District Cooling in Malaysia

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Suruhanjaya Tenaga
Energy Commission

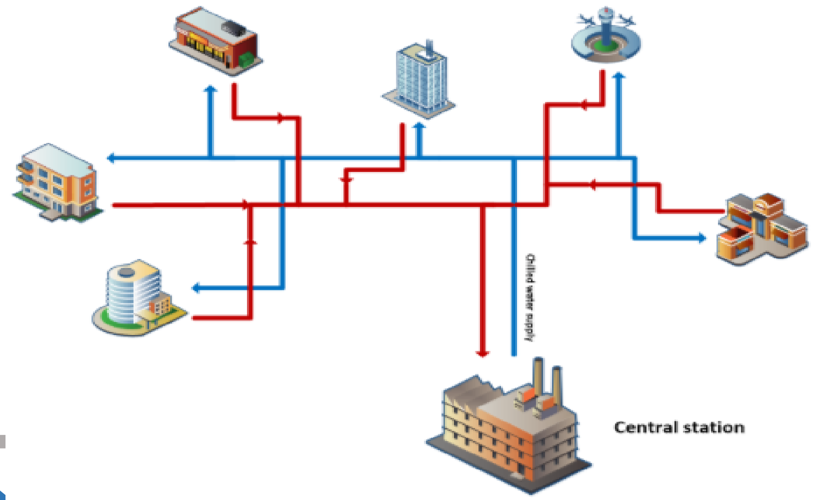
Contents

Introduction

District Cooling Cools Buildings the Smart Way

District cooling concept begins by chilling water at a centralized plant. Chilled water is then pumped through a long piping network via underground to heat exchangers in different buildings. The heat exchangers are used to transfer the chilling energy from the water (often called Primary Loop) to customers' internal building chilled water loop (often call Secondary Loop).

Cold air then is dissipated within the building via a typical Fan Coil unit and Air Handling Unit. Warm water returns to the heat exchangers for a continuous closed loop cooling process again.



Why Malaysia Built District Cooling Facilities?

Advantages of District Cooling System (DCS)

A DCS essentially delivers its benefits through economies of scale. Larger and more efficient chillers can be installed in places of the many scattered smaller and less efficient ones required in a conventional system

A higher efficiency system translates directly into both capital and running cost savings. Similar savings can be achieved for other plant equipment such as cooling towers and pumps

The district cooling system offers operating flexibility, since each building can use as much or as little cooling as needed, without worrying about chiller size or capacity – and the system produces no noise or vibrations.

A DCS is space saving, allowing more space for other uses since the combined chiller plant is located away from the consumer's premises

Operations and maintenance are reasonably simple, offering more convenience, ease and peace of mind in addition to reducing costs and is time saving. Just pay for your usage without having to maintain the system.

Why Malaysia Built District Cooling Facilities?

Advantages of District Cooling System (DCS)

Thermal Energy Storage capitalises on the cheaper off-peak tariff offered by the electric utility company. The system produces cooling energy at night when the electricity tariff is low

During the day, when the air-conditioning demand is high, the stored cooling energy is released by circulating chilled water through the storage system and onto the buildings. Only a limited amount of chiller capacity needs to operate during this period

By adopting this concept, the plant consumes less electricity during the day, when electricity tariff is high. This leads to significant savings in operating costs

As the electrical power demand for this plant is also low during the day, further cost saving is achieved through reduced maximum (MD) charges.

Number of district cooling facilities in Malaysia and percentage of buildings connected to such facilities

	Operation	Chiller Plant Capacity	Thermal Storage Capacity	No. of Building Connected to DCS
Gas District Cooling Putrajaya Plant 1, Presint 1, Putrajaya.	2008	12,000 RT	32,700 RTH	
Gas District Cooling Putrajaya Plant 2, Presint 2, Putrajaya.				
Gas District Cooling Putrajaya Plant 3, Presint 5, Putrajaya.				
Gas District Cooling Putrajaya Plant 4, Presint 4, Putrajaya.				
Gas District Cooling Putrajaya Wisma Putra, Putrajaya.			2,300 RTH	
Gas District Cooling Putrajaya Putrajaya International Convention Center, Putrajaya.			3,880 RTH	
Gas District Cooling Kuala Lumpur City Center (KLCC) Plant, Kuala Lumpur.	2005	12,000 RT	45,000 RTH	
Gas District Cooling Kuala Lumpur International Airport (KLIA) Plant, Sepang, Selangor	1998	30,000 RT		
Gas District Cooling Universiti Teknologi Petronas (UTP) Plant, Tronoh, Perak	2002	6,000 RT	11,000 RTH	

Gas District Cooling (M) SB is Malaysia's largest district cooling provider serving Putrajaya, Kuala Lumpur City Centre (KLCC) and Kuala Lumpur International Airport (KLIA) precinct. Their assets encompass of 9 co-generation /district cooling plants with total combined capacity of 59 MW electric, 442 ton/hr steam, 147,000 RT & 238,000 RTh chilled water.

