13th UIC Sustainability Conference

VIENNA 2016

SNCF preliminary study on wear particles emitted by a freight train

Workshop "Emissions and Air Quality"

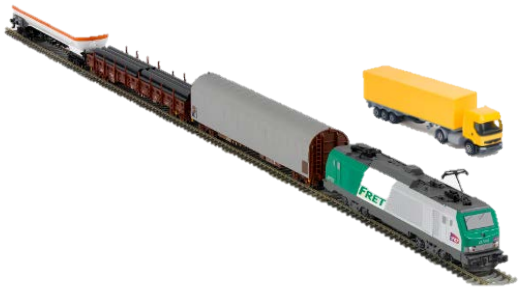
Philippe CLÉMENT | Ecomobility manager

12, 13, 14 October 2016

CONTEXT

- Evaluation by the French government of 48 solutions to improve air quality in FRANCE
  - A proposal : **"Develop the road-rail combined transport"**
  - CITEPA (Inter professional Technical Centre for Studies on Air Pollution, State operator of the French Environment Ministry) study :

Emission factor		Total wear
Rail	gPM_{10}/km	**8,54**
Heavy truck		**0,05***
Rail	$gPM_{2,5}/km$	**3,38**
Heavy truck		**0,02**



*** 0,1 with road wear**

SNCF STUDY

- Scope

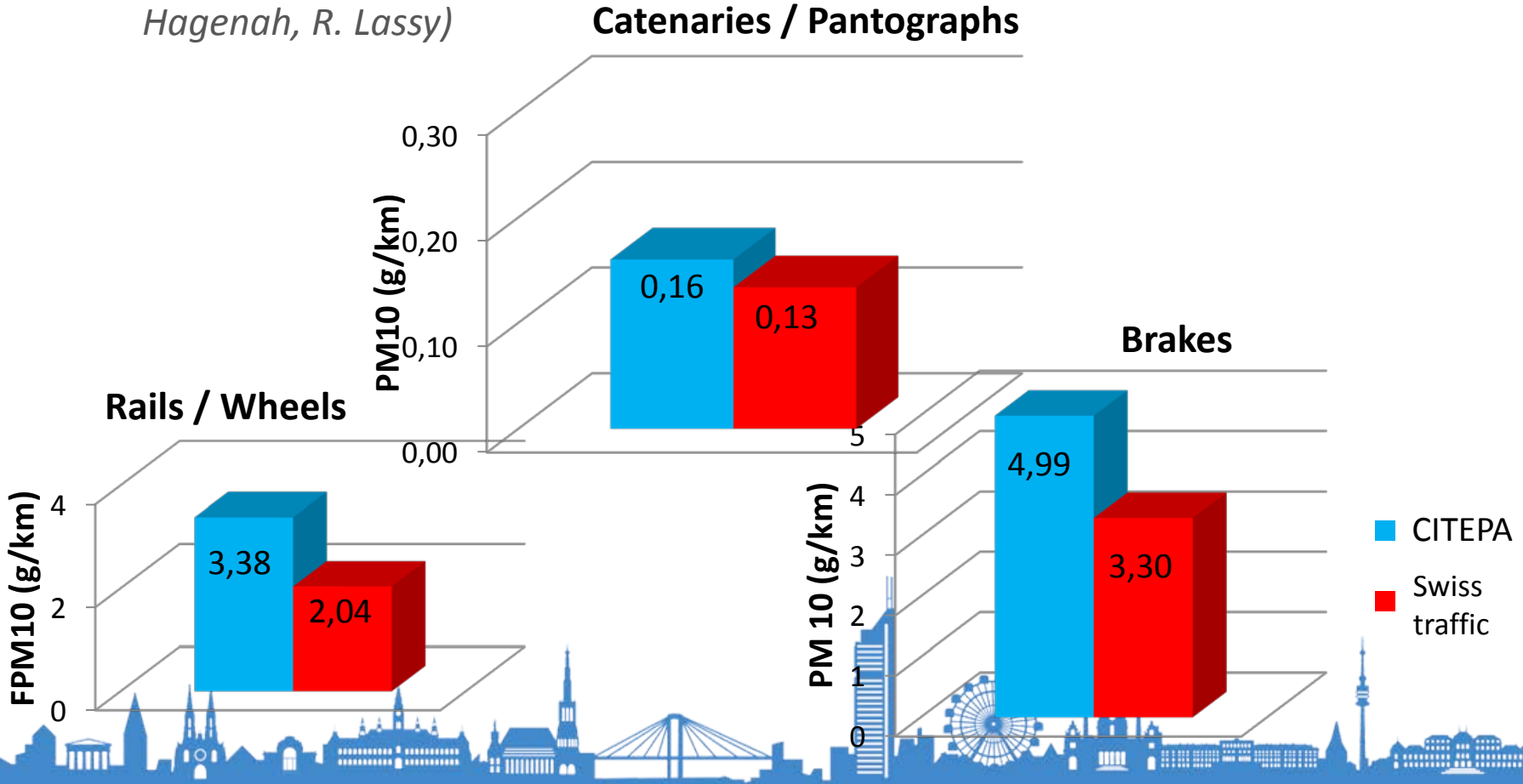
Catenaries / pantographs wear

Rails / Wheels wear

Brakes wear

SNCF STUDY

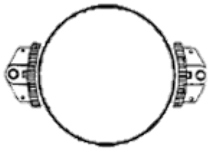
