DEEP DECARBONIZATION PATHWAYS

Deep decarbonization pathways for freight in large and fast-growing economies: challenges and opportunities

7th International Workshop on Sustainable Road Freight Transport

Session – Pathways for developing countries

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Supported by

The Deep Decarbonization Pathways initiative

- Launched prior to COP21 in 2015 to demonstrate the interest of nationally-based proposals and the role of long-term trajectories to inform short term policies

- From 16 independent country research teams in 2015 to more than 36 in 2020.

- <u>Key shared objective, as of today:</u>

  Designing transparent long-term pathways supporting the decarbonization of economies compatible with the objective to reach the global carbon neutrality around mid-century.

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The DDP research network shares a common approach to build consistent and policy-relevant pathways

1. **Bottom-up and country-led** analysis are required to build country-relevant pathways.

2. **A multi-scenario approach** defined from the key global and country-specific uncertainties affecting the country pathways enable to inform on possible futures and consequences.

3. **An iterative and backcasting approach from 2050** is required to identify the compatible short-term actions and consider some systemic changes with profound inertia to reach mid-century development objectives and emissions target

4. **Consistent and detailed sectoral pathways** requires a systemic description describing all underlying drivers, with qualitative and quantitative sectoral details, with consistent demand-side and supply-side articulations, going beyond the usual quantitative energy and emissions trajectories

5. **Actionable and policy-relevant pathways** requires to be transparent and comprehensive by stakeholders. Current models do not enable to structure these policy discussions. Policy-relevant framework requires comparable qualitative and quantitative description to structure and facilitate stakeholders' discussions and to accommodate quantitative analysis coming from different sources.

Recent methodological publications:

- *A pathway design framework for national low greenhouse gas emission development strategies, Nature Climate Change, 2019, Waisman, Bataille et al.*
- *A pathway design framework for sectoral deep decarbonisation : the case of passenger transportation, Climate Policy, 2020, Lefevre, Briand et al.*

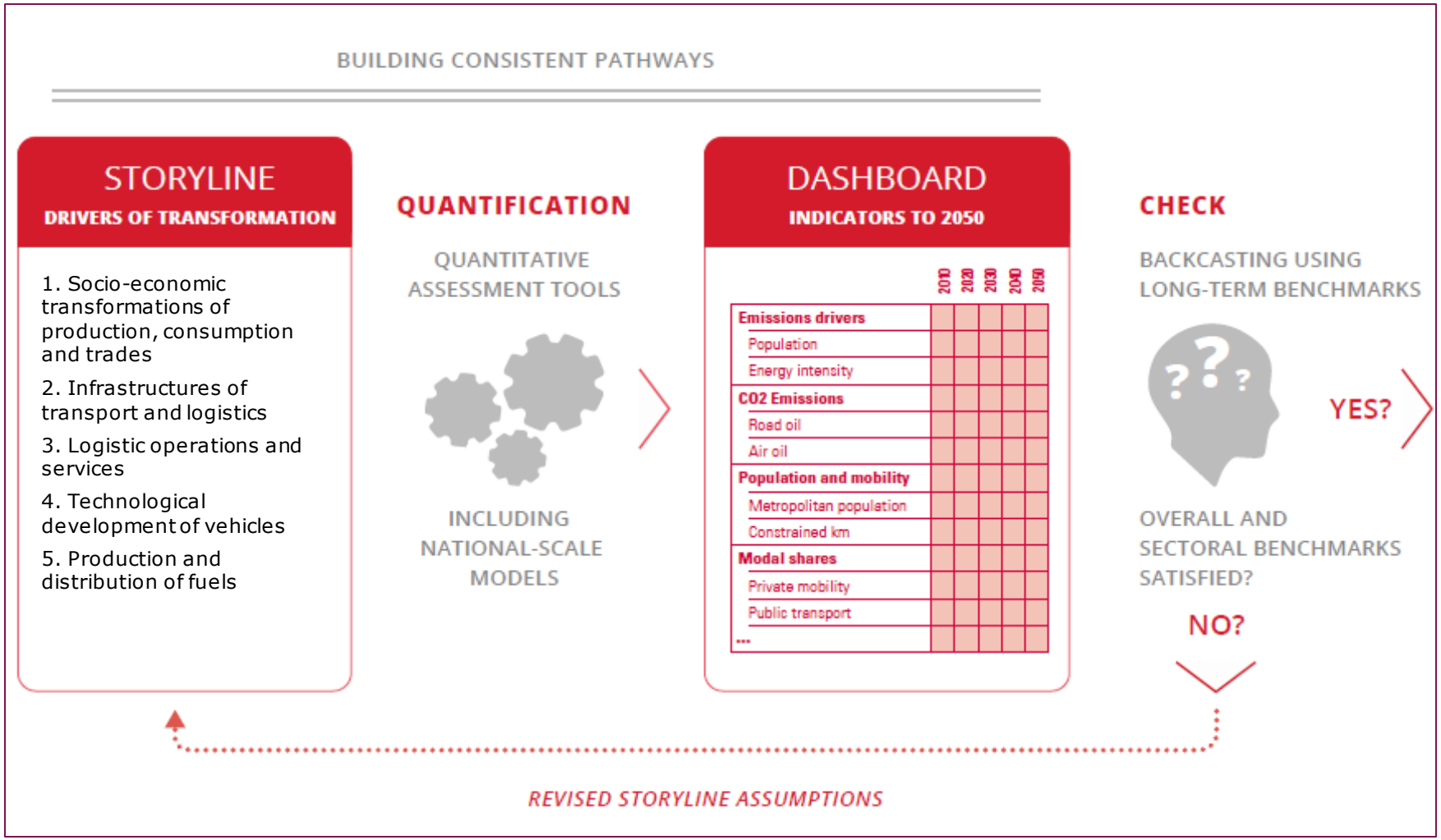
The DDP research network shares a common analytical framework with global, economy-wide and sectoral sub-descriptions

