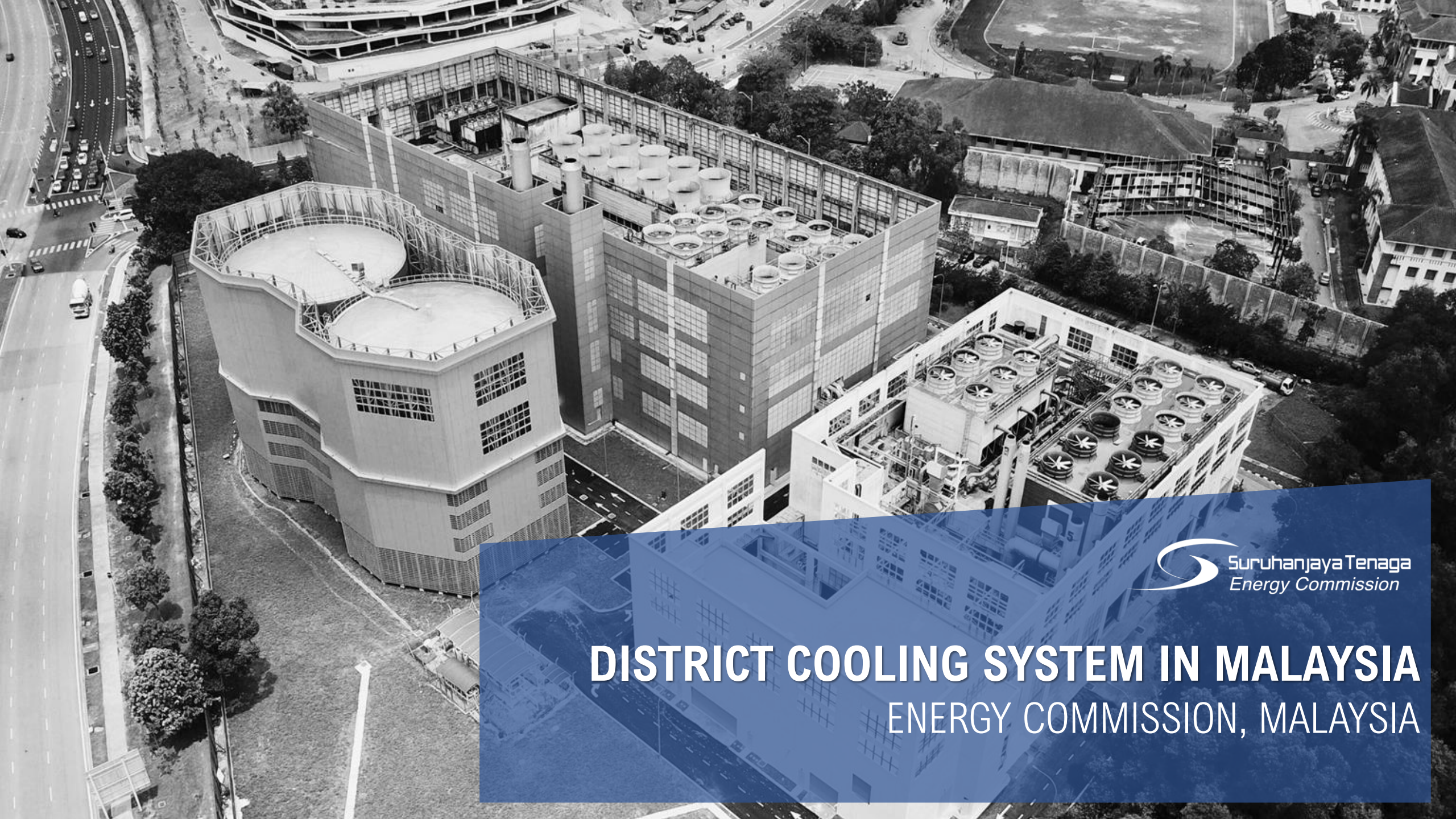


Suruhanjaya Tenaga
Energy Commission

DISTRICT COOLING SYSTEM IN MALAYSIA

ENERGY COMMISSION, MALAYSIA

INTRODUCTION

District cooling system (DCS) technology has been in Malaysia for more than two decades. DCS has benefitted many building owners, cities and various industries in a proven and sustainable manner.

Today, district cooling is seen as solution to further reduce energy usage and carbon emissions via tried-and tested technology, supported by readily available local district cooling service providers.

