SMART
AUTOMATION ENERGY

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INTELLIGENT
EFFICIENCY
@WORK

Project highlights

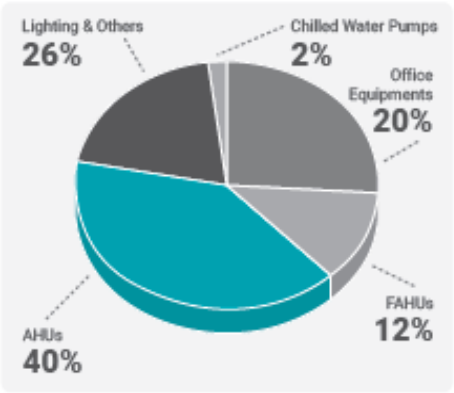
Energy Performance Project

Project Highlights

16,500m² Floor Area

7 storey building

Annual Energy Highlights



3.3 M AED
Energy Bill

7.33 M kWh
Energy Consumption

Challenges

- High Energy Bills
- Temperature Fluctuation causing Human Discomfort

Solution

- Demand Controlled Ventilation
- Digi-VAV® Control System on AHU
- VFD Control on AHU
- Intelligent Building Analytics Platform

Financing

- Guaranteed Savings

Project Results

Environment

1.53 M kWh Savings

↓ 1,109 Tonnes

↓ 238

↑ 28,738 ten-year old seedlings

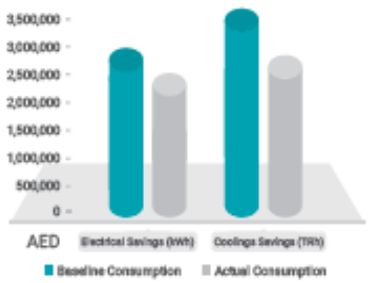
Economic

682,380 AED
Annual Energy Cost Savings

2.1 years
Simple payback

20.6% Energy Savings

Energy Savings Profile



Delta T Project

Project Highlights

Standard Chartered Bank at DIFC, Dubai

Annual ΔT Highlights Performance

413,758 AED
Annual Penalties Pre-Retrofit

5.2°C
Average ΔT at the building side Pre-Retrofit

0 AED
Projected Annual Penalties Post-Retrofit

8.9°C
Projected Average ΔT at the building side Post-Retrofit

Project Results

Above 9°C
Achieved Delta T after controls

413,758 AED
Projected Annual Cost Reduction

1.23 Years
Projected Simple Payback

Challenges

Low Delta T (ΔT) Syndrome
Low difference between the temperature going inside the building and that returning, causing a penalty by the district cooling provider

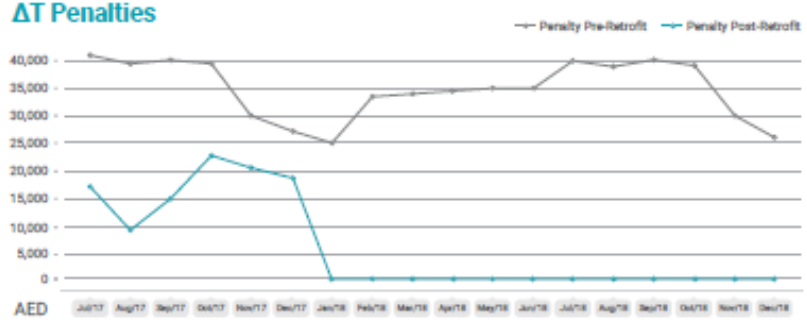
Solution

Controlling chilled water flow at the Secondary side of the hear exchanger to maintain the desired ΔT

Financing

- Cost Reduction Contract
- Guaranteed Performance

ΔT Penalties



Intelligent Building Analytics Platform

Adaptive Energy Modelling:

- Automatically learns the building's thermal characteristics and energy requirements
- Adapts to changes in space usage or the building envelope over time.

