

A WORLD OF COMFORT

busworld
NORTH AMERICA CREDITORS
FEB 14-16 2022



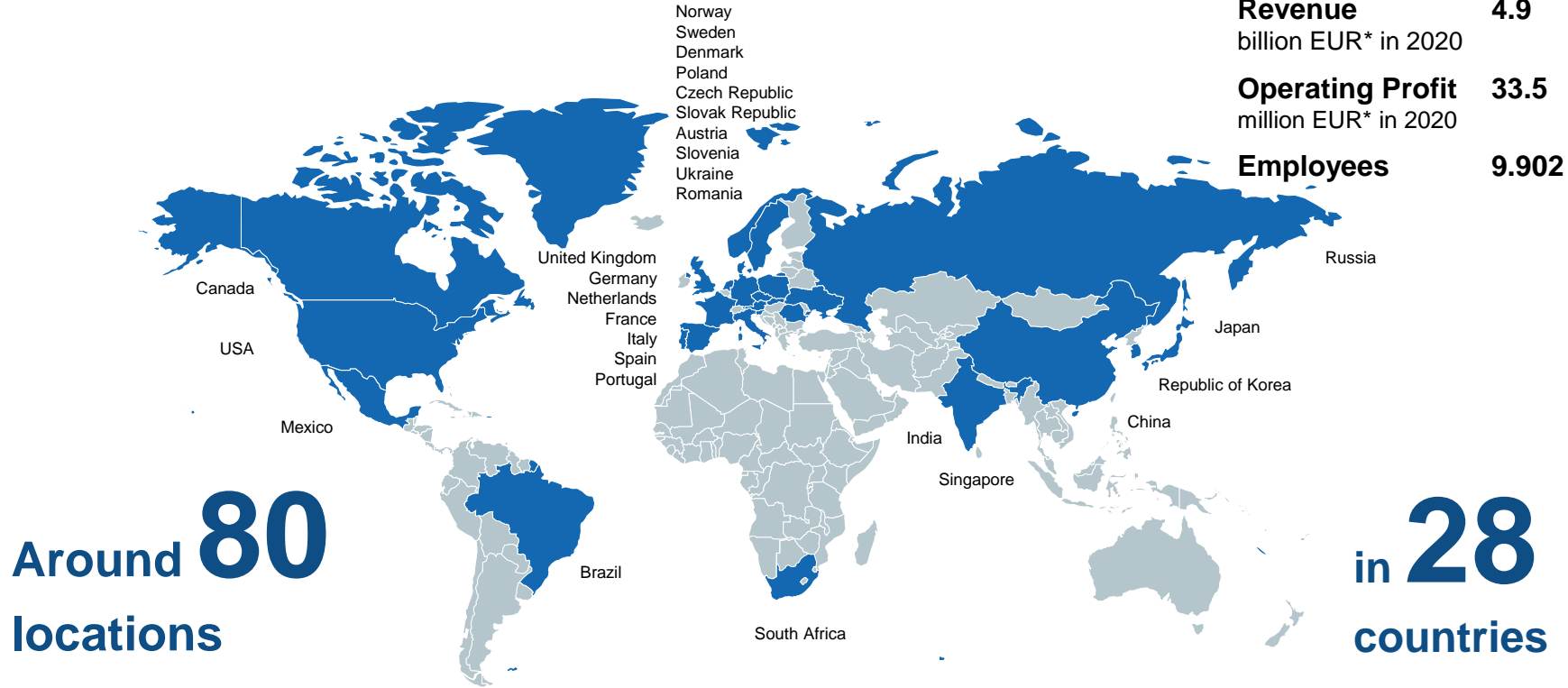
 **Eberspächer**



CLIMATE CONTROL SYSTEMS

CLEAN AIR BY EBERSPAECHER

WE ARE EBERSPÄECHER



Revenue 4.9
billion EUR* in 2020

Operating Profit 33.5
million EUR* in 2020

Employees 9.902

Around **80**
locations

in **28**
countries

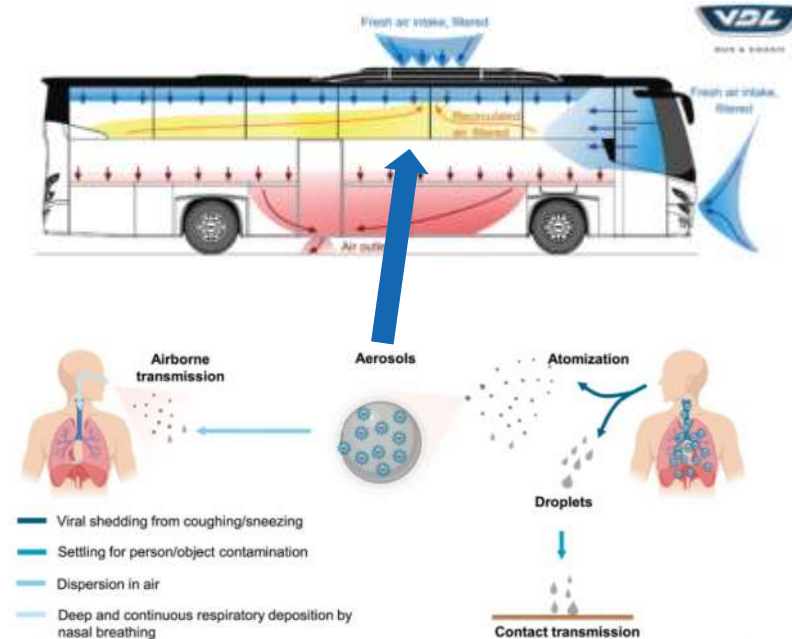
In addition: general agents for full market representation

WHAT DOES THE AIR CONDITIONING DO ?



WHAT THE AIR CONDITIONING SYSTEM DOES AND DOES NOT DO WITH REGARD TO THE SPREAD OF COVID-19

- The virus is shed by people coughing and sneezing
- Larger droplets fall onto surfaces inside the bus
- Smaller atomised particles remain in the air and are either transmitted to other passengers or are carried by the air movement up into the AC unit
- It would be more effective to utilise fresh air, but this very inefficient, specially in tropical climate zones
- The AC system creates the air movement inside the bus; therefore our solutions concentrate on treating 100% of the air movement within the AC unit
- A well maintained AC unit can help reduce the virus concentration in the bus and actually make bus environment a safer place to be



EBERSPÄECHER APPROACH



INTRODUCTION TO CLEAN AIR BY EBERSPÄECHER



Treatment of 100% of the air moving through the AC unit without generating ozone

- Our 3 step approach:
 - Level 1 = air filtration
 - Level 2 = air cleaning
 - Level 3 = air sterilization
- Filtration = **particle filtration**
=> virus capture
- Cleaning = **Polarized media electronic air cleaner**
=> virus capture
- Sterilization = **UV-C LED Module**
=> virus de-activation