INTRODUCTION

- Established in the 1990s
- More than 6 major local DCS service providers

- Customers vary from single-buyer to multiple users
- Single building to city-wide development areas, ranging from 1500RT onwards.

- Unregulated market
- No specific policies on DCS unlike some countries
- General and indirect energy policies and regulations exist *(Electricity Supply Act, Factories and Machinery Act, Electricity Regulations)*

- Sporadic location
- Mostly in Klang Valley and major cities

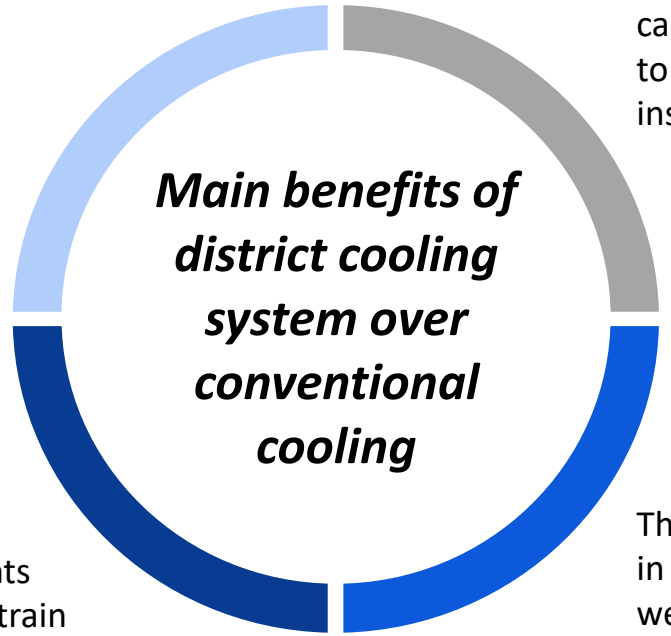
- Market driven between DCS service providers and developers/ building owners
- Chilled Water Supply Agreements (CWSAs) varies in tariff, duration performance and guarantees etc.
- Business model varies among DCS service providers – *(owner-operator, operator, full-turnkey)*

- Electric and gas-fired chillers commonly used
- Thermal Energy Storage(TES) application for electrical load management

WHY DISTRICT COOLING ?

- Reliable CHW supply within a temperature range 7 deg C within 30 minutes.
- Optimal utilization of primary energy incorporating energy conservation measure of cogeneration.
- Adaptation of proven technology for long term operational reliability.
- Adaptation of environment friendly system. Non HCFC refrigerant and de NOx system for Gas Turbine Generator
- Enhanced building aesthetics, wider choice for building design
- Saving in capital investment to building owner.
- Optimization of building space

MAIN BENEFITS OF DISTRICT COOLING SYSTEM



1 ***Low energy requirements***

District cooling consumes less energy stemming from more efficient technology and plant's ability to maintain steady level of efficiency over time. This also leads to reduction in CO2 emissions.

2 ***Peak period saving potential***

District cooling offers storage capability that can smooth out power requirements throughout the day, thereby reducing strain on power systems. In-building systems impose full load on power systems at peak times.

More efficient use of space **3**

District cooling typically requires less capacity for the same cooling loads due to flexibility in capacity design and installation.

Flexibility to varying cooling demand **4**

The pattern and timing of cooling requirements in a building vary depending on building use and weather. With conventional cooling system, meeting air-conditioning requirements at night or on weekends can be difficult and costly. With district cooling, these needs can be met easily and cost-effectively whenever necessary.

OTHER BENEFITS OF DISTRICT COOLING SYSTEM

Up to 90% lower water consumption used for cooling

Up to 65% lower CO2 emission

Optimised & efficient building design

Up to 70% savings in cooling infrastructure CAPEX

Reliable operation with redundancy

Up to 15 points contribution in GBI certification

KEY DRIVERS IN MALAYSIA DISTRICT COOLING

Government ESG Initiatives

More announcement and target related to ESG and low carbon economy.

National Low Carbon Cities Masterplan (2021- 2050).

Urbanisation

88% migration by 2050

More energy required to cool cities resulting higher energy consumption.

Requires more efficient future infrastructure design and urban planning.

Cooling demand expected to double by 2030

Emerging Industry

Smart Cities transition among states.