Forecast Energy Use:

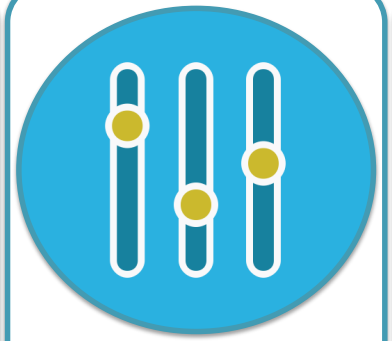
- Incorporates weather forecasts, utility data and proprietary algorithms

- create an optimal forecast for the building's energy usage, cost and tenant comfort.

Optimized BMS Management:

-Continuously optimize operations based on current and predicted conditions sending command changes

- Supply air temperature and Supply air static pressure as well as Zone air temperature



Variable Parameters:

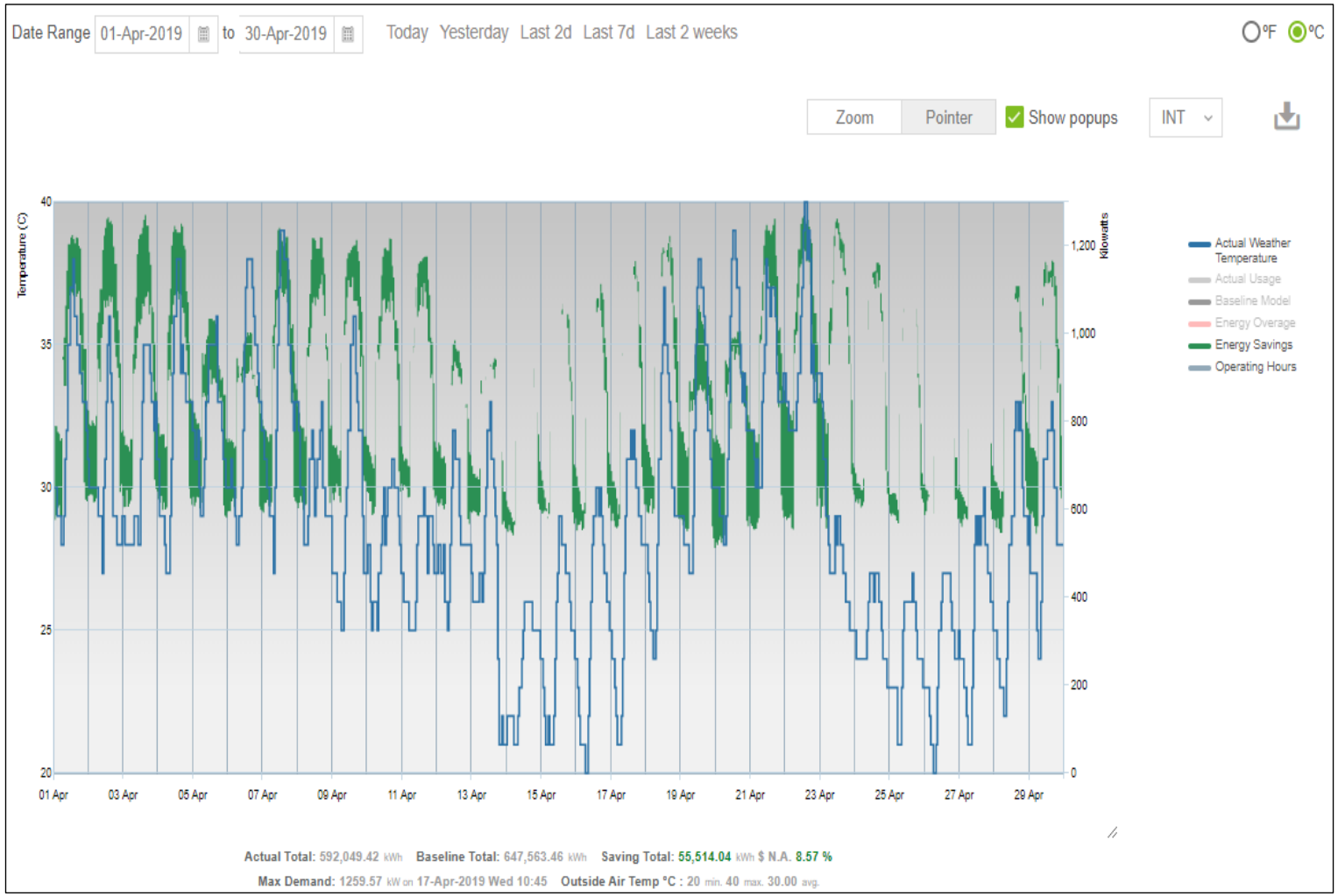
Operators can set key parameters to influence the optimization process depending on their priorities for reducing energy, cost or increasing comfort performance (or any combination thereof).

