



Carbon Dioxide measurements as a rapid and dynamic Facility Management Tool

CO₂ and Risk Assessment

Carbon Dioxide as a proxy for infection risk

Since humans generate both CO₂ and virus, it is scientifically accepted that measurement of CO₂ can be accurately used as a proxy for determining the amount of virus in the air



The lower the CO₂ concentration, the lower the Infection risk

Countries incorporating CO₂ into their Ventilation Guidance Documents

USA – via ASHRAE 700ppm or less above outdoor levels / DCV of 400 – 500 (within HVAC Systems)

Australia – Trade Unions are asking for limits below 600ppm

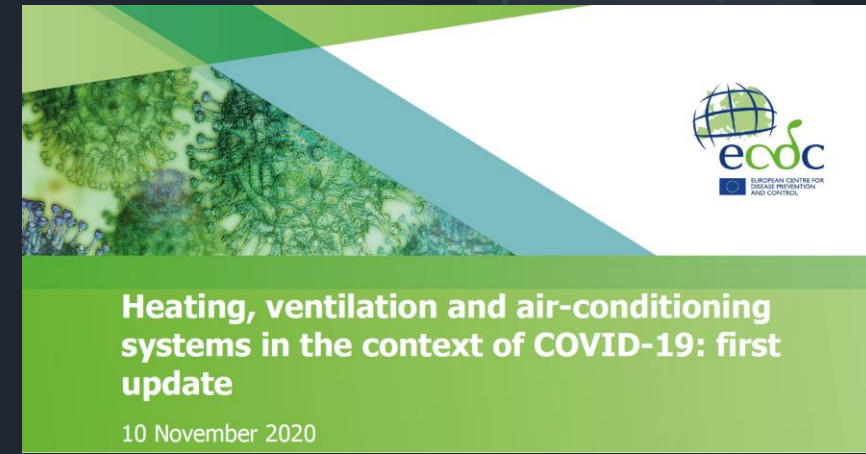
Denmark - Use energy saving settings or CO₂ sensors control

Germany - Consider additional CO₂ measurement ("CO₂ traffic light ") for the purpose of user awareness

Norway - The use of a CO₂ sensor can act as an indicator of poor air quality and thus also potential SARS-CoV-2 presence from exhalation

Slovenia - It is sufficient to set ventilation systems that require the CO₂ value to be set to a lower value at 400 ppm