Government measures to promote public and private investments in digital infrastructures – MyDigital Blueprint announced in 2021 with potential development of new hyperscale data centres.

CHALLENGES AND OPPORTUNITIES

Challenges

- Level of awareness: district cooling as smart option for sustainability within policymakers and developers
- Creating paradigm shift on the benefit of district cooling: from short term to long term
- Urban planning: integrating district cooling with other development priorities

Opportunities

- Smart district cooling as strategic decarbonisation initiatives
- Urbanization: centralised cooling as efficient solution to mitigate future cooling demand
- Optimistic growth in emerging industries
- Local expertise
- Leveraging on trade association to promote DCS and stakeholder engagement

DATA COLLECTION

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

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

DATA COLLECTION

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 registered under the co-generation license

In the National Energy Balance publication, the data for input and output of co-generators will be reported under the Self-Generation / Auto producers

MALAYSIAN DISTRICT COOLING ASSOCIATION

INFO PACK

MDCA

Malaysian District Cooling Association (MDCA)

Malaysia's first industry platform for district cooling service providers

MDCA

Est. 2021

Mission

To create a positive common platform for DCS providers in Malaysia to network, collaborate and share related information and insights.

Core Objectives

- **Knowledge Sharing Platform**
- **Common Unified Voice**
- **Creating Public Awareness**

Founding Members

GAS DISTRICT COOLING (PUTRAJAYA)

TNB ENGINEERING CORPORATION

MEGAJANA

Jana DCS

MALAKOFF UTILITIES

Gas District Cooling (M) Sdn Bhd

Malaysia DCS Key Areas

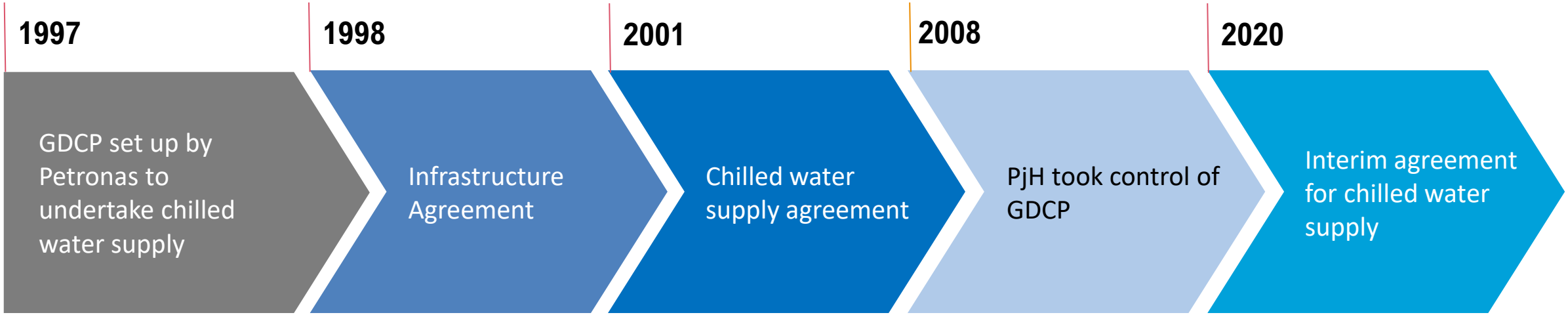
Total installed DCS capacity:
284,500 RT
(*est. 2021, MDCA members*)
Source: MDCA

GAS DISTRICT COOLING (GDC) PUTRAJAYA

- 30 December 1998 - Infrastructure Agreement was entered between Gas District Cooling (Putrajaya) Sdn Bhd and Putrajaya Corporation for GDCP to supply chilled water for the purpose of providing air conditioning to the end-users of Kawasan Perbadanan Putrajaya which includes the Putrajaya Federal Government Administrative Centre and to carry out the management, operation and maintenance of the district cooling plant and related infrastructure for the supply of chilled water.

- 30 October 2001 - GDCP entered an Agreement for the Supply of Chilled Water with the GOM for a period of 22 years commencing from **10 June 1999** and expiring on **9 May 2021**.

