International Transport Forum

SIPA
Sustainable Infrastructure Programme in Asia

DECARBONISING PATHWAYS FOR FREIGHT TRANSPORT IN THE PHILIPPINES

Training Session

24 April 2023
14:30–17:00 Manila

Supported by:

Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

IKI INTERNATIONAL CLIMATE INITIATIVE

based on a decision of
the German Bundestag

Freight Modelling Training Session

14:30 – 17:00

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Introduction

Dr Guineng Chen

Team Lead

International Transport Forum

International Transport Forum

International Transport Forum

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FRAMEWORK AND RESULTS OF THE ITF PHILIPPINES FREIGHT MODEL

Mr Till Bunsen, Policy Analyst
International Transport Forum

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for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

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OUTLINE

1. BACKGROUND & OBJECTIVES
2. STUDY APPROACH
3. RESULTS
4. CALLS-TO-ACTION FOR POLICY MAKERS

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Background & Objectives

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Sustainable Infrastructure Programme in Asia - Transport

Regional studies

- Assess infrastructure programs' scope in **Central Asia** and **Southeast Asia** to improve connectivity and reduce environmental costs
- Suggest strategies to finance investments to close infrastructure gaps
- Benchmark national freight transport policies against best practices

National studies

- Develop sustainable transport roadmaps in partnership with national stakeholders
- Identify for which locations, transport sub-sectors, modes and technologies policies can be most effective
- National studies: **Mongolia**, **Philippines**, **Uzbekistan**

Low-carbon pathways for the Philippines' freight sector

Take stock of the national freight transport system.

- Contextualise the sector structure, identify policy priorities and collect data

Asses impacts of alternative low-carbon pathways.

- Quantify how policy choices could shape activity and emissions across sector segments

Disseminate best practices for low-carbon freight.

- Recommendations for effective emission reduction strategies

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Study approach

Project launch and stakeholder consultations (April 2022)

Data collection

- International and domestic trade flows by mode, trade partner and commodity
- Airport and port capacity
- Nautical highways
- Rail and road network
- Infrastructure development plans

National partners: DOTr, ICTSI, MARINA, NEDA, PSA, UNDP, UP, others

Scenario projections provide insights into sector trajectory

Evaluate the impacts of the current policy framework.

- Identify announced policies and infrastructure projects that will influence the emission trajectory.

Assess the saving potential of additional measures.

- Select additional policy options viable in the local context in consultation with national partners.

Define two alternative scenarios with higher ambition.

- Scenarios with increased ambition explore possible outcomes of adopting additional measures.

Evaluating sector trajectory in Current Ambition Scenario

- This scenario presents the **evolution of CO_2 emissions** if the **current measures** are implemented as planned but no further actions are considered.

Technology stocks target for the LCV fleet	Rail freight expansions	Road upgrades	Eco-driving	Improving intermodal dwell time (2025)	Change in the energy mix
Target level: 10-30% zero-emission LCV sales/registrations by 2030 (implementation starts in 2025).	Two new rail lines in Luzon; operational by 2026.	From provincial to tertiary road: 10-30% by 2030 and 2050. From tertiary to secondary road: 30-50% in 2030 and 2050. From secondary to primary road: 10-30% in 2030 and 30-50% in 2050.	This has already been implemented. This policy has the potential of reducing CO2 emissions by 1-2.5% in 2030 and by 5% in 2050.	Truck-to-port: reduced by 20% in 2030 and by 45% in 2050. Rail-to-port: reduced by 20% in 2030 and 2050. Shipping-to-port: reduced by 20% in 2030 and by 45% in 2050.	A decrease in oil and coal trade is expected to be start by 2025.

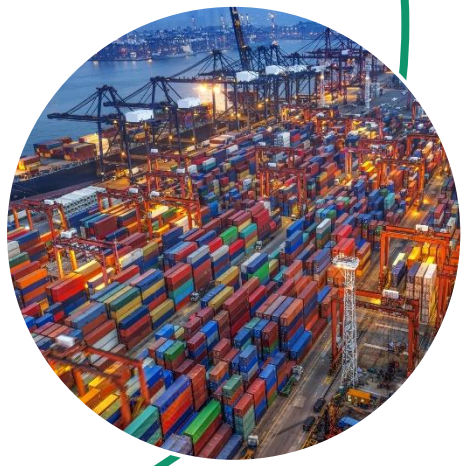
Assessing two Climate Ambition Scenarios

Green fleet:

Vehicle technology improvements through truck fleet renewal

Stricter fuel economy standards for diesel trucks

Fleet renewal/vessel refurbishment to reduce the share of fuel-oil-intensive ships



Seamless Intermodality:

Infrastructure improvement to increase port capacity

Infrastructure improvement to reduce dwell times

Asset sharing to increase load factors

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Results

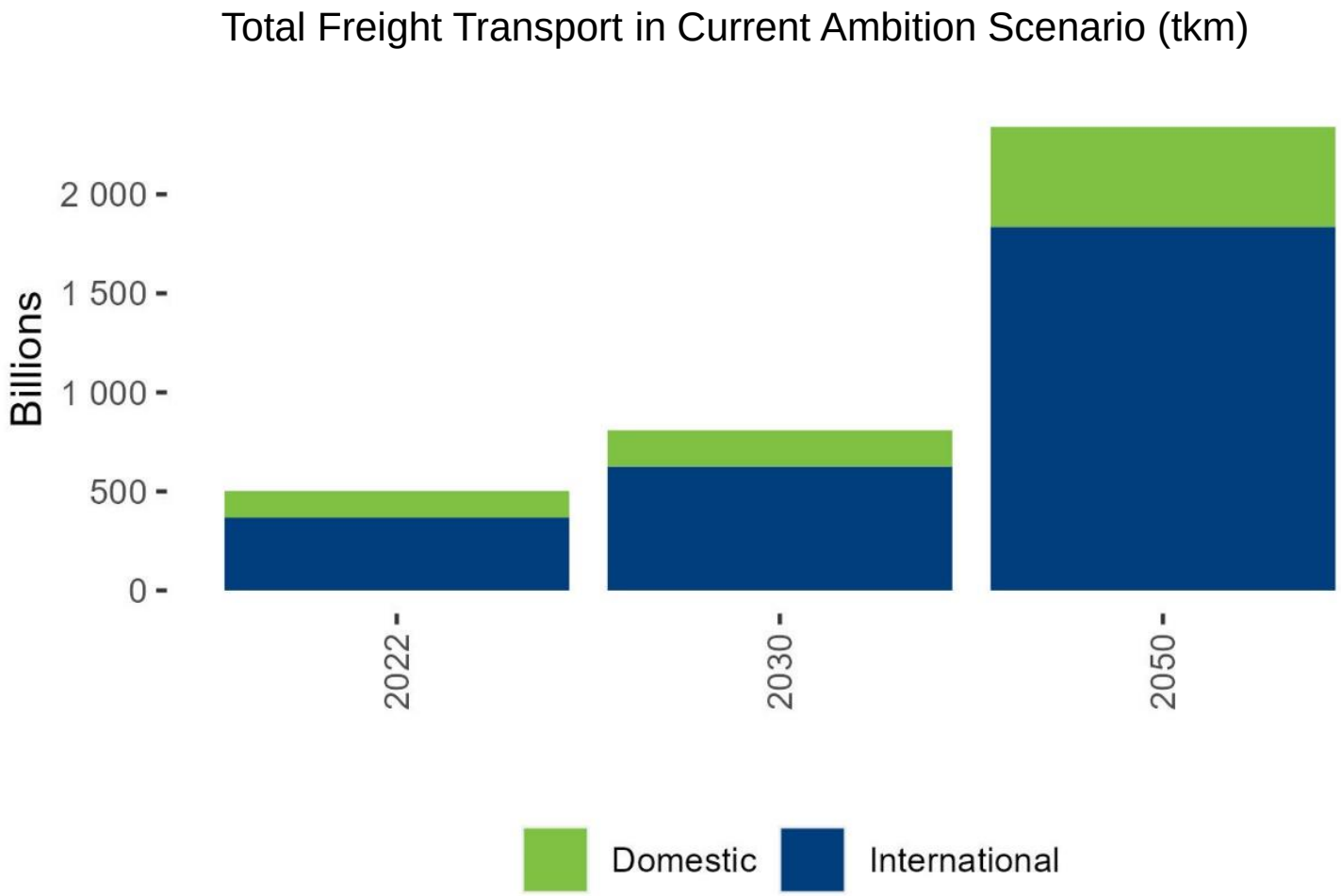
International Transport Forum

Freight transport is set to more than quadruple until 2050

Trade will exceed 2 trillion tkm by 2050

Economic growth in the SEA region drives trade

International transactions present increasing share



Trucks and ships remain the main transport modes

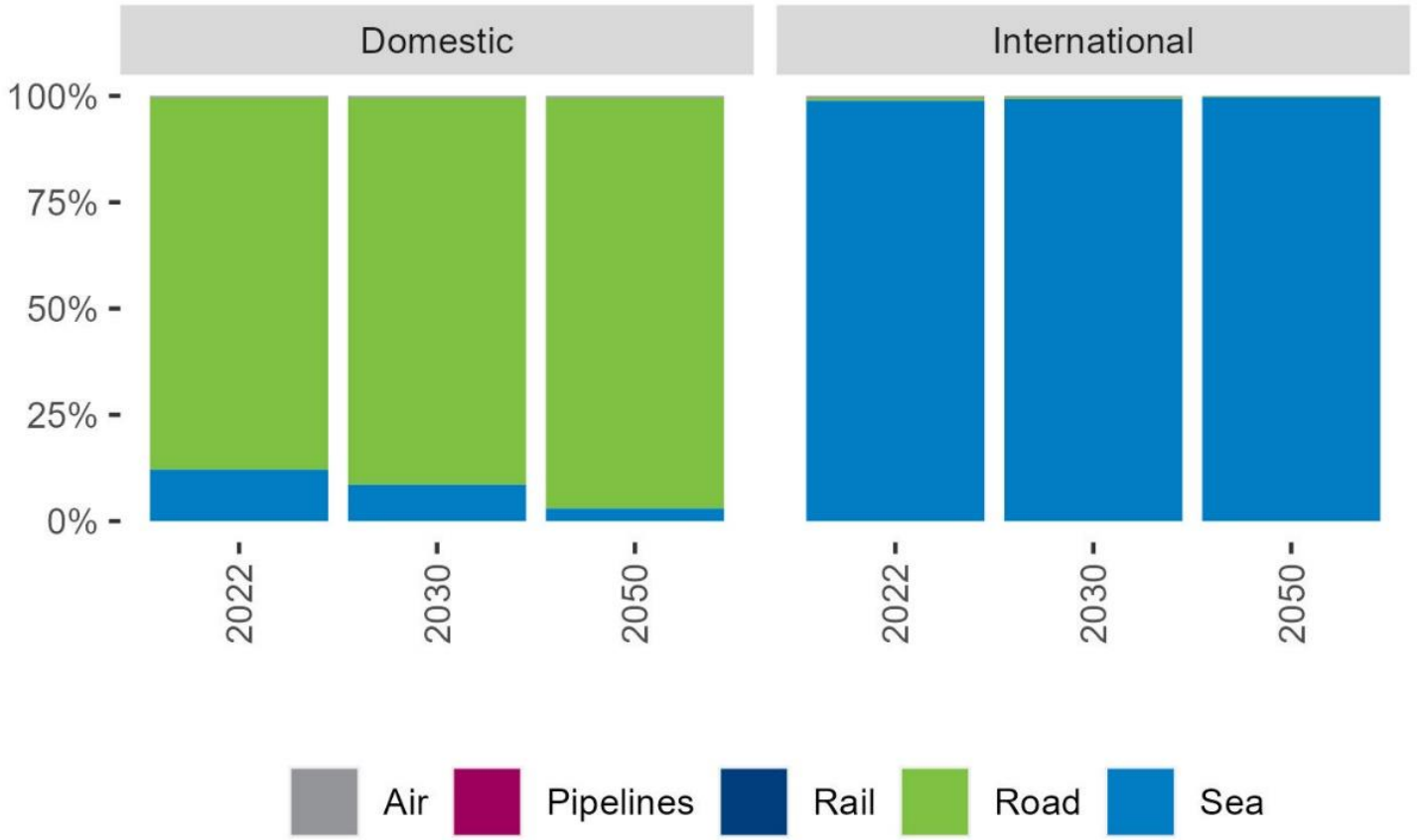
Trucks set to increase domestic modal share

Cargo rail is expected to remain uncommon

Aviation crucial for time-sensitive, valuable goods

Maritime dominates international trade

Freight transport modal share by year (based on tkm)

