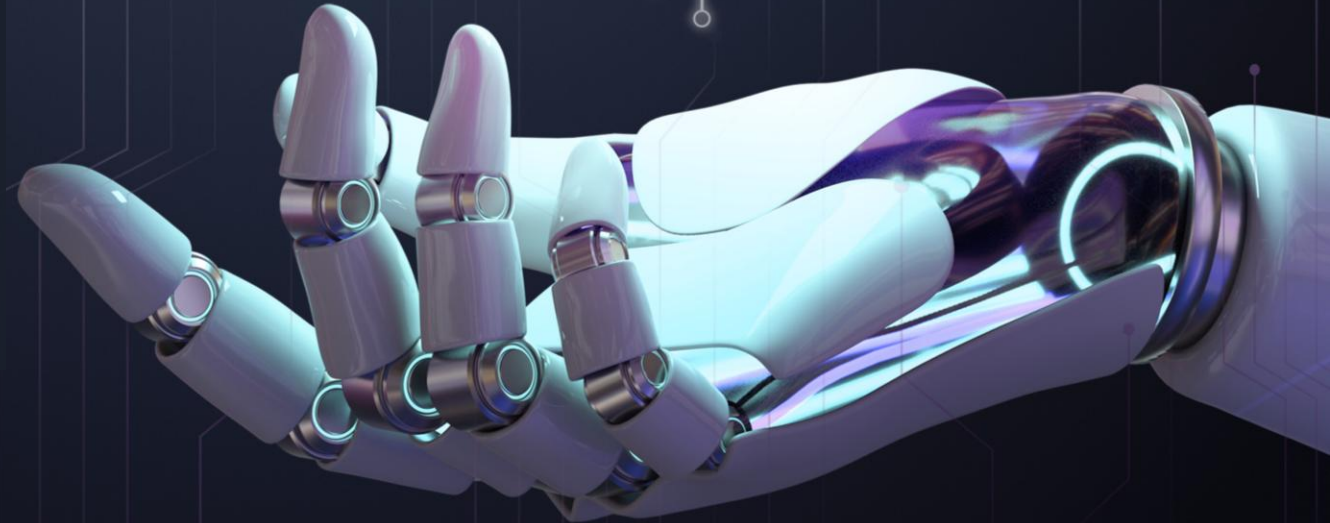


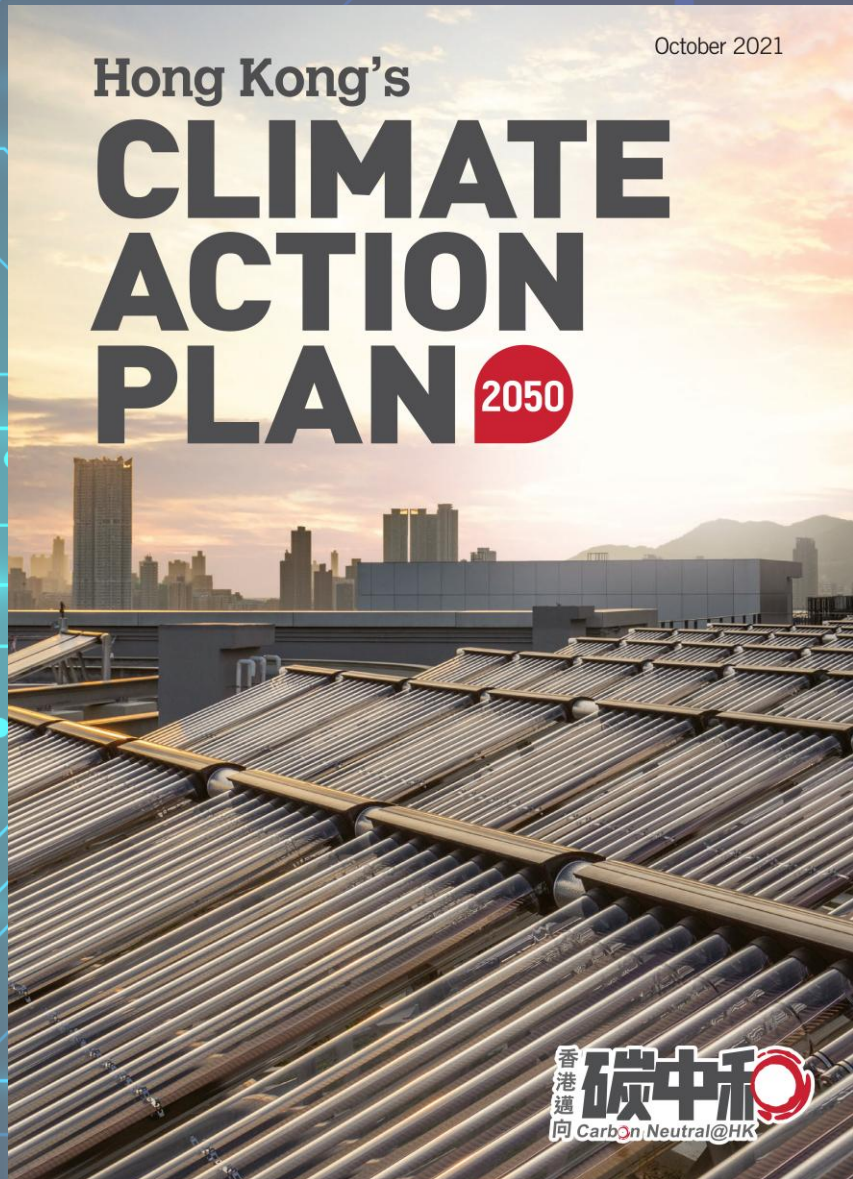
Advancing System-Level Energy Efficiency: Policy Harmonization and Innovative District Energy Services in APEC