South Africa – Busy rewriting the NBR, Part O to include CO₂ concentrations



GFA Limits applied to test Ventilation Rates

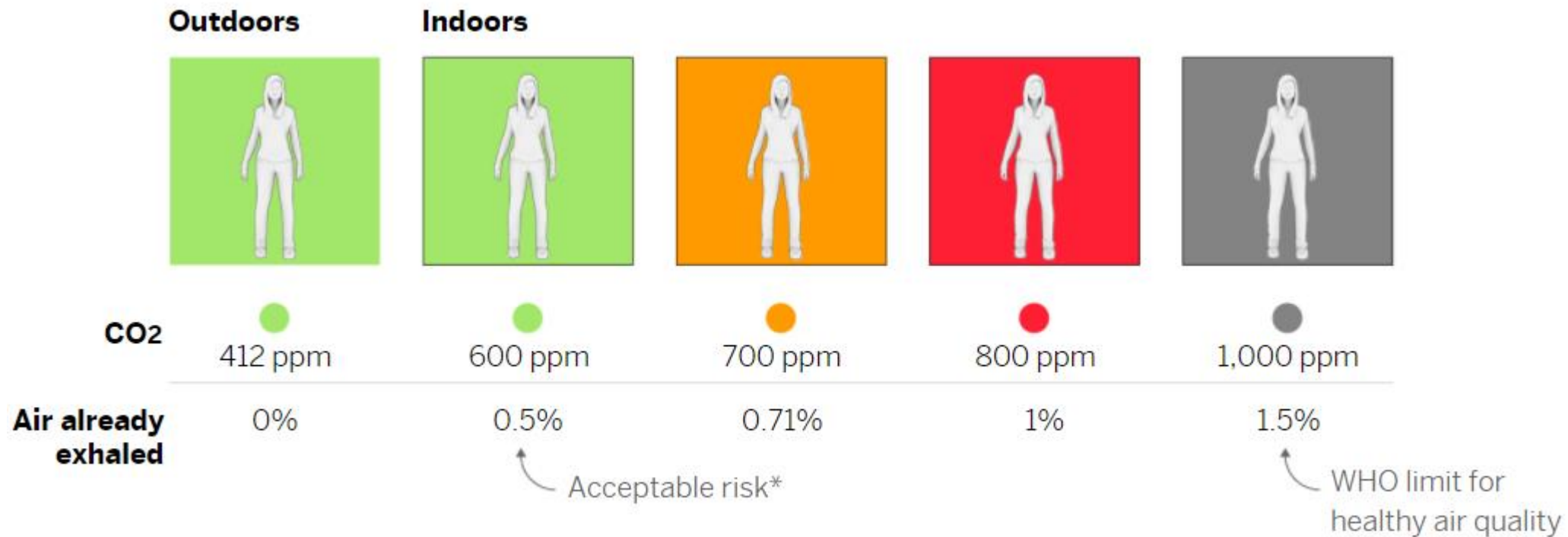


- Accepted that CO₂ value maintained as <400ppm above ambient (outside) air limits viral transmission (99.9% Risk Reduction)
- 800ppm roughly equates to 15 liters / second / person
- >800ppm indicates increasingly poorer quality ventilation with
- > 1400ppm and above indicating very Low-Quality ventilation

Concentrations above 1400 ppm are not unusual in poorly ventilated areas

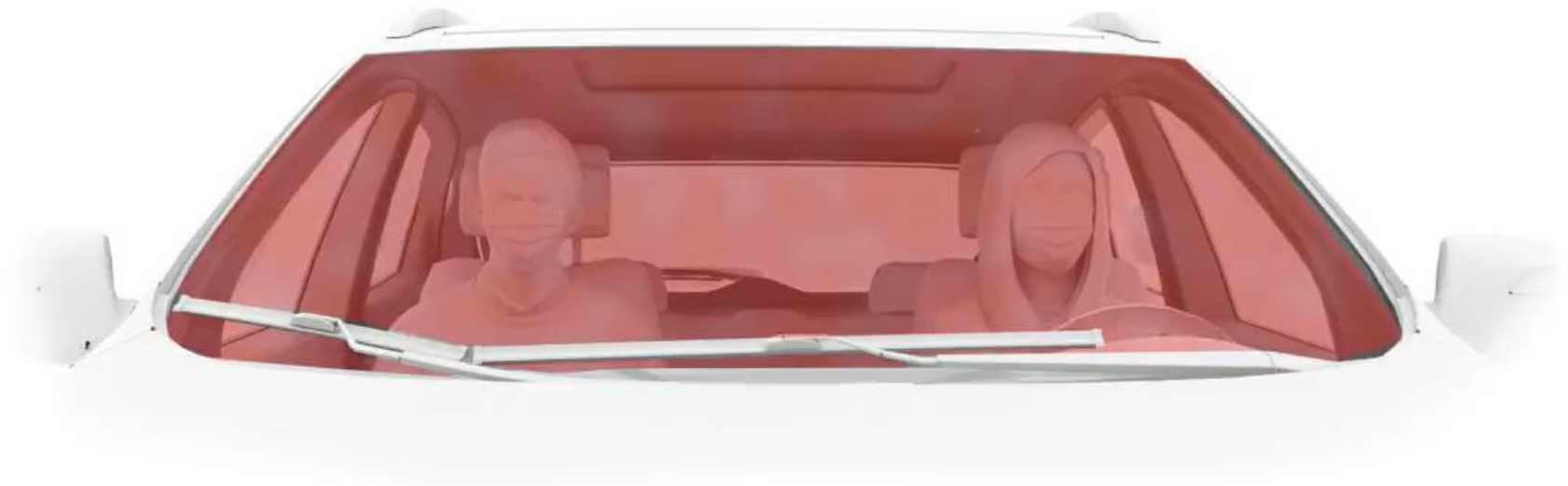
Carbon Dioxide: 2000ppm CO₂ - would equate to ventilation rates of <2L/s per person as **100% relative risk** of COVID-19 infection occurring and is used to describe superspreading events

