



# MODELLING APPROACH AND DATA REQUIREMENTS: CASE OF THE FREIGHT MODEL FOR ARGENTINA

**Stakeholder Consultation Workshop**

26 April 2022

John P Pritchard, Transport Modeller/Policy Analyst,  
ITF

On behalf of:



of the Federal Republic of Germany





# Importance of Data



## Importance of data

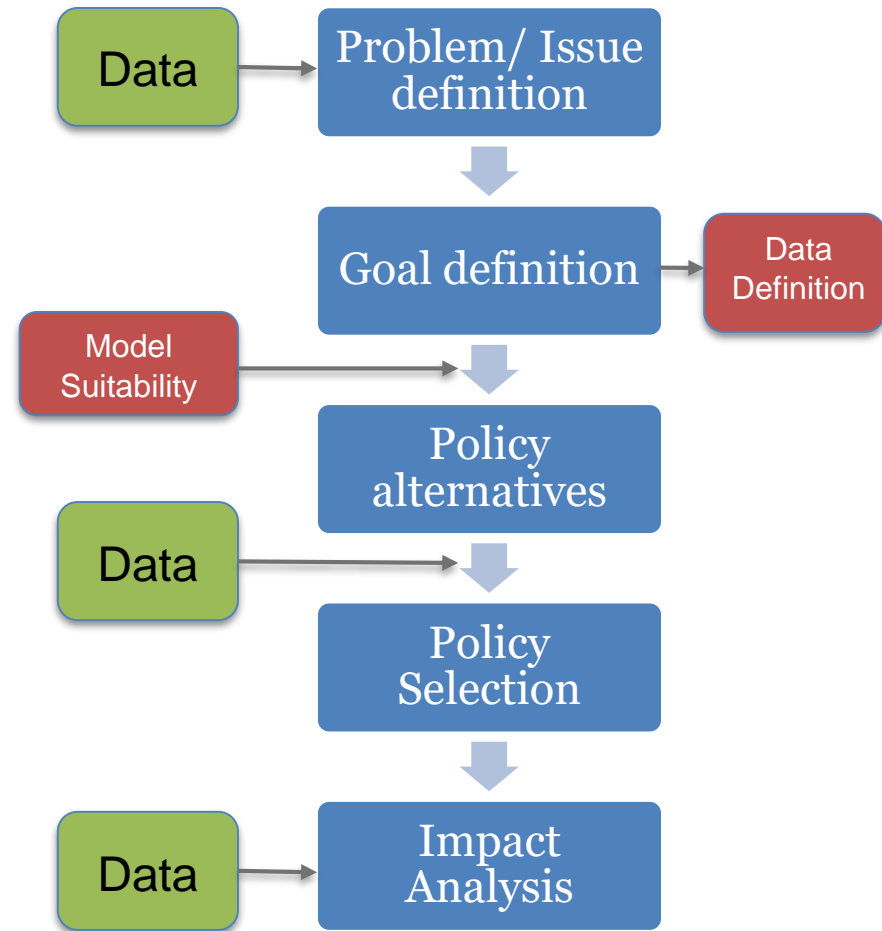
---

- Accurate data collection is essential to **maintain integrity** of research and policy analysis
  - Avoid compromising decisions for public policy
- Enables the definition and analysis of **EFFECTIVE policies**
  - **What** is the aim?
  - **How** is success quantified?
  - Did it **achieve** its aim?



## Importance of data: Effective Policy

- Data allows us to **understand existing issues**
- When defining policy **aims and goals**, the **data needed** to quantify impact should be defined
- **Suitability of Models** to the context
- **Ex-ante** analysis of alternatives and scenarios
- **Ex-post** analysis of results





## Data collection: Things to consider

---

- **What data is needed?**
  - Necessary to be **strategic** in data collection
    - Data collection can be cost and time consuming
  - Specific models require **specific data**
- **Quality Assurance** and **Validation**
- **Systematized** and **continuous** data collection (**time series**) frameworks are important
- The best time to start is **now!**

