



# SUSTAINABLE TUNNEL SOLUTION AGAINST AIR POLLUTION

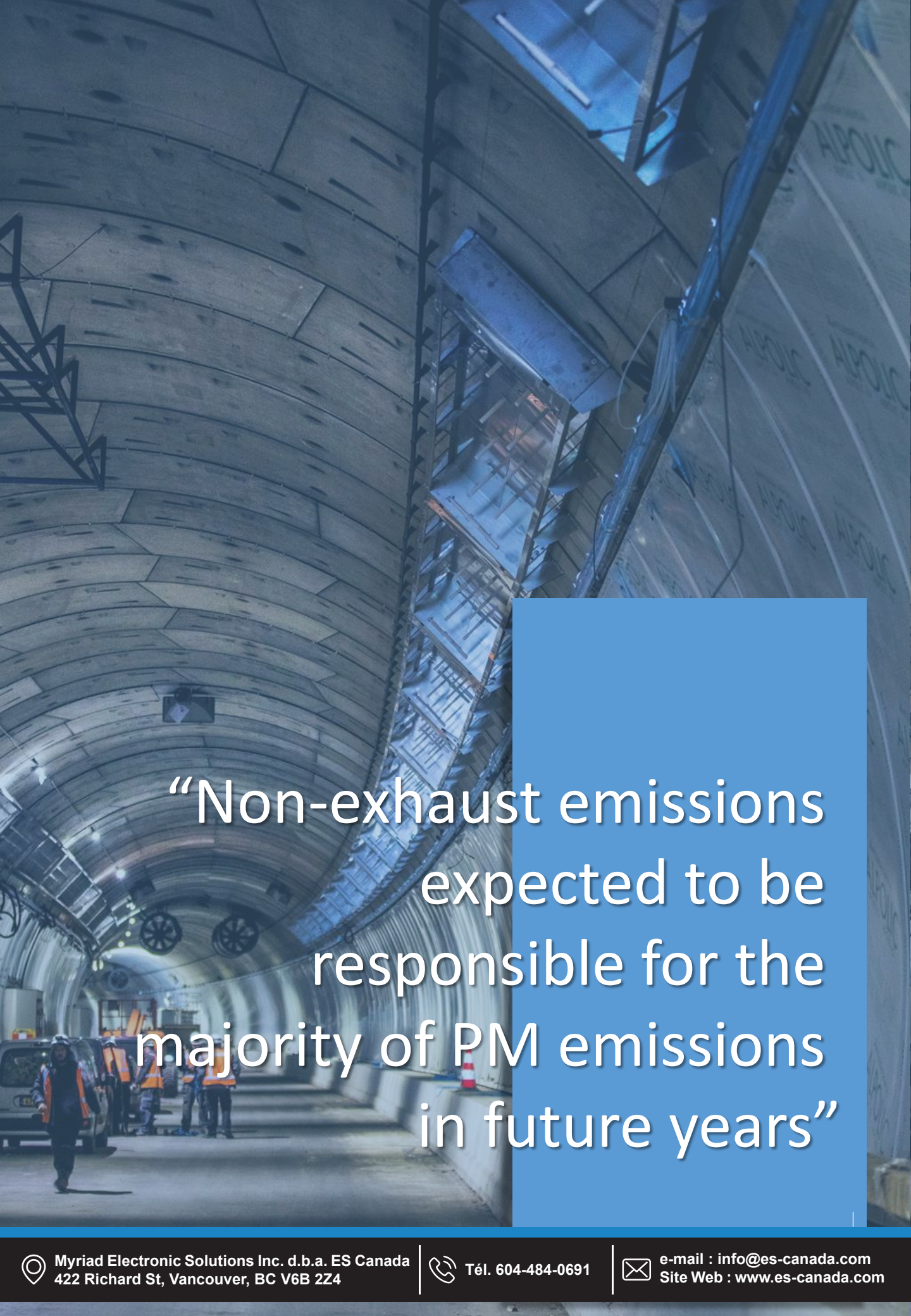


## FDRS *Fine Dust Reduction System*



**STATIC**  
AIR



A photograph of a large, circular tunnel under construction. The tunnel's interior is lined with large, grey concrete segments. On the right side, a complex network of metal scaffolding and support structures is visible. In the lower-left foreground, several construction workers wearing orange safety vests and hard hats are standing near a white van. The tunnel recedes into the distance, creating a strong sense of perspective.

