

Journey to “Clean Air for Schools” in Hong Kong



Organizer

Clean Air Network
CAN
健康空氣行動

Collaborator



Sponsor

擇善
ZESHAN
FOUNDATION

Project Background

COVID

- How and what can be done to prevent another pandemic
- Rising concern on air quality to avoid sickness

Clean Air Schools for Hong Kong

Jan 2022 - Mar 2024

Theory of Change

Data

15-month indoor air quality monitoring (PM & CO₂) in schools



Knowledge

Build knowledge of schools and public about air pollution



Action

Recommend and test mitigation strategies



Clean Air Schools for Hong Kong

Project Goals

Environment

- **Minimise students' exposure** to air pollution
- Equip schools with **data** and **knowledge** about air pollution



What we did

- 15-month air monitoring in schools
- Provide mitigation measures
- Education toolkits, workshops, review meetings

Social

- **Enhance public awareness**



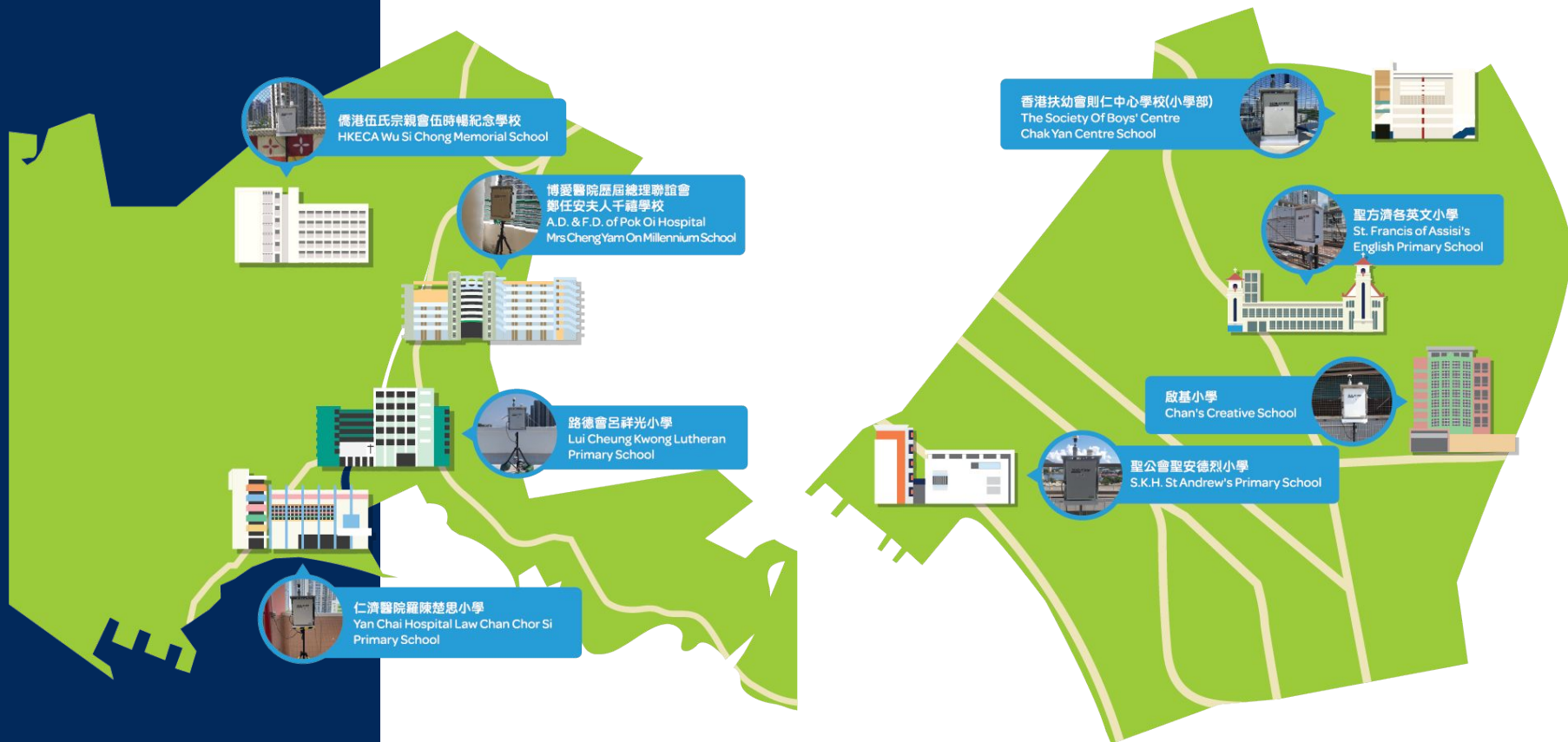
What we did

- CASHK app to share data with community
- Hold public events like Clean Air Day and community walks



Participating Schools

- **8 primary schools from Tuen Mun and Sham Shui Po**
- Located near highways, inside the community and in the periphery of the district



IAQ Standards



	Project Standard (HKUST)	Hong Kong IAQ Objectives
Averaging time	1-hour	8-hour
CO ₂	<800 ppm (Excellent) <1,000 ppm (Good) >1000 ppm (Moderate)	<800 ppm (Excellent) <1,000 ppm (Good)