# ITF MODELLING FRAMEWORK



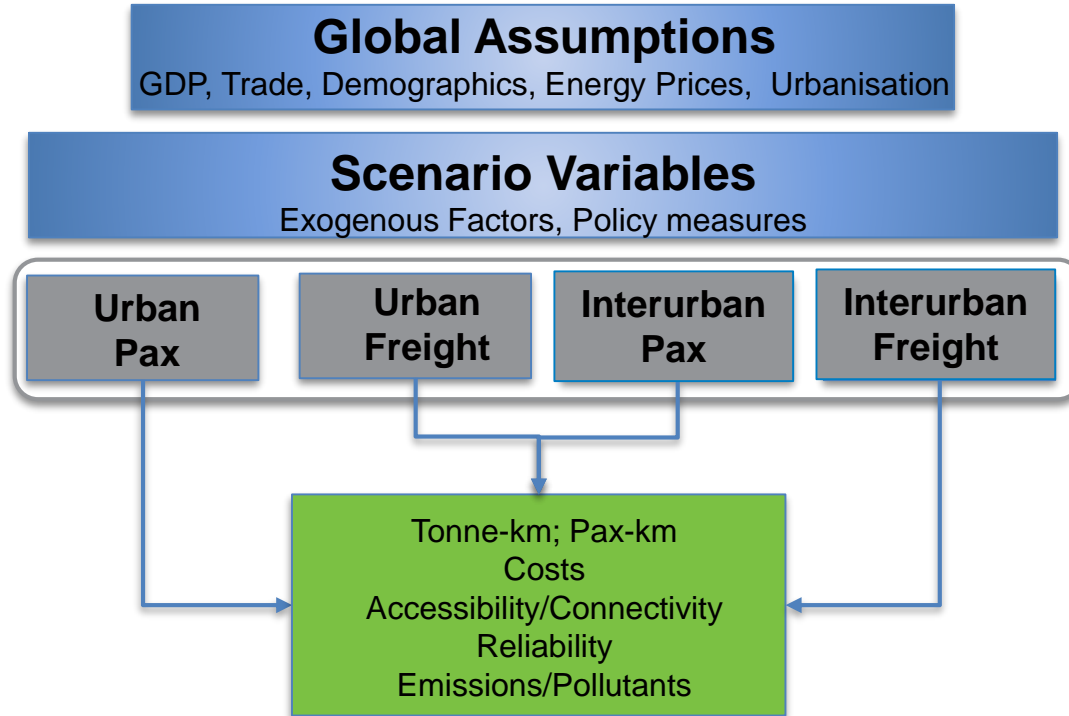
# ITF Modelling framework

---

- Allows testing the impact of various **policies, measures, and trends** in:
  - **Freight**: Urban, Non-Urban (global)
  - **Passenger**: Urban, Non-Urban (global)
- Scenarios are built into the model with **direct stakeholder engagement** to ensure the inclusion of **relevant** and **interesting policy scenarios**.
- **Simultaneous estimation** in **common network** and zoning system
- Based on traditional **4-step model** approach
- In terms of the technology/and efficiency of vehicles,
  - NEW ITF FLEET MODEL
  - Previously: **IEA MoMo model**