- Bibliography : Only 2 Swiss studies found
  - *Diffuse release of environmental hazards by railways (M. Burkhardt, L. Rossi, M. Boller)*
  - *Poussière dans les tunnels ferroviaires : causes, risques et remèdes (J. Rodlder, B. Hagenah, R. Lassy)*



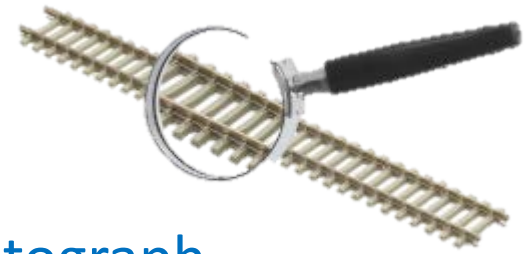
SNCF STUDY

- Definition of a mean road-rail combined freight train for SNCF
  - <u>Locomotives</u>
    BB 26000 or
    BB 27000

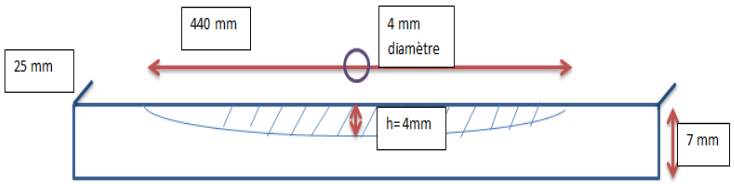
  - <u>Wagons</u>
    25 Sgss wagons
    Y25 bogies
    2Bg Brakes
    1333t
    501m (*CITEPA hypothesis : 750m)*

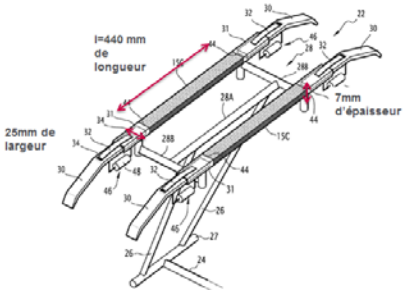


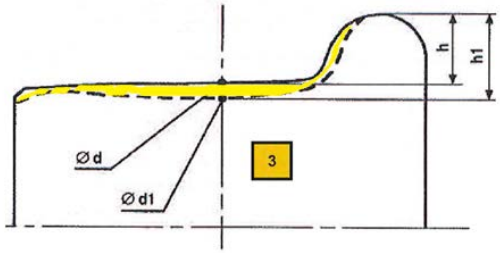
SNCF STUDY



- Calculation method
  - Brakes, wheels and pantograph
    - Computation of lost volume (weight) between new & worn profiles
    - Field tests reports analysis to determine average wear/km