Number of district cooling facilities in Malaysia and percentage of buildings connected to such facilities

	Operation	Chiller Plant Capacity	Thermal Storage Capacity	No. of Building Connected to DSC
District Cooling System University Tenaga Nasional (UNITEN)	1996	3,500 RT	26,000 RTH	15 buildings
District Cooling System Bangsar	1997	11,250 RT	30,000 RTH	Few buildings
District Cooling System Universiti Kebangsaan Malaysia (UKM) Plant	1998	3,700 RT	11,300 RTH	10 faculties
District Cooling System Megajana Cyberjaya	1999/2012	14,000 RT	95,000 RTH	48 buildings
District Cooling System Malaysia Institute of Nuclear Technology	2001	1,500 RT	6,000 RTH	NA
District Cooling System Serdang Hospital	2002	2,800 RT	6,000 RTH	NA
District Cooling System Hospital Universiti Kebangsaan Malaysia (HUKM)	NA	2,800 RT	7,200 RTH	NA
District Cooling System Amcorp Mall	2005	2,500 RT	NA	NA
District Cooling System MBS (Shah Alam Council)	2006	2,400 RT	4,500 RTH	NA
District Cooling System 1 Borneo Hypermall	2008	5,700 RT	16,800 RTH	NA
District Cooling System Institut Jantung Negara (National Heart Hospital)	2008	1,930 RT	7,100 RTH	NA
District Cooling System Solaris, Dutamas	2008	11,000 RT	NA	NA
District Cooling System Kuala Lumpur International Airport 2 (KLIA2)	2012	25,000 RT	90,000 RTH	NA
District Cooling System Universiti Kebangsaan Malaysia (UKM) (Loop 2)	2012	4,764 RT	15,795 RTH	10 faculties
District Cooling System Galleria @ Kotaraya	2012	1,950 RT	NA	NA
District Cooling System Hotel Selesa, Pasir Gudang, Johor	2012	560 RT	NA	NA
District Cooling System Pagoh Education Hub, Johor	2015	7,900 RT	NA	NA
District Cooling System Puteri Harbour, Johor	2015	8,000 RT	NA	NA

Technologies and fuels used

- A DCS normally incorporates one of a few technological options available, each with its own benefits and advantages. These options can be classified as follows:
  - Thermal Energy Storage (TES) - can be further divided into ice storage, chilled water storage, ice harvester, etc.
  - Co-Generation – Electricity is generated from an alternator attached to the gas turbine output shaft. Waste heat from the gas turbine exhaust is channelled to a waste heat boiler to generate steam - which is used as primary energy source to generate chilled water

Are district cooling data available or if not, can it be collected from district cooling companies?

Since DCS is not regulated in Malaysia, data and information on its development is very limited

Under the Electricity Supply Act 1990 [Act 447] and Electricity Supply (Amendment) Act 2015 [Act A1501] any public and private installation that produced electricity need to submit their data to Energy Commission of Malaysia

While under the Efficient Management of Electrical Energy Regulations 2008 [P.U.(A)444] any users of electricity that consumed electricity equal or more than 3,000,000 kWh in six consecutive months need to report their data to Energy Commission of Malaysia

District cooling companies that falls under these two categories need to submit their data to Energy Commission of Malaysia

6-MONTHLY REPORT OF EFFICIENT MANAGEMENT OF ELECTRICAL ENERGY

FOR

Gas District Cooling (M) Sdn Bhd

GAS DISTRICT COOLING (KLIA) SDN BHD
-KLIA Plant-

5th. Report to Energy Commission (Suruhanjaya Tenaga) under the Electricity Supply Act 1990: Efficient Management of Electrical Energy Regulations 2008

Jan-June 2016

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If Data Are Already Collected, Are Data Included In Malaysia's Energy Statistics?

Reported data only related to power sector, such as the input and output from co-generators that involved gas district cooling companies;

These gas district cooling plants are regulated under the co-generation license;

In the National Energy Balance publication the data for input and output of co-generators is reported under the Self-Generation / Autoproducers.

Planned expansion of district cooling facilities in Malaysia

Since DCS is not regulated in Malaysia, information on its development is very limited.

For long term development especially in cities, DCS is the best option to minimize the usage of electricity and mitigate the climate change. DCS is the future trend in large air-conditioning systems and the natural choice for far sighted real estate developer .

According to a 2013 report by the Asian Development Bank, Malaysia could triple the scale of its district cooling industry to a built-up capacity of 575,000 refrigerant tonnes, the equivalent cooling load of up to 12 million square metres of commercial floor space. With the pace of Malaysia's real estate market growth, and the numerous successful district cooling systems being commissioned across the country, this potential could be even higher.

District energy system could help Malaysia to achieve its Paris Agreement pledge to reduce its greenhouse emission by 45% by 2030 and cut 32 million tonnes of carbon emission by 2020

Thank You

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