PM ₁₀	<20 µg/m ³ (Excellent) <100 µg/m ³ (Good) >100 µg/m ³ (Moderate)	<20 µg/m ³ (Excellent) <100 µg/m ³ (Good)
PM _{2.5}	<10 µg/m ³ (Excellent) <15 µg/m ³ (Good) >15 µg/m ³ (Moderate)	Not provided

IAQ Standards



School Type	Count as of Feb 2023
Subsidized Primary School	1
Subsidized Secondary School	1
Kindergarten	8
Special School	1
International School	8

Indoor Air Quality Certificate
室內空氣質素檢定證書

Valid period: _____ to _____
有效日期: _____ 到 _____

I hereby certify that the indoor air quality of the following location(s) has fully complied with the Excellent Class of the Indoor Air Quality Objectives.
本人證明下列地點的室內空氣質素完全符合「卓越級」室內空氣質素指標。

Name of building: _____
建築物名稱: _____
Address: _____
地址: _____

Certified location(s): _____
已檢定地點: _____

Name of competent examiner: _____
合資格檢驗師姓名: _____
IAQ Certificate Issuing Body: _____
室內空氣質素證書發給機構: _____
Signature: _____
簽署: _____
Date of issue: _____
簽發日期: _____
Certificate No.: _____
證書編號: _____

Indoor Air Quality Certification Scheme for Offices and Public Places
辦公室及公眾場所室內空氣質素檢定計劃

Indoor Air Quality Certificate
室內空氣質素檢定證書

Valid period: _____ to _____
有效日期: _____ 到 _____

I hereby certify that the indoor air quality of the following location(s) has fully complied with the Good Class of the Indoor Air Quality Objectives.
本人證明下列地點的室內空氣質素完全符合「良好級」室內空氣質素指標。

Name of building: _____
建築物名稱: _____
Address: _____
地址: _____

Certified location(s): _____
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CO₂