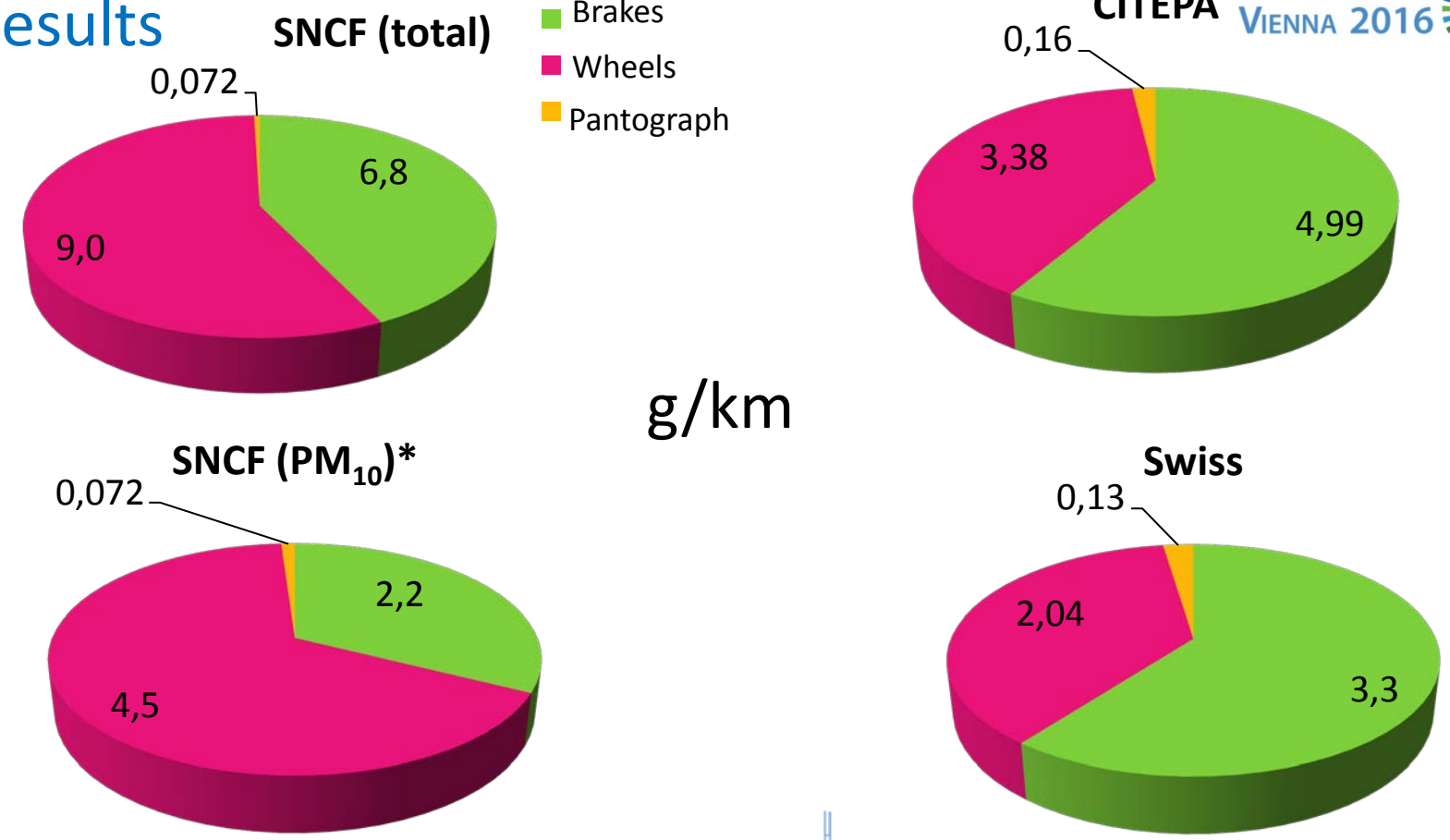




  - Rails and catenaries
    - To be determined

SNCF STUDY

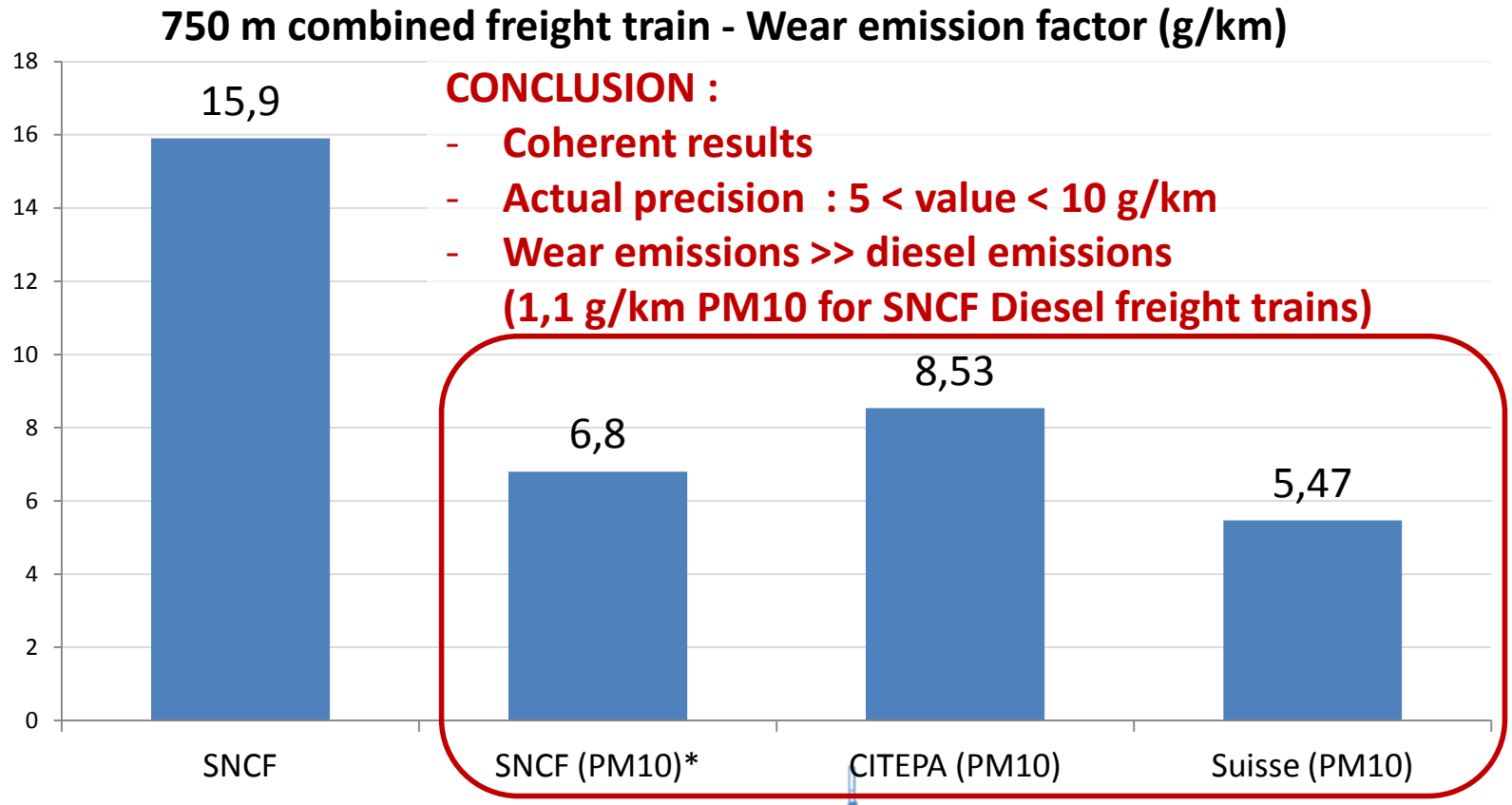
- Results



SNCF Data: Rails & catenaries wears missing
* PM10/Total facto r given by CITEPA

SNCF STUDY

- Results



CONCLUSION :

- **Coherent results**
- **Actual precision : 5 < value < 10 g/km**
- **Wear emissions >> diesel emissions (1,1 g/km PM10 for SNCF Diesel freight trains)**