2 main modes of representations of the pathway:

1. The Storyline
2. The Dashboard

3 main steps to build consistent pathways:

1. The Storyline definition
2. The Quantification
3. The analytical Check and iterative process



Sectoral analytical framework for freight providing complementary informations

The chapters of the storylines

1. Economic and social macrostructure: systems of production, consumption and exchange of goods;

2. Management and operations of infrastructures of transport and logistics;

3. Logistic services and operations;

4. Technological development and supply of low-carbon goods transport vehicles;

5. Production and distribution of low carbon fuels.

The dashboard families of indicators:

1. Goods and mobility

2. Modal structure

3. Road-rail logistic indicators

4. Zoom on road freight transport

5. National energy consumption and related emissions

Emission perimeter: inland transport emissions

Summary of the main elements of narratives: the example of Brazil

1. Economic and social macrostructure: systems of production, consumption and exchange of goods;	• **Political will to think towards long-term investments, international finance access and reducing bureaucracy in rail and water activities** • Growing population, peaking around 2050 and growing economy • Ageing population help to rethink access in the largest metropolis and land use planning • **Development of urban consolidation center schemes to reduce the inefficient traffic**
2. Management and operations of infrastructures of transport and logistics;	• **Prioritizing investments** to renew railways, IWW and create multimodal platforms almost inexistant today around ports and rail infrastructures • Prioritizing investments to develop corridors between the main import/export and production/consumptions zones • **The restrictions of the « right of way » between the rail concessions are removed to facilitate rail access** • **Amortization rules** are adapted to favour investments.
3. Logistic services and operations;	• Explosion of light and medium trucks due to the development of e-commerce and the prohibition of heavy trucks in densely populated areas increasing during business hours congestion, energy consumption and air pollution. **The development of urban schemes will organize overnight deliveries to reduce partially the congestion and energy consumption**. • For long distance transport, the share of road transport is reducing due to tax cut, bureaucracy simplification, digitalization and process transparency. • Digitalization enable operational improvements in the average load factor and eco-driving programs or automation enable operational energy consumptions gains. • The **job opportunities** are reducing and salaries are under tension because of the digitalization and automation development. • **Tax reduction for IWW and cabotage** to favour water-based transport.

Summary of the main elements of narratives: the example of Brazil

4. Technological development and supply of low-carbon goods transport vehicles;	• Technological improvement of road transport enable energy consumptions gains (aerodynamics, engine performance…). • **Development of national eco-labeling program targeted for heavy duty vehicles** to improve their energy consumptions • **Development of national manufacturers of electric trucks and buses** and automative components **change the industry pattern and help reduce the price of Evs**. • The battery price reduces and the battery energy density is improved by 2050 enabling to reach a price parity with ICE. • The development of **electromobility will be concentrated in urban areas**. The sales of urban light trucks are mostly of BEV type by 2050 but for long distance, ICE vehicles remains dominant. • **Renewal of concession** contract to modernize and electrify more than 85% of the rail fleet by 2050, combined with improvements in propulsion efficiency and regenerative braking • Ships design, weight and engines improvements enable a 25% gain in energy efficiency by 2050.