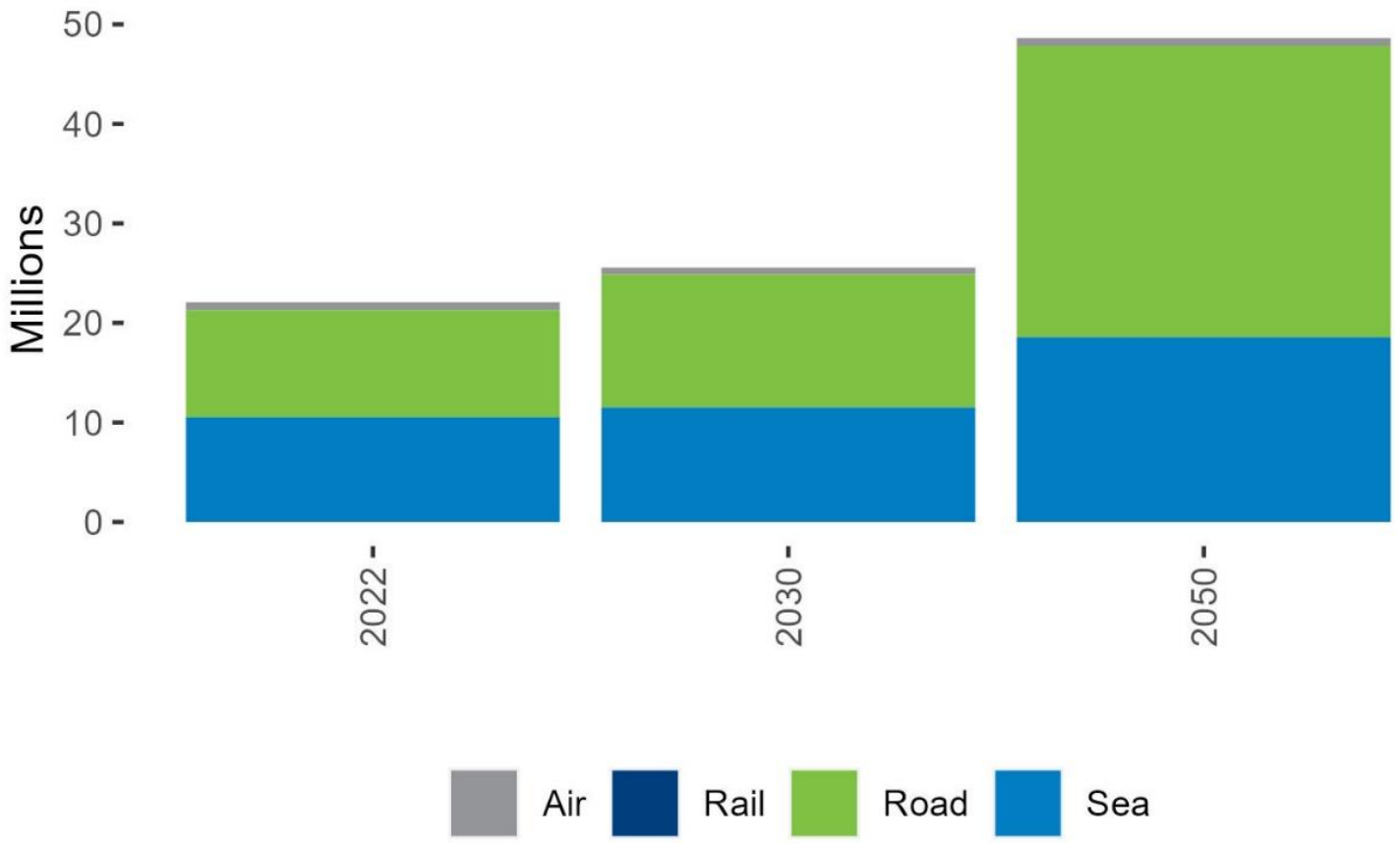


Tank-to-wheel emissions to reach 50 million tCO_2 by 2050

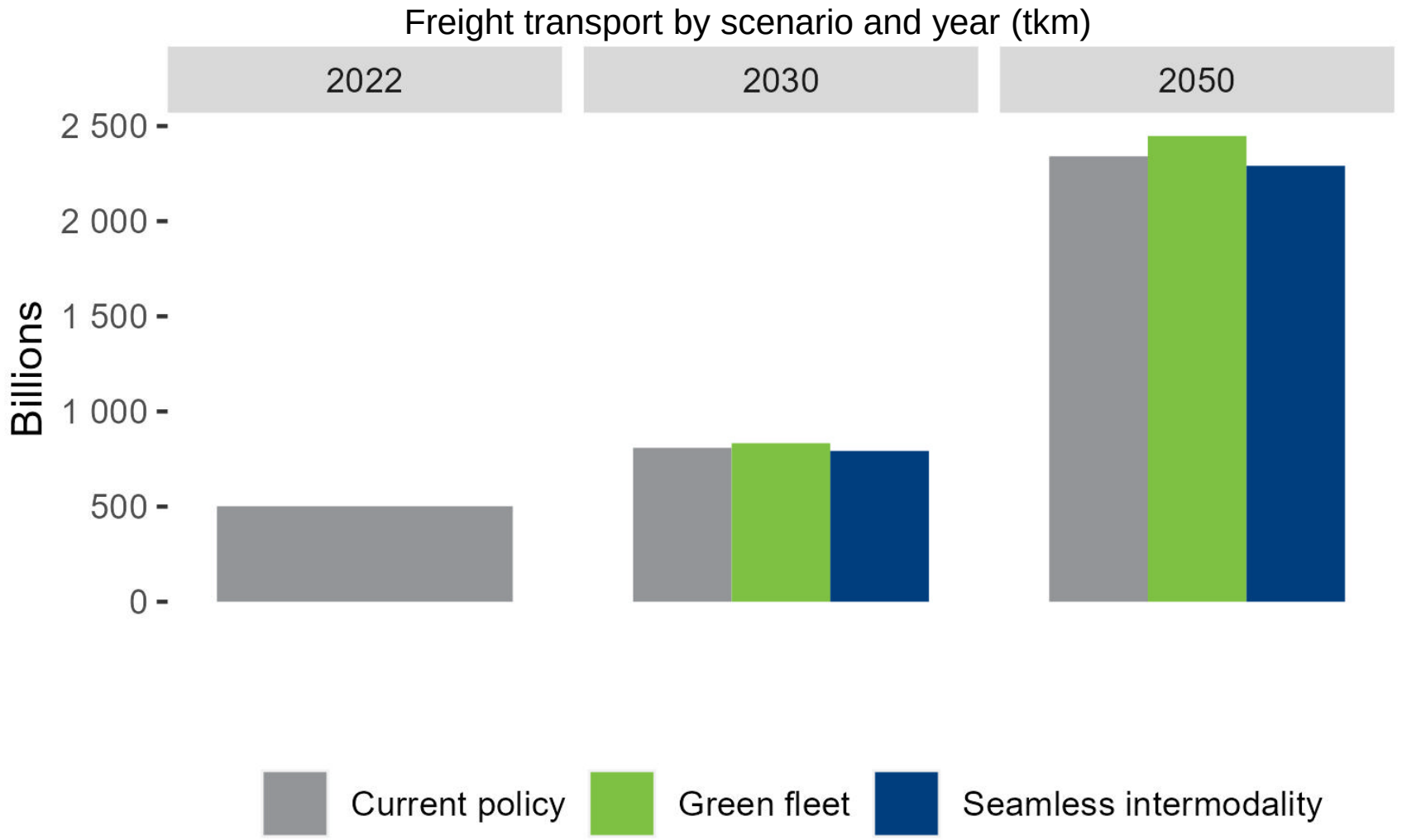
Road emissions to increase stronger than maritime despite lower traffic growth

Decarbonising road transport is a priority

CO_2 emissions by transport mode and year (ttw)



Vehicle replacements and intermodal transport do not oppress sector growth



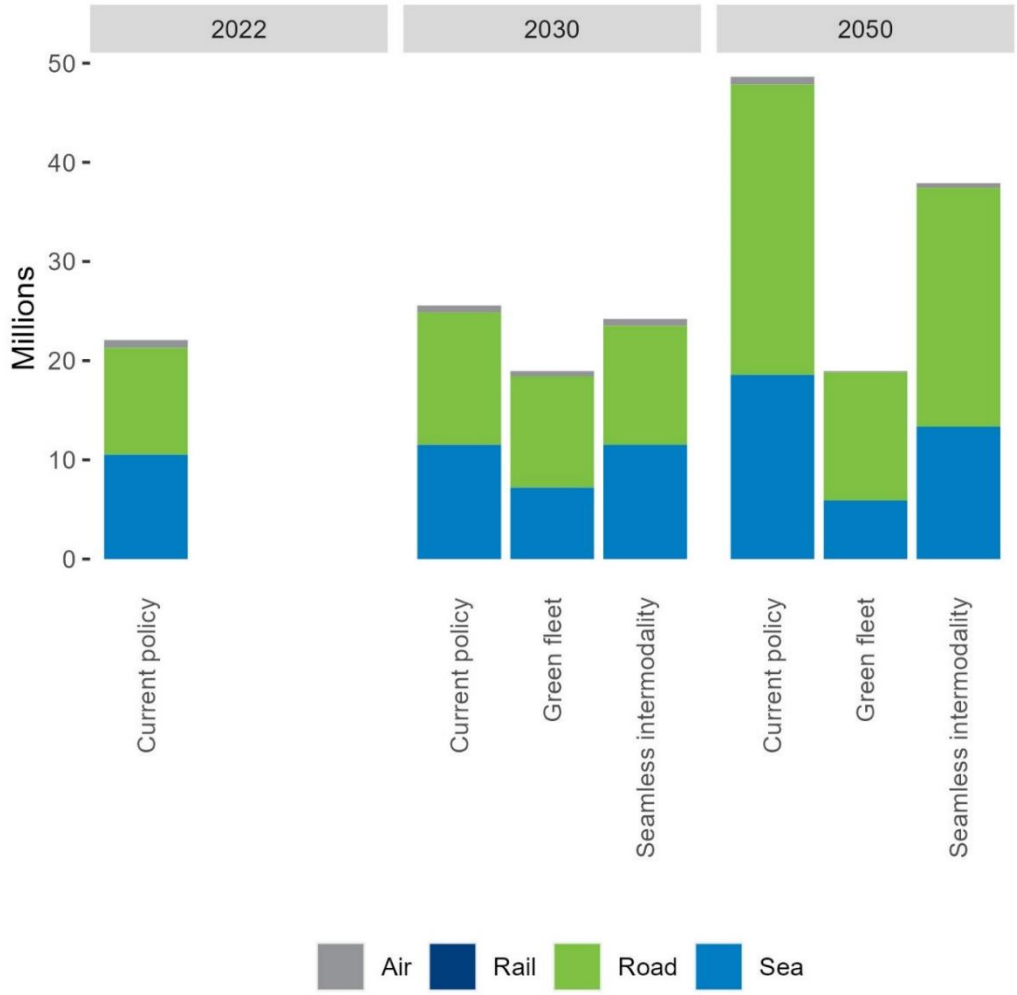
Ambitious freight policies can halve sector emissions

Investing in more efficient trucks and ships can reduce emissions by 61% in 2050, below current levels.

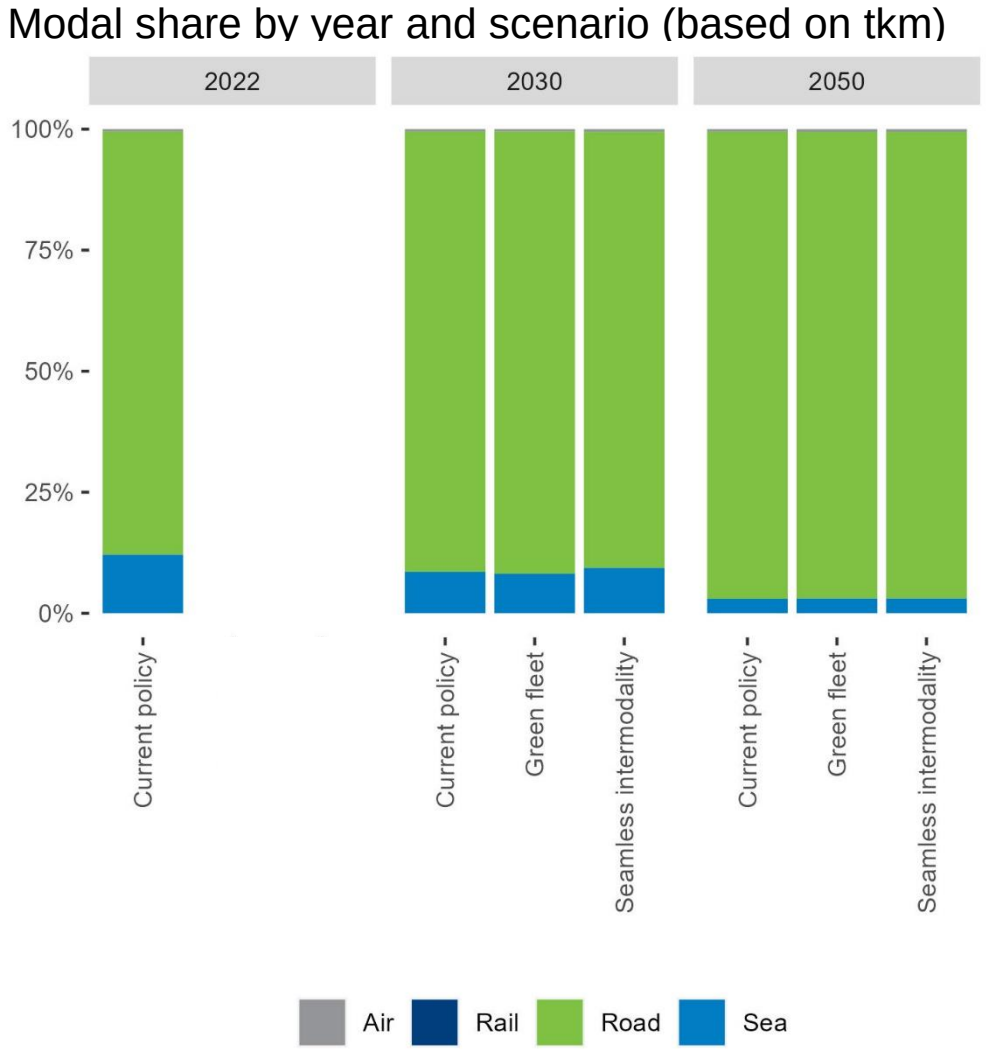
Zero-emission trucks are the most effective measures to decarbonize road freight

Savings from intermodal transport are lower than in the green fleet scenario, at 22%.