> 2000ppm is common in (unventilated) occupied spaces



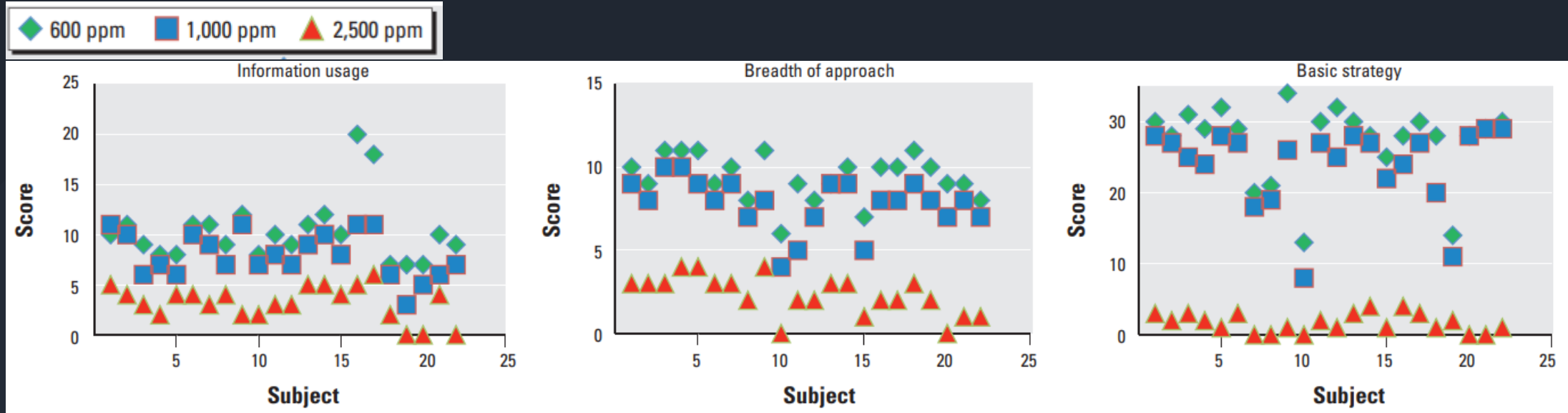


If one of the two people in the car is Covid-positive, **the risk of the other catching the virus** is 30% in 30 minutes or **71% in an hour.**