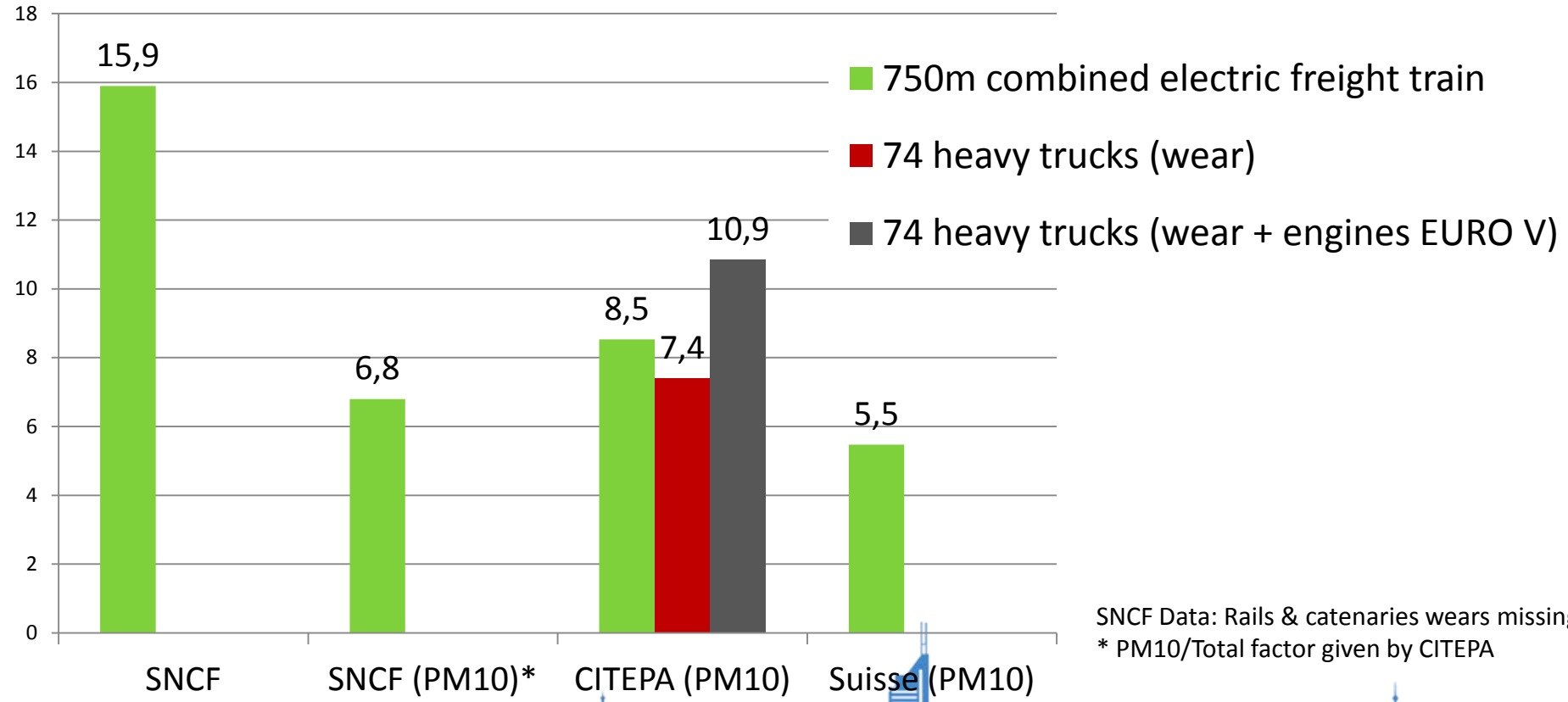
SNCF Data: Rails & catenaries wears missing
* PM10/Total facto r given by CITEPA

SNCF STUDY

- MODAL COMPARISON
  - Hypothesis
    - 1 freight train : 750m ; 37 wagons ; 1208 tons of goods ; 74 containers
    - 74 trucks : 1208 tons of goods ; 74 containers