CO_2 emissions by year and scenario (ttw)



Modal shares do not vary significantly between scenarios



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Calls-to-action for policy makers

International Transport Forum

Green Fleet Scenario: Calls-to-action

Follow international best practices in adopting fuel economy or CO_2 emission standards for trucks.

Identify use cases for early adoption of zero-emission trucks in the Philippines and incentivise fleet conversions.

Promote efficient ships, for example, with differentiated port fees depending on the environmental performance of vessels and investment incentives.

Seamless Intermodality Scenario : Calls-to-action

Invest in port capacity expansions and maximise utilisation of existing assets to enable maritime transport to capture a higher modal share.

Streamline and digitalise processes to reduce dwell times at cargo transfer points.

Incentivise and enable asset sharing, for example through promoting digital technologies and platforms to connect logistics operators.

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TECHNICAL TRAINING ON MODELLING AND SCENARIO BUILDING

Dr Guineng Chen, Team Lead
Mr Diego Botero, Data Officer
International Transport Forum

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OUTLINE

1. ITF PASTA GLOBAL FREIGHT MODEL
2. MODEL UPDATES
3. PRESENT THE VISUALISATION TOOL

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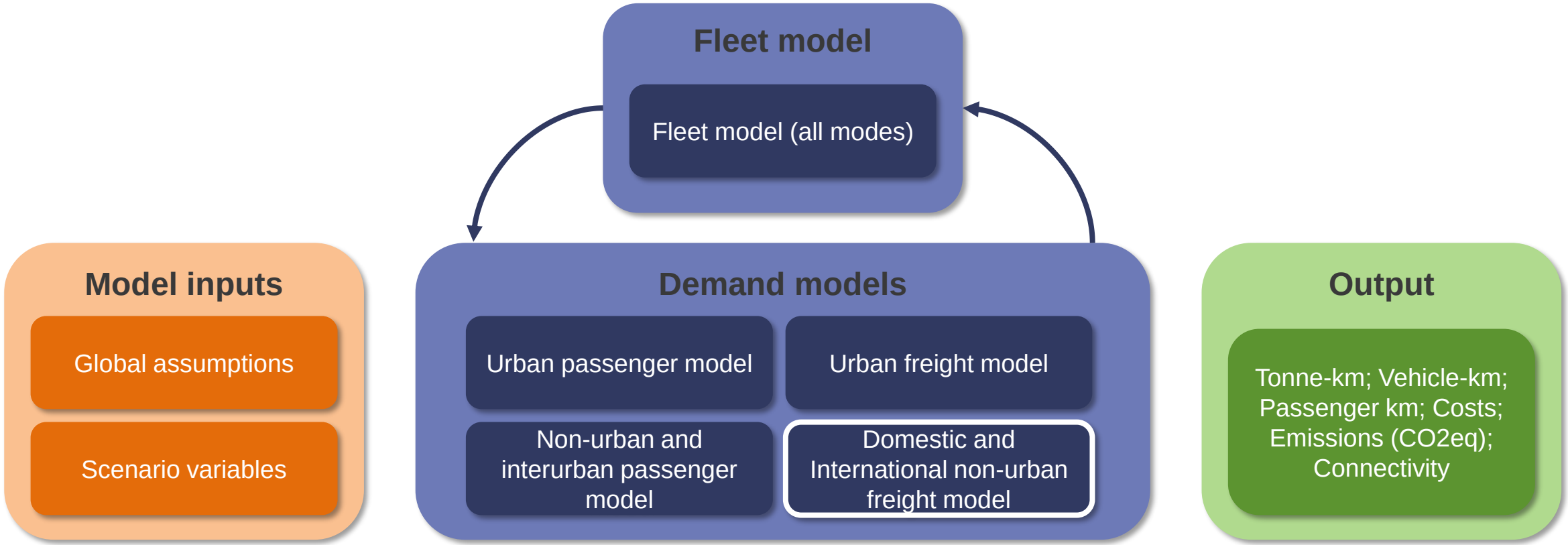
ITF PASTA global freight model

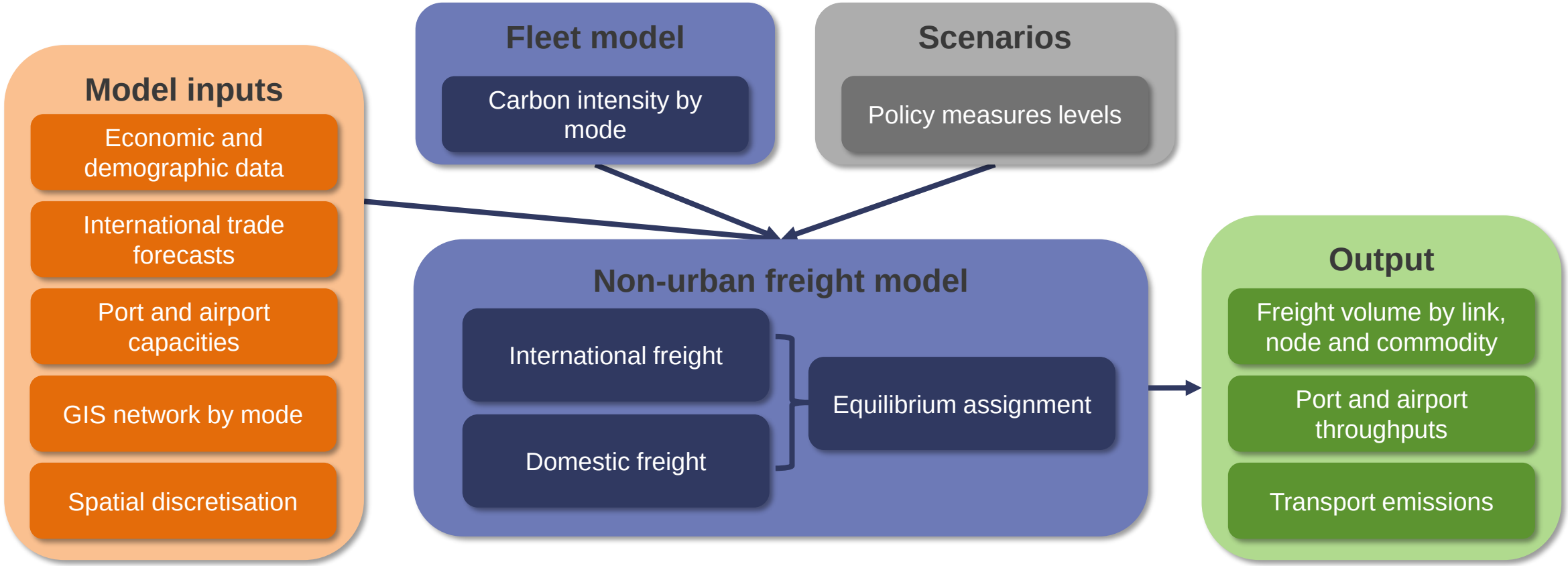
What is ITF PASTA?

ITF's freight model is one of five models that make up the ITF Policy Ambitions and Sustainable Transport Assessment (PASTA) framework



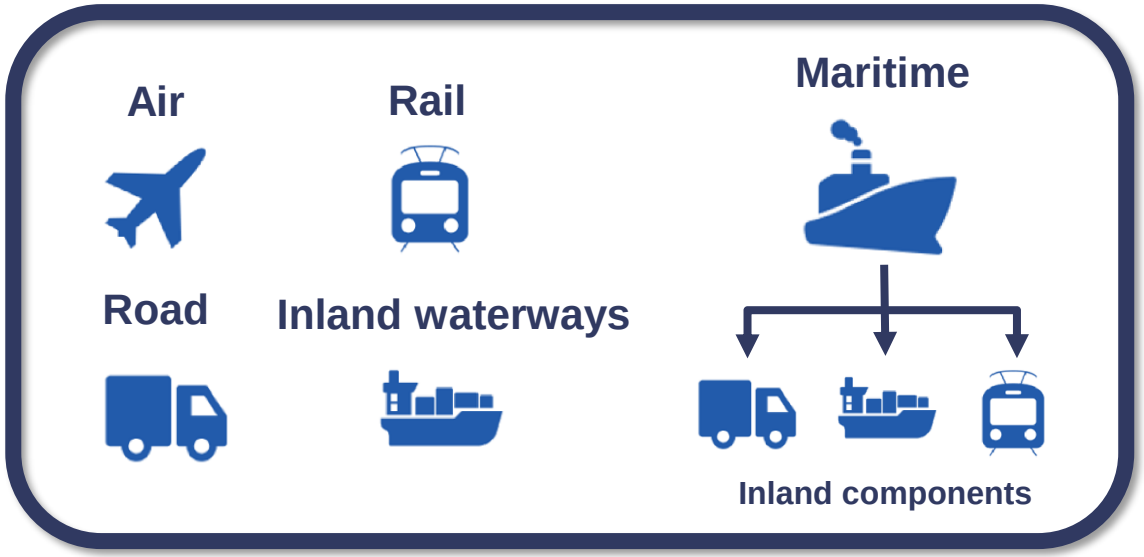
ITF non-urban freight model components

It is a fully integrated multi-modal network model that assigns freight flows on al major transport modes to specific routes, modes, and network links



International Freight Model

International centroids



- Freight centroids are used to discretise regional origin-destination trade flows
- The model assumes a proportionality of trade to GDP
- Commodity shares are calculated according to the GDP created within the respective economic sector
- The conversion of value units (US dollars) into weight units (tonnes) of cargo was formulated as a Poisson regression model
- The mode share model for international freight flow defines the transport mode used

Domestic Freight Model

Domestic centroids

Equilibrium assignment

The model uses an iterative equilibrium assignment procedure with travel time cost updates at every iteration (5 years). Freight transport activity is assigned to the shortest or least-costly path

- The model follows a gravitational model to understand how total trade splits into an OD matrix between domestic freight centroids
- Total surface freight activity is estimated by country, encompassing transport of international and domestic nature
- Urban freight transport is included in the estimation
- Domestic freight activity is estimated in alignment with international freight activity estimates and domestic freight wights

Outputs

Transport output

- Freight flows by **origin-destination links, commodities and transport modes**
- Throughputs by node
- **Utilisation rate** of infrastructure and potential **bottlenecks**
- **Modal split** by country, region or total

Connectivity output

- **Connectivity index** of a country
- Assessment of the **access to world markets**

Environmental output

- **CO_2** well-to-wheel emissions
- **Local pollutants**
- **Activity and emissions** by vehicle type and distance

Policy output

- Evaluation of **current policies**
- Projection of the impact of **alternative policy pathways**
- Relevant and quantifiable **policy recommendations**

Projects mobilising this model

Decarbonising Transport Initiative

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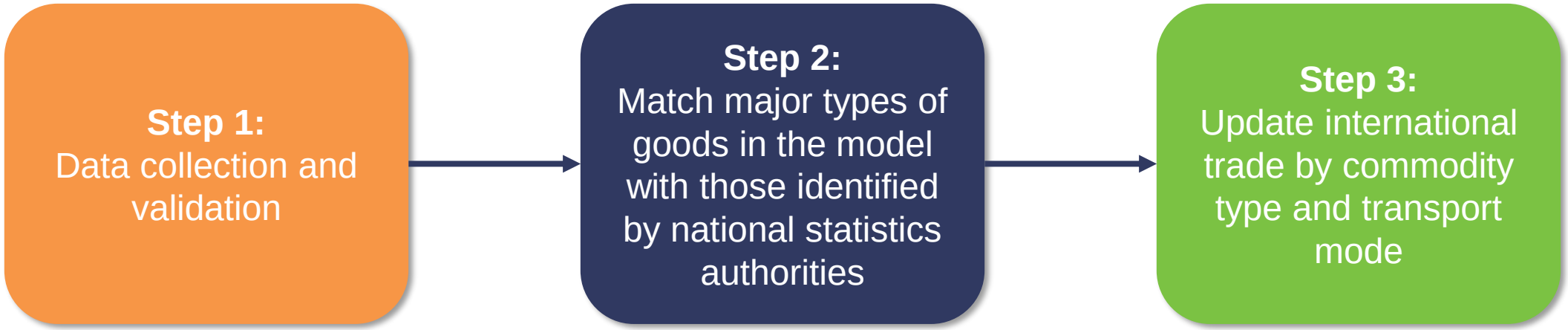
ITF PASTA global freight model updates