Reports and Dashboard:

All historical and management information is made readily available along with event reporting.

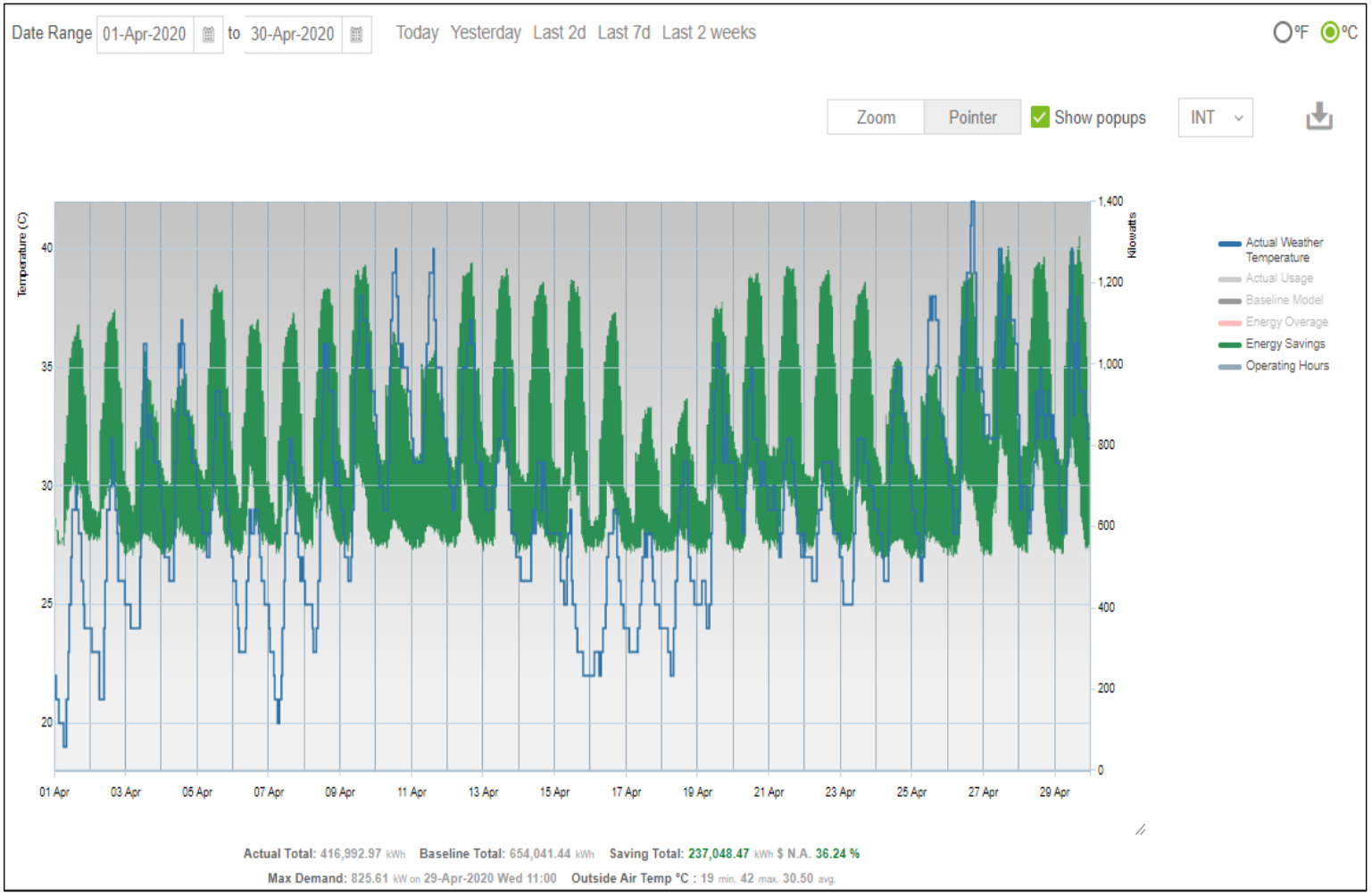
IoT Energy Performance Dashboards

ENERGY SAVING DURING 1st to 30th APRIL 2019 = 8.6% due to Energy efficiency Project