5. Production and distribution of low carbon fuels	• Investments in charging stations along all important highways to encourage the electrification of regional freight trucks
	• Despite the decrease in international prices, the dependence on fossil fuels is reduced due to national industry improvements enabling to have competitive biofuels and due to the development of electromobility.
	• Development of liquid biofuels :
	  • Diesel blend for road and rail are increased and reach about 40% by 2050.
	  • Diesel blend is created for IWW and targets also 40% by 2050.
	  • Fuel oil blend is created for coastal transport and targets 20% by 2050.

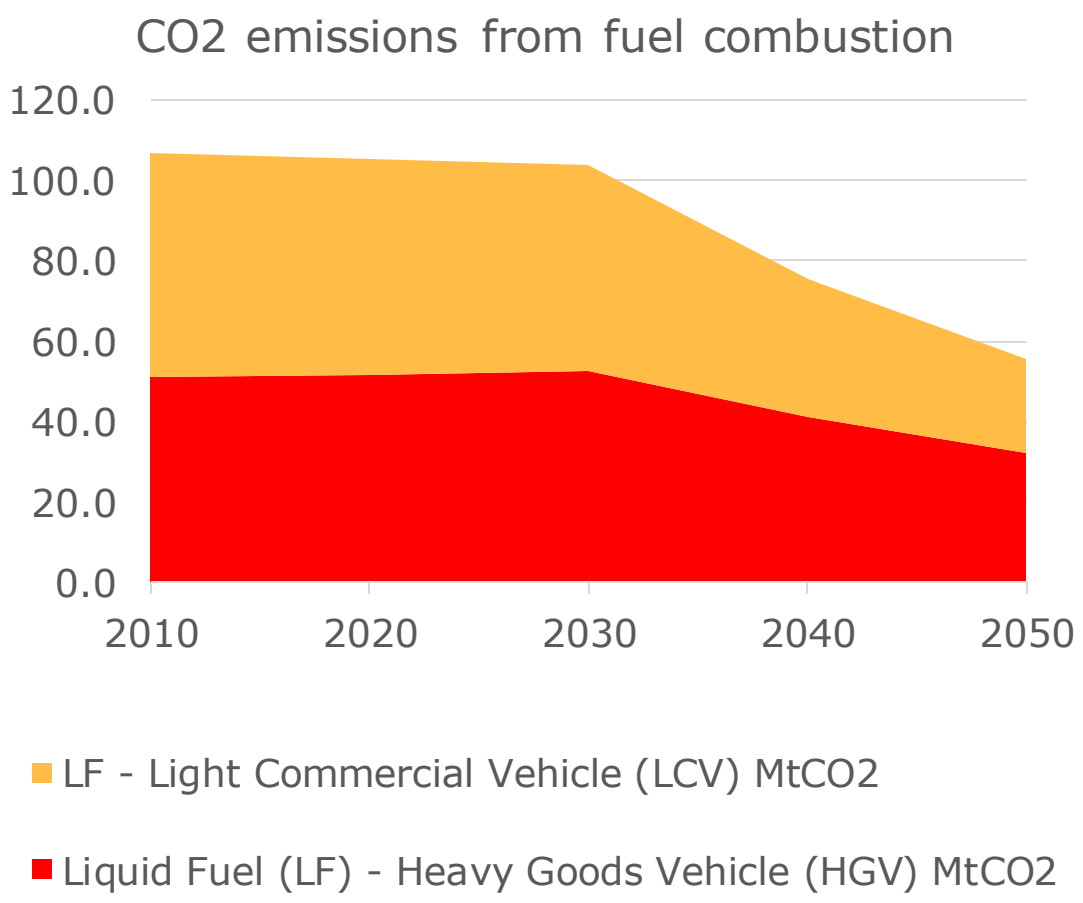
Summary of the main elements of narratives: the example of India

Chapters of storyline	India
1. Economic and social macrostructure: systems of production, consumption and exchange of goods;	
2. Management and operations of infrastructures of transport a	
3. Transport service	
4. Supply of low-carbon goods transport vehicles;	
5. Production and distribution of low carbon fuels	