NB: all levels can be retrofitted to existing buses or supplied as new equipment

RETROFIT SOLUTIONS

With our North American Partner ABC Companies



17469 W Colonial Dr
Winter Garden, FL 34787
USA

PHONE

800.222.2871 x77211
Direct 407.287.3112



CLEAN AIR BY EBERSPÄECHER

UV-C LED AIR STERILIZATION



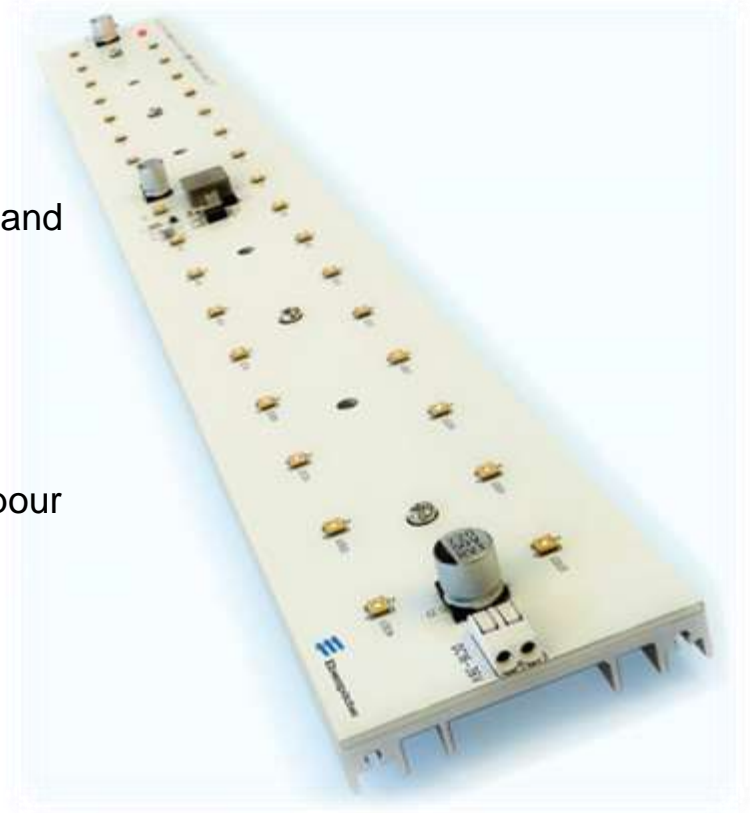
AIR STERILIZATION

Why UV-C?

- UV-C radiation (also known as germicidal or microbicidal radiation) that results in the inactivation of microorganisms and viruses as used in hospitals for many years

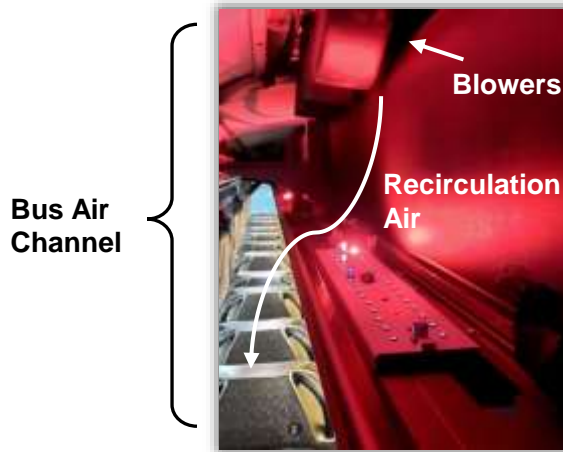
Why LED?

- Led lights are known for their reliability and long life
- UV-C can also be produced from low pressure mercury vapour lamps, but these were not considered for bus use due to:
 - durability
 - safety concerns if they are broken
 - production of ozone as they 'warm up'
 - drifting away from UV-C to UV-B or UV-A as they age
 - heat generation



UV-C LED

- Eberspächer uses a modular UV-C LED solution using modules of different lengths
- They can be fitted inside the AC unit (typically before the heat exchangers) or within the air channel of the bus
- When fitted inside the AC unit, they sterilise both fresh and recirculation air



- ✓ Minimum power consumption: 0,8 Amp 24VDC per module
- ✓ The UV-C LED module is not a filter: therefore a filter is still required (It is possible to keep the existing foam filter and service intervals do not need to change)
- ✓ Only maintenance required is to periodically clean the profile with a soft brush
- ✓ Affordable initial cost with no servicing costs

UV-C LED

Proven effectiveness against viruses, validated by

- Well reputed Guangdong Centre of Microbiology
 - Influenza virus H1N1
 - Influenza virus H3N2
- Perfectus Biomed (UK test laboratory)
 - Human coronavirus 229E
 - Human rhinovirus (common cold)
 - Murine norovirus (winter sickness bug)