**A Case Sharing from
Hong Kong, China**

***Smart Cooling:
Breakthrough Strategies
and Innovations***



Action against climate change



by 2035

**COMMERCIAL
BUILDINGS**
15-20%

Electricity consumption
(compared with 2015)

**RESIDENTIAL
BUILDINGS**
10-15%

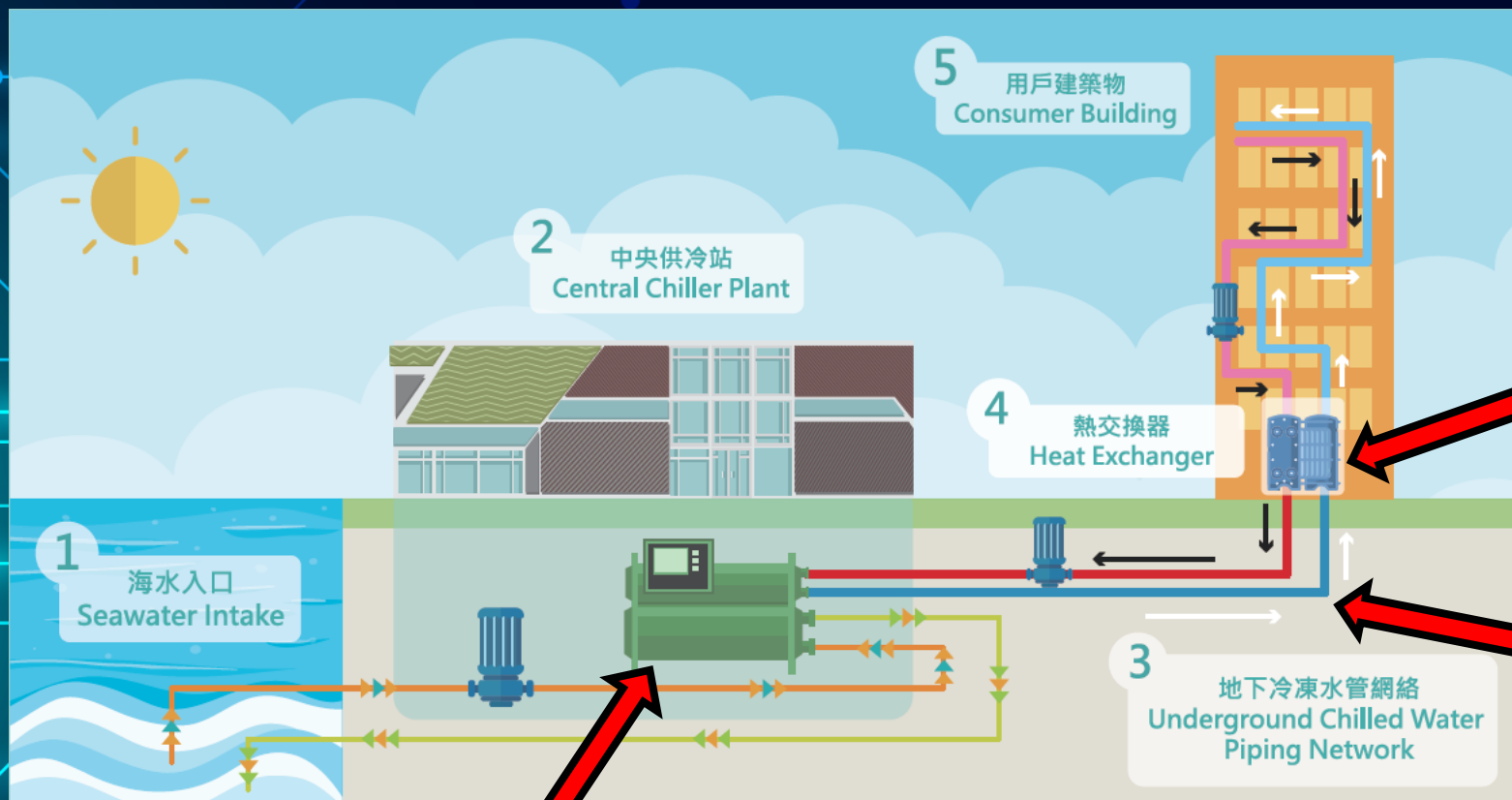
by 2050

(Reduce by 30-40%
subsequently)

(Reduce by 20-30%
subsequently)



What is District Cooling System (DCS) ?