IAQ Data & Insights

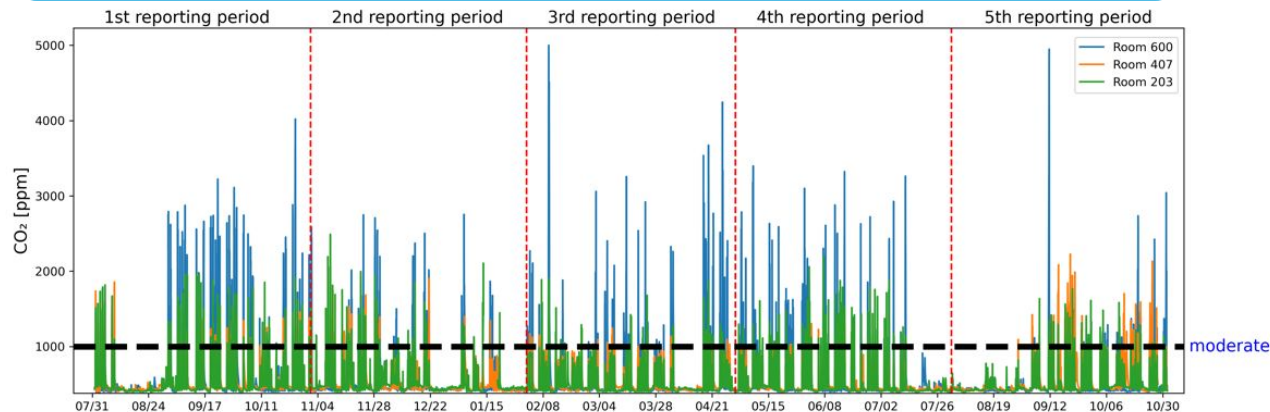


High CO₂ levels

- Indicate poor ventilation and increased **risk of infection of respiratory pathogens**
- Impact students' **cognitive functions**

Observation:

- CO₂ level repeatedly high in most monitored classrooms
- **Quarterly average: approx 1100 ppm**
- Hourly CO₂ levels **exceed 1000 ppm in 32% of the occupied hours**



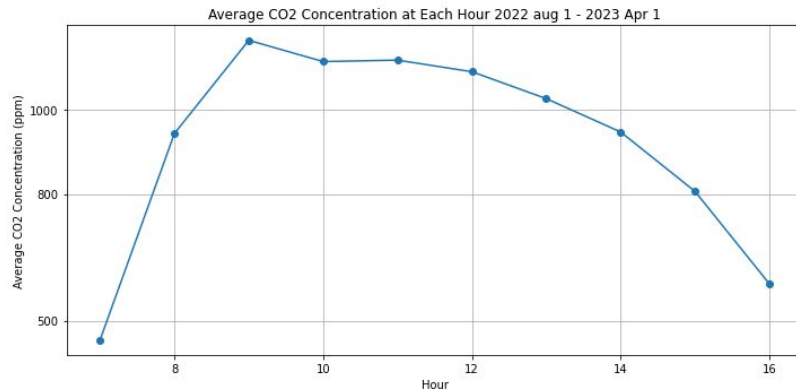
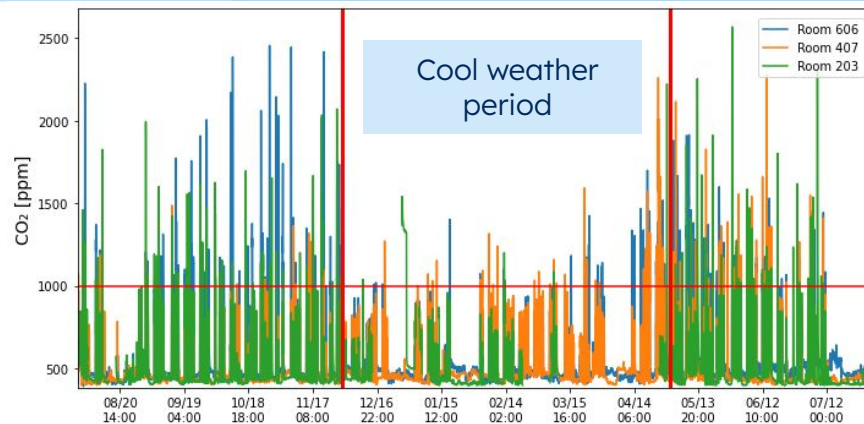
CO₂

IAQ Data & Insights



Temperature & CO₂

- CO₂ level was higher when room temperature was lower
- **Ineffectiveness of air conditioning systems** in maintaining acceptable IAQ
- Students may stay indoors longer and be more active during warmer seasons



PM

IAQ Data & Insights



Observations:

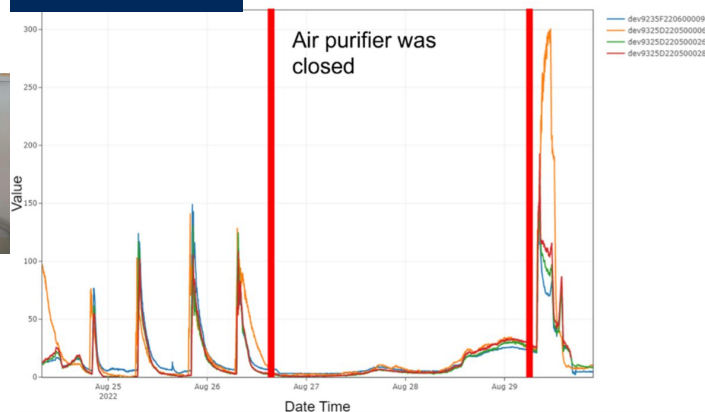
- Indoor sources: Case of **vapourized chlorine dioxide** disinfectant.
- Outdoor sources: **50-60 %** of PM pollution is from **outdoor infiltration**.
- Hourly $PM_{2.5}$ levels was above $15 \mu\text{g}/\text{m}^3$ in 18 percent of the occupied hours in some classrooms.



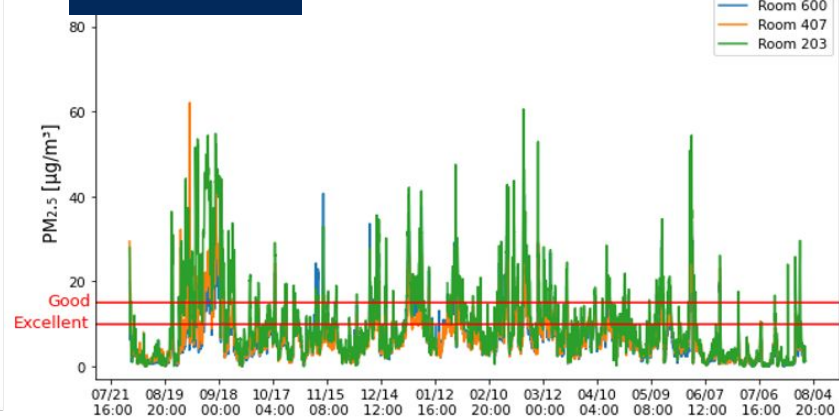
Policy action

Dangers of outdoor PM should be **communicated to schools** via current EPD AQHI for appropriate indoor actions.

Indoor sources



Outdoor sources



Project standard



Mitigation Strategies

(Based on existing school resources)