“Non-exhaust emissions  
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responsible for the  
majority of PM emissions  
in future years”



# Breathe Life

## Clean Air is a Human Right

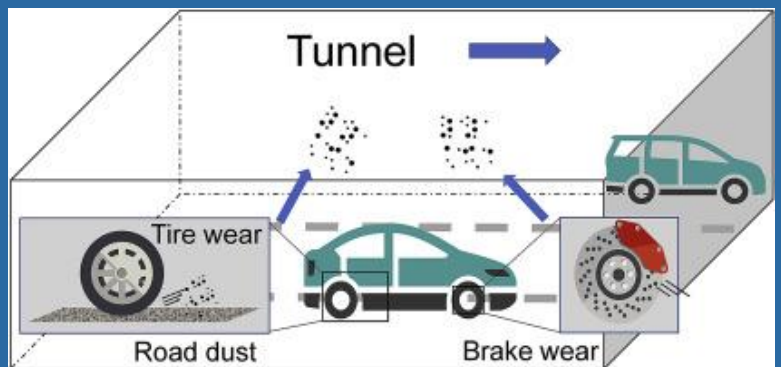
*The importance to employ principles for sustainable infrastructure is inevitable. Discover how FDRS offers a smart solution to improve the air quality and lower the impact of (traffic) emissions. We are happy to explain how the urban environment can be made healthier and more attractive with innovative solutions.*

*FDRS is a sustainable, powerful and silent ionizer. An intelligent system that offers, through efficiency and smart connection, structural results to meet air quality objectives while achieving results.*

### C40 CLEAN AIR CITIES DECLARATIONS

Mayors who signed the C40 Clean Air Cities Declaration saw the urgent need to acknowledge and act on the air pollution problem in their cities. (Source: [here](#)). With signing the declaration, they recognized that breathing clean air is a human right. And declared they will commit to use all the powers at their disposal as mayors to tackle air pollution, calling on others responsible for the sources of air pollution, that poison the air in our cities, to match this commitment.





(Figure A: Non-exhaust PM emissions )

## CONCERNS ABOUT PARTICULATE MATTER

Many substances can pollute the air. Some of these are very harmful and their sale and use is strictly regulated. Others are not immediately harmful, but are released in thousands or millions of tonnes per year nationally as by-products of transport, energy production, chemicals manufacture, domestic combustion and farming. When released in these quantities into the air, these substances have gradual but significant impacts on health and the environment. Once released, these air pollutants are dispersed by the weather and can travel significant distances within and between countries. They mix and interact in the atmosphere, forming new compounds, and are deposited on land and water.

## ELECTRIC VEHICLES AND NON-EXHAUST SOURCES

*While emission standards for exhaust particles from motor vehicles are becoming more stringent worldwide, non-exhaust PM emissions like micro plastics and micro metals are largely unregulated. As a result, the proportion of PM emissions from non-exhaust sources has increased in recent years due to the significant reductions in PM from exhaust emissions over this period. Non-exhaust emissions Electric Vehicles are expected to be responsible for the vast majority of PM emissions from road traffic in future years. (Source: [here](#) ).*



# What is Particulate Matter?

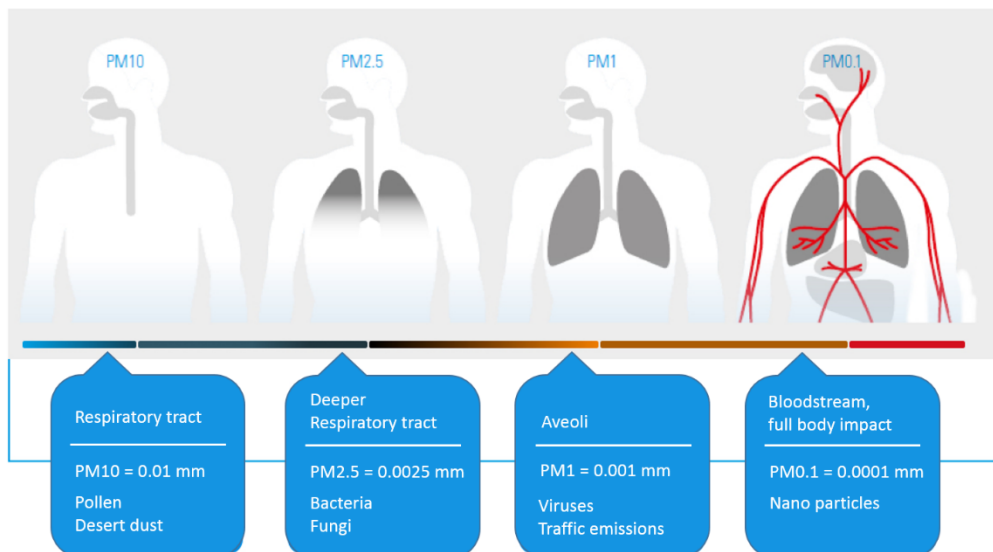
## INVISIBLE FINE DUST

Particulate Matter (also known as aerosols), is a completely invisible form of air pollution.