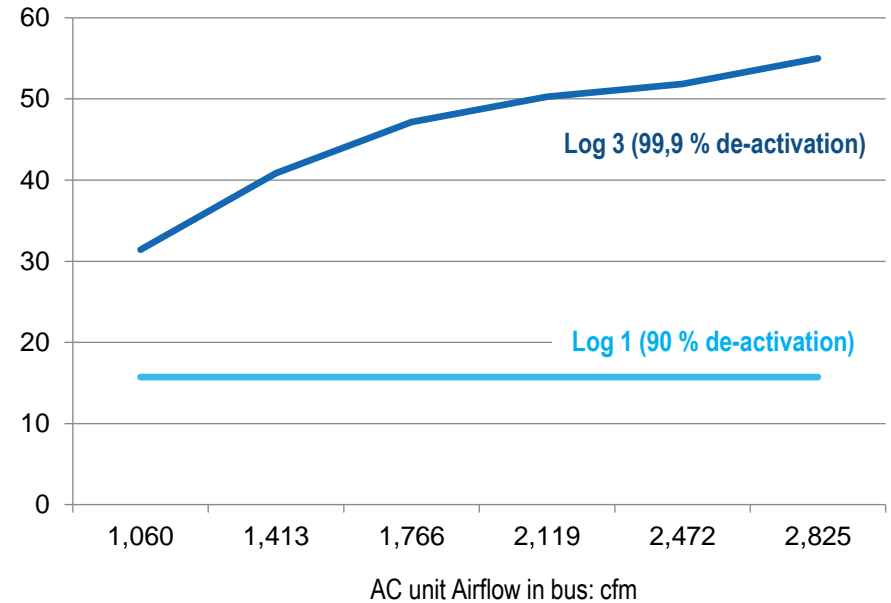


UV-C LED



Calculated bus air disinfection times based on measured irradiance:

Time (minutes) to disinfect 1,700 ft³: assumed internal volume of a 40 ft. bus



CLEAN AIR FOR BUSES



REFERENCES

Germany Installations

MAN/Neoplan

(AC: Konvekta/Valeo units)

- MAN Lion's Coach
- Neoplan Cityliner
- Neoplan Tourliner
- Neoplan Skyliner (Double deck)



Lithuania Installation

MAN/Neoplan

(AC: Valeo Speros Revo 32kW system)

- MAN Lion's City



India Installation

VOLVO

(AC: Eberspaecher AC353G4.III)

- Volvo Eicher Intercity Sleeper Coach



WRAP UP

- Viruses are transmitted by people coughing and sneezing
- Smaller particles are atomised and our solutions concentrate on the treatment of these particles in the air
- A well maintained AC unit can help reduce the virus concentration in the bus and actually make bus environment a safer place to be



Eberspaecher solutions:

1. We treat 100% of the air moving in the AC unit without generating ozone
 - ASHRAE standard 62.1-2019 Ventilation for Acceptable Indoor Air Quality states in its foreword:
⇒ *Air-Cleaning devices that generate ozone are prohibited*
2. We have different solutions for different climate zones around the world
 - Different levels of air treatment
 - Different life-cycle costs

CLEAN AIR BY EBERSPÄCHER



UV-C LED AIR STERILIZATION FOR YOUR BUS

- UV-C LED LIGHT PROFILE WITH MICROBICIDAL RADIATION (PROVEN METHOD IN MEDICAL SECTOR)
- INACTIVATION OF 99,9 % OF MICROORGANISMS AND VIRUSES INCL. INFLUENZA, HUMAN CORONA VIRUS (I.A. DELTA VARIANT)
- CERTIFICATED SOLUTION BY BIOMED GROUP, UNITED KINGDOM
- INSTALLATION IN THE AIR CONDITIONING UNIT OR WITHIN THE BUS AIR CHANNEL
- NO CHANGES IN THE INTERIOR OF THE BUS

YOUR ADVANTAGES

- INFECTION PREVENTION AND MORE SAFETY FOR YOUR DRIVER AND PASSENGERS
- OZONE- AND HEAVY METAL FREE
- LONG SERVICE LIFE AND HIGH RELIABILITY
- NO MAINTENANCE COSTS
- EASY RETROFITTING IN ALL TYPES OF BUSES AND AIR CONDITIONING UNITS



YOUR CONTACTS



Caleb Creer

Eberspaecher Climate Control Systems USA Inc.
29101 Haggerty Road
Novi, MI 48377
USA

Caleb.Creer@eberspaecher.com

eberspaecher.calebcreer@gmail.com



Attila Illes

Attila.Illes@eberspaecher.com
atihu73@gmail.com



17469 W Colonial Dr
Winter Garden, FL 34787
USA

PHONE

800.222.2871 x77211
Direct 407.287.3112

A WORLD OF COMFORT

PRODUCT MANAGEMENT
CLIMATE CONTROL SYSTEMS