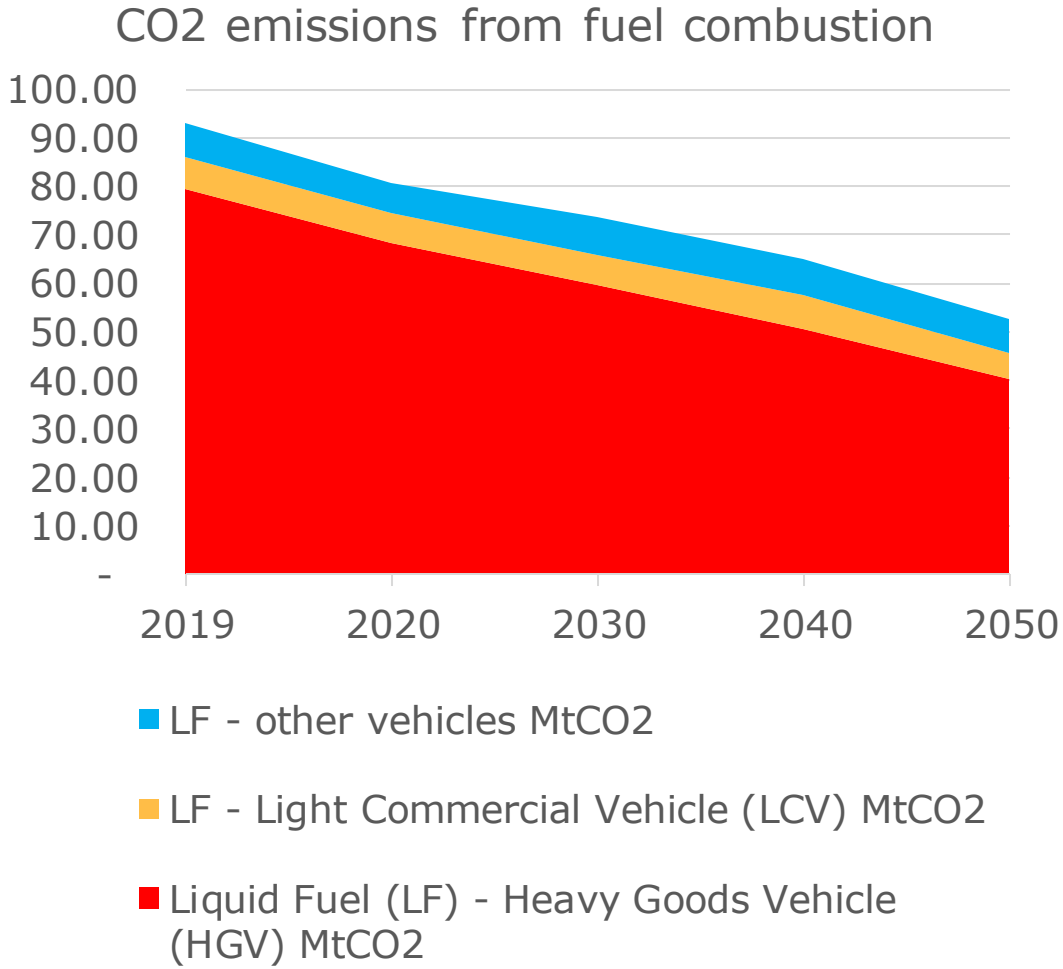
See the presentation of Dipti Gupta

Summary of the CO2 emissions

India : - 48% MtCO2 over 2010-2050

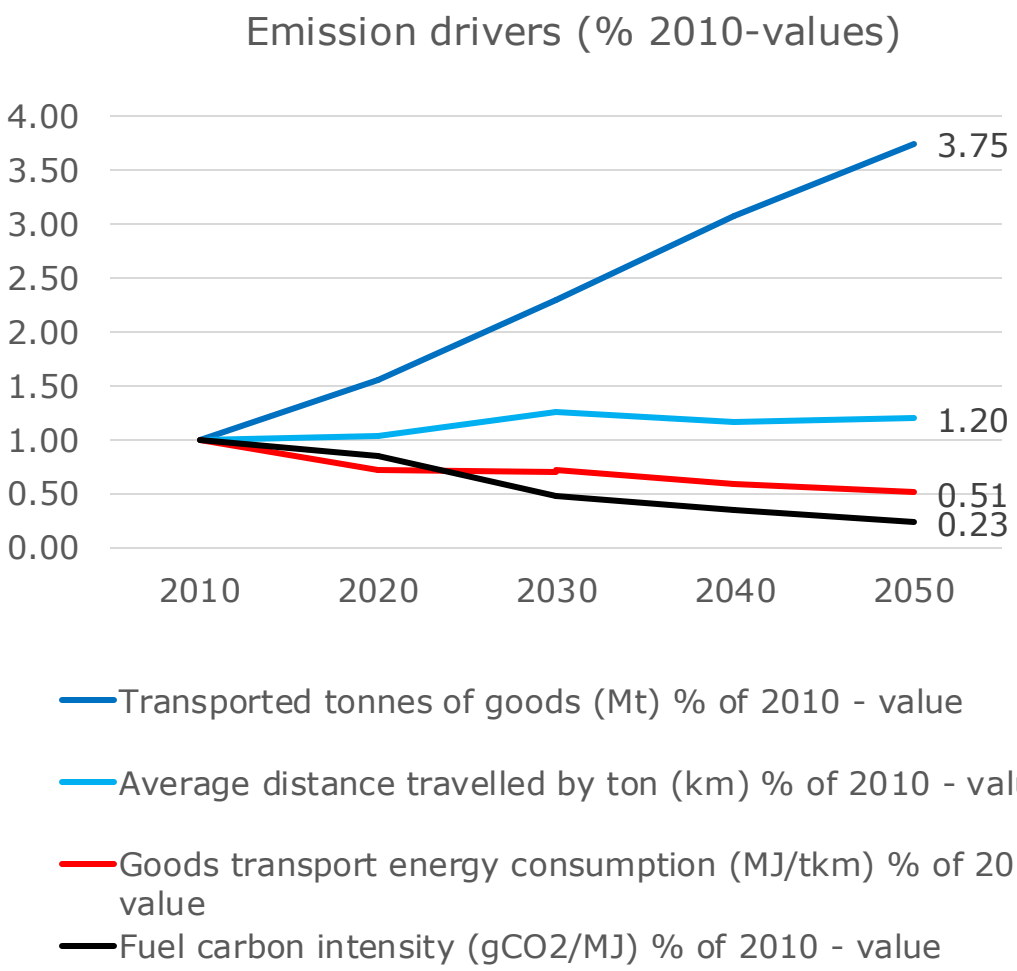