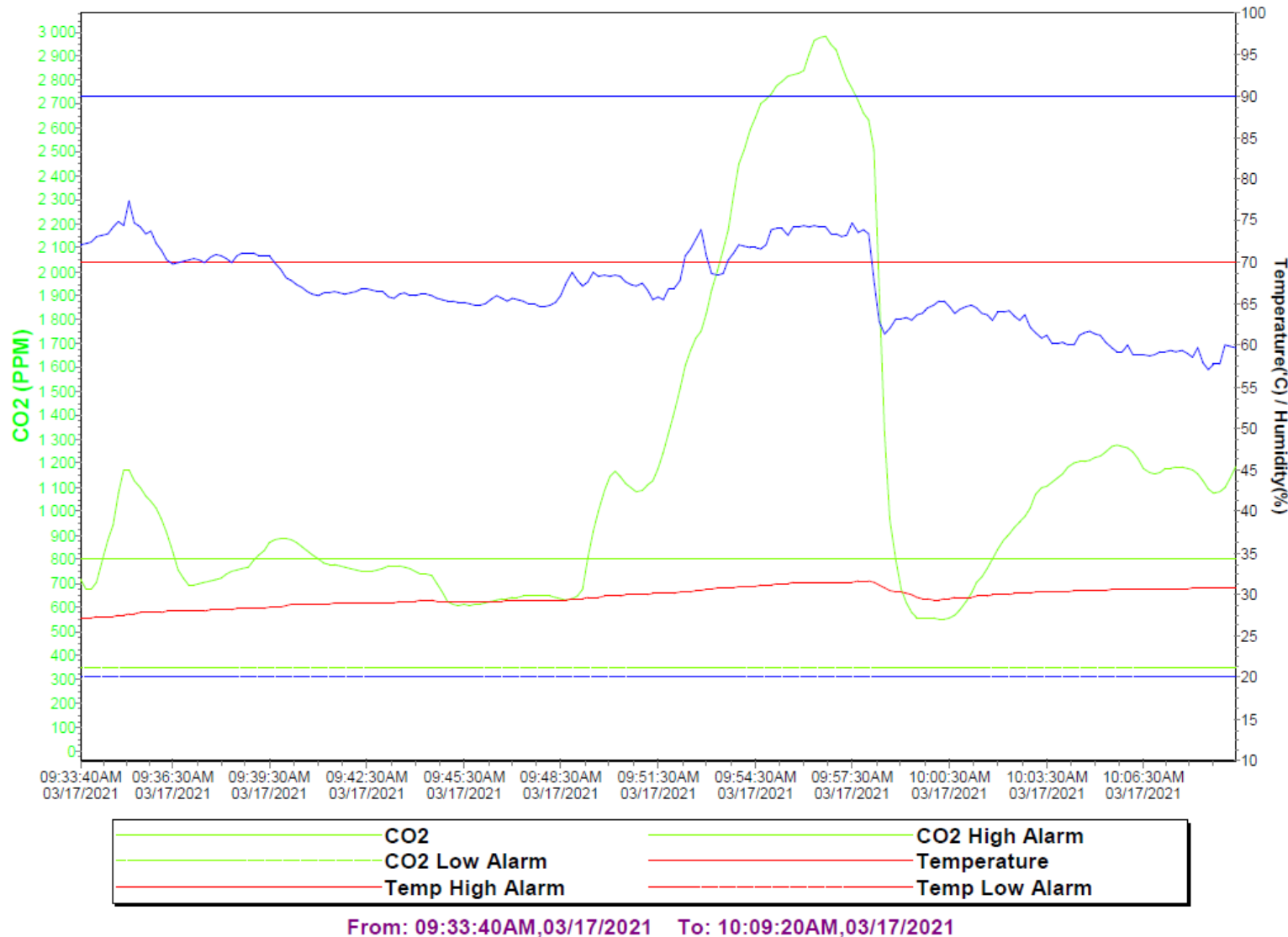
If both people **open their windows** just five centimeters, cross-ventilation can **renew the air up to nine times every minute**. The exhaled air disappears and **the probability of transmission is low.**

Impact of CO₂ on human decision-making performance



- Increases in indoor CO₂ concentrations were associated with statistically significant and meaningful reductions in decision-making performance.
- At 1,000 ppm CO₂ performance was significantly impacted
- At 2,500 ppm CO₂ performance metrics decreasing to levels associated with marginal or dysfunctional performance.
- Other studies show that at 100ppm there is an increased risk of inflammation, bone demineralization, kidney calcification, oxidative stress and endothelial dysfunction

GreenFlag - Mobile Unit Test Results



CO₂ monitoring is a **Rapid Test** where the complexity in the interpretation is well understood by the GreenFlag Association and backed by international standards and research