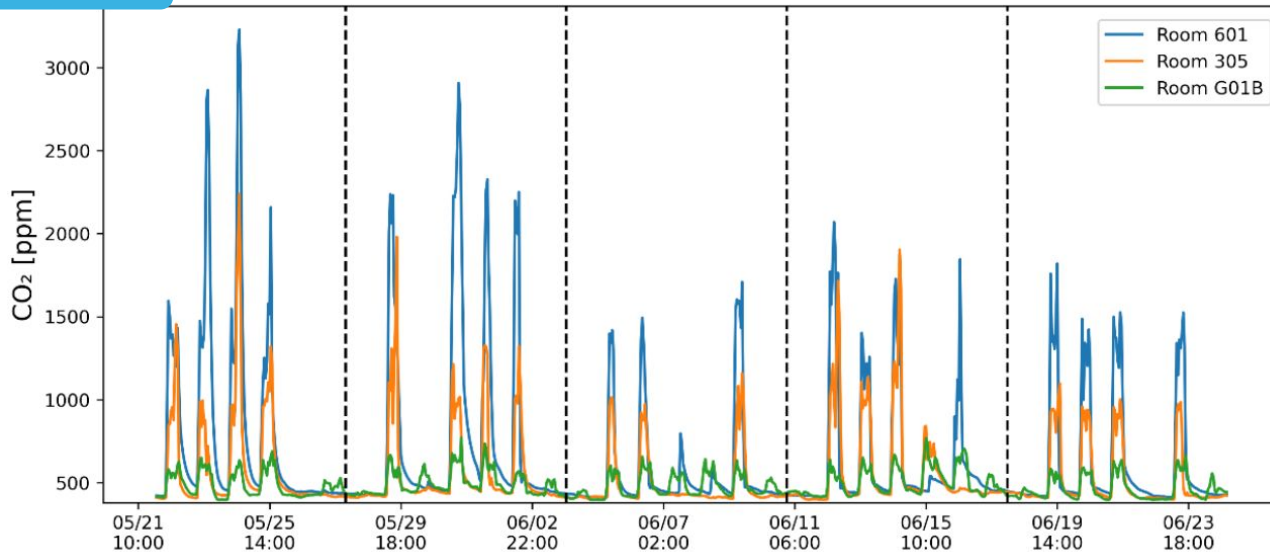
Case: Exhaust/FAP

2 exhaust
+ 2 FAP

2 FAP only

2 exhaust only

1 exhaust
+ 1 FAP



Education Bureau budgets HK\$70m for improving schools' ventilation

Local | 1 Mar 2022 8:07 pm



Room 601 vs Room 305

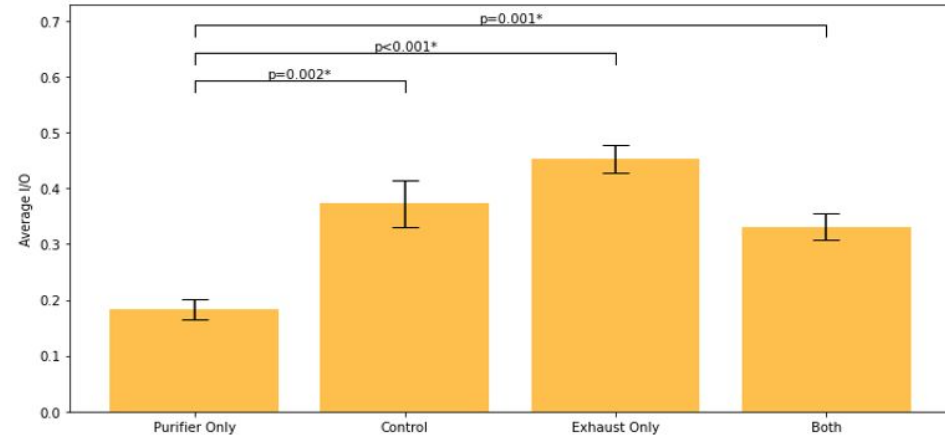
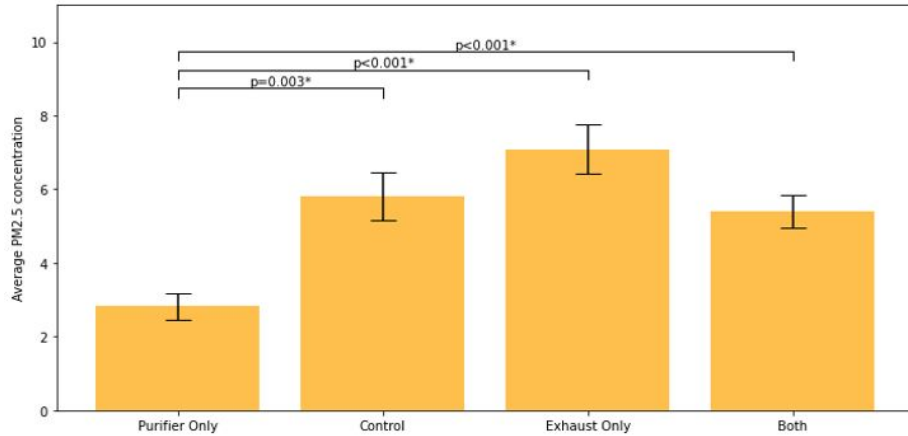
- Different patterns on how exhaust and FAP affect indoor CO₂ concentration