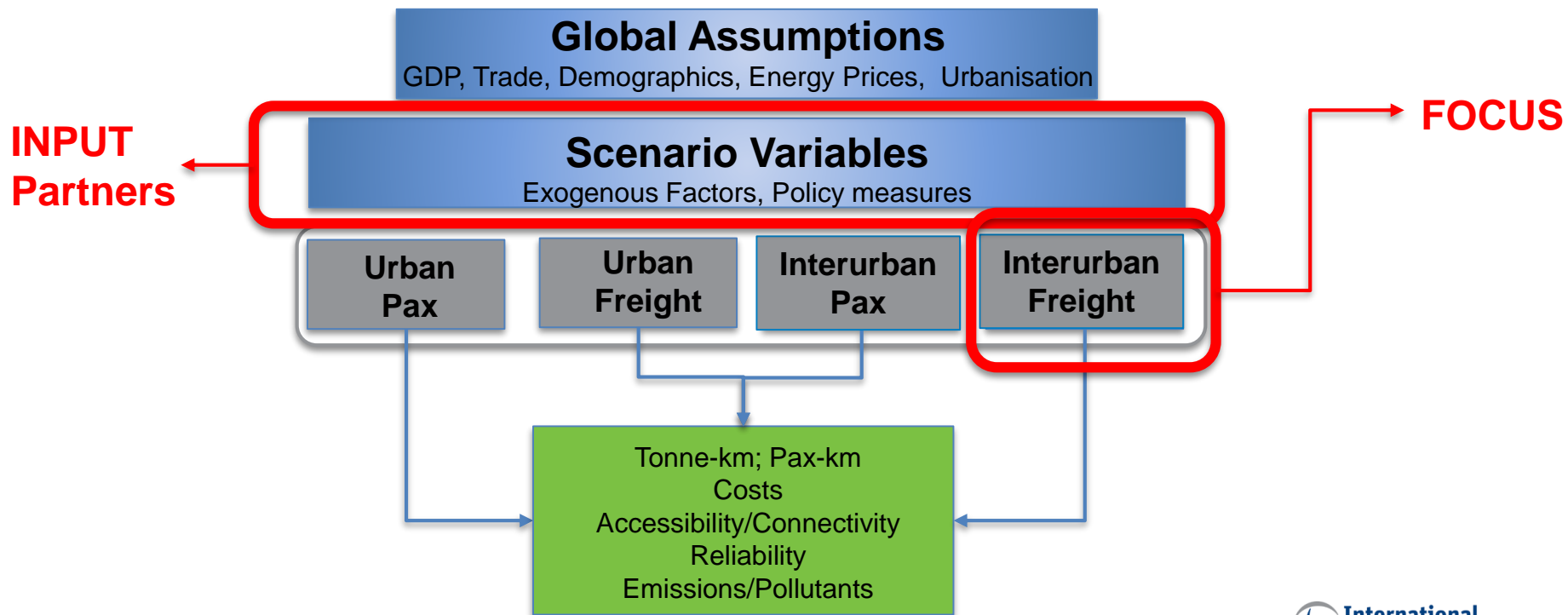
# ITF Modelling framework







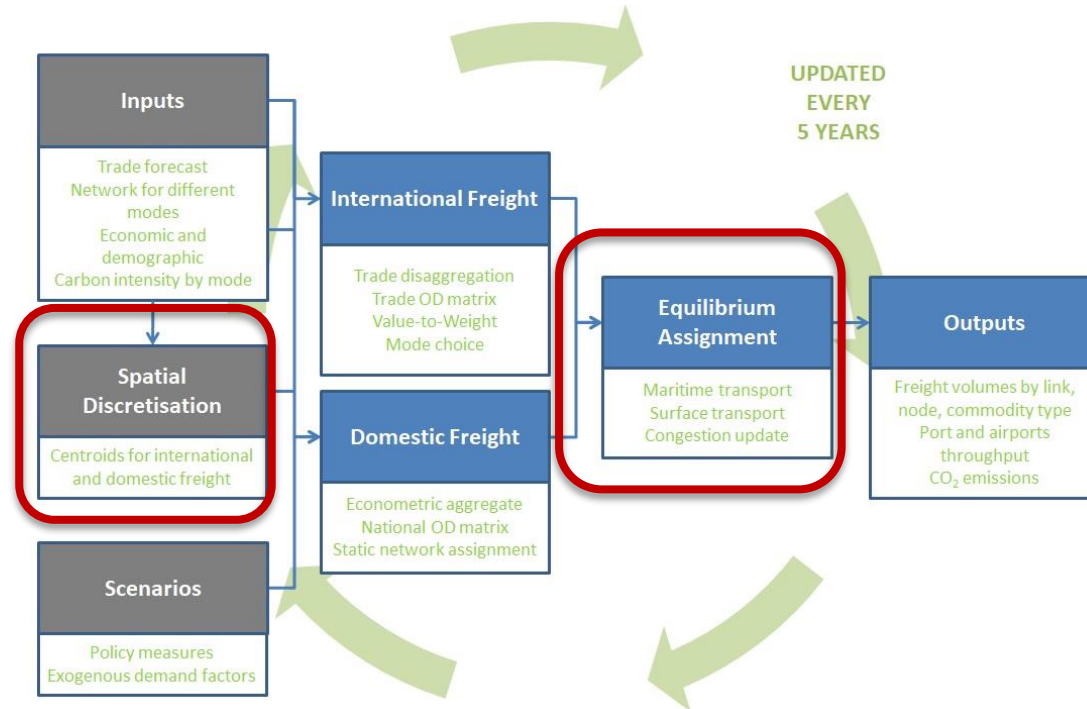
# ITF Modelling framework



# THE ITF NON-URBAN INTERNATIONAL FREIGHT MODEL

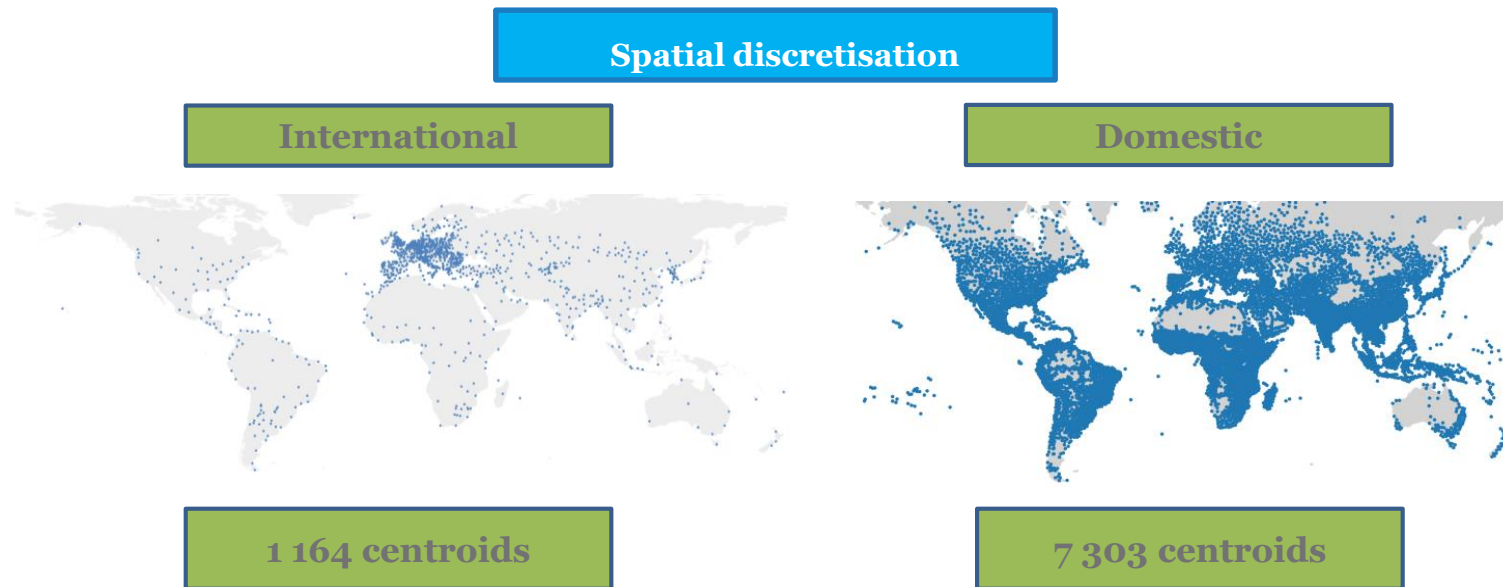


# ITF Global non-urban freight model





# ITF Global non-urban freight model: Components

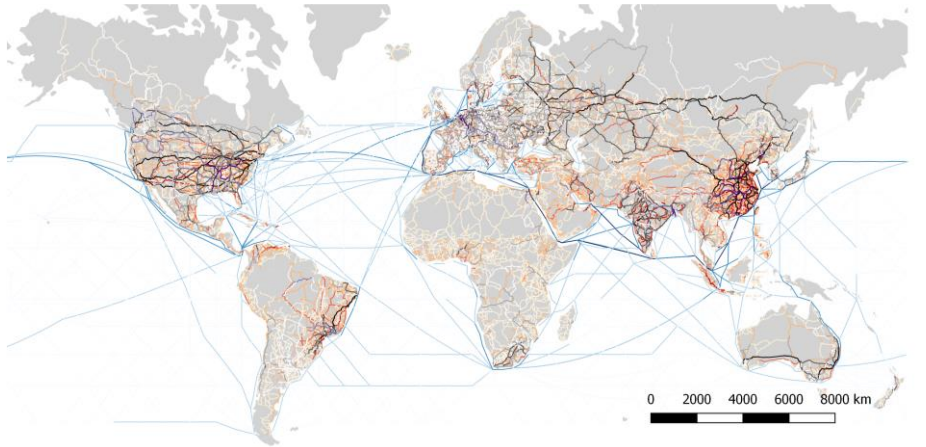


The **level of detail** between the regions **can vary significantly** as a result of the available data.