Heat Exchangers



Underground Pipework



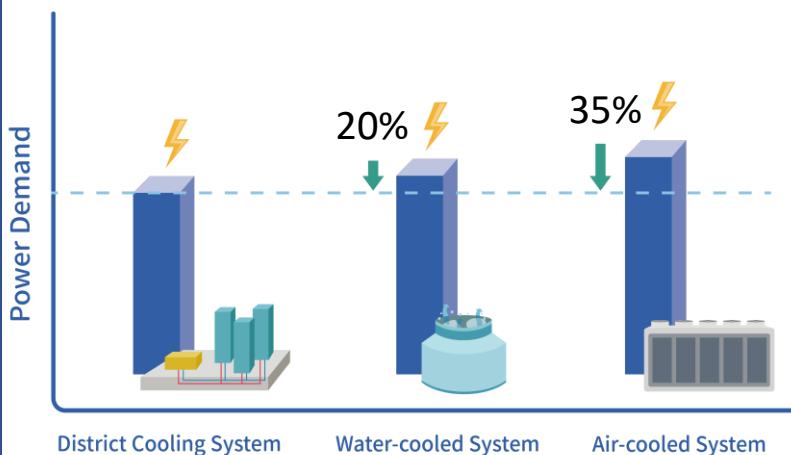
Chillers



Central Plant

Benefits of DCS

Electricity Consumption for Cooling



Energy Saving

傳統風冷式冷氣系統
Traditional Air-cooled Air-conditioning System

引致熱島效應
Induce heat island effect



系統安裝佔用空間
Occupied space for installation

風冷式冷水機
噪音及震動
Noise and vibration



區域供冷系統
District Cooling System

減少熱島效應
Reduce heat island effect



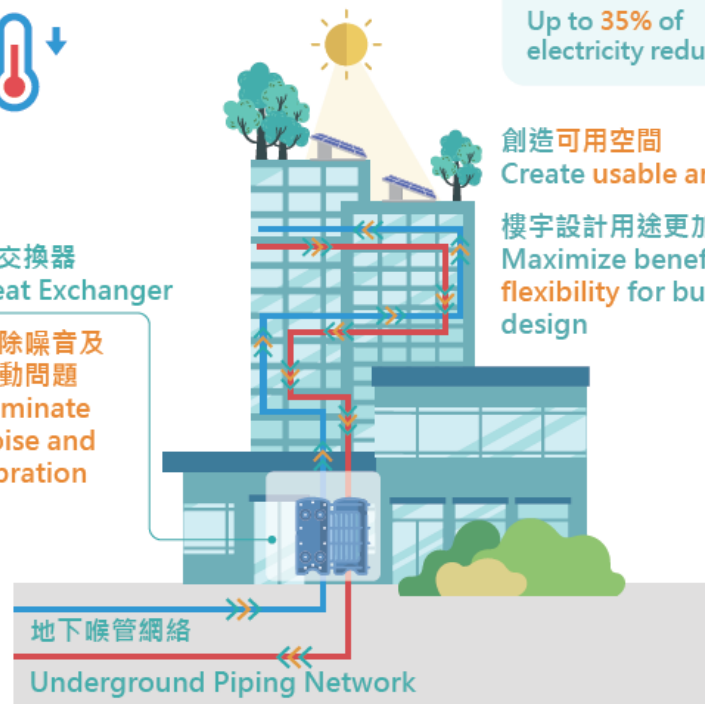
節省用電
Up to 35% of electricity reduction

創造可用空間
Create usable area
樓宇設計用途更加靈活
Maximize benefits and flexibility for building design

熱交換器
Heat Exchanger

消除噪音及震動問題
Eliminate noise and vibration

地下喉管網絡
Underground Piping Network



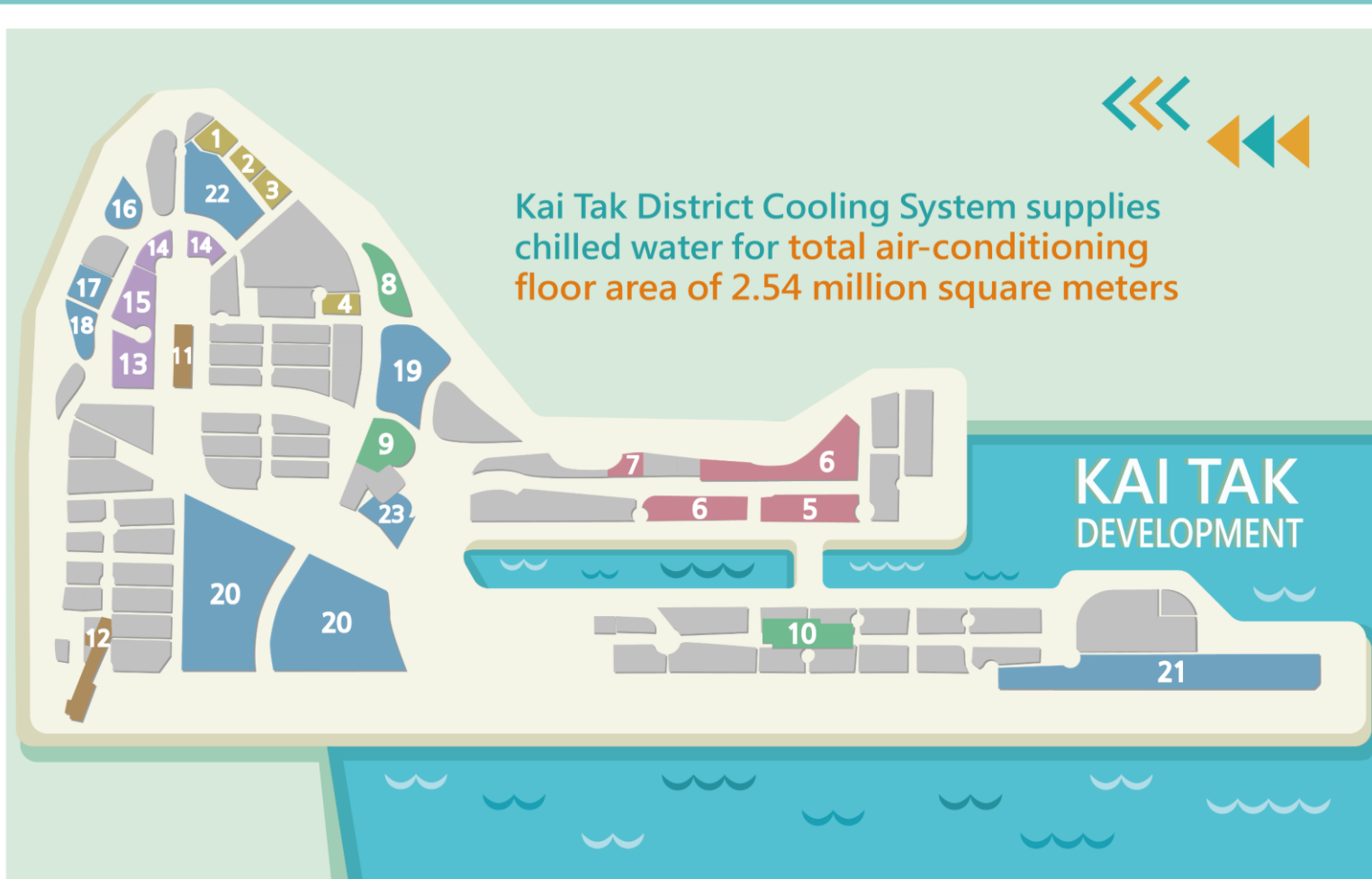
Release building space for greening

DCS at Hong Kong Kai Tak Development

- Former Kai Tak airport
- Redevelopment
Area >320 hectares
- Three DCS plants +
Seawater plant
- Supply chilled water
for 40+ buildings
- Total Cooling
Capacity = 462 MW



