



## G7 Transport Academic Workshop

# A Pathway to resilience: the FS Group approach

**Mario Tartaglia**



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Politecnico di Milano, Bovisa Campus, Milan (Italy)

# FS Group at glance

100% Ministry of Economics **MEF**

Over 120 subsidiaries



**ITALCERTIFER**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**FS FONDAZIONE FS ITALIANE**

**INFRASTRUCTURE HUB**  
The backbone of economic and social development throughout the territory

**PASSENGER HUB**  
Integrated solutions for sustainable mobility

**LOGISTICS HUB**  
The entire supply chain of digitised freight

**URBAN HUB**  
The sustainable regeneration of cities

**FERSERVIZI**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**TECHNOLOGY**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**FERCREDIT**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**SECURITY**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**FS INTERNATIONAL**  
A COMPANY OF THE FS GROUP

Sector's Group Leaders

**RFI**  
RETE FERROVIARIA ITALIANA  
GRUPPO FERROVIE DELLO STATO ITALIANE

**TRENITALIA**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**MERCITALIA LOGISTICS**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**SISTEMI URBANI**  
GRUPPO FERROVIE DELLO STATO ITALIANE

Sectoral parent companies

**Sanas**  
GRUPPO FS ITALIANE

**BUSITALIA**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**FERROVIE DEL SUD EST**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**FERROVIE DEL SUD EST**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**ITALFERR**  
GRUPPO FERROVIE DELLO STATO ITALIANE

**GrandiStazioni**  
GRUPPO FERROVIE DELLO STATO ITALIANE

+ Presence of Subsidiaries

# Strategic FS initiatives for resilience of transport



Investments aimed to **strengthen and monitor the safety and resilience** of road and rail infrastructure, also by upgrading, electrifying and boosting the resilience of railway lines, and including a **Digital Resilience Platform** for monitoring road and railway infrastructure.



**Research and innovation** on automation and digitalization of railway operations, sustainable and resilient systems, freight rail transport and regional lines (within the public-private partnership **Europe's Rail**, of which the FS Group is a founding member).



Significant **investments** (within the scope of **National Recovery and Resilience Plan**) for developing and upgrading the national and regional railway network, as well as for digitalization, innovation, competitiveness, ecological transition, inclusion and cohesion.



The governance and implementation of the **Group's climate resilience framework** supporting the climate change Transition and Adaptation Plans.

# Physical Risk Assessment

The technical process for the Physical Risk Assessment implemented by FS Group is inspired by “The Adaptation Support Tool” of the **EU Climate-Adapt** platform:



**“Hazard and Asset Identification”**: FS mapped the meaningful asset cluster with the hazard (according to EU Taxonomy Regulation’s list of climate events) exposed to.



**“Risk Modelling and Assessment”**: FS developed a “Climate risk & vulnerability assessment” and a “Climate Scenario Planning” in order to classify the assets most vulnerable to climate hazard and to quantify the economic impact related to climate hazard in RCP 4.5 and RCP 8.5 in the next years.



**“Identification of adaptation options”**: FS create a catalogue of relevant adaptation options, build on the output of the risk modelling and assessment step.

# Climate change mitigation strategies

## Direct actions

Decreasing own GHG emissions

SCOPE 1

Increasing own energy efficiency

SCOPE 1

Adopting low/zero GHG traction systems

SCOPE 2

Reducing GHG intensity of energy sources

SCOPE 1

Direct production of renewable energy

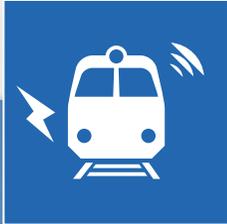
SCOPE 3

Mobility and supply chain management

## Indirect actions

Decreasing overall GHG emissions

Modal shift from modes more affecting climate change



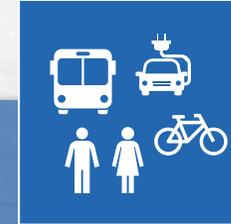
## Rail Transportation

- ✓ Increase of railway transport capacity
- ✓ Decarbonisation and energy efficiency
- ✓ Digitalization of railway transport
- ✓ Innovation in freight transportation