# ITF Global non-urban freight model: Components

## Equilibrium multimodal assignment



► Completely **integrated multimodal** network, that includes:

1. **Maritime**
2. **Roads and Highways**
3. **Inland Waterways**
4. **Railways**

# APPLYING THE MODEL TO ARGENTINA



# Overview

---

- Project relied on the **Global Freight Model**
- Policy Scenarios **designed in direct collaboration** with Argentina
  - The ITF **does not advocate** for particular solutions
  - The inclusion or exclusion of a particular measure **does not imply a value judgement**
- Output was generated for three different **timeframes: 2015, 2030, and 2050**
- Required **extensive validation** of data at the national scale



# Policy scenarios

Defined collaboratively:

1. Baseline: reference point
2. Intermodal and infrastructure improvements
3. Fleet renewal with transition to gas
4. Urban freight fleet electrification
5. E-commerce
6. Global trends
7. Combined

**DEFINED IN  
COLLABORATION  
WITH MINISTRY**

**INCLUDE  
REGIONAL AND  
GLOBAL  
SCENARIOS**



# ADAPTING THE MODEL TO A NATIONAL SCALE



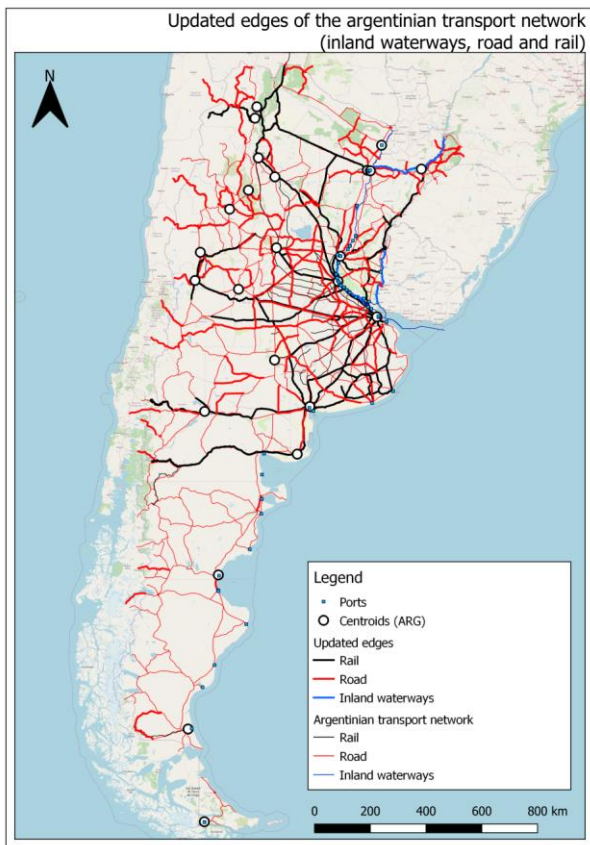
# Challenges and Opportunities of implementation at national scales

---

- Implementation at national scales requires effort to **validate** and **recalibrate** the model
- **Quality data is essential**
- **Refining the resolution** allows for more **interesting insights**
- Test **national** and **regional/global** policies and trends simultaneously
  - **Regional scenarios have advantages**: coherent measures in terms of regionalization and other trends that are not applied only in a country
- **LOCAL EXPERT KNOWLEDGE IS KEY!**



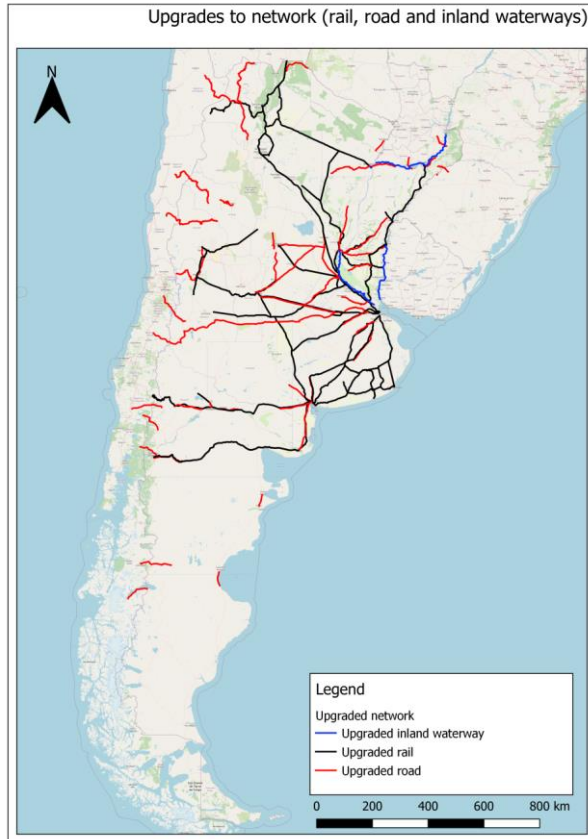
# Updates to the network



1. **Centroids** increased
  - 1 international centroid/province (**24 total**)
2. Entire **multimodal Transport network** was defined and validated
  - **58 642 km** of roads
  - **23 128 km** of rail
  - **2 241 km** of inland waterways
3. International **Entry and Exit points** were defined
  - **Border Crossings** by mode
  - **Ports**



# Proposed upgrades in scenario 2 (Intermodal and infrastructure improvements)



- Extensive inventory of future upgrades to the network based on:
  - Expert consultation
  - Review of **existing plans** and **proposals**



## Emission factors updates

---

- Validated and updated to more accurately reflect the **Argentinian reality**
- Based on IEA MOMO
  - **Regional values** (e.g. Modes, Vehicle Types, Energy sources)
  - **NEW: INTERNAL ITF FLEET MODEL**
- To differentiate by country we need to adapt the model
  - Requires **detailed data**:
    - **Fleet Composition**
    - **Carbon Intensity** of fleet (by type of **vehicle** and **fuel**)