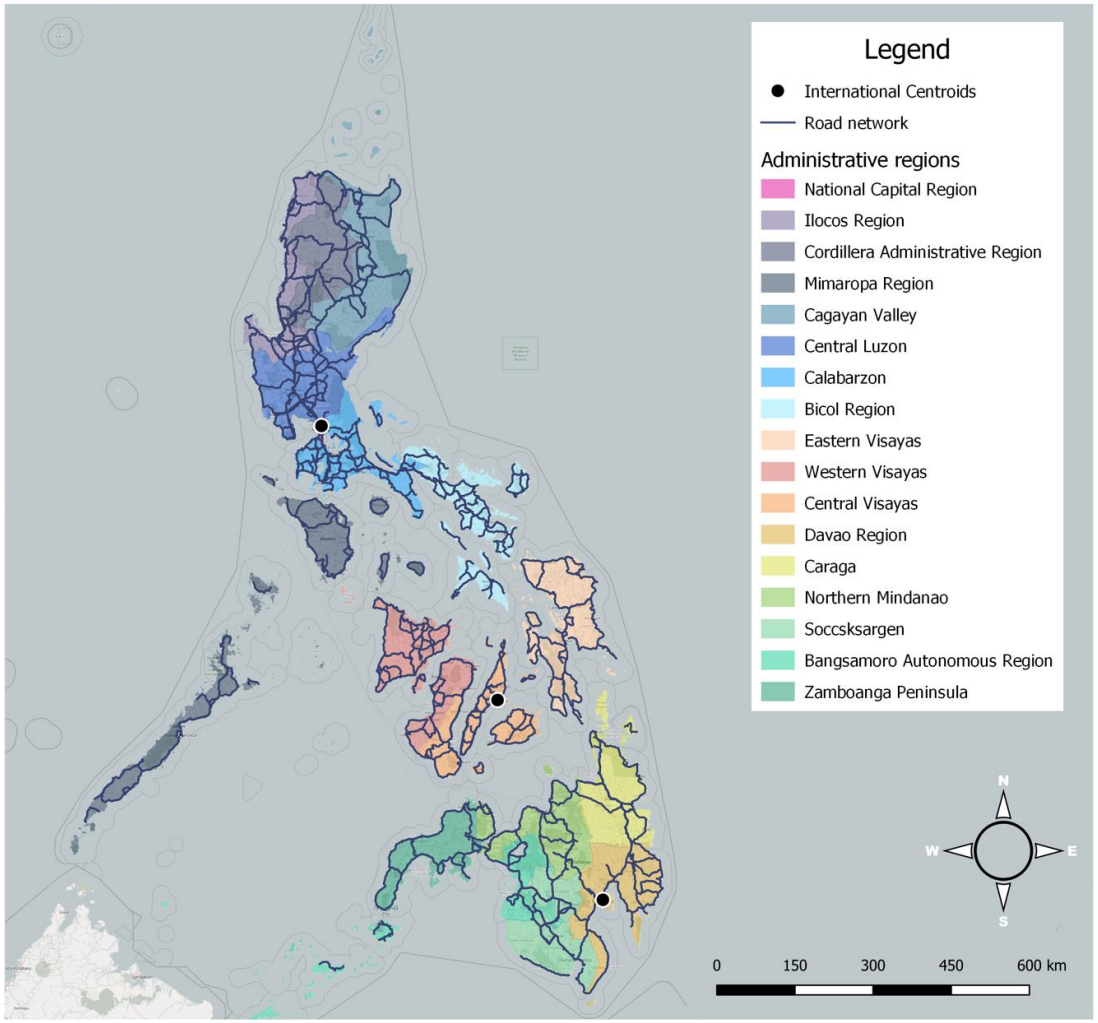
Trade updates

- The stakeholder consultation phase was of the highest importance to identifying data requirements for the national study and determining data ownership
- Trade data are a central pillar in the global freight model that must be updated frequently to capture new trends and changes
- International trade data by country is used to calibrate the model and serve as a benchmark for its results



Centroid updates

Map of the Philippines and administrative regions



Source: Department of Transportation, International Transport Forum, Open Street Map (2023)

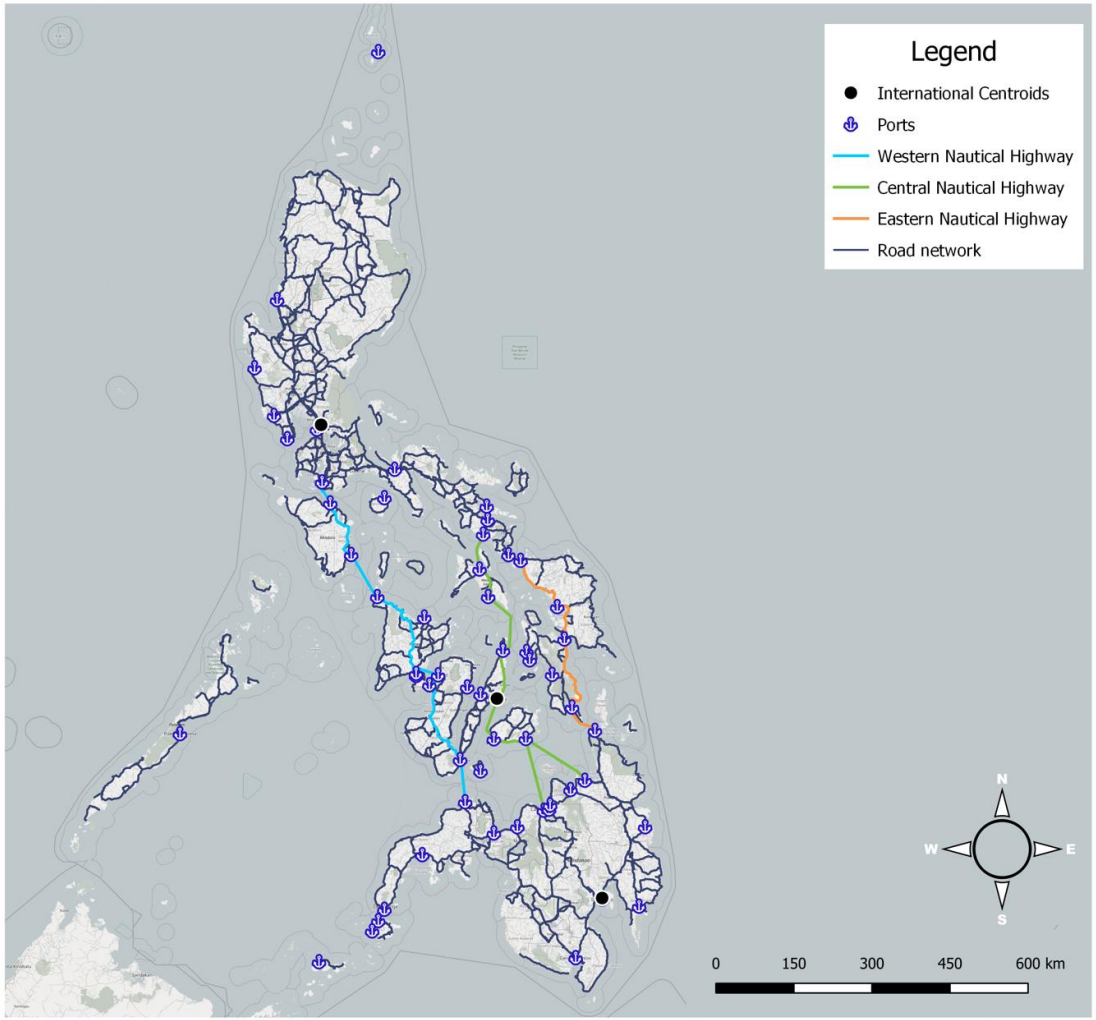
The number of centroids was re-evaluated to increase possible **origin-destination links** for international trade and maximise the use of data provided by local stakeholders.

There are currently **three** international centroids in the archipelago, each representing one group of islands. Thus, there are three centroids: Manila (**Luzon**), Cebu City (**Visayas**) and Davao (**Mindanao**).

Domestic centroids were equally updated. Using data from stakeholders, the ITF team updated the **capacity** of the existing domestic centroid in the model.

Nautical highways

Philippines nautical highways



Source: Department of Transportation, International Transport Forum, Open Street Map (2023)

One of the most important updates to the model consists of the inclusion of the three main nautical highways of the Philippines. These key roll-on-roll-off corridors are an essential component of the country's connectivity and are vital for domestic trade.

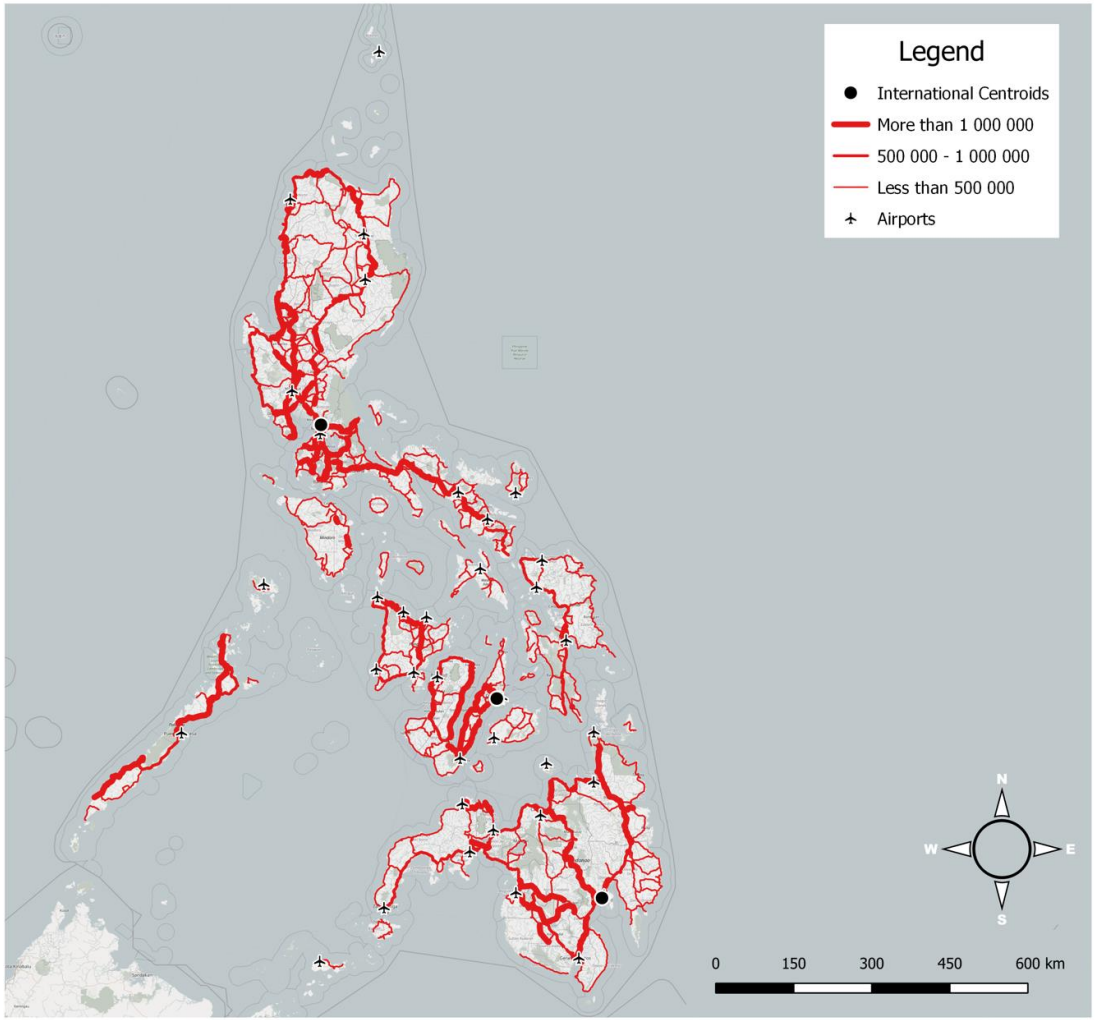
The **western** nautical highway comprises approximately 130 nautical miles and 535 km of road and links 8 ports in the model. It connects the islands of Luzon, Mindoro, Panay, Negros and Mindanao.