## CCAM Connected Networks and Smart Infrastructure

- ✓ Smart infrastructures for CCAM
- ✓ Resilience of networks and asset management
- ✓ Zero-carbon refuelling/recharging infrastructures

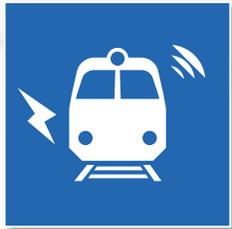


## Urban Mobility

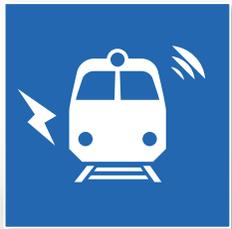
- ✓ Smart Urban Mobility Management
- ✓ Sustainable Urban Mobility Services
- ✓ infrastructures and terminals for mobility

# FS Group Projects for Infrastructure Resilience

## Rail Transportation



Use of **BVTOL/VLOS** (Beyond Visual Line of Sight – Vertical Take Off and Landing) Drone in order to prevent, protect and mitigate incidental events (according to the EU [Drone Strategy 2.0](#) for a Smart and Sustainable Unmanned Aircraft Eco-System in Europe).



**New Algorithms** for train routing optimization to solve problems due to a small and large disruption affecting railway traffic and with an impact in delay on trains time-table approaching/leaving railway stations.



**Cybersecurity algorithms** to protect data transmission related to energy consumption (from train to ground) against threats targeting the mission of [UIC/CER Sustainability Strategy](#).

# FS Group Projects for infrastructure Resilience

## CCAM, Connected Network and Smart Infrastructure



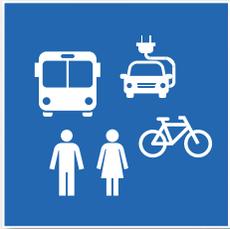
Use of **rain radar** (integrated with additional sensors) to measure and localize the impacts of pouring rain (high intensity and short duration) on transport infrastructure to identify protocols for nowcasting management (weather forecast based on provided data in real time and with high precision degree).



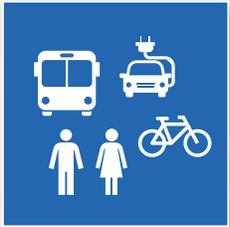
**Acoustic technology innovative monitoring system** to evaluate progressive road infrastructure deterioration concerning materials (e.g. structural anomalies). Acoustic signals related to the progressive release of energy transmitted to the structure as elastic waves (due to structural stress) are applied.

# FS Group Projects for infrastructure Resilience

## Urban Mobility



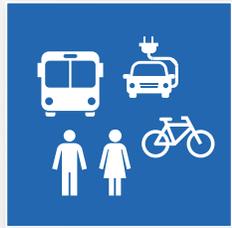
**Mobility Digital Twin:** a new national urban mobility modeling platform integrated with the existing FS Group platform and its national transportation simulation model.



Demonstrate the scalability of the ultimate sharing mobility service in a small Town (Sesto Fiorentino) and beyond and test the user willingness to share a vehicle driven by another customer and her willingness to pay the service. **TUSS Project (The Ultimate Sharing Service)** addresses the scalability of a mobility service for urban peripheries combining, car-sharing, ridesharing and automation-aided vehicle-repositioning to and from local hubs

# FS Group Projects for infrastructure Resilience

## Integrated Projects



Definition of methodological references, modeling configuration and IT architecture of a digital platform for the **analysis, management and planning of urban mobility**, able to exploit both the **new CCAM technologies** and the data from different sources, including big data (mobile phones, floating car data, public transport, etc.)

Prof. Mario Tartaglia PhD Ferrovie  
dello Stato Italiane S.p.A.  
Corporate Affairs  
*Leader of FS Research Centre*