Brazil : - 43% MtCO2 over 2019-2050

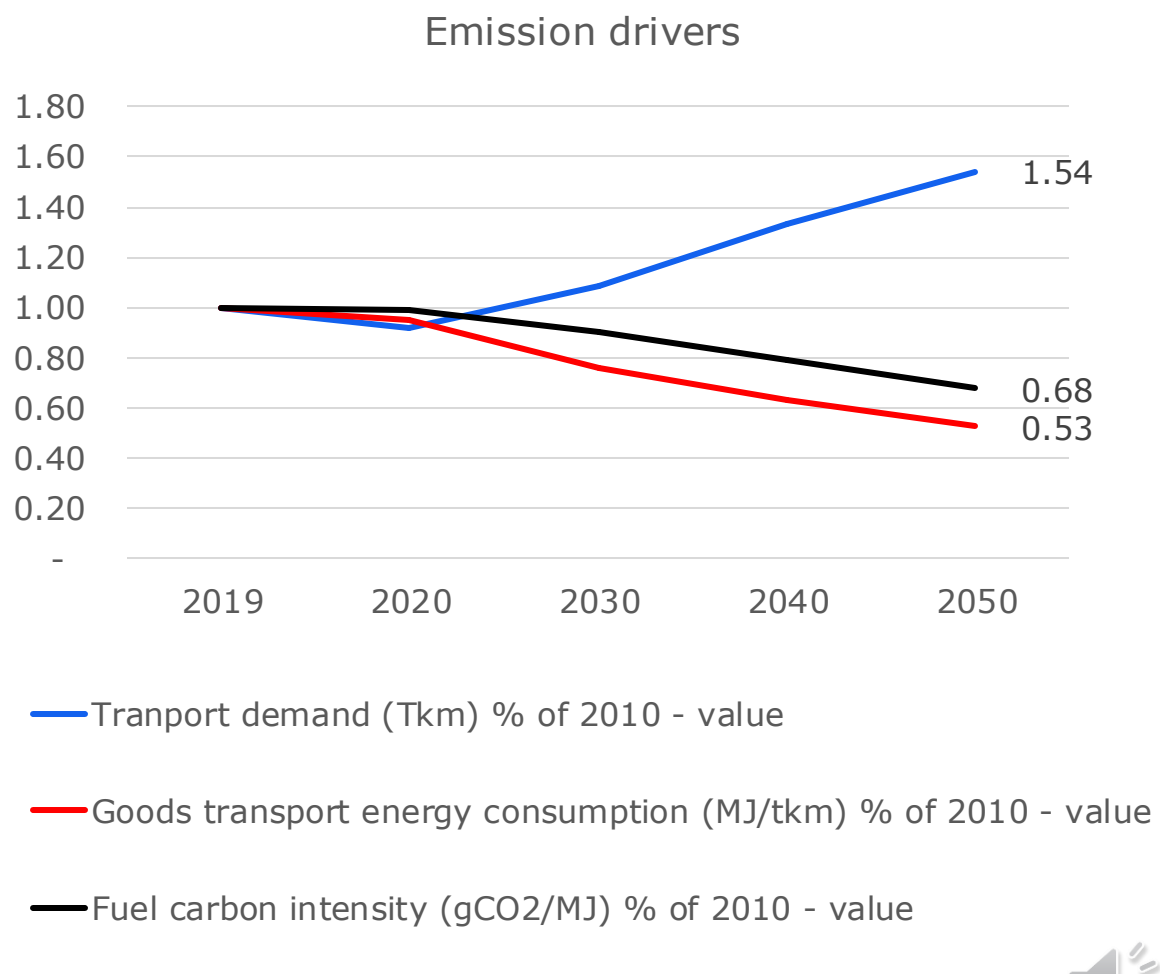


Summary of the emission drivers

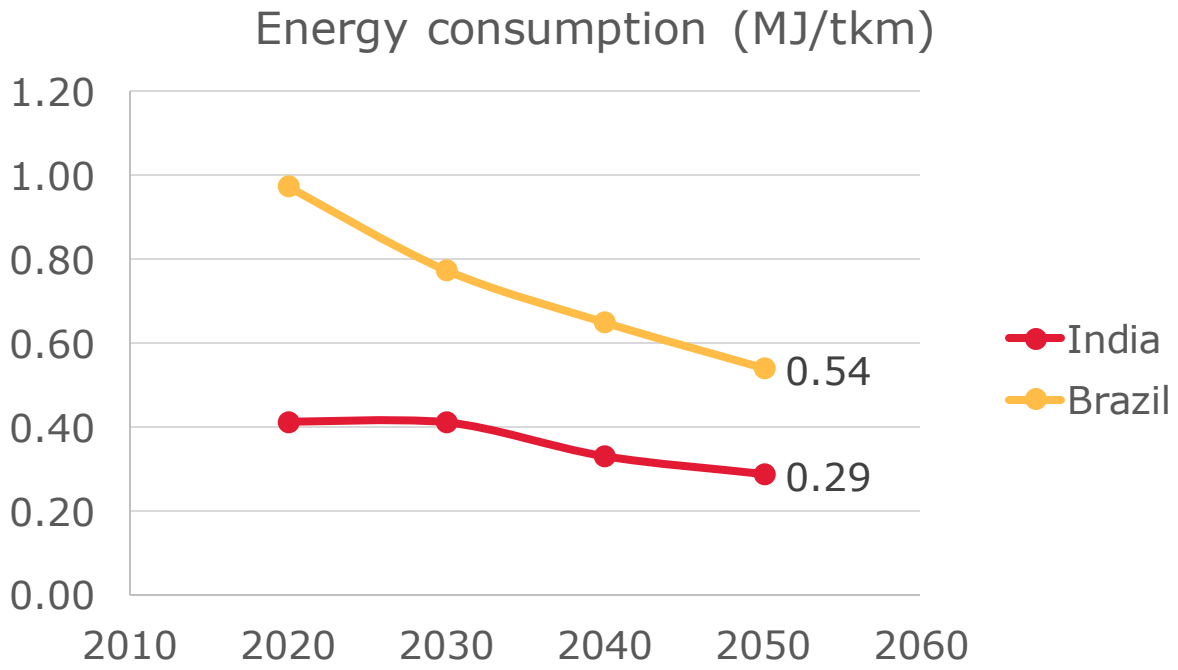
India over 2010-2050



Brazil over 2019-2050