The GreenFlag Association Continuous Monitoring Platform



INDOOR AIR QUALITY
EXCELLENT

PATHOGEN RISK
LOW

TEMPERATURE COMFORT LEVEL
COMFORTABLE

Alerts

No new notifications

**Continuous Monitoring
allows for dynamic real-
time risk management of
occupied spaces**

Not Occupied

23 hours ago

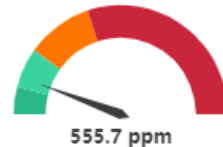
Air Quality

2 min ago



Equivalent CO2

2 min ago



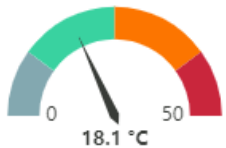
Light Level

2 min ago



Temperature

2 min ago



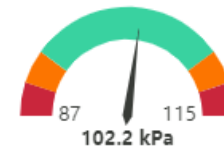
Humidity

2 min ago



Air Pressure

2 min ago



Air Quality

DAY

WEEK

MONTH

Start date

30/06/2021

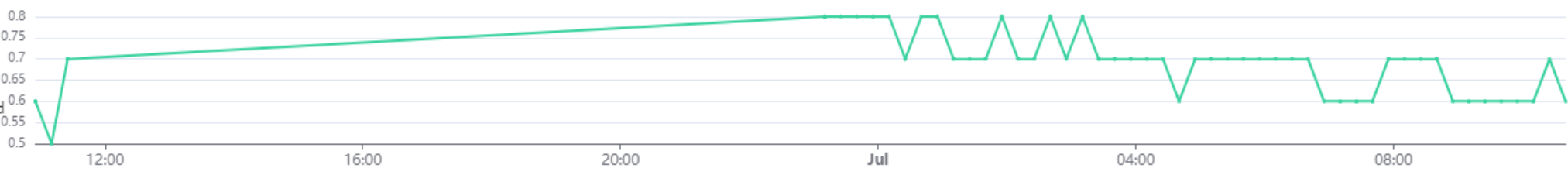


End date

01/07/2021



- Extremely polluted
- Severely polluted
- Heavily polluted
- Moderately polluted
- Lightly polluted
- Good



GREENFLAG

CERTIFICATE OF COMPLIANCE

This is to confirm that:

The Butcher Boys

Shop 1, Lighthouse Mall, Umhlanga, Durban
Tel: 031 561 4106
umhlanga@butcherboysgrill.co.za

was inspected on the 25 March 2021 by:

Apex Solutions

| Inspector: | Approved Supplier |
|--|---|
| Sithembile Sinenhlanhla Nxumalo ID: 9803220474082 | Apex Solutions https://greenflagsolutions.co.za info@greenflagsolutions.co.za |

and is hereby deemed **COMPLIANT** with the GreenFlag Association's certification criteria to provide a healthy public space that significantly mitigates the risk of spreading airborne pathogens like COVID-19, through implementing the following key barriers:

**Management Systems / Ventilation / Social Distancing / Occupancy Rates /
Mask Use / Disinfection & Sanitisation**

With average Carbon Dioxide concentrations predicted to be in the **EXCELLENT (<800PPM)** range for Indoor Air Quality at a peak occupancy of **100** people, this certificate is issued subject to the following provisions:

- Maintain the existing excellent customer login and surface disinfection protocols including sanitization station at the entrance
- All North and East facing windows to remain **FULLY OPEN** during peak occupancy and open to 30% – to 40% off-peak occupancy
- Occupancy rates should not exceed 100 people

