

# SOLUTIONS for AIR QUALITY management

## 1. Avoiding emissions

- 1.1. Cross-cutting/general
  - 1.1.1. Influence of efficient driving: eco-driving and Driver Advisory Systems (DAS)
  - 1.1.2. Electrification and alternatives to combustion engines
- 1.2. Brake system wear
  - 1.2.1. Brake system pollution prevention
  - 1.2.2. Electrodynamic/electromechanical braking
- 1.3. Wheels/track wear
  - 1.3.1. Steering bogie
  - 1.3.2. Maximise track curve radius
- 1.4. Pantograph/catenary wear
  - 1.4.1. Rolling pantograph
- 1.5. Maintenance works (Grinding, ballast management)
  - 1.5.1. Work zone air flow control with vacuum cleaning

## 2. Reducing emissions

- 2.1. Brake system wear
  - 2.1.1. Mechanical brake system management
  - 2.1.2. Low emission brake pads
- 2.2. Wheels/track wear
  - 2.2.1. Lubrication of wheels and tracks
- 2.3. Pantograph/catenary wear
  - 2.3.1. Optimising emission-influencing factors in pantograph-overhead contact line (OCL) system
- 2.4. Exhaust
  - 2.4.1. HVO
  - 2.4.2. Electrification (see 1.1.2.)

## 3. Reducing concentration

- 3.1. Capture onboard trains
  - 3.1.1. Vacuum cleaner train
  - 3.1.2. At source brake dust collection system
  - 3.1.3. Filtration via the HVAC system
- 3.2. Capture inside stations
  - 3.2.1. Station/tunnel cleaning
  - 3.2.2. Plant filtration (green wall)
  - 3.2.3. Particle traps
  - 3.2.4. Liquid filtration
  - 3.2.5. Filtration by ionisation
  - 3.2.6. Passive trap filtration

### 3.2.7. Mechanical filtration

- 3.2.8. Filtration with the existing station HVAC system
- 3.3. Ventilation/ barriers / doors inside stations
  - 3.3.1. Ventilation
  - 3.3.2. Platform screen/edge doors (PSD/PED or automatic platform gates)

# AIR QUALITY MANAGEMENT IN RAIL

## PROMISING SOLUTION:

- **Mechanical filtration (air purifying)**

	Innovation	Ease/rapidity/aff.	Benefits
Level	Low	High	High
Special note	Mature solution		
Field	Air quality, filtration, stations, etc		
Solution	Classical filtration		
Description	This air purification technique consists in drawing air in and pass it through a series of filters to trap particulate matter.		
Objective	Reduce the PM10 and PM2.5 concentrations in the underground stations air.		
How to	Implementation purification units on platforms. Large capacity needed. Efficiency testing		
Costs and resources required	Industrial air purifier, installation, monitoring and maintenance		
Benefits Effects	Reduction of ~ 35 % for PM10 and PM2,5 for station's ambient pollution levels		
Ease of implementation	First phase was tested with prototypes. It will be tested in a second phasis with full scale modules		
Constraints, challenges, or lessons learnt	Difficulties to evaluate the efficiency as underground stations concentration are fluctuating on time		
S/M/L term	Short term		
Efficiency	High efficiency (system dedicated to air purification)		
Maturity	TRL 9		
Mentioned by	SNCF		
Experience	SNCF: This filtration system has been tested in Sevrans Beaudottes station. Implementation of 8 purification units regularly installed on 2 platforms. Total capacity of 76 000 m3/h Test made during ~9 months		