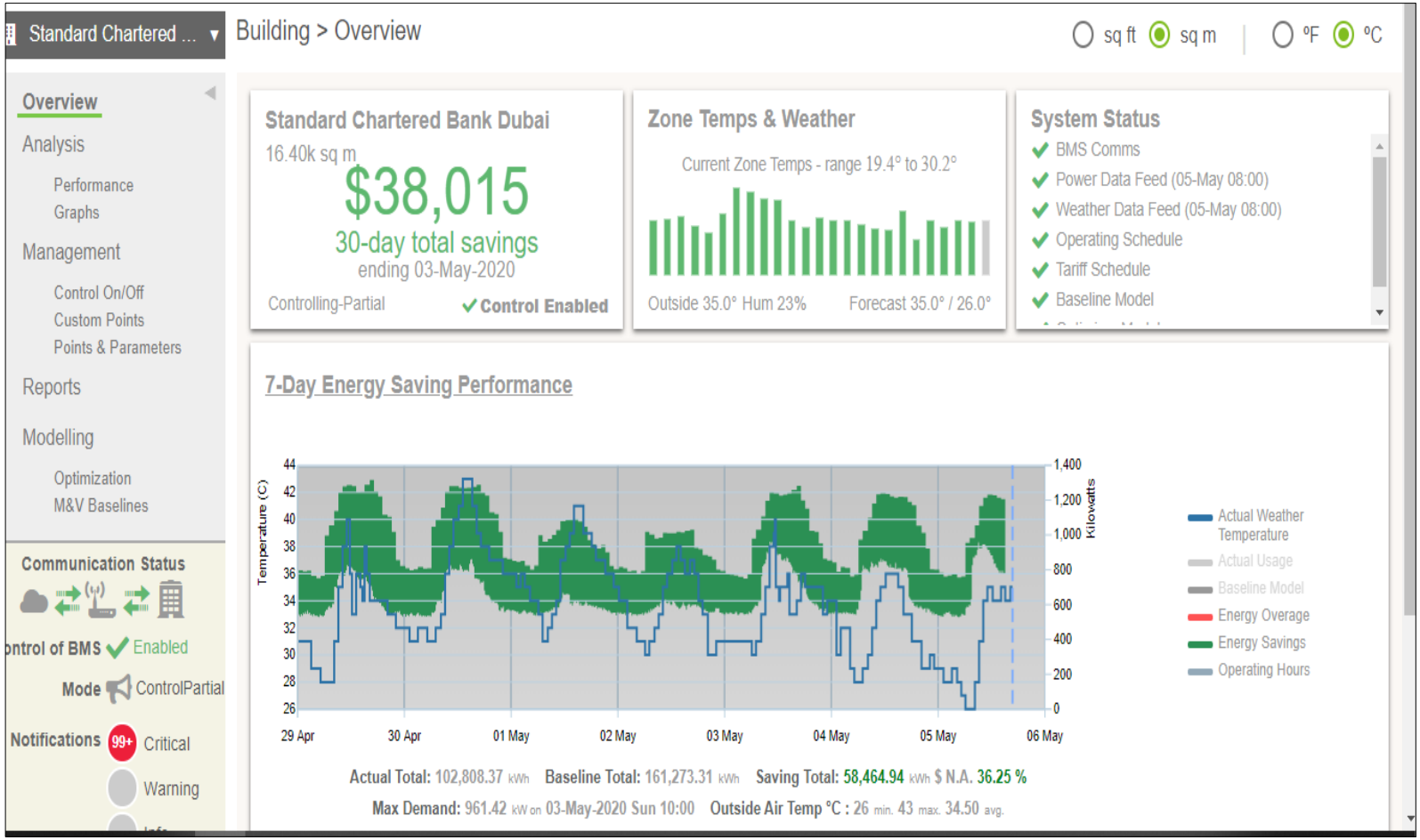
IoT Energy Performance Dashboards

ENERGY SAVING DURING 1st to 30th APRIL 2020 = 36.24% due energy efficiency project + AHUs kept off due to low occupancy in the building



IoT Energy Performance Dashboards

ONE WEEK ENERGY SAVING DURING 29th APRIL to 06th MAY 2020 = 36.25% due energy efficiency project + AHUs kept off due to low occupancy in the building

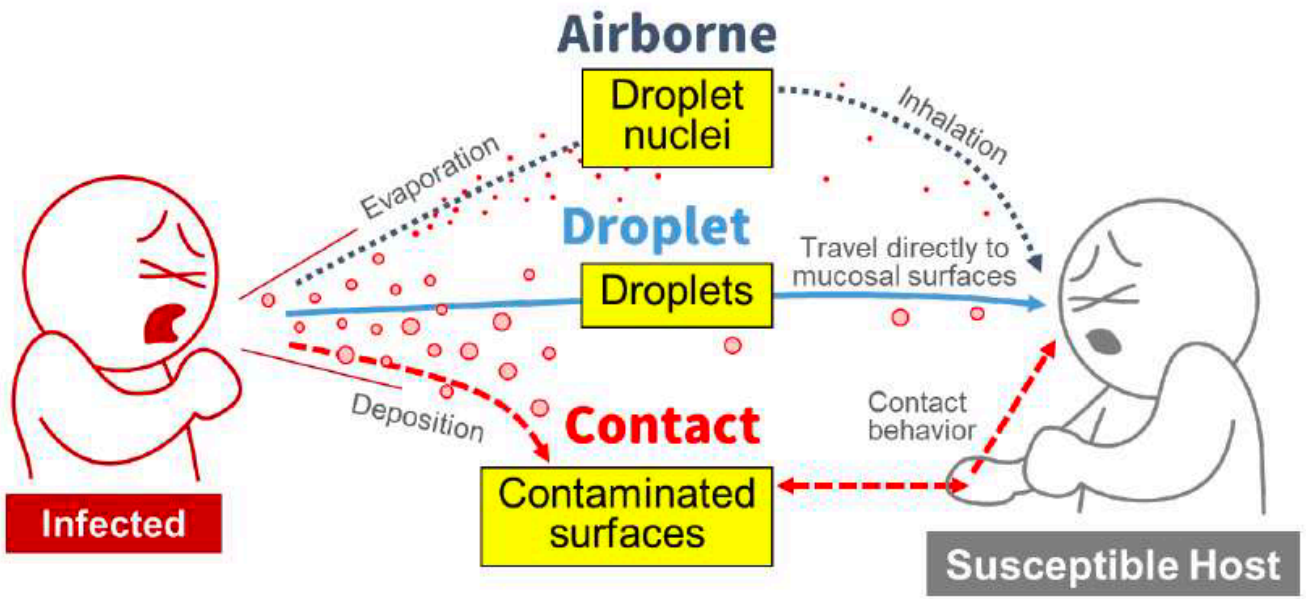


Energy Savings differences between occupied & unoccupied status

PERIOD	CONSUMPTION	COMMENTS
Baseline consumption in April 2019	647,563 kWh	depending on the building energy model & weather data (CDD)
Baseline consumption in April 2020	654,041 kwh	depending on the building energy model & weather data (CDD)
Actual consumption in April 2019	592,049 kWh	Actual from utility meters
Actual consumption in April 2020	41,6992 kWh	Actual from utility meters

% reduction in actual consumption from April 2019 to April 2020 is **30%**. This can be considered as due to low occupancy during lockdown due to COVID-19.