Kai Tak DCS User Buildings



Schools	Private Development
1 Cognitio College (Kowloon)	13 AIRSIDE
2 SKH Holy Cross Primary School	14 The Twins
3 PLK Stanley Ho Sau Nan Primary School	15 Phase 1 of Cullinan Sky
4 Baptist Rainbow Primary School (Under Construction)	
Hospitals	Government Buildings and Other Facilities
5 Hong Kong Children's Hospital	16 Kowloon East Regional Headquarters cum Ngau Tau Kok Divisional Police Station
6 New Acute Hospital (Under Construction)	17 Inland Revenue Centre
7 AFCD Animal Management and Animal Welfare Building Complex	18 Trade and Industry Tower
	19 EMSD Headquarters
Central Chiller Plants	20 Kai Tak Sports Park
8 Kai Tak District Cooling System Plant No. 1	21 Kai Tak Cruise Terminal
9 Kai Tak District Cooling System Plant No. 3	22 Ching Long Shopping Centre
10 Kai Tak District Cooling System Plant No. 2	23 Central Kowloon Route - Kai Tak Ventilation Building and Administration Building
MTR Stations	
11 Kai Tak MTR Station	
12 Sung Wong Toi MTR Station	

DCS Plant Challenges – High Control Complexity!!!



Various Types of User buildings



Government Buildings



Metro Stations



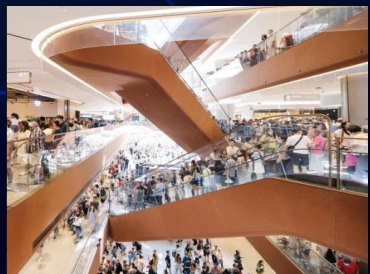
Hospital



Cruise Terminal



School



Shopping Mall & Office

Mega and Complex Plant Design



Pump: 45 nos.



Cooling Towers: 18 nos.



Chillers: 34 nos.