# RESULTS HIGHLIGHTS



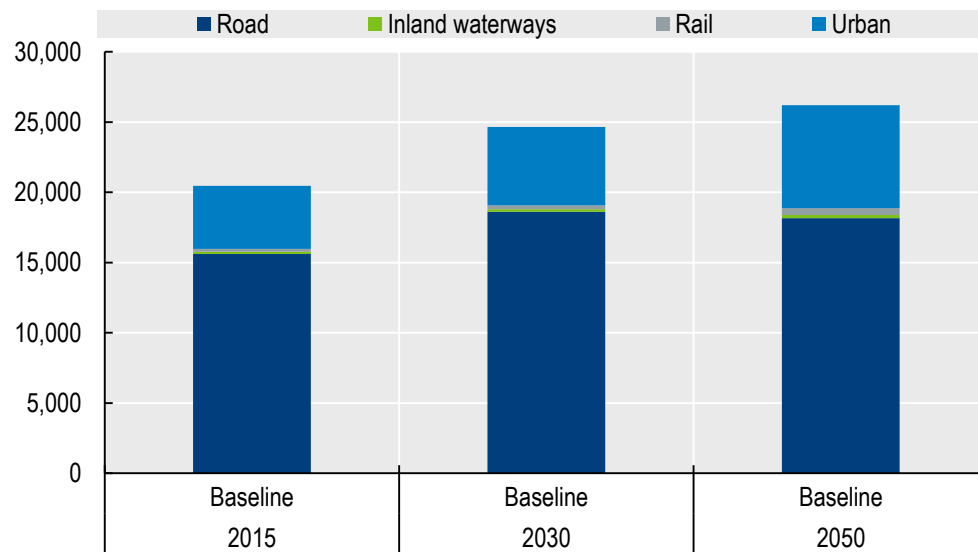
# Emissions from surface freight transport

Emissions from surface freight transport increase in the **Baseline**

**20%** in the period from 2015 to 2030

**28%** in the period to 2050.

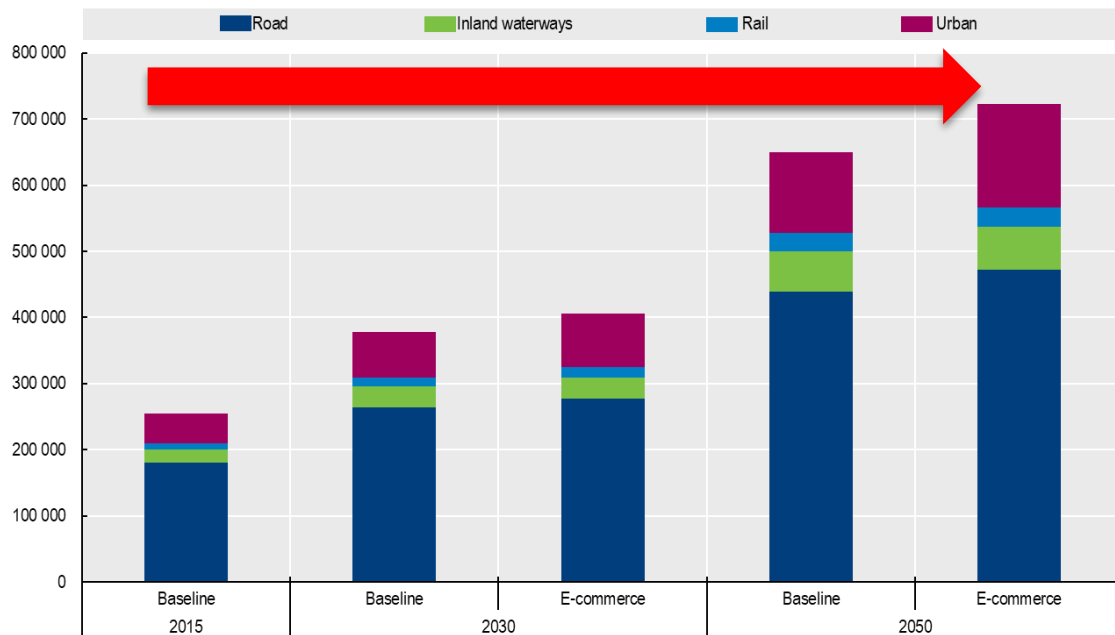
Surface freight emissions in Argentina by mode (thousand tonnes of CO<sub>2</sub>)





# Results: tonne-km

Surface freight tkm in Argentina by mode in the ecommerce scenario (Million tkm)