GAS DISTRICT COOLING (GDC) PUTRAJAYA



PLANT SETUP

GDCP consist of 5 plants as below:

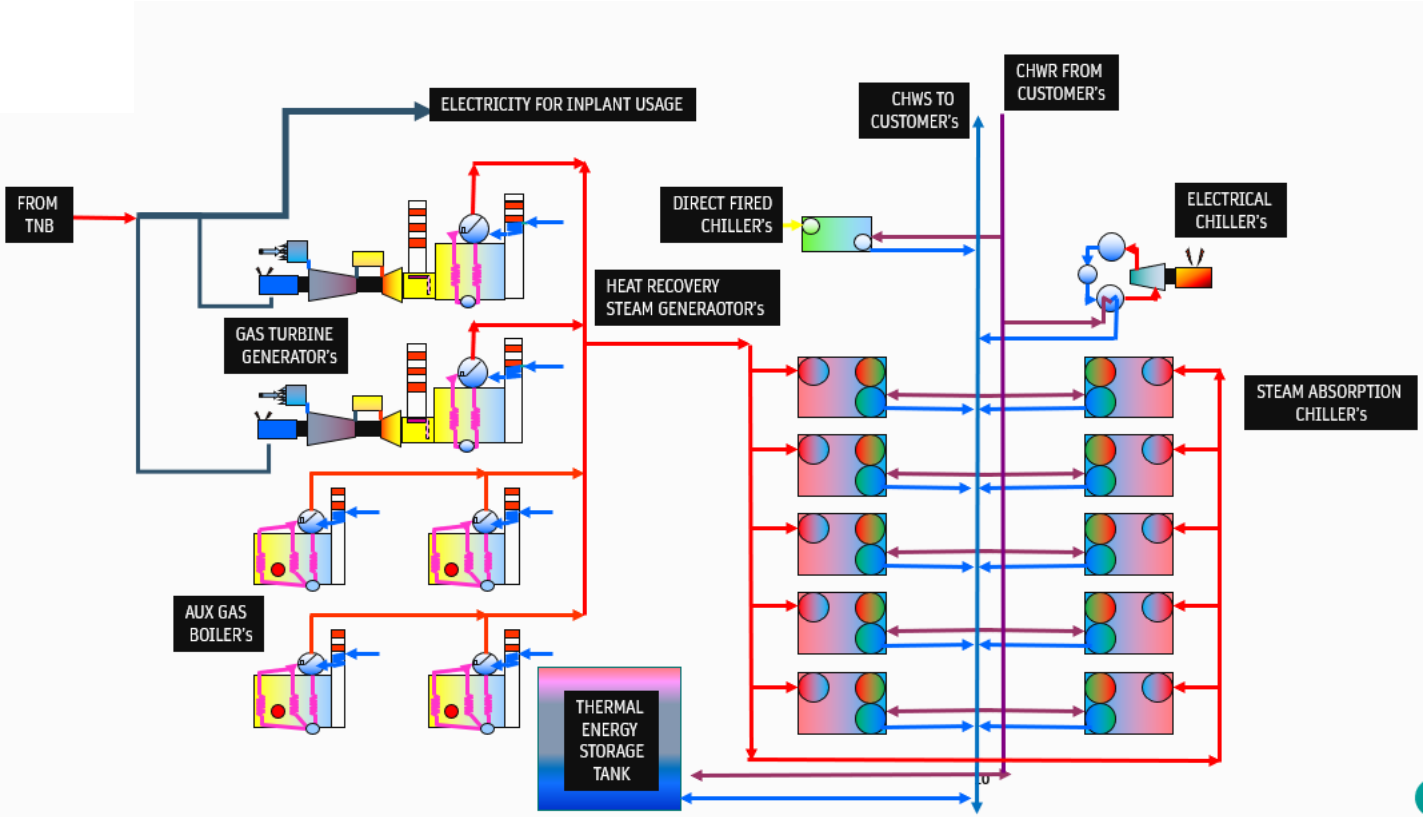
a. PJ 1 – Cogeneration + District Cooling System
b. PJ 2 – Cogeneration + District Cooling System
c. PJ 3 – District Cooling System (Electricity + Gas)
d. WISMA PUTRA – Stand-alone Chiller Plant (Gas + Electricity)
e. PICC – Stand-alone Chiller Plant (Electricity + Gas)

NOTE:

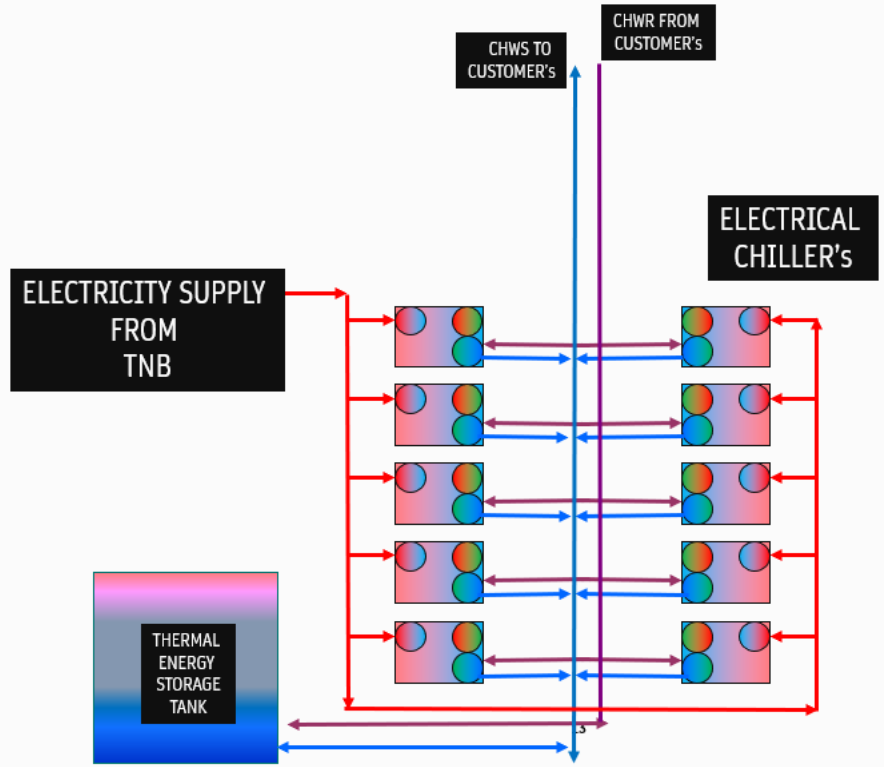
1. COGENERATION – plant having capability to generate electricity via gas turbine generator for its own internal consumption and steam generated to run steam absorption chillers for chilled water production.

PLANT SETUP

COGEN + DCS at PJ1 & PJ2



NORMAL DCS SETUP - ELECTRICAL



3
District
Cooling Plants

Total Cooling Capacity
(including TES & TIS)
98,600 RT

Energy Storage Capacity (TES
& TIS)
189,000 RTh

Gas Turbine Generator
4

2
Stand Alone
Cooling Plants

Total CHW Network
14 km x 2

17.2 MW
Electricity Generating Capacity

BIGGEST
DCS (with COGEN)
in Southeast Asia

102
Energy Transfer Stations
(including commercial)

45
Chillers

2
types of chiller
8
diff brands

Total CHW Volume
109,938 m3

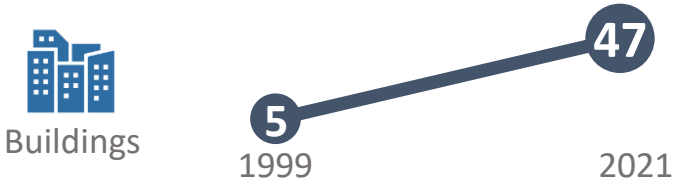
Malaysia' Experience: Cyberjaya Smart City District Cooling

High concentration of tech-based companies

Affordable world-class infrastructure

Living lab for innovation

DCS Evolution in Cyberjaya



Cyberjaya District Cooling Plant

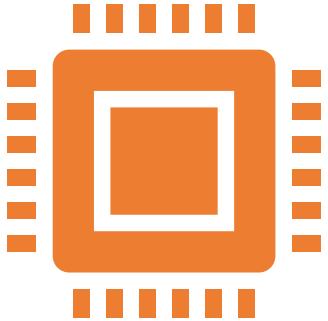
DCP 1

DCP 2

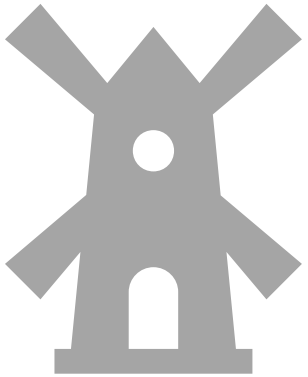
25,700 RT
Total cooling capacity

7,080 tonne
Emissions reduction (2021)

FUTURE PLAN



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

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