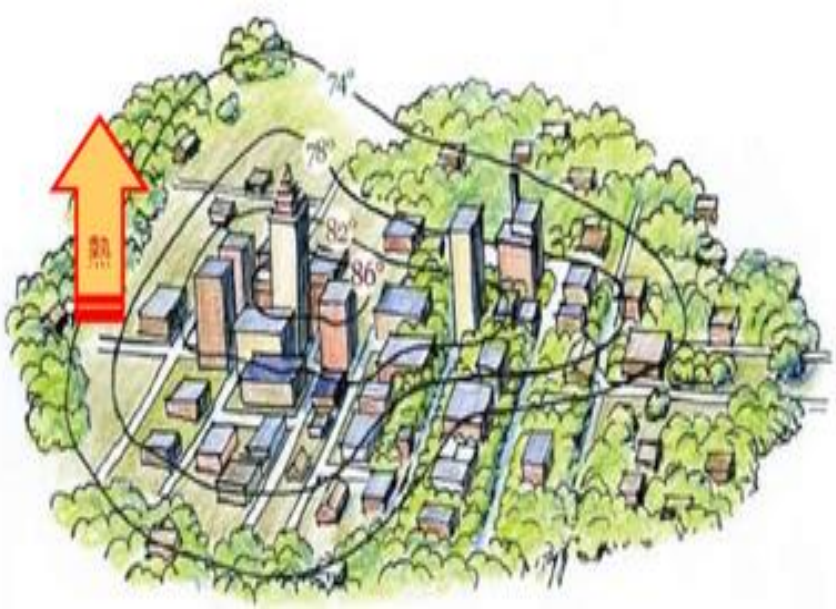
- Kai Tak DCS use seawater for heat rejection, consume 35% less electricity
- Annual saving of about 85 million kWh in electricity consumption



Benefits of the DCS

Mitigate Heat Island Effect

- Heat rejection no longer generates from separate air-conditioning systems



Benefits of the DCS

- Reduction in upfront capital cost for chiller plant installation
- More flexible in building design
- Reduce noise, vibration and heat
- More adaptable to varying demand

Current Status of Kai Tak DCS

Existing DCS Consumers

Trade and Industry Tower

Ching Long Shopping Centre

2 Primary Schools

EMSD Headquarters

Kai Tak Cruise Terminal Building

Organisers:

International Co-owners:

2017-2019 DCS Consumers Buildings

Police Regional Headquarters

Secondary School

Kai Tak Station

Hong Kong Children's Hospital

To Kwa Wan Station

DCS Services Charges

Charging Principles

- Costs comparable with water-cooled AC systems using cooling towers
- Cost recovery in 30 years
- Price stability
- Simple charging mechanism

District Cooling Services Ordinance & Charging Arrangement

- "District Cooling Services Ordinance (Cap. 624)" was passed by LegCo and enacted in March 2015
- Mainly two charges:

Capacity charge	⇨	Capital costs and O&M costs
Consumption charge	⇨	Cost that vary with actual consumption

Adjustment Mechanism

- Capacity charge rate to be adjusted annually based on the Composite Consumer Price Index (CCPI)
- Consumption charge rate to be adjusted annually taking into account change in electricity tariff rate

DCS in New Development Areas (NDAs)

As stated in the 2017 Policy Address, HK Government is considering the provision of DCS in NDAs, such as:

- Topside development at the Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities
- Tung Chung New Town Extension

Conclusion

Conclusion

- DCS is the most energy efficient centralized air-conditioning system suitable to KTD and NDAs
- Annual saving of 85 million kWh in KTD DCS
- Mitigate the heat-island-effect
- Enhance flexibility for building design and reduce noise, vibration and heat

Thank you