Underground Pipes:
63km

High Standard



Committed Water
Supply Temp of 5°C

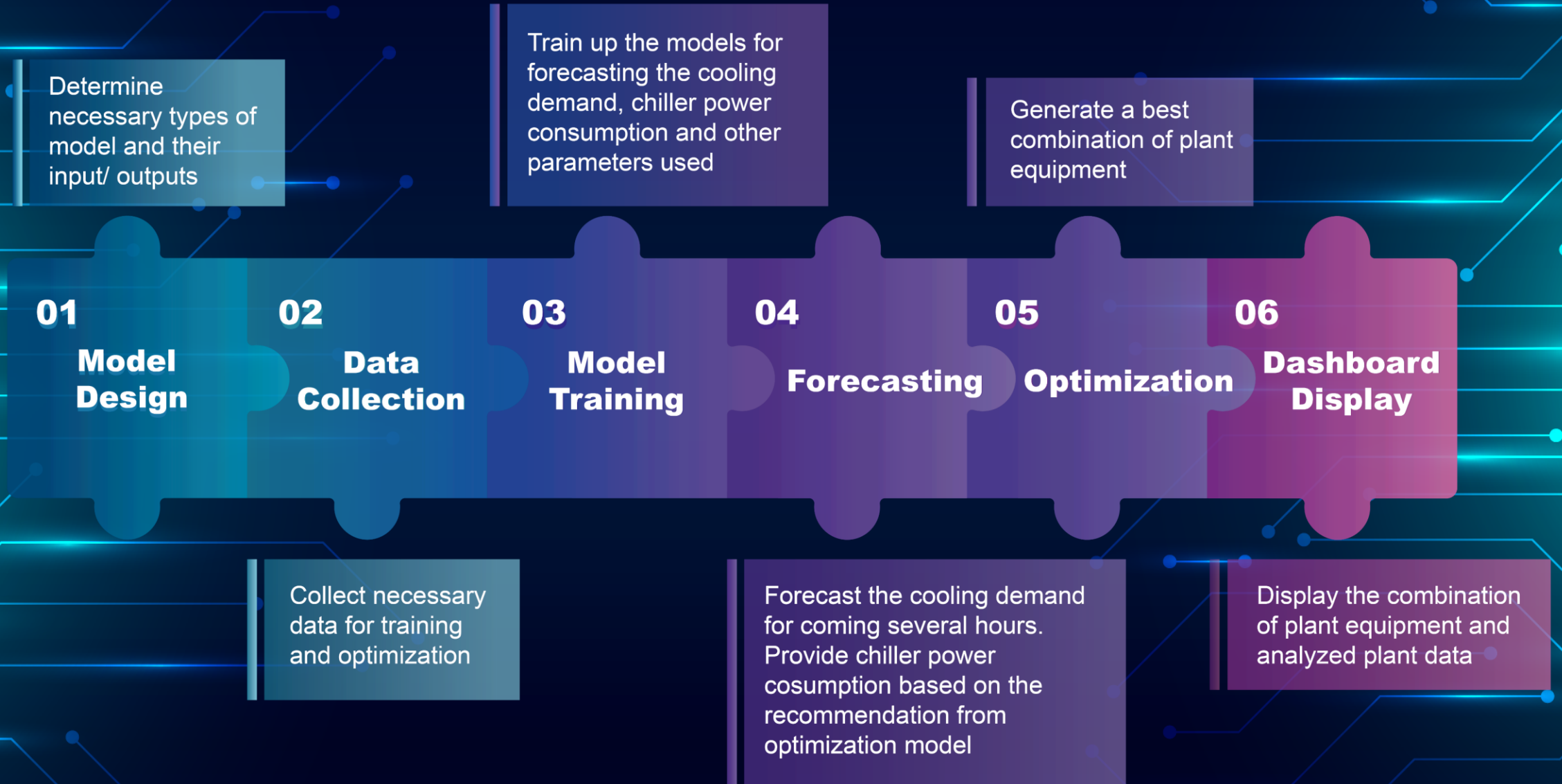


Stable and Reliable
99.999%

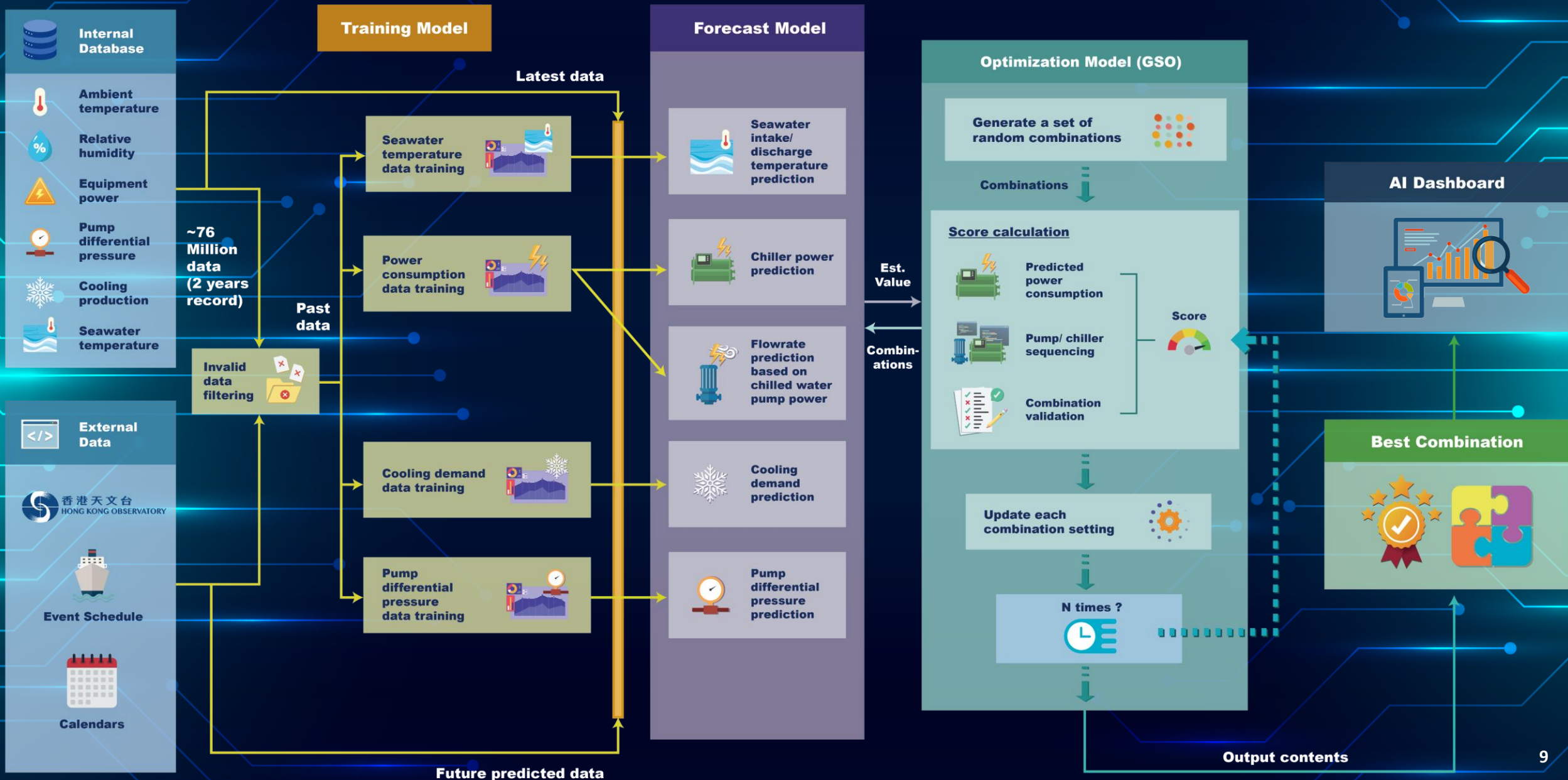


Round the Clock Services