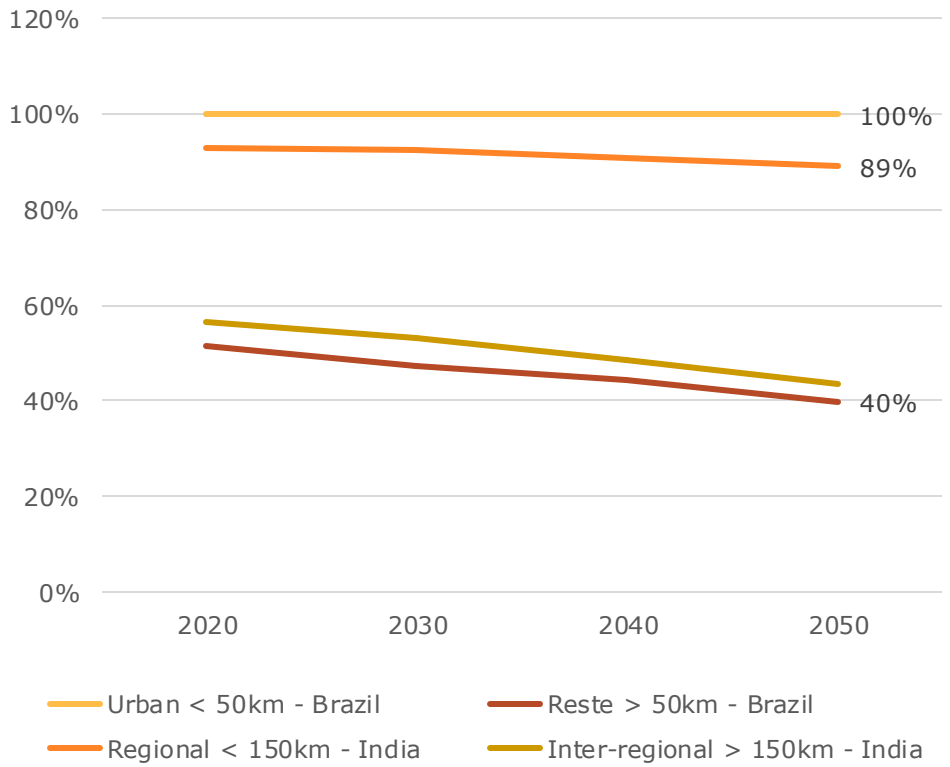
Zoom on energy consumption



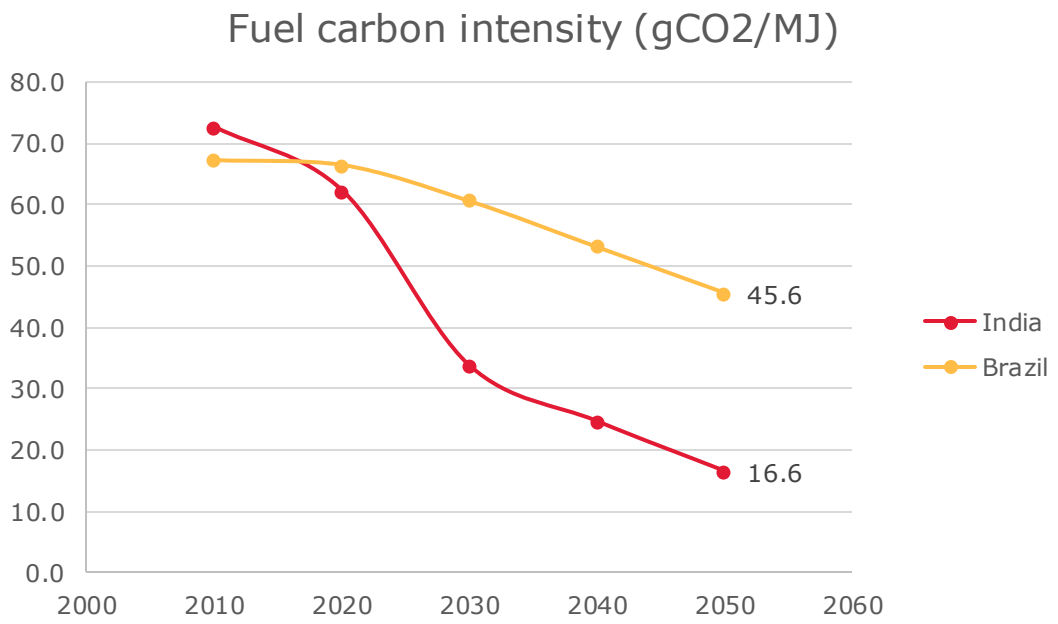
Efficiency gains reflecting:

- Systemic regional versus long-distance demand
- Systemic modal shift
- Systemic road vehicle shift
- Vehicle and driving improvements
- Shift from ICE to EV
- Average load factor improvement (empty running and filling rate)