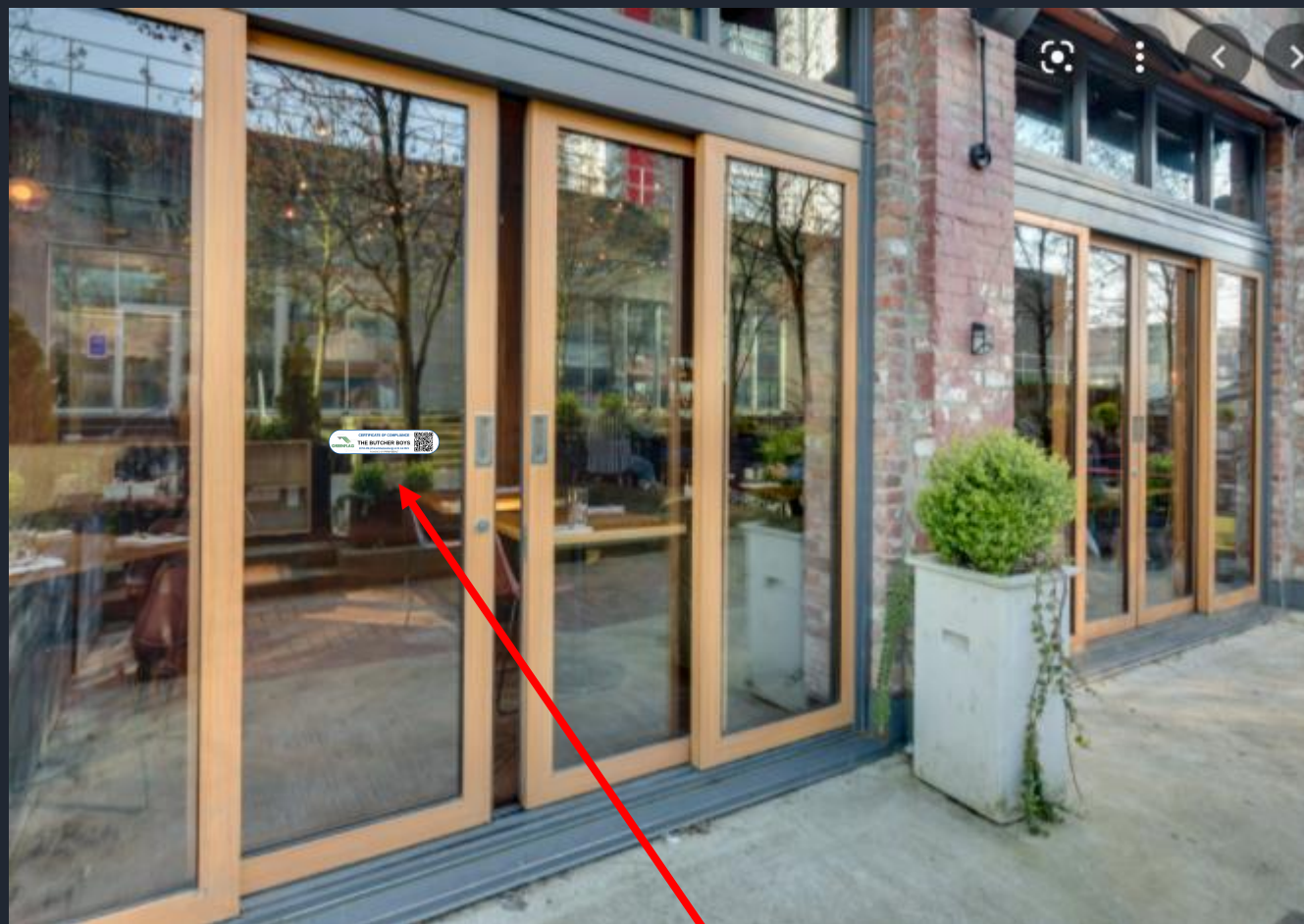


Certificate Number:
AGFS001
Expiry Date:
25 June 2021

Issued by:
The GreenFlag Association
info@greenflagassociation.com
www.greenflagassociation.com



GreenFlag Association Certification



“The only thing necessary for the triumph of evil is for good men to do nothing.” Edmund Burke

