



University of Antwerp  
| TPR | Research Group Transport  
and Regional Economics

# How to decarbonize freight transport?

Prof. Thierry Vanellander  
University of Antwerp

# Situation

- **Global freight transport, measured in tonne-kilometres (tkm), grew by 68% between 2000 and 2015 and is projected to grow 3.3 times by 2050 (ITF 2019)**
- **Heavy-duty vehicles (HDVs) make a disproportionate contribution to air pollution, relative to their global numbers, because of their substantial emissions of particulate matter and of black carbon with high short-term warming potentials (Anenberg et al. 2019)**
- **Climate change impacts such as extremely high temperatures, intense rainfall leading to flooding, more intense winds and/or storms, and sea level rise can seriously impact transport infrastructure, operations, and mobility for road, rail, shipping, and aviation.**

## Situation (2)

- Available evidence suggests that transport-related CO<sub>2</sub> emissions would need to be restricted to about 2 to 3 Gt in 2050 (1.5°C scenario-1.5DS, B2DS), or about 70 to 80% below 2015 levels, to meet the goals set in the Paris Agreement.
- Avoid - Shift - Improve
- Infrastructure - Pricing - Regulation

# Infrastructure

- **Urban form**
- **Autonomous vehicles**
- **Battery-electric (LIB) vehicles (Electronic Road Systems?)**
- **Hydrogen (ammonia or methanol) fuel cells?**
- **Large-scale investments in low-carbon transport infrastructure**
- **(Biofuel and hydrogen)**
- **Intersectoral deployment**
- **Critical minerals, resource availability**

# Pricing

- **R&D support**
- **Investment support**
- **Charging for external costs, mode shift**

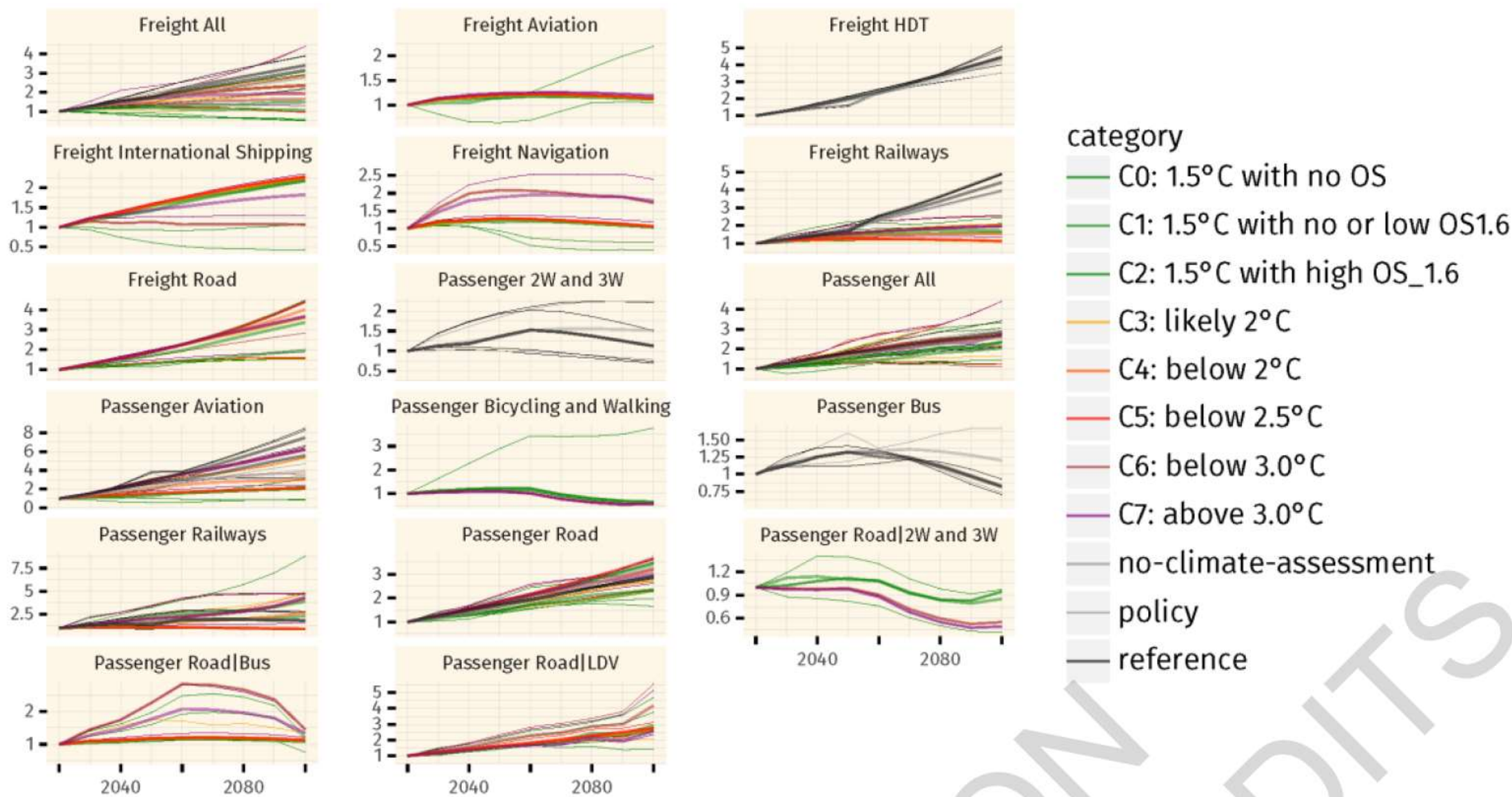
# Regulation

- **Urban behaviour**
- **Vehicle and fuel efficiency standards**
- **Supportive planning policy, building regulations**
- **Emission reporting**
- **'Poseidon' rules**
- **Design standards**
- **LNG/CNG, biofuels, Ammonia, synthetic fuels: mainly for long-distance transport modes**
- **Labour rights, non-climate impacts**

# Conclusion

- **A substantial package of measures needed**
- **No unique recipe, but clear differences in performance**
- **No exact science: human behaviour**
- **Consistency and follow-up**

Transport activity by mode – World [Index, 2020 level = 1.0] (fig\_6-AR6\_snapshot-norm)







Thank you!

[Thierry.Vanelander@uantwerp.be](mailto:Thierry.Vanelander@uantwerp.be)