The **central** nautical highway extends approximately 190 nautical miles and 260 km of road. It connects a total of 11 ports in the model, distributed in Luzon, Masbate, Cebu, Bohol and Mindanao.

The **eastern** nautical highway includes about 53 nautical miles and 415 road km. Being the shortest one, it links 4 ports in the model. This highway connects Luzon, Samar, Leyte and Mindanao.

Network updates – Part 1

Philippines road network by capacity and airports



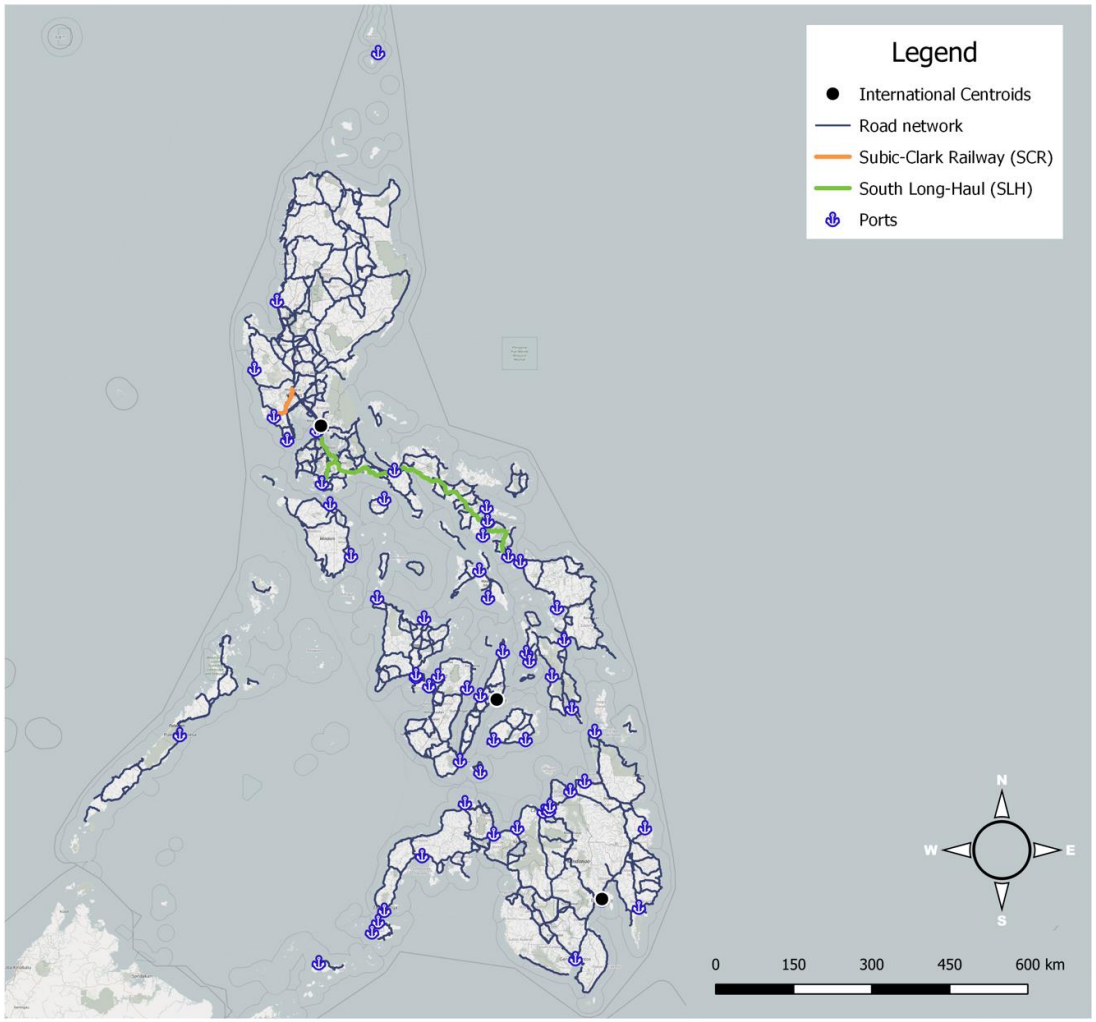
Source: Department of Transportation, International Transport Forum, Open Street Map (2023)

Transport infrastructure updates encompassed three main tasks: road capacity, the number of ports and airports, and rail infrastructure.

1. Road-specific characteristics, like the number of lanes and speed limit, were updated. These variables are crucial for the model to assign trade flows throughout the road network. Capacity is measured by the number of trucks that circulate in a specific segment. The national model identifies 4 main road transport corridors distributed on the islands of Luzon, Panay, Cebu and Mindanao.

Network updates – Part 2

Philippines rail network



Source: Department of Transportation, International Transport Forum, Open Street Map (2023)

2. Additional entry/exit points to/from the Philippines for the international movement of goods were considered. In total, 12 new ports were included in the model. These new ports allow the model to capture better international trade and freight transport through nautical highways.

3. Rail infrastructure updates were made based on stakeholder consultations and desk research. Two rail corridor proposals, the **SCR** and **SLH**, were kept in the model with additional information on the estimated year to begin operations, capacity, speed and factors influencing costs.

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The visualization tool

Introduction to the dashboard

Components

Background datasheets

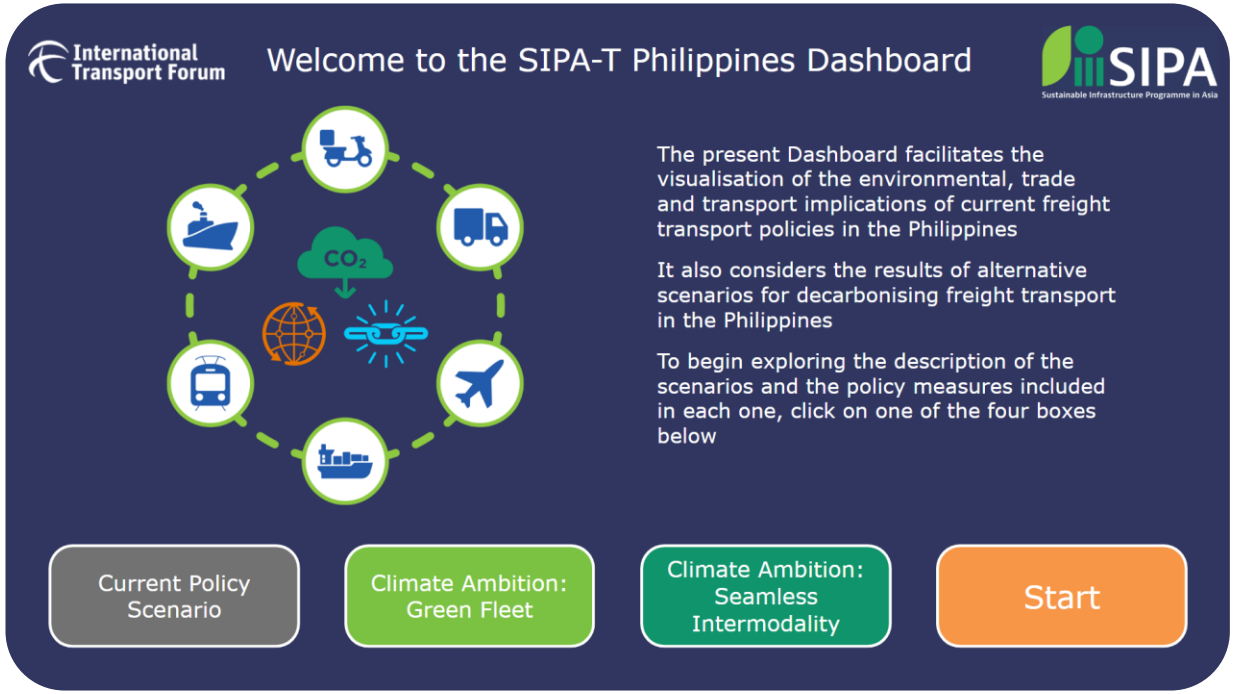
Composed of direct results from the model and divided into tables according to the needs

Metadata

Includes the scenario description and the overall framework

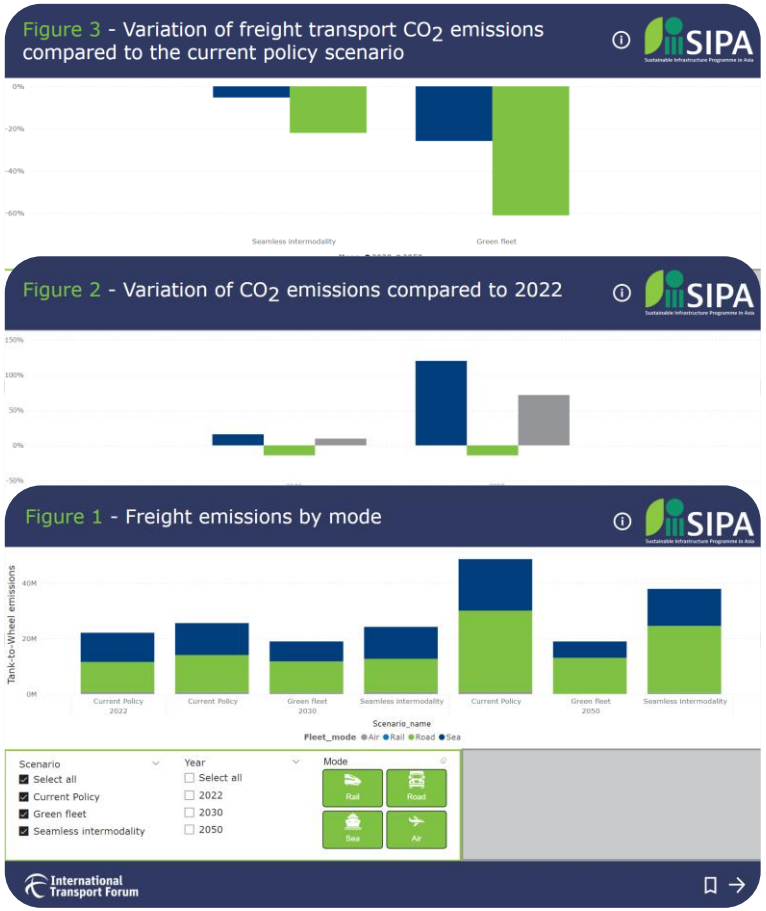
Dashboard

Showcases 8 interactive figures to explore additional results from the 3 freight transport decarbonisation scenarios

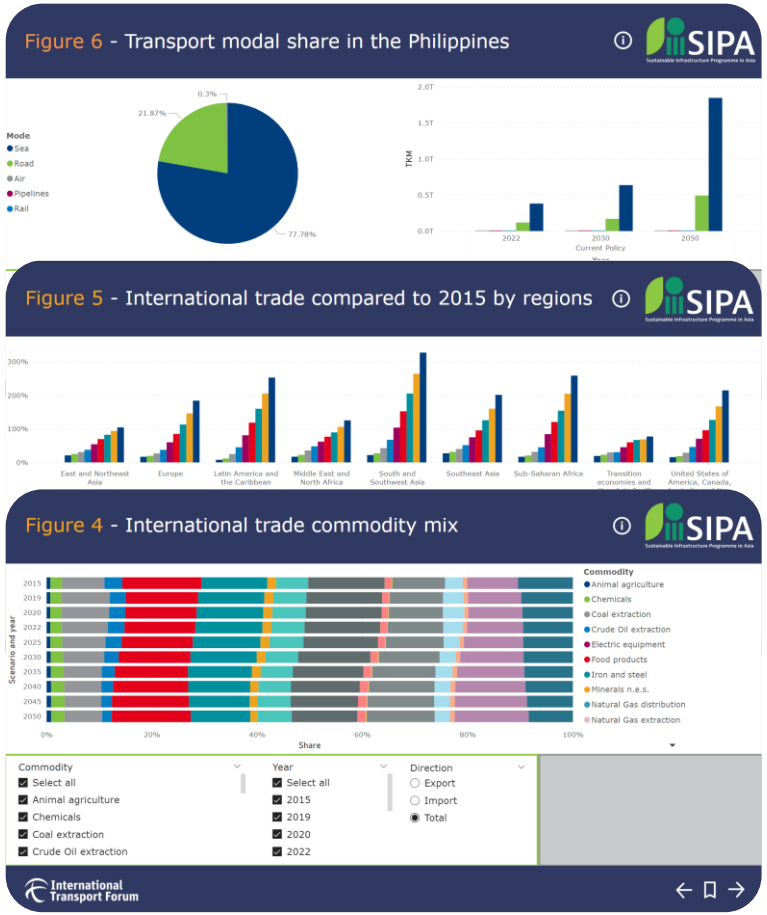


Visualisation tool zoom in

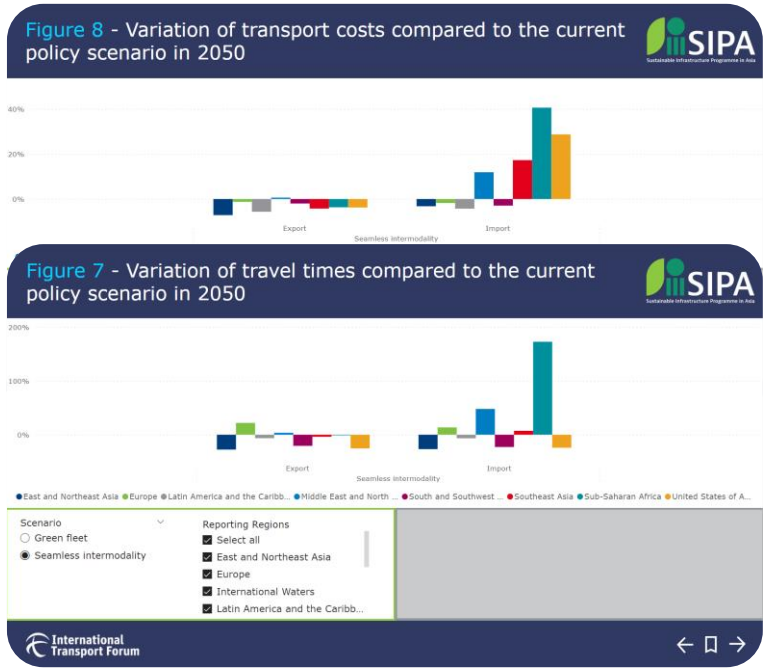
Environment



Trade



Travel time and costs



The Dashboard

Go to the dashboard

https://app.powerbi.com/view?r=eyJrIjoiZTE2ZjM0MmEtOWU2Ny00Y2UwLTkyZGItNTY1NTg0YjA2ZjQwIiwidCI6ImEzMTRlY2M5LWFlODAtNGM0ZC1hZjU1LTE1ODRkNTQyZGIxNiJ9