Zero Emission projects have a strong focus on traffic emissions, obtaining a structural lowering of air pollution: (ultra) fine dust (PM10 and PM2,5), ammonia (NH<sub>3</sub>) and Sulphur dioxide (SO<sub>2</sub>). The latter two are substances produced in the air by chemical processes and are converted into harmful particulate matter, adding to the importance of reducing fine dust.

*(ULTRA)- FINE PARTICLES INCLUDE VIRUSES, BACTERIA, SOOT, MICRO METALS, MICRO PLASTICS, FUNGI*

There are serious concerns about the consequences of air pollution caused by particulate matter affecting our health and well-being. These tiny particles are classified in different varieties, where a distinction is made between sizes. The infographic below shows an overview of the impact of the various sizes in particles on the human body.



*The above illustration gives a clear display of how microscopic small particles impact our body and are able to cause permanent damage.*



# Tunnel Vision


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## PERMANENT AIR QUALITY IMPROVEMENT


Air quality has become a topic of concern in the planning, design and operation process of road tunnels. FDRS operates to protect the health of surrounding urban communities and drivers that use tunnels. Traffic tunnels are hot-spots for PM air pollution. FDRS is designed to control vehicle emissions.

## CLEAN AIR TARGETS 2030

Studies show that FDRS operates most efficiently when located at the tunnel exit. The system typically reduces 50 percent of particulate matter, preventing it to freely mix with valuable fresh air. This makes FDRS an excellent choice in the run towards achieving *Clean Air Targets with a 50 percent reduction* of air pollution by 2030. (Source: [here](#))



“FDRS reduces and contains up to 50% of PM Pollution, instead of mixing



“Welcome to the Future:  
Smart tunnels  
protecting air quality  
24/7 with FDRS”



# The Smart Tunnel

## IoT connected with LoRa

A Smart Tunnel is a Green Tunnel. Smart plug-ins provide smart connection for sustainable tracking.

FDRS can be equipped with LoRa technology. LoRa offers IoT (Internet of Things) settings for the system to connect to the Smart City Grid and Smart City Dashboard. LoRa Technology is a Cloud Enabled Solution for Remote Monitoring, alerting and decision making. LoRa is easy to connect with the existing infrastructure of Smart City and or Tunnel Management Systems. The FDRS can be completely adapted to the wishes of the customer.



“Smart Green Tunnels:  
Digital technology for  
Clean Air”



# FDRS *a Tunnel solution to reduce Air Pollution*

**PLUG & PLAY**

**PATENTED *IONIZATION*  
TECHNIQUE**  
REDUCES PM10, PM2.5 TO PM0.1

**50% REDUCTION**  
EMISSION POLLUTION, MICRO METALS,  
MICRO PLASTICS, VIRUSES, BACTERIA

**SILENT**  
NOISE FREE OPERATION



**24/7**  
AIR QUALITY IMPROVEMENT

**CERTIFIED SAFE**  
FOR HUMANS & ANIMALS

**IoT CONNECTED**  
SMART CITY SOLUTION

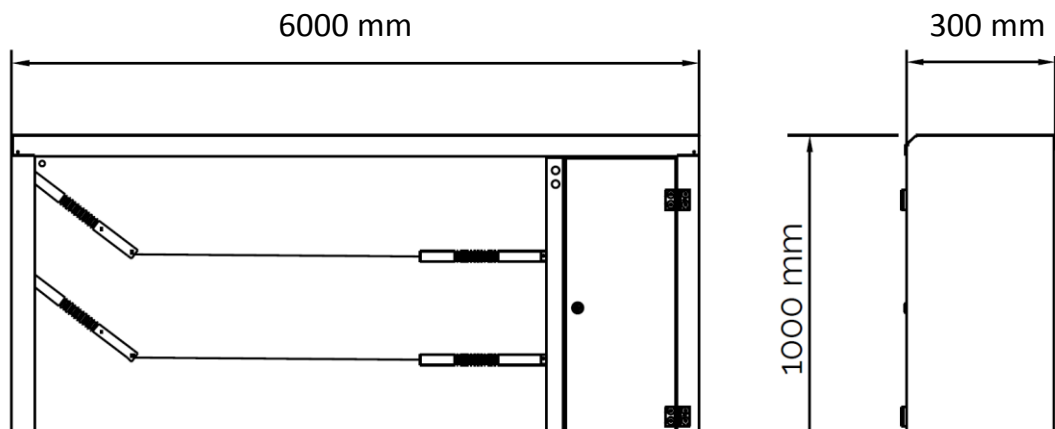
**SUSTAINABLE**  
18 WATTS – FULLY RECYCLABLE