Viruses Modes of Transmission

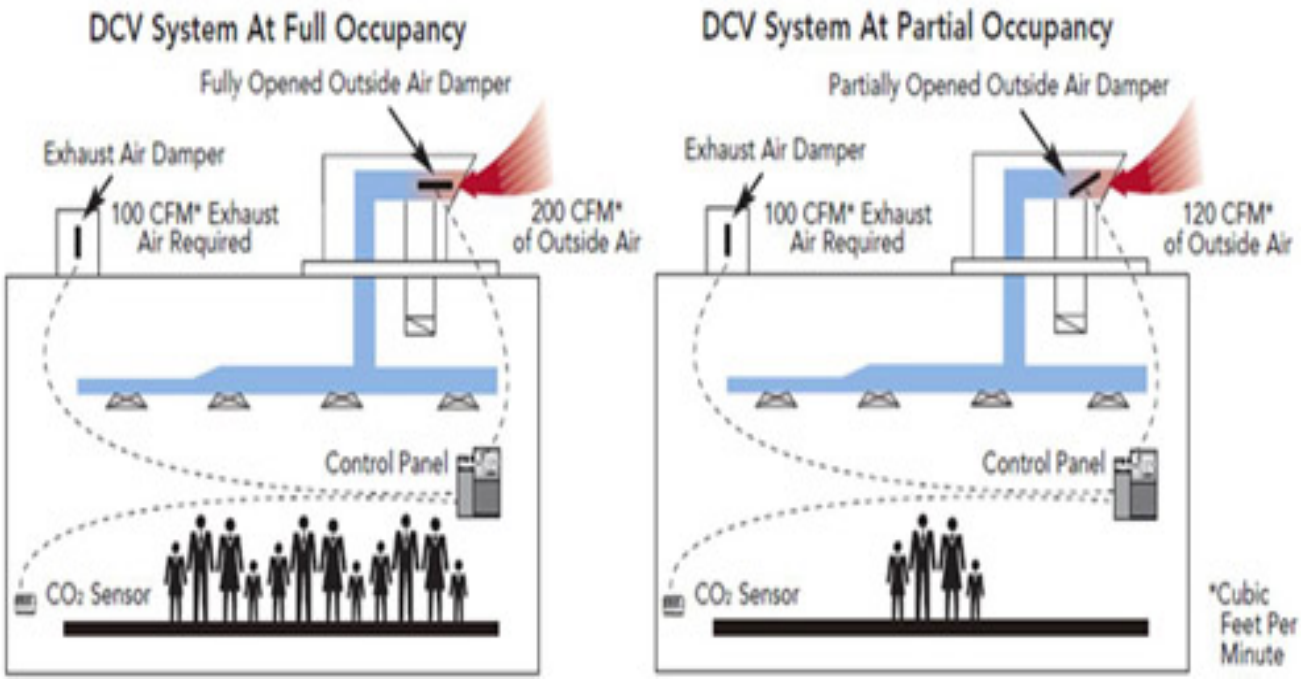


For the Airborne Transmission Mode: Where particles will typically have dimensions less than 10 µm, decreasing the concentration of these particles can be achieved by diluting them with fresh air provided by the ventilation process

Modes of Transmission from Exhaled Pathogens (adapted from leaflet of the Office of the Prime Minister and the Ministry of Health, Labor and Welfare of Japan (2020))