Next Steps

After this meeting

- The ITF team will share with all registered participants of this session:
  - The tool itself
  - This PPT/training manual
  - A methodological note explaining in more detail the methodology on which the tool is based
- The dashboard will be embedded in the SIPA-T Philippines website (https://www.itf-oecd.org/decarbonising-pathways-freight-transport-philippines)
- New results and figures will be included in the dashboard
- The inputs and outputs of this study will complement the future SEA regional study, to be launched in 28 April 2023

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DECARBONISING PATHWAYS FOR FREIGHT TRANSPORT IN THE PHILIPPINES

Dissemination Meeting

25 April 2023
8:30–16:30 Manila

On behalf of:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany

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Sustainable Infrastructure Programme in Asia

Welcome and Introduction

Moderator

Dr Guineng Chen

Team Lead

International Transport Forum

International Transport Forum

SIPA
Sustainable Infrastructure Programme in Asia

Welcome remarks

Leonel De Velez

Assistant Secretary

Department of Transportation

International Transport Forum

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Sustainable Infrastructure Programme in Asia

Welcome remarks

Dr Young Tae Kim

Secretary-General

International Transport Forum

International Transport Forum

High-level Opening Panel Session

Is the Philippines ready to transition to a low-carbon freight transport future?

10:00 -11:30

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Sustainable Infrastructure Programme in Asia - Transport

Regional studies

- Assess infrastructure programs' scope in **Central Asia** and **Southeast Asia** to improve connectivity and reduce environmental costs
- Suggest strategies to finance investments to close infrastructure gaps
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National studies

- Develop sustainable transport roadmaps in partnership with national stakeholders
- Identify for which locations, transport sub-sectors, modes and technologies policies can be most effective
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Low-carbon pathways for the Philippines' freight sector

Take stock of the national freight transport system.

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Asses impacts of alternative low-carbon pathways.

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- Recommendations for effective emission reduction strategies

Green Fleet Scenario: Calls-to-action

Follow international best practices in adopting fuel economy or CO_2 emission standards for trucks.

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Promote efficient ships, for example, with differentiated port fees depending on the environmental performance of vessels and investment incentives.

Seamless Intermodality Scenario : Calls-to-action

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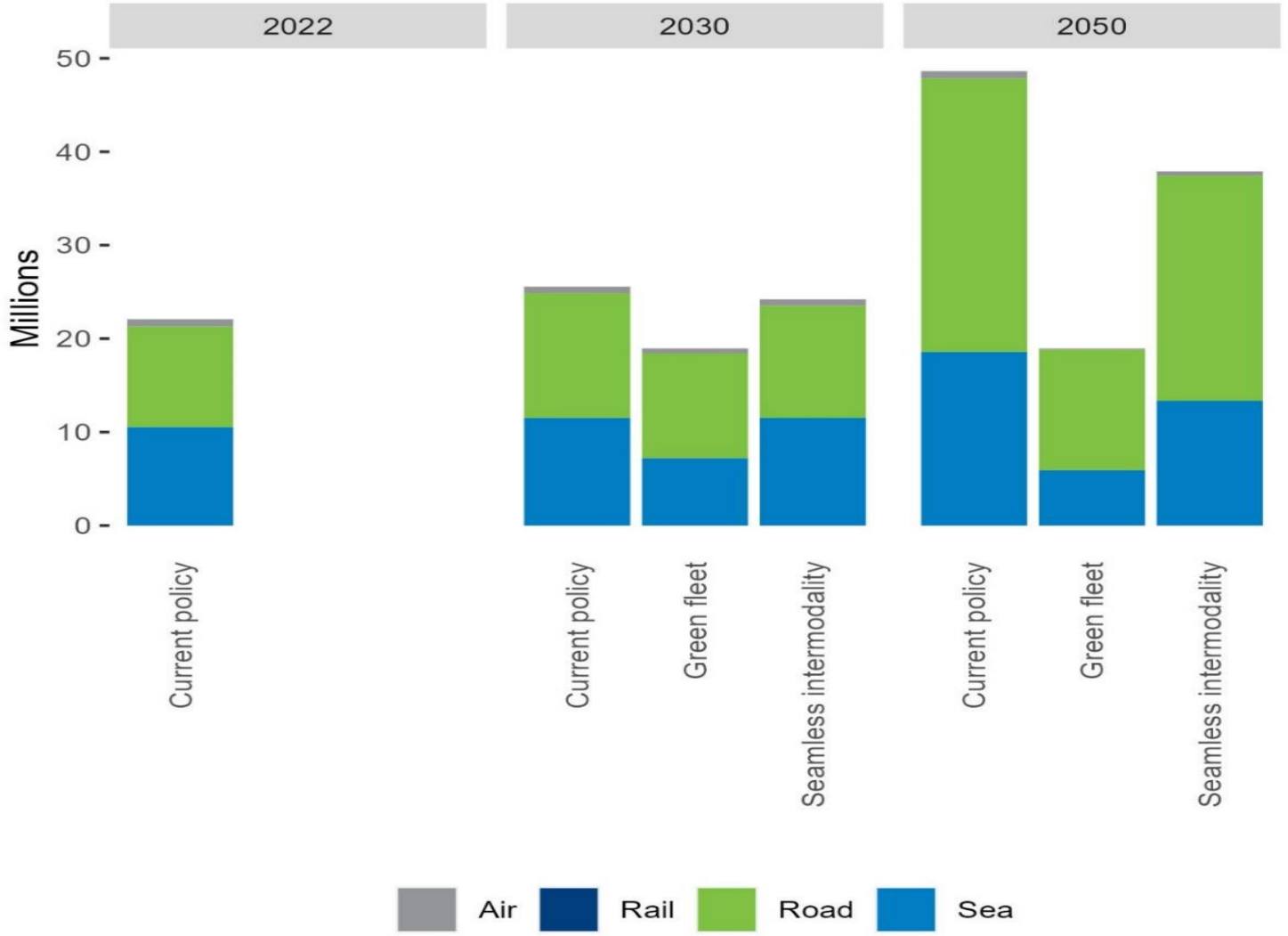
Streamline and digitalise processes to reduce dwell times at cargo transfer points.

Incentivise and enable asset sharing, for example through promoting digital technologies and platforms to connect logistics operators.

Ambitious freight policies can halve sector emissions



Emission trends:
Green Fleet: -61%
Seamless Intermodality: -22%

Is the Philippines ready to transition to a low-carbon freight transport future?

Moderator

Dr Guineng Chen

Team Lead

International Transport Forum

Mr Leonel De Velez

Assistant Secretary

Department of Transportation

Mr James Leather

Chief of the Transport Sector Group

Asian Development Bank

Dr Young Tae Kim

Secretary-General

International Transport Forum

Ms Teresita del Rosario

Chief of Standards Developments

Department of Trade and Industry

Ms Elaine Borejon

Senior Science Research Specialist

Climate Change Commission

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Lunch break

11:30 – 13:15

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In-Focus Policy Dialogue – Part 1

What are the strengths and missing elements of the Philippines' current decarbonizing freight transport agenda?

13:15 -14:15

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RESULTS OF THE ITF CURRENT POLICIES SCENARIO FOR THE PHILIPPINES

Mr Diego Botero, Data Officer
International Transport Forum

On behalf of:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany

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OUTLINE

1. HOW DID WE BUILD THE CURRENT POLICY SCENARIO?
2. CURRENT TRANSPORT POLICIES
3. MODEL UPDATES
4. RESULTS AND CONCLUSIONS

How did we build the Current Policy scenario?

In collaboration with Philippines stakeholders we

- Analysed **current transport policies** for the Philippines
- Reviewed the planned evolution of the **transport network** in the coming years
- Updated **international trade** data by commodity and mode
- Inclusion of the three main **nautical highways** and other ferry connections

Combining the effects of each measure, we projected the CO_2 emissions of the transport sector in the Philippines between 2019 and 2050

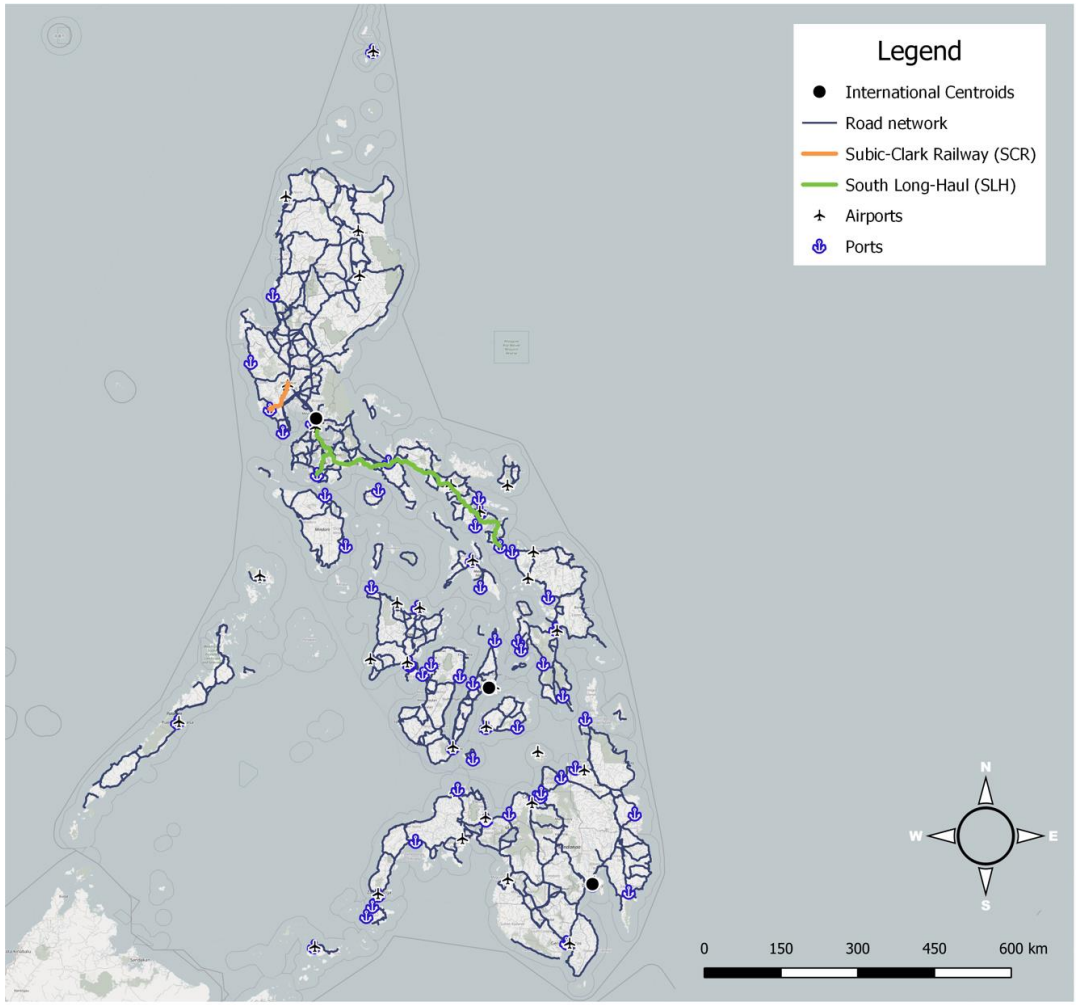
Current transport policies

This scenario presents the **evolution of CO_2 emissions** if the **current measures** are implemented as planned but further actions are not considered.