## Product Features

- Plug & Play
- Wall mounting
- Low power consumption 18 WATTS
- Power supply 110 -230V
- IP Classification – IP65
- Silent operation
- Low maintenance solution
- Easy control with LED indicator
- IoT connected (optional)

## SPECIFICATION OF FDRS

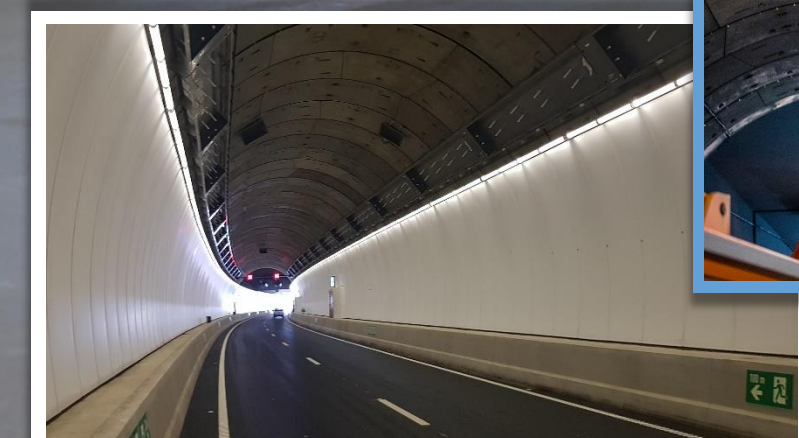
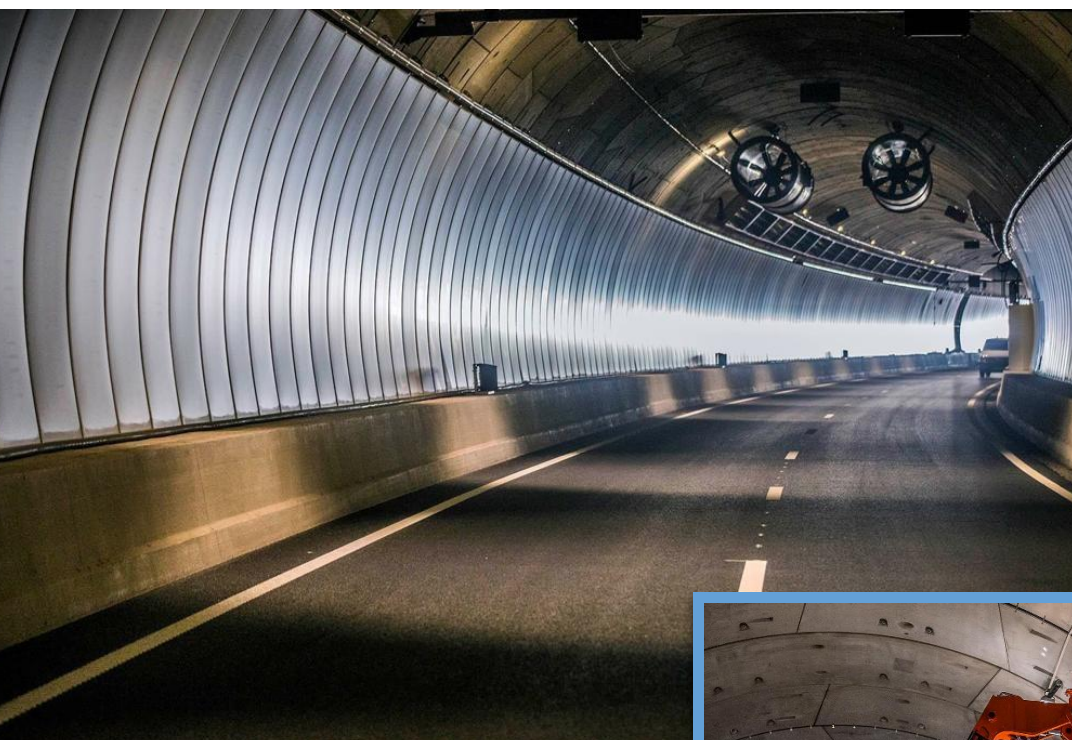
- Sustainable stainless steel frame
- Height 1000 mm
- Length 6000 mm
- Depth 300 mm
- Weight 125 kg
- Customized sizes optional
- Locally produced in The Netherlands







**STATIC  
AIR**  
FINE DUST FREE





Every tunnel asks for its own unique approach.  
[Contact](#) our advisors for professional advice.

## COMPARE OUR SOLUTIONS

Click [here](#) for an overview of our systems

Click the icons to follow our social channels

