ITF Transport Outlook: Scenarios to 2050

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ITF Annual Summit, 21 May 2014
Strategic tool

- A scenario tool to examine development of global transport volumes and related CO$_2$ emissions, health impacts
- Strategic tool to support policy-makers in shaping the future of transport policies
- Allows us to analyse how world could change if we choose different policies and development paths
Approach

- Examine factors that can affect supply and demand for transport services
- Focus on scenarios illustrating potential upper and lower pathways
- Aim to gradually expand to cover key policies and external factors shaping future transport demand
A collaborative effort

- International Energy Agency (IEA)
- OECD Economics Directorate
- International Council on Clean Transportation (ICCT)
- The Energy and Resources Institute India (TERI)
- China Academy of Transportation Sciences
- Transportation Planning Research Institute China
- University College London Energy Institute
- Economic Commission for Latin America (ECLA)
- Development Bank of Latin America (CAF)
- McKinsey
- Professor David Hummels, Purdue University
- Dr Laura Puzzello, Monash University
Population growth generates rising mobility needs

9 billion

The world population by 2050

Source: ITF Transport Outlook 2013 based on UN Urbanisation Prospects (2011 Revision)
Economic center of gravity shifts

Cities shaping future transport flows

2.7 billion

Additional urban dwellers in 2050, 92% will live in developing countries

Source: ITF Transport Outlook 2013 based on UN Urbanisation Prospects (2011 Revision)
International freight patterns change

1/3 of world trade will take place between non-OECD countries by 2050 (15% in 2010)

Source: ITF Secretariat based on OECD Economics Department (forthcoming)
Total inland transport CO2 emissions by world region, 2050 (2010=100)

Source: ITF Transport Outlook 2013
Total inland transport CO2 emissions by world region, 2050 (2010=100)

Source: ITF Transport Outlook 2013
Total inland transport CO₂ emissions by world region, 2050

2010

- OECD: 60%
- Latin America: 15%
- RoW: 17%
- Asia: 8%

2050

- OECD: 26%
- Latin America: 18%
- RoW: 46%
- Asia: 10%

Source: ITF Transport Outlook 2013
Impact of urban pathways and economic scenarios is big on emerging economies

CO₂ emission growth for inland passenger transport by region, 2050

Alternative urban pathways and economic scenarios, 2010=100

Source: ITF Transport Outlook 2013
International freight model

Assess trends and scale of future international freight

- Design policies to achieve more sustainable outcomes in the future
Model framework

Model by commodity type (19 classes)

Outputs:
- International trade in weight by OD pair
- International trade tonne-km by OD pair and mode

* Source: OECD Economics Directorate
Production/consumption centroids

- Based on Population density, regional GDP and minimum influence area of 500 km within the country
- The model considers 294 centroids
Model framework

- Model by commodity type (19 classes)

**Outputs:**
- International trade in weight by OD pair
- International trade tonne-km by OD pair and mode

*Source: OECD Economics Directorate*
Network model

- Infrastructure and routes
  - a) Road (highways or main roads)
  - b) Rail (station, network)
  - c) Sea (ports, routes)
  - d) Air (airports, commercial flights)
  - Differential speeds by mode, infrastructure and continent

- Links between modes (including dwelling times) and to centroids

Source: ITF International Freight model, OpenStreetMap, OpenFlights, Sea Project, UCL
Shift in world freight patterns

- Evolution of international trade in tonne-km (350% increase 2010-2050)

Source: ITF International Freight model
Sea predominance maintains, but...

- Evolution in mode share and in average distance of international trade

Road international freight share would increase about 40% with current infrastructure, while freight average hauling distance increase by 17%

Source: ITF International Freight model
Freight volume patterns change (2010-2050)

Source: ITF International Freight model
North Atlantic remains important, but...
North Pacific surpasses North Atlantic volume

Source: ITF International Freight model
Strong increase in volume in the Indian Ocean and the Suez Canal

Source: ITF International Freight model
Significant future pressure for inland connections, especially in Asia and Africa

Source: ITF International Freight model
This domestic transport linked to international trade relevance presents great variability, depending on the geographic location of the main world producers/consumers.