SNCF STUDY

- MODAL COMPARISON g/km



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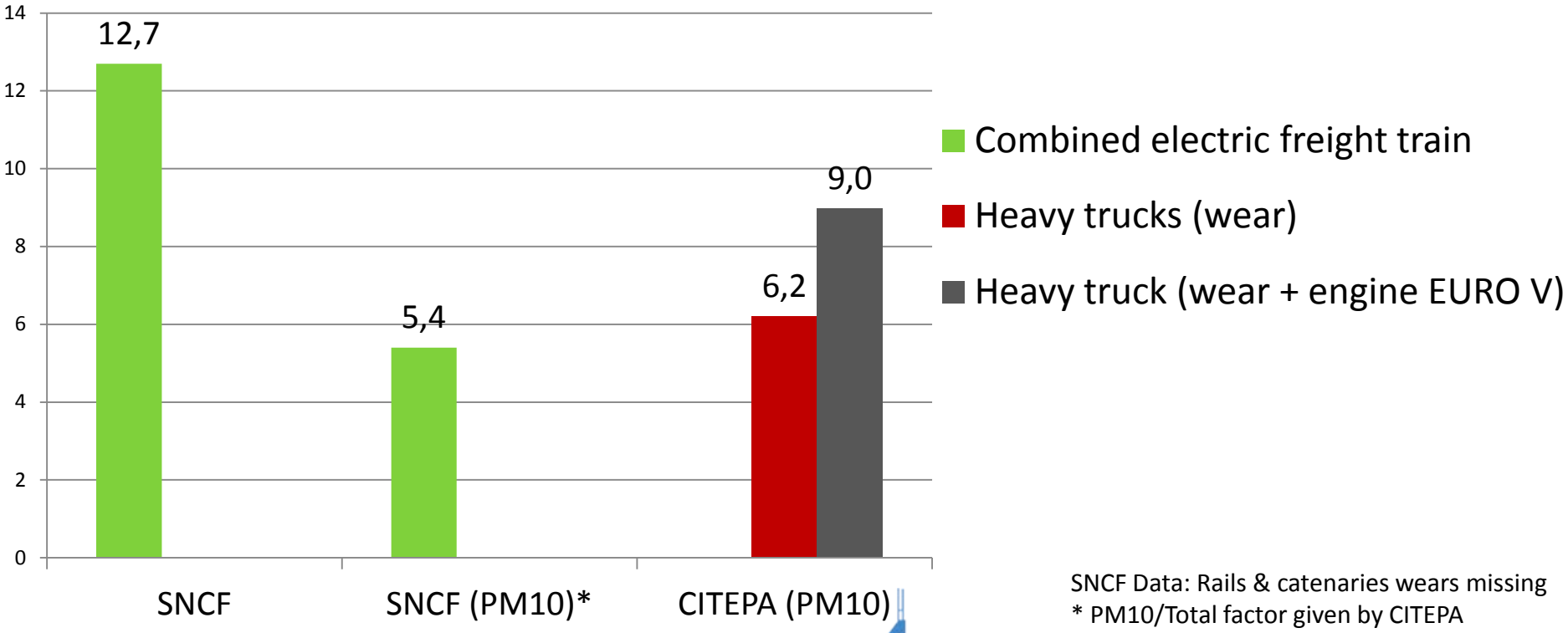
SNCF STUDY

- MODAL COMPARISON mg/(tons of goods.km)



SNCF Data: Rails & catenaries wears missing
* PM10/Total factor given by CITEPA

SNCF STUDY

- CONTINUATION
  - Pantograph wear : Computations for 25kV
  - Wheel wear : Confirmation of the computation of lost volume
  - Rails & catenaries wear : to be determine
  - Factor between total lost weight & PM10 & P2.5
    - Brakes : emission studies on rig test to analyse
    - Pantographs : emission studies on rig test to obtain
    - Wheels, rails & catenarie : to be determined
  - Environmental & sanitary impacts of wear emissions
  - Application of the method to other trains

CONTACT

- **PHILIPPE CLÉMENT**
  Ecomobility manager
  SNCF - DIRECTION DU MATÉRIEL
  Rolling stock engineering centre (CIM)
  4 allée des Gémeaux - 72100 LE MANS
  Tél. : +33 (0)2 43 78 68 85 (37 68 85) - Mobile : +33 (0)6 27 04 07 64
  philippe.clement@sncf.fr