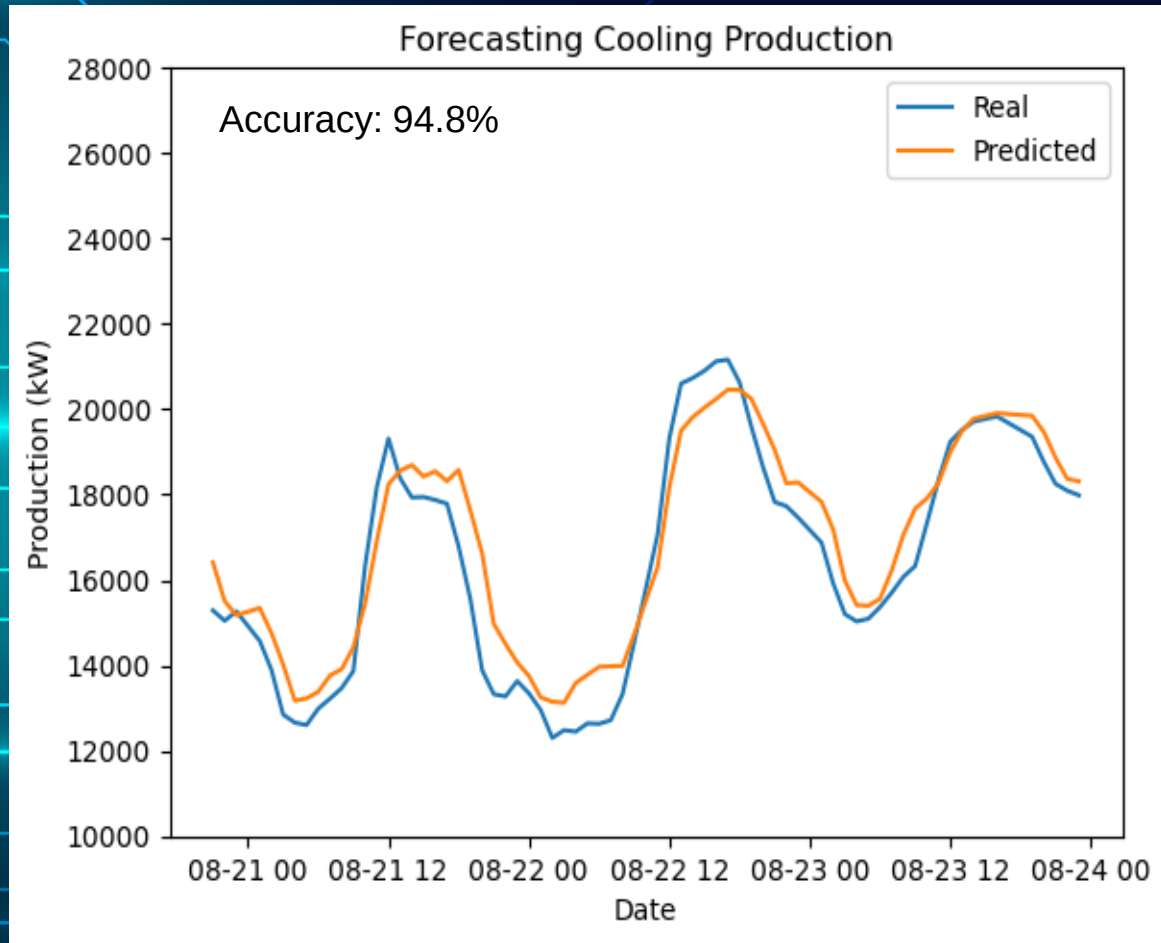
AI Workflow



AI Control flowchart



AI Model – Cooling Demand Prediction



Inputs:

- Ambient temperature and humidity forecast by Hong Kong Observatory
- Event schedules
- Calendars

Output:

- Cooling demand

AI Models



Seawater intake temperature prediction



Chiller power prediction



Flowrate prediction based on chilled water pump power

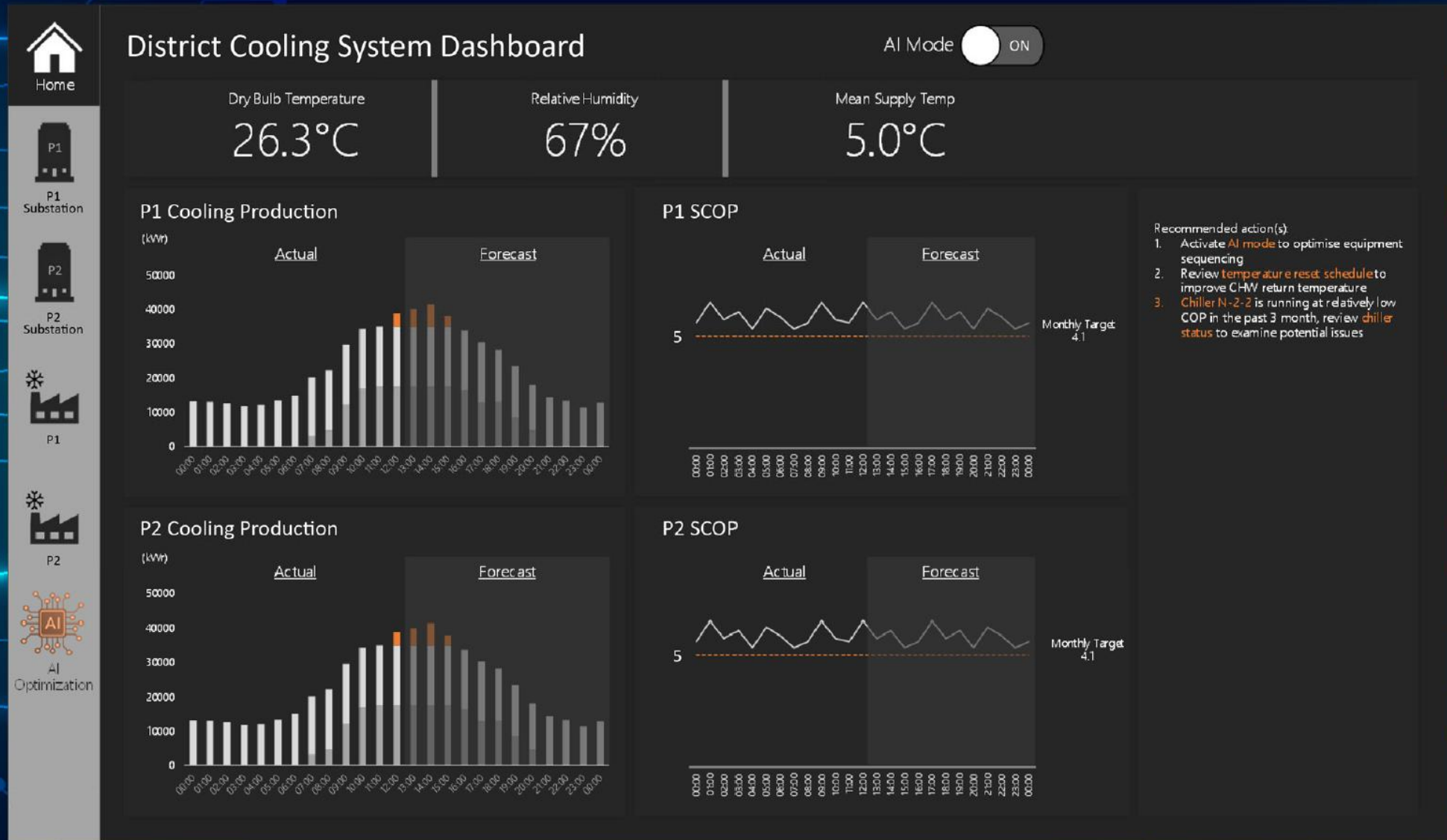


Cooling demand prediction



Pump differential pressure prediction

AI Dashboard – Plant



Running

Under Maintenance

Standby

AI Mode ☒ ON

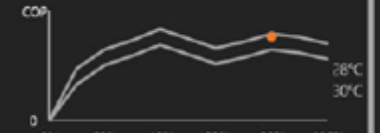
5.0°C

Loading
78%

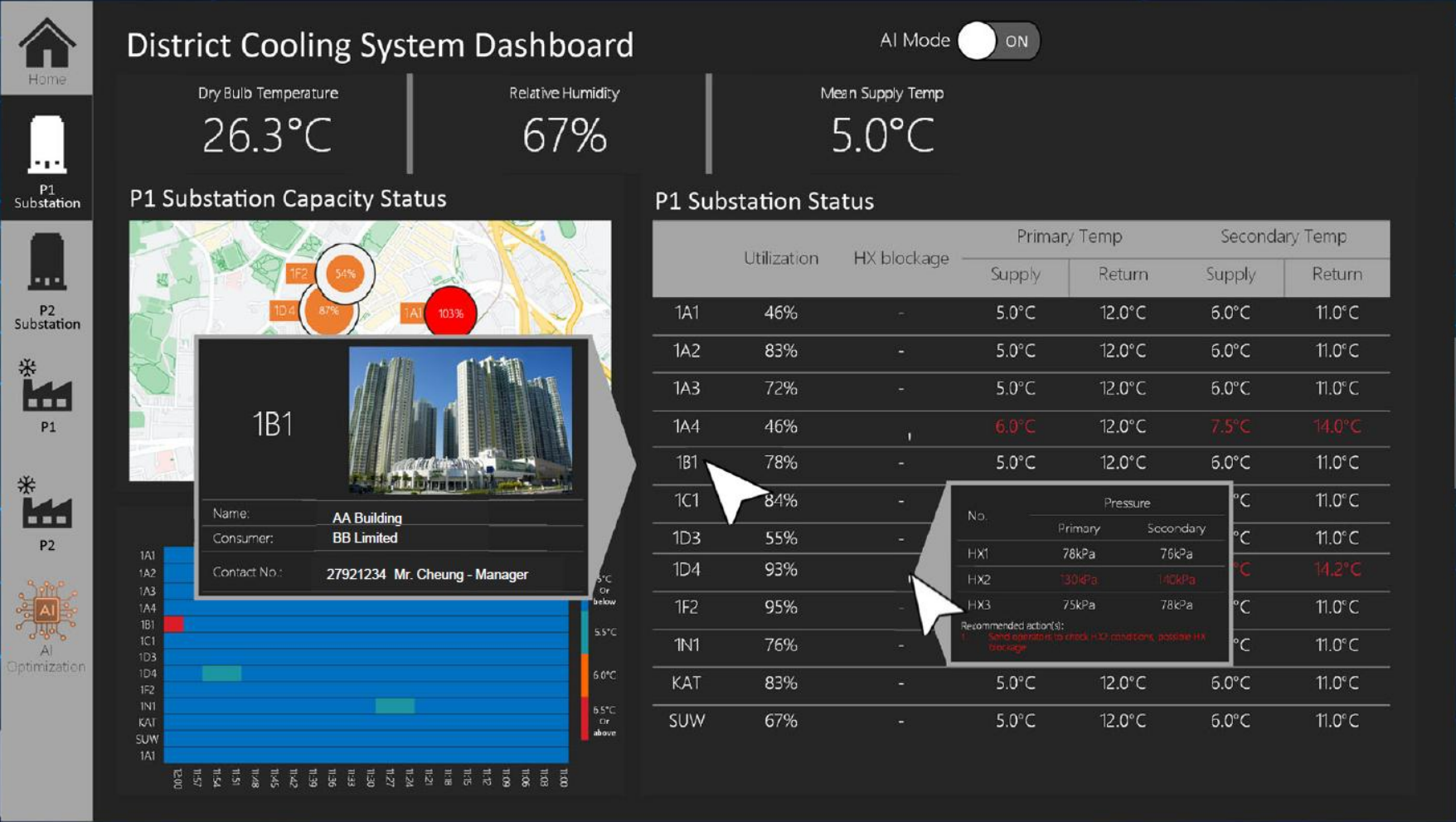


Parameter	Value
Loading	82%
COP	5.65

Liquid Level	57%
Small ΔT	0.9°C
Vibration Alarm	Normal
Running Hour	41,387



AI Dashboard – Consumer



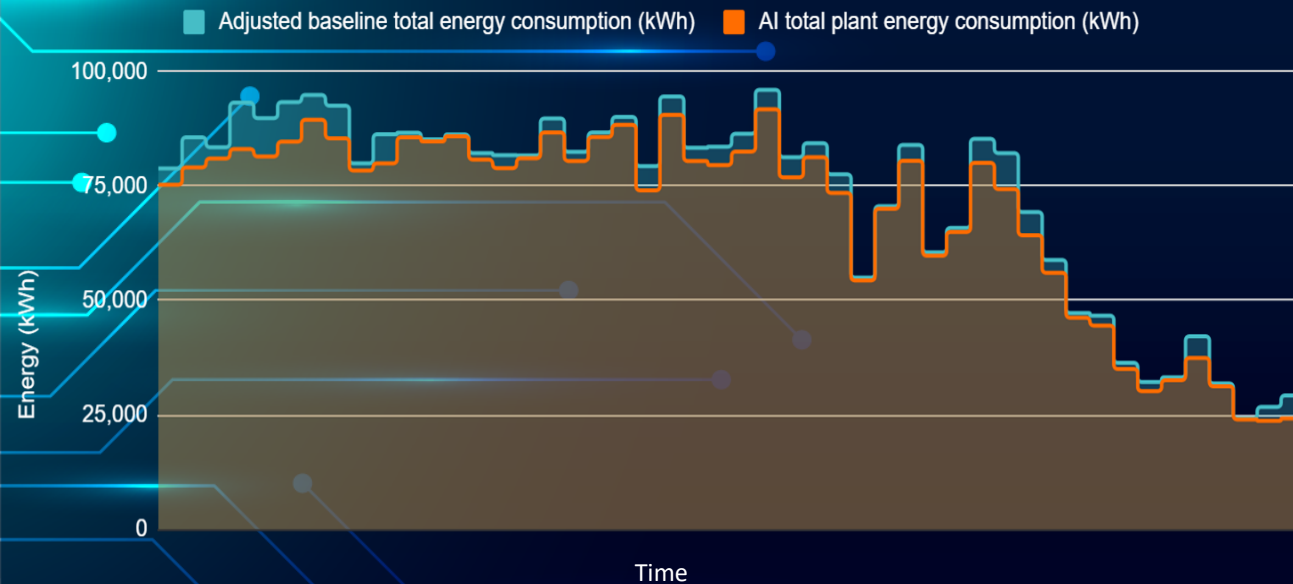
Real Time HX
Status and
Condition

AI achievement

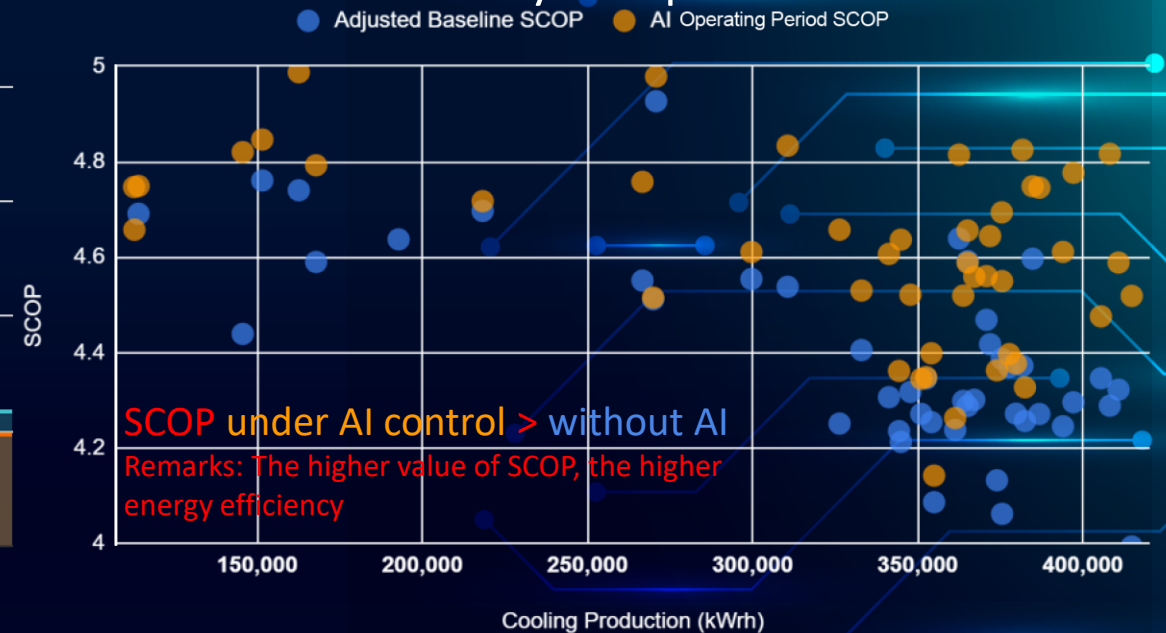
Improved Energy Performance in District Cooling Plant

- Estimated Additional Annual Energy Savings: 1.7M kWh
- Equivalent to approx. 520 three-person household annual energy consumption in Hong Kong

Energy Consumption Comparison



Efficiency Comparison





Thank You



Plant Virtual Tour

APEC Policy Implications & Harmonization

Three Pillars for Scaling Innovative District Energy Services Across APEC

01



Standardise Efficiency Metrics

Harmonise system-level standards across APEC economies

02



Open Data & Cybersecurity Frameworks

Enable cross-border AI data sharing & security

03



Integrated Urban Planning

Mandate DCS connection in new urban developments

Kai Tak DCS — a replicable model for system-level efficiency across APEC