Mitigation Strategies

(Based on external resources)

Purifiers Study and Effectiveness

- Indoor **PM_{2.5}** concentrations **significantly reduced**
- Indoor CO₂ concentrations not reduced
- Best used in conjunction with proper ventilation





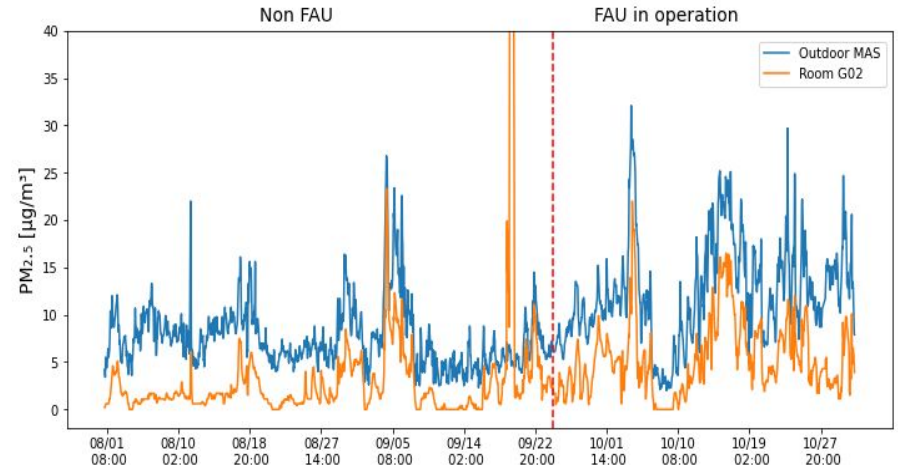
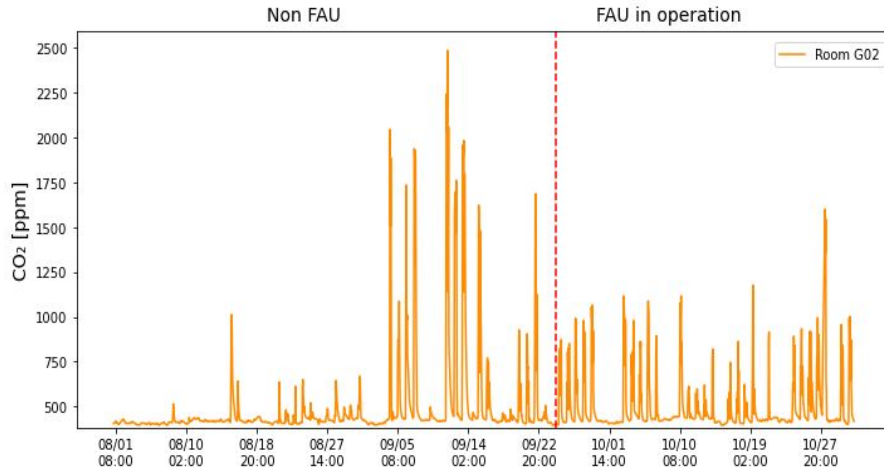
Mitigation Strategies

(Based on external resources)

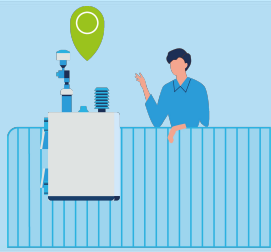


CO₂/PM Levels and Effective Air Exchange

- Introduction of fresh air unit (FAU) **significantly improved CO₂ and PM levels.**
- May affect thermal comfort of the room.



Conclusion: Finding the Balance



01

**Occupancy-driven
ventilation
strategies**

02

**Dangers of PM
not to be
underestimated**



The Challenge



01

If you don't measure, you don't manage

- Awareness for a proper audit and recommendation programme

02

Resources needed for schools to implement:

- Measurement
- Reporting
- Compliance

Thank you!