5

E-commerce

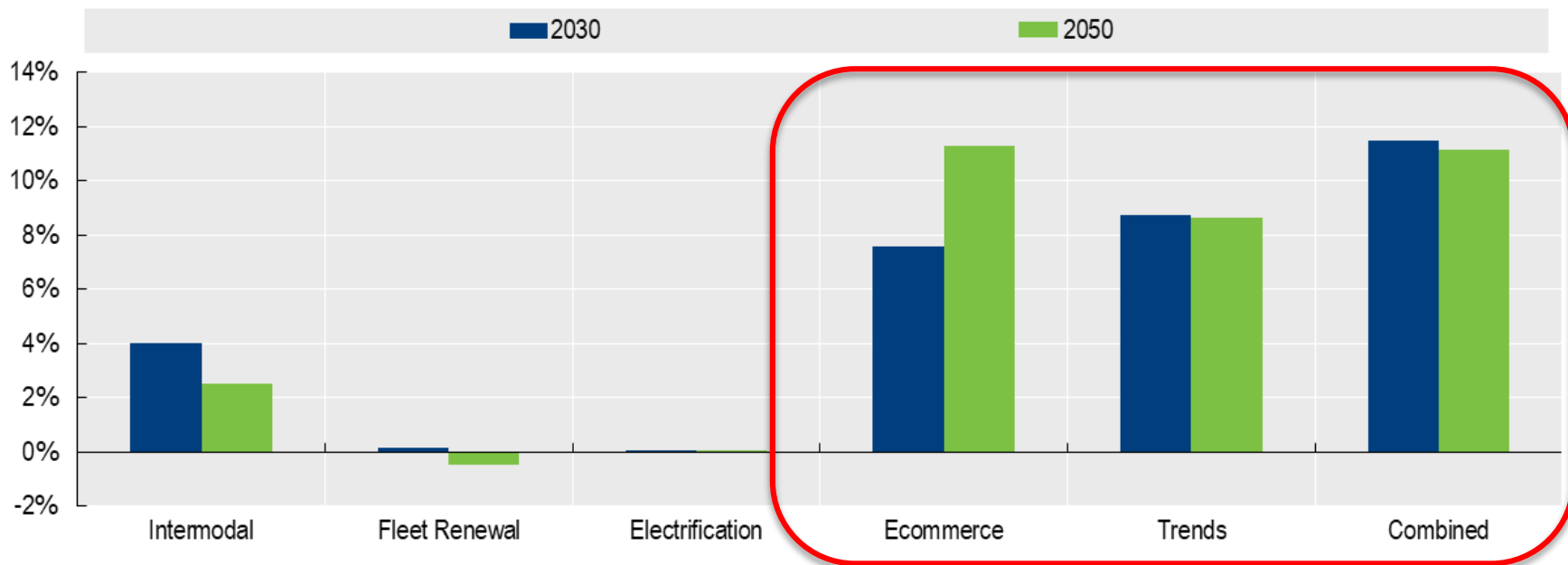
Trends such as e-commerce would **impact the amount of freight** being transported





# Results: demand variation

Variation of demand compared to the Baseline (% based on Tonne-kilometres)

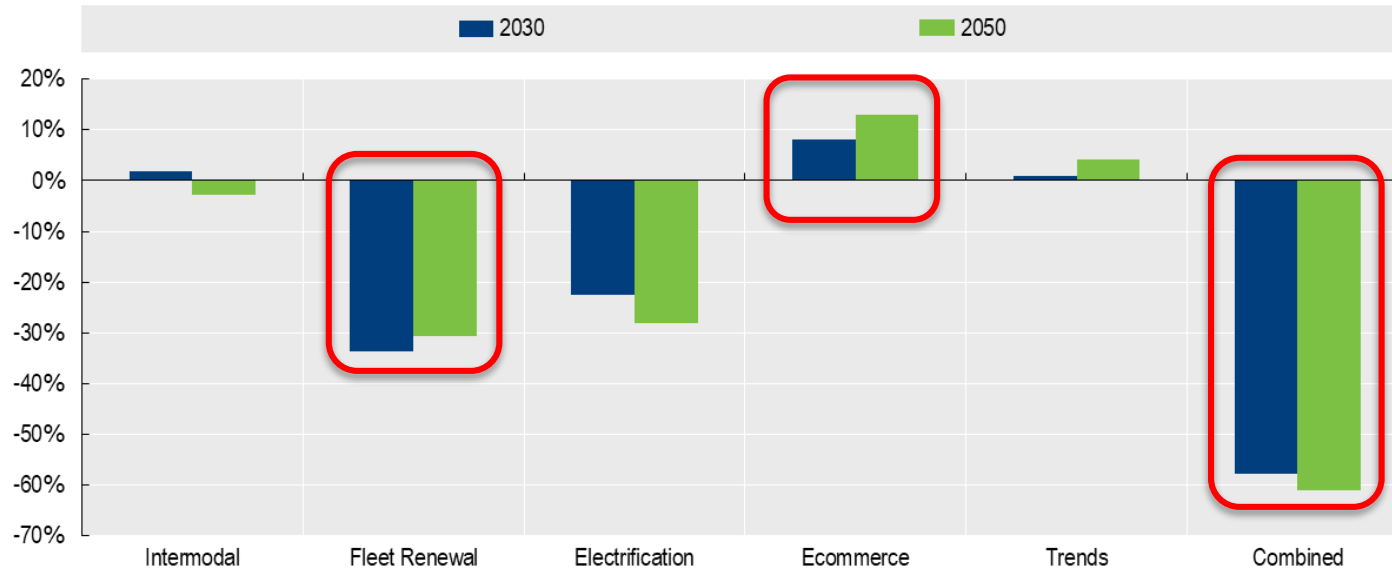




# Emissions from surface freight transport

## Surface freight emissions in Argentina by mode (thousand tonnes of CO<sub>2</sub>)

Variation of emissions compared to the Baseline (%)