Details on Spatial x Modal structure Gtkm (% road)



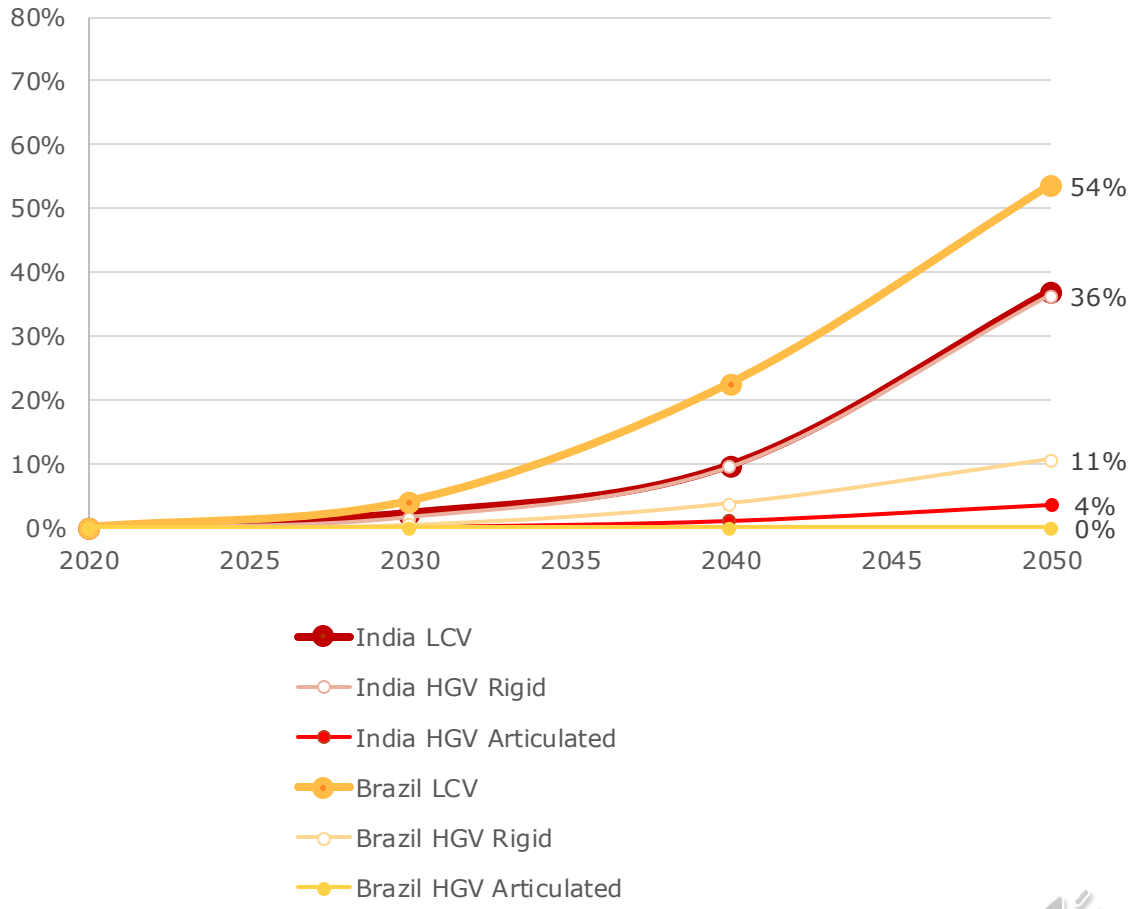
Zoom on carbon intensity



Carbon intensity gains reflecting:

- Systemic regional versus long-distance demand
- Systemic modal shift
- Systemic road vehicle shift
- Shift from ICE to EV
- Introduction of biofuel in liquid or gaseous blended fuels

Details on electrification (% BEV)



Key implementation challenges

- Difficulties to build pathways describing what are the underlying drivers of transformations behind some systemic transformations (like demand projection, modal structure…)
- Difficulties to consolide the databases related to the demand: type of goods, of flows, of distance categories… and vehicles (LCVs especially)
- Difficulties to articulate consistently the transformations related to the demand transformations and the development of non-road modes or the penetration of low-carbon road vehicles (where, when and how they are efficient and suited…)
- Difficulties to integrate the time inertia between the storyline and action described and when the transformation really happens
- Key policy challenges to be discussed…

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Merci pour votre attention !

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