Demand Controlled Ventilation

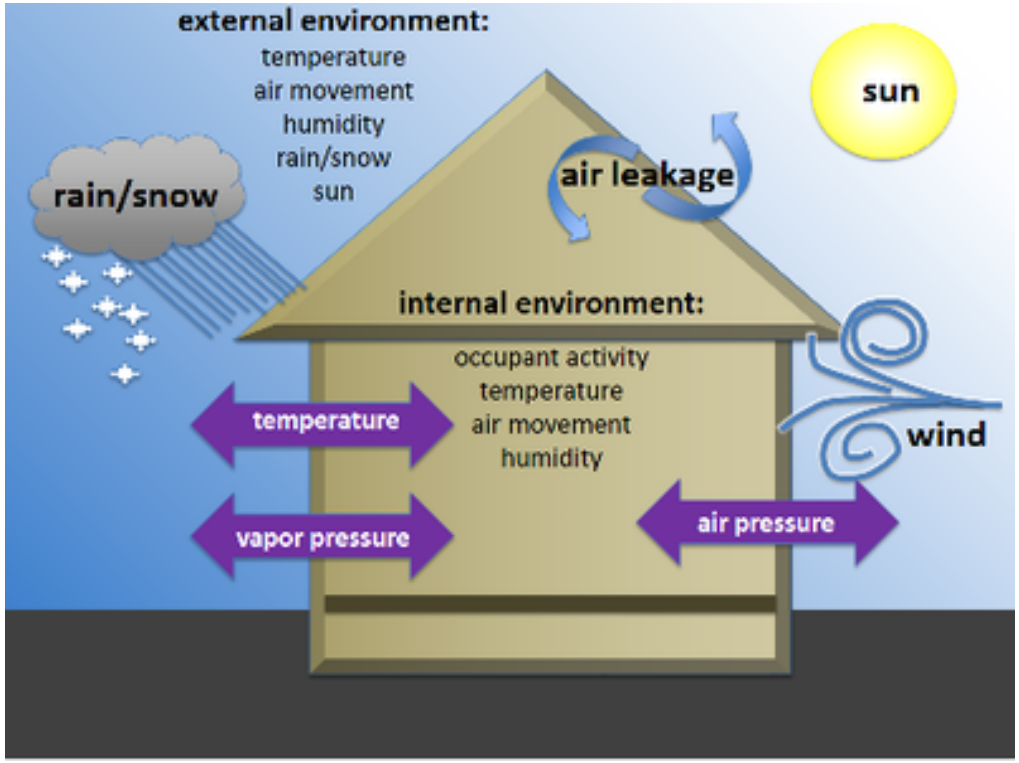
Demand Controlled Ventilation (DCV)



Instead of increasing the ventilation and fresh air to the maximum to remove the airborne. Like DCV that is based on CO2, we can optimize DCV based on PM by adding PM sensors in the zones.

Positive Building Pressure

Positive Building Pressure & Sick Building Syndrome



- To deliver healthy indoor air quality is to properly balance the building so that it maintains positive pressure versus outside.
- This will mitigate moisture and air infiltration and prevent related contaminants from entering via uncontrolled pathways.
- To achieve that goal, it's important to ensure that the facility is airtight.
- Buildings should be properly commissioned and balanced
- Recommissioning should occur every three to five years
- Building pressure should be monitored and trended via the building automation system to confirm it remains within limits.

Key Takeways

Adaptive Energy Modeling/ Advanced Building analytics: Building retrofits for the purpose of energy efficiency, increases comfort conditions as well as heathenness and Indoor Air Quality (IAQ).

Demand Controlled Ventilation (DCV) based on Particulate Matter PM: Instead of increasing the ventilation and fresh air to the maximum to remove the airborne. Like DCV that is based on CO2, we can implement DCV based on PM by adding PM sensors in the zones.

Positive Building Pressure: This will mitigate moisture and air infiltration and prevent related contaminants from entering via uncontrolled pathways. To achieve that goal, it's important to ensure that the facility is airtight. Building pressure should be monitored and trended via the building automation system to confirm it remains within limits.

Good air distribution & Air Balancing: In addition to good ventilation, it has been pointed out that a strong air flow from one person to another might cause infection. Therefore, good air distribution, i.e. providing even ventilation rate at low air velocity within all points in the room is important.

Sick Building Syndrome: The COVID-19 pandemic has drastically increased the need to resolve sick building syndrome, so building retrofits

Virus transmission modes: There are three possible modes of virus transmission: Airborne, droplets and contact. Among all three modes, airborne transmission can be eliminated through the ventilation.

Energy Efficiency & Indoor Air Quality (IAQ): Building retrofits for the purpose of energy efficiency, has a positive impact on comfort conditions as well as heathenness, wellbeing and Indoor Air Quality (IAQ).

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Thank You

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