# Fleet Renewal Scenario

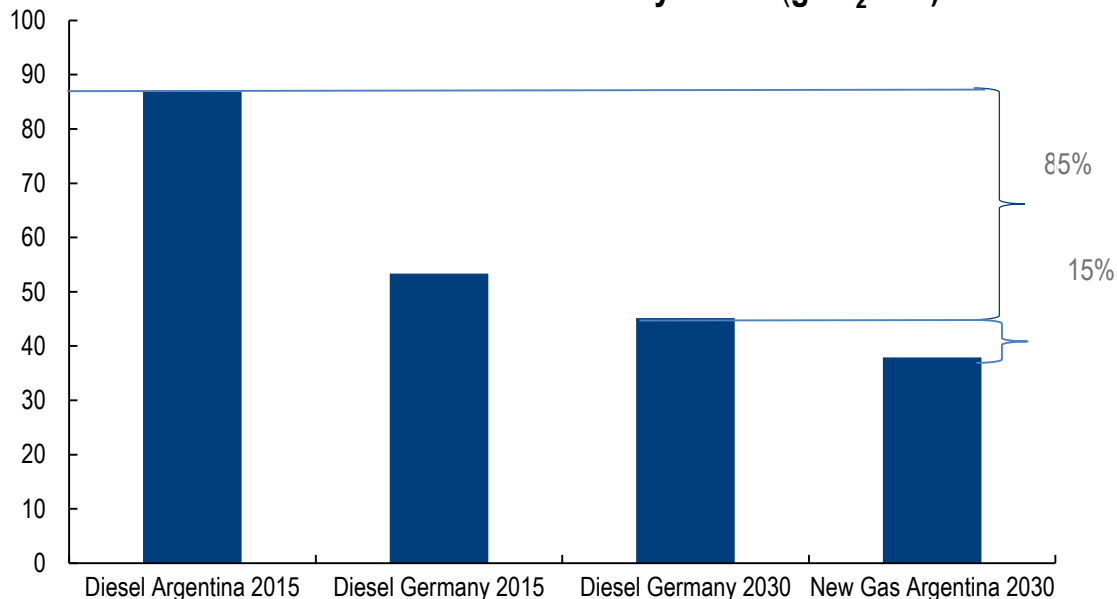


## Fleet renewal with transition to gas

The transition to gas *per se* is responsible for **15% of the total reduction of carbon emissions** of heavy long haul trucks by 2030.

Increased **vehicle efficiency** and improvements to **operations** enable the remaining 85%.

Emission factors heavy trucks (gCO<sub>2</sub>/tkm)



Note: All emissions considered in this analysis are tank-to-wheel; upstream methane leaks are not accounted for. The latter can decrease emissions reductions from a transition to gas when accounting for well-to-wheel emissions.



# Modal shift



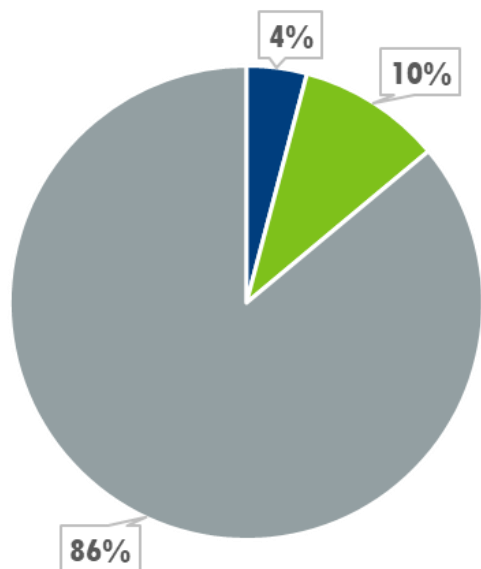
# Combined

## Greener Modes

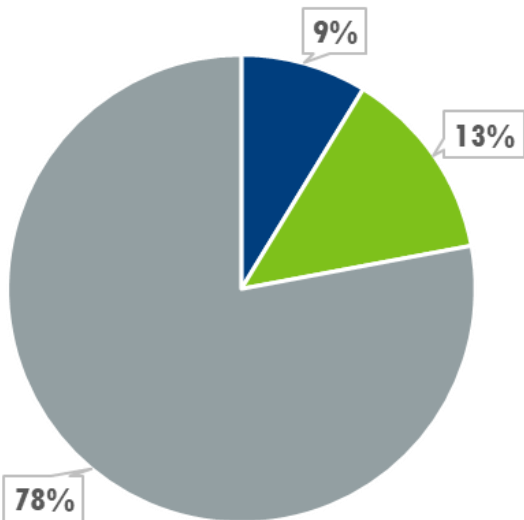


Baseline 2015

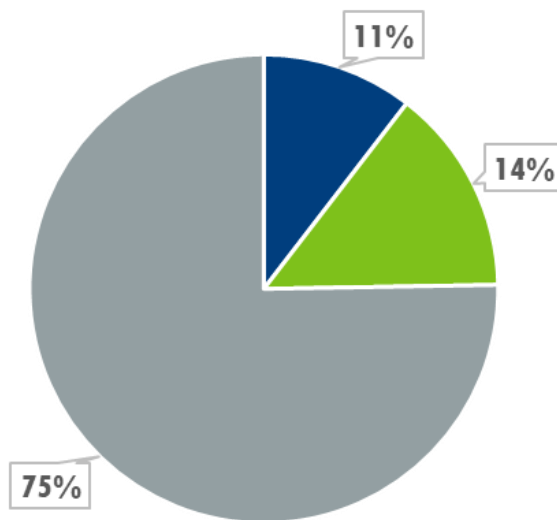
■ Rail ■ Inland waterways ■ Road



Intermodal 2050



Combined 2050



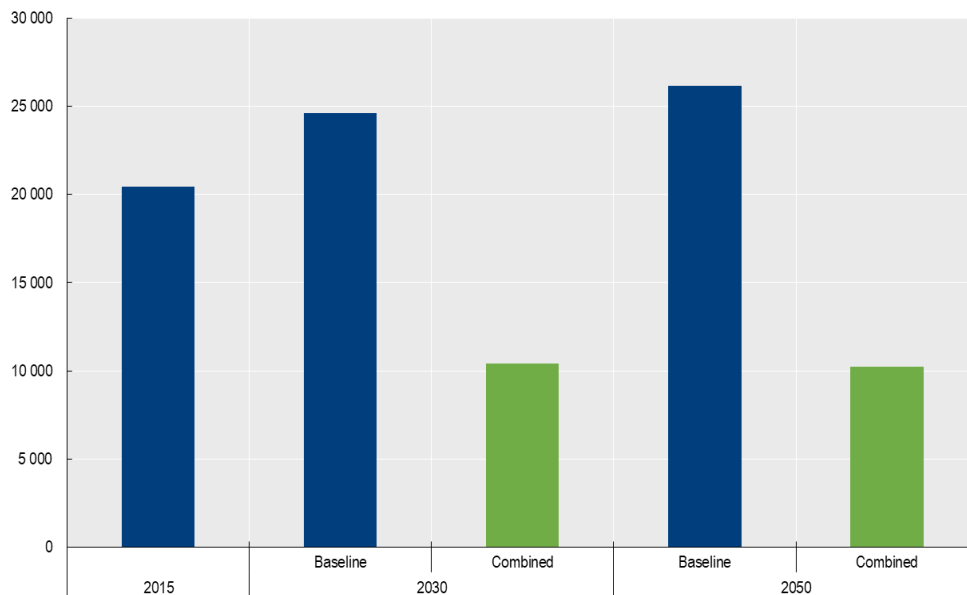


# Emissions combined scenario



# Combined

Emissions of Baseline and Combined scenarios (Thousand tonnes of CO<sub>2</sub>)



Emissions could be  
**cut by half** in 2050  
compared to 2015

# KEY TAKEAWAYS AND CALLS TO ACTION



# Main steps to decarbonise freight transport in Argentina

1. Renew fleets and improve road freight operations (in urban and non-urban areas)

2. Foster intermodality where modal shifts can be achieved and activity increases can be avoided

3. Combine measures that complement one another (infrastructure, operations, policy and pricing)



# Calls to action for policy makers in Argentina

1. Pursue bold actions to decrease emissions from freight transport.
2. Enhance the monitoring and reporting of emissions by transport sub-sector.
3. Install appropriate institutional frameworks that allow to implement pathways to reduce emissions, while promoting transport resilience and efficiency.



# SCENARIO EXPLORATION TOOL



## Main sections of the tool

---

- Emissions
- Foreign trade
- Modal share
- Cost
- Travel time



# VISUALIZATION TOOL



## Descarbonizando los Transportes en Economías Emergentes: Argentina

### Dashboard: Escenarios de políticas públicas para descarbonizar el sistema de transporte en Argentina

Esta publicación presenta los impactos de siete escenarios de políticas de descarbonización sobre las emisiones, la demanda, los costos y los tiempos de viaje del transporte de carga en Argentina. Se resaltan las medidas y tendencias que impactarán a Argentina y sus conexiones internacionales en las décadas a venir.

Enlace del reporte:



### Escenarios de políticas de descarbonización

1

Base

Incluye compromisos existentes para la descarbonización, pero no incluye nuevas políticas de descarbonización, ni mayores compromisos o metas ambientales más ambiciosas. Como tal, presenta el resultado de la trayectoria actual.

2

Mejoras intermodales y de infraestructura

Mejoras a la red nacional de transporte (ferrocarriles, vías navegables y carreteras), puertos y pasos internacionales. Mayor uso de las soluciones intermodales.

3

Renovación de flota inter-urbana con transición a gas

Renovación de toda la flota de camiones de carga medianos y pesados con una transición en su totalidad a gas natural antes del 2030.

4

Electrificación del transporte urbano de carga

Electrificación de toda la flota de camiones de logística urbana (de última milla) antes del 2030.

5

Comercio en línea

Aumento de la demanda de mercancías en el comercio en línea.

6

Tendencias globales

Impuestos sobre el carbono, regionalización del comercio, impresión 3D, reducción de velocidades de buques de carga (slowsteaming) y camiones, descarbonización general del comercio mundial.

7

Combinado

Aplicación simultánea de todas las medidas de los otros escenarios.

[DETALLES ADICIONALES SOBRE LOS ESCENARIOS](#)

### DASHBOARD DESCARBONIZACION - DTEE ARGENTINA

### EXTRACTOS DEL TEXTO DEL REPORTE

#### Gráfico 1

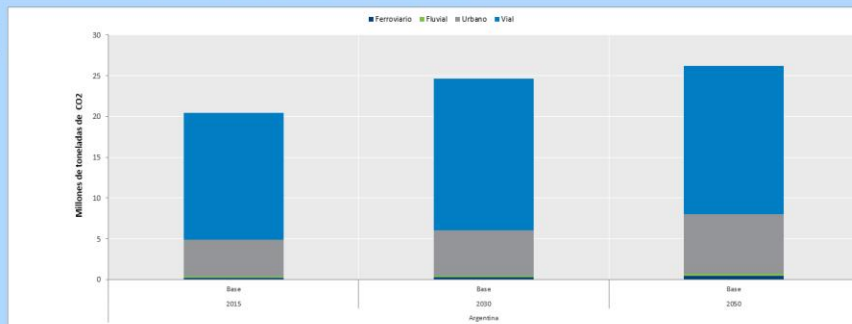
#### Emisiones de CO<sub>2</sub> equivalente – Carga de superficie

Escenario: Base

Regiones: África, Argentina, China, EEU.UU. y Canadá, Europa y Transición, Mercosur, Oceanía, Otros países asiáticos, Otros países latinoamericanos y del Caribe, Otros países sudamericanos

Año: 2020

Modo: Ferrovioario, Fluvial, Urbano, Vial



#### DIAPOSITIVA 23

En el Escenario Base las emisiones del transporte de carga de superficie en Argentina aumentarían un 20% en 2030 y 28% en 2050, en comparación con los niveles de 2015.

Aunque se proyecta que se tomen algunas medidas para descarbonizar el sector transporte en dicho escenario estas medidas graduales no lograrían a alterar el paradigma del transporte de carga. Por esta razón, los beneficios que se obtienen al reducir la intensidad de carbono se ven superados por el aumento sustancial de la demanda.

Nota: El transporte de carga de superficie incluye al transporte vial (urbano e interurbano), el transporte ferroviario y el transporte fluvial

THANK YOU FOR YOUR ATTENTION

JOHN P. PRITCHARD, PH.D.

[JOHN.PRITCHARD@ITF-OECD.ORG](mailto:JOHN.PRITCHARD@ITF-OECD.ORG)

2 RUE ANDRÉ PASCAL

F-75775 PARIS CEDEX 16