- **China:** (9%): Coastal concentration of activity
- **India:** (14%): Less coastal concentration of activity

**Increase of 10% from 2010 to 2050**

Source: ITF International Freight model
Relevance of domestic transport linked to international freight

- This component represents a large share of total hinterland freight volume (national and international) in some countries:
  - **China**
    - 9% 2010 can grow up to 11% 2050 (if coastal pattern of GDP concentration maintains)
  - **United States of America**
    - 16% 2010 can grow up to 40% 2050

- Increase of 10% from 2010 to 2050

Source: ITF International Freight model
First insights

- **Strong increase of international trade related freight in Asian countries**
  - The main freight corridor may shift from the North Atlantic to the North Pacific
  - Generates significant volume also in the inland links between countries and within continents
    - Increase of road volume without infrastructure improvements

- **Domestic transport linked to international trade** represents a significant component of overall international freight volume (10%)
  - Relevance of connections from/to ports
  - This component requires targeted policies to mitigate its impact
ITF Urban Transport Model

What type of urbanization?

Source: ITF Outlook 2013
ITF Urban Transport Model

- Simulates evolution of cities under different urban policy scenarios

- Results: travel and mobility, modal shares, CO2 emissions

- “Urban front-end” to the IEA Mobility Model (MoMo)

- Regional analysis of trends and drivers in cities are used for modeling
40% of total new urban dwellers in 2050:
Latin America, India and China

Source: UN Urbanization process 2012

Photo: GIZ, Pardo, 2010
Latin America cities

Public transport quantity and quality:
+ slow down vehicle ownership growth

Road infrastructure:
+ Four-wheeler saturation
- Two-wheeler saturation

Fuel prices:
+ increase income threshold of vehicle ownership

Source: ITF Outlook 2013
Private Motorization in India

2 Wheelers / GDP*

4 Wheelers / GDP*

Source: IMF, IEA MoMo, ITF urban transport module for Latin America
Indian Largest Cities

2 Wheelers / GDP*

Source: ITF based on TERI, McKinsey Cityscope
Indian Largest Cities

4 Wheelers / GDP*

2 Wheelers / 4 Wheelers

Source: ITF based on TERI, McKinsey Cityscope
What could explain the differences?

- **Land-use:**
  - Urban density (total and by urban region)

- **Public transport:**
  - Bus service (SRTU) + private
  - Informal services (rickshaws)
  - Access to rail services in different areas

- **Road provision:**
  - Network density (in terms of population and urban area)

- **Prices:**
  - State taxation (ownership and fuel)
Beyond Co2: Air pollution and health impacts

PM 10 concentration

Source: WHO / Le Monde
Latin America urbanization scenarios

V-km growth relative to Baseline

- Private transport oriented
  - High road growth
    - CO₂: 34%
    - Premature mortality (PM 2.5): -9%
  - Low road growth
    - CO₂: 20%
    - Premature mortality (PM 2.5): 12%

- Public transport oriented
  - High road growth
    - CO₂: -18%
    - Premature mortality (PM 2.5): -15%
  - Low road growth
    - CO₂: -27%
    - Premature mortality (PM 2.5): -4%

Source: ITF Transport Outlook 2013 & ICCT
Implications

- Context is extremely important in the way policies play out regarding different impacts (e.g. Health and Environment)

In the case of Latin America:

- Increasing the share of public transport in urban mobility will only bring significant health benefits if coupled with regulations that assure improvement in bus technologies used

- Two-wheeler increasing role in urban mobility can be positive in terms of CO$_2$, congestion and affordable mobility, but regulation is critical to avoid important damage to the health of the population
ITF Transport Outlook 2014

- Publication November 2014
- Update of underlying variables and scenarios
- International freight - CO₂ emissions
- Alternative trade liberalisation scenarios
- Urban module for Indian and Chinese cities
- Health impacts
- Workshop December 2014
Thank you

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