Technology stocks target for the LCV fleet	Rail freight expansions	Road upgrades	Eco-driving	Improving intermodal dwell time	Change in the energy mix
Target level: 10-30% zero-emission LCV sales/registrations between 2030 and 2050. (implementation starts in 2025).	Two new rail lines in Luzon (SCR and SLH); operational by 2026.	From provincial to tertiary road: 10-30% by 2030 and 2050. From tertiary to secondary road: 30-50% in 2030 and 2050. From secondary to primary road: 10-30% in 2030 and 30-50% in 2050.	This has already been implemented. This policy has the potential of reducing CO2 emissions by 1-2.5% in 2030 and by 5% in 2050.	Truck-to-port: reduced by 20% in 2030 and by 45% in 2050. Rail-to-port: reduced by 20% in 2030 and 2050. Shipping-to-port: reduced by 20% in 2030 and by 45% in 2050.	A decrease in oil and coal trade is expected to start by 2025.

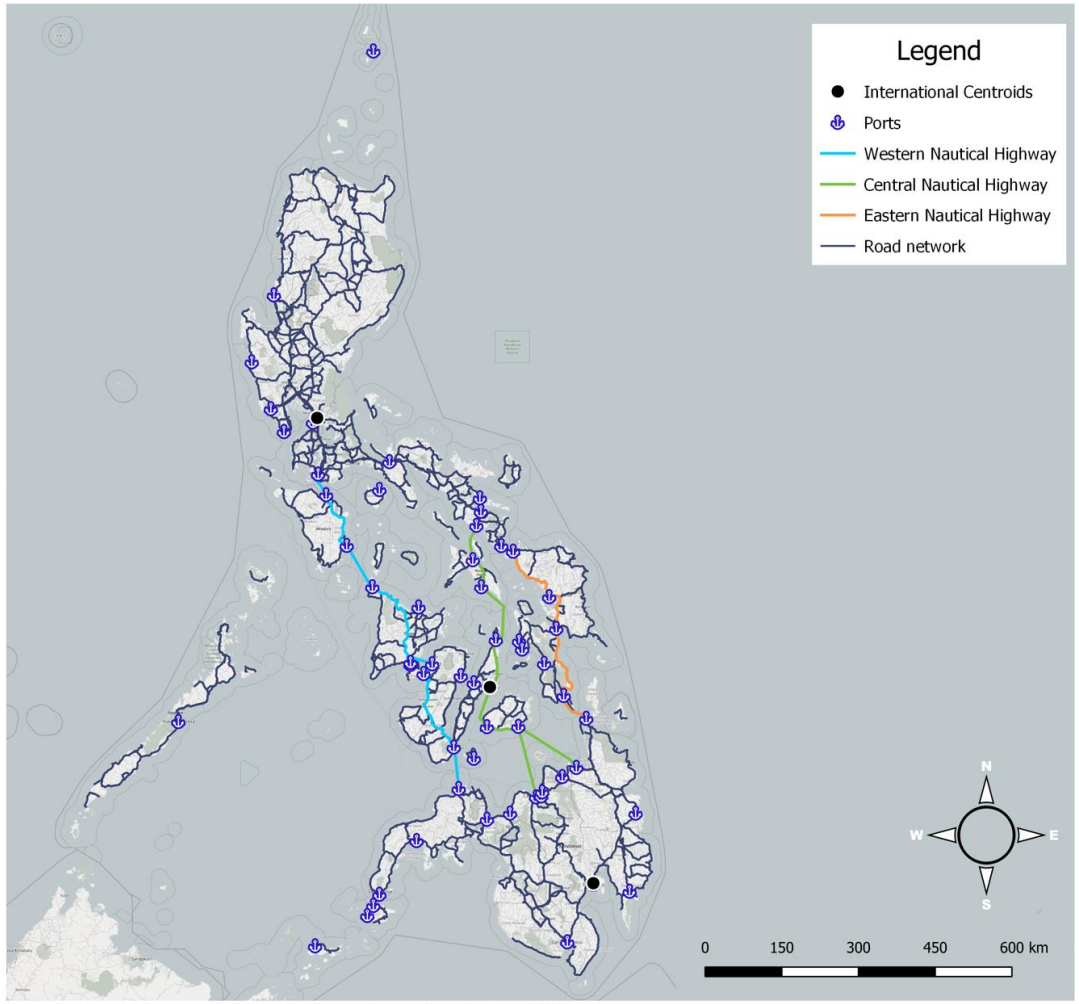
Infrastructure updates

Centroids and inland infrastructure



Source: Department of Transportation, International Transport Forum, Open Street Map (2023)

Nautical highways



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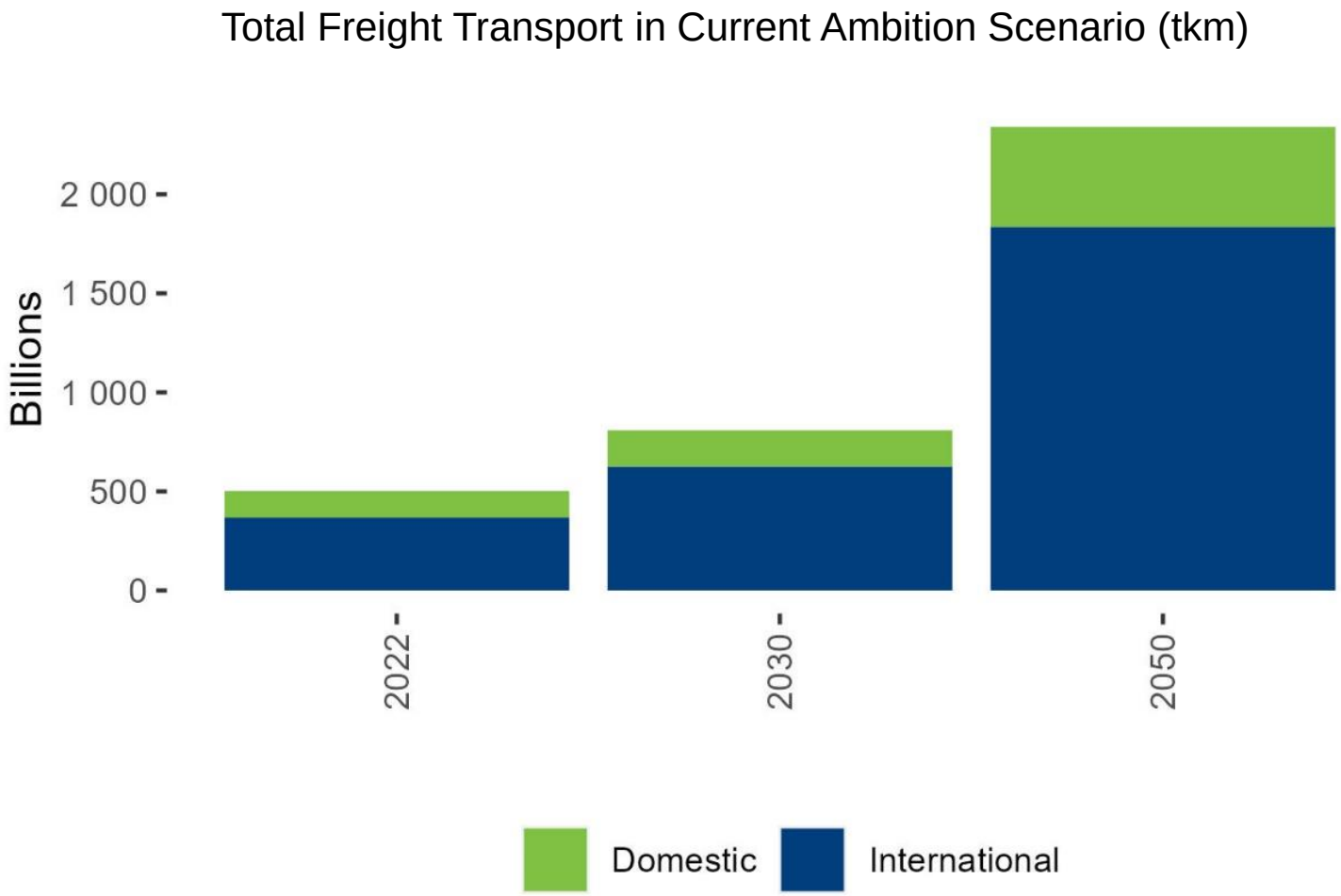
Freight transport is set to more than quadruple until 2050

Trade will exceed 2 trillion tkm by 2050

Economic growth in the SEA region drives trade

International transactions present increasing share



Trucks and ships remain the main transport modes

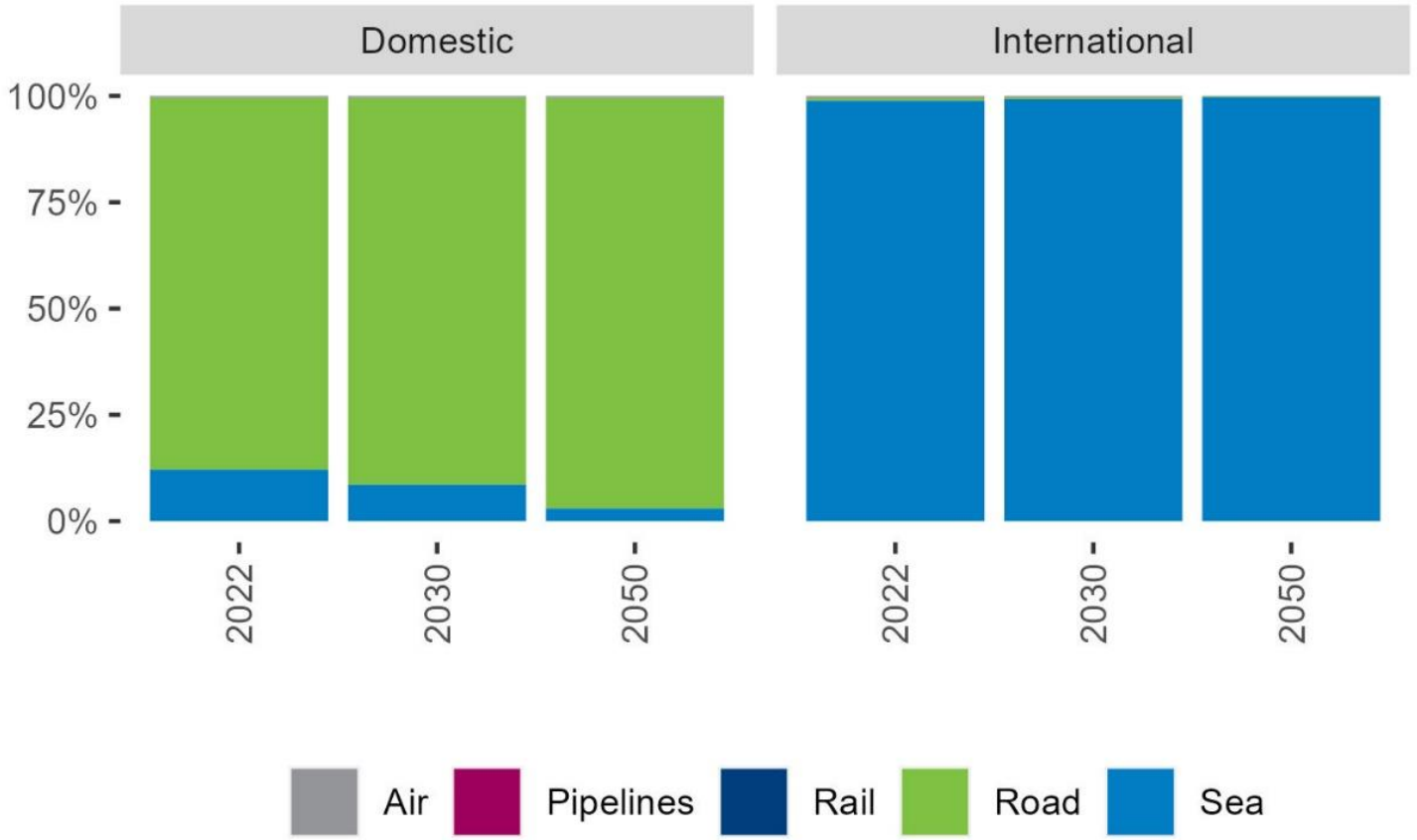
Trucks set to increase domestic modal share

Cargo rail is expected to remain uncommon

Aviation crucial for time-sensitive, valuable goods

Maritime dominates international trade

Freight transport modal share by year (based on tkm)

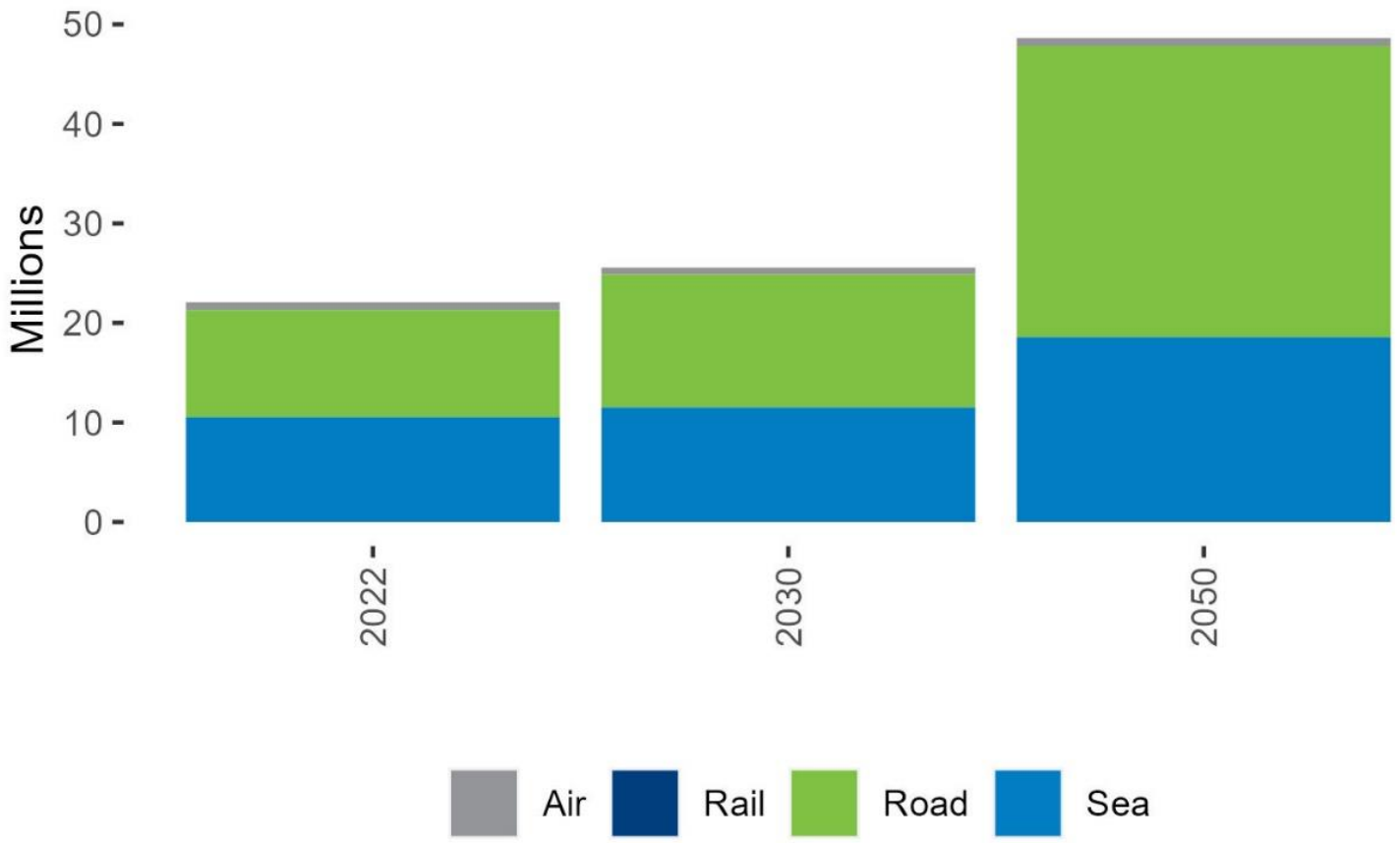


Tank-to-wheel emissions to reach 50 million tCO_2 by 2050

Road emissions to increase stronger than maritime despite lower traffic growth

Decarbonising road transport is a priority

CO_2 emissions by transport mode and year (ttw)



In conclusion

1. Freight transport is set to more than triple in the Philippines
2. Maritime transport will be the dominant mode
3. Road domestic transport will represent the main source of emissions in 2050
4. It is essential to decouple freight transport growth and CO_2 emissions
5. Decarbonising trucks and promoting a modal shift towards more efficient modes are priorities for upcoming years
6. Decarbonisation must be done without ignoring the crucial role that sea-born freight represents for the country

What are the strengths and missing elements of the Philippines' current decarbonising freight transport agenda?

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International Transport Forum

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Coffee break

14:15 – 14:45

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In-Focus Policy Dialogue – Part 2

What is the successful pathway to reaching the climate goal for freight transport in the Philippines?

14:45 -16:15

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RESULTS OF THE ITF CLIMATE AMBITION SCENARIOS FOR THE PHILIPPINES

Mr Till Bunsen, Policy Analyst
International Transport Forum

On behalf of:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany

IKI INTERNATIONAL CLIMATE INITIATIVE

OUTLINE

1. INCREASED AMBITION SCENARIOS
2. RESULTS
3. POLICY RECOMMENDATIONS

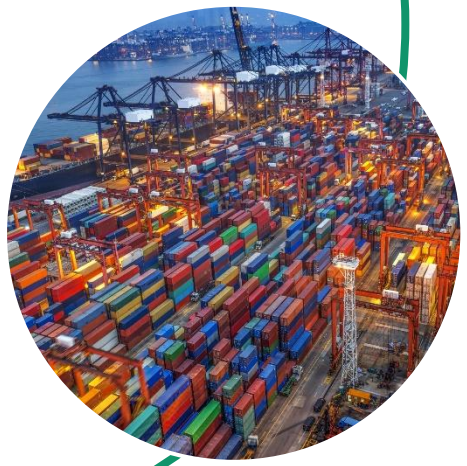
Assessing two Climate Ambition Scenarios

Green fleet:

Vehicle technology improvements through truck fleet renewal

Stricter fuel economy standards for diesel trucks

Fleet renewal/vessel refurbishment to reduce the share of fuel-oil-intensive ships



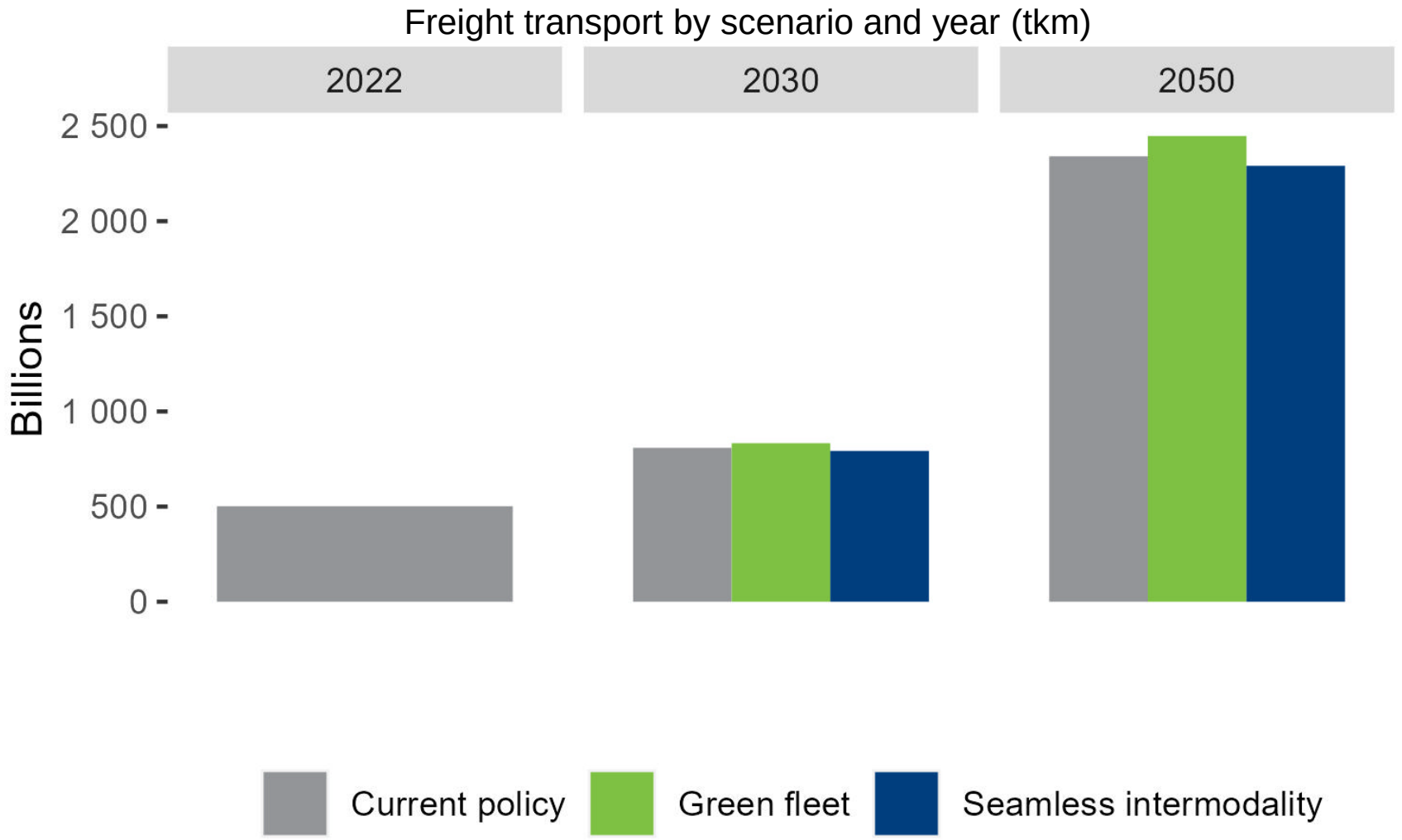
Seamless Intermodality:

Infrastructure improvement to increase port capacity

Infrastructure improvement to reduce dwell times

Asset sharing to increase load factors

Vehicle replacements and intermodal transport do not oppress sector growth



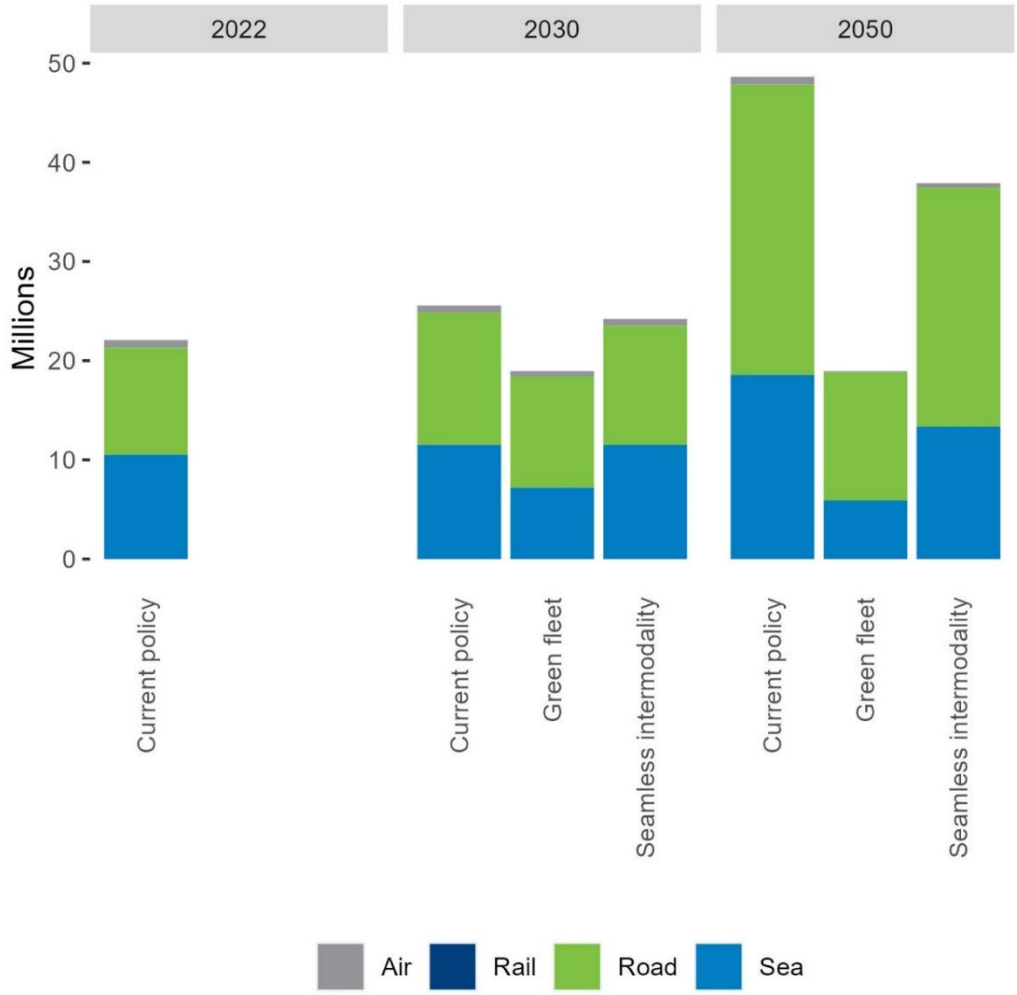
Ambitious freight policies can halve sector emissions

Investing in more efficient trucks and ships can reduce emissions by 61% in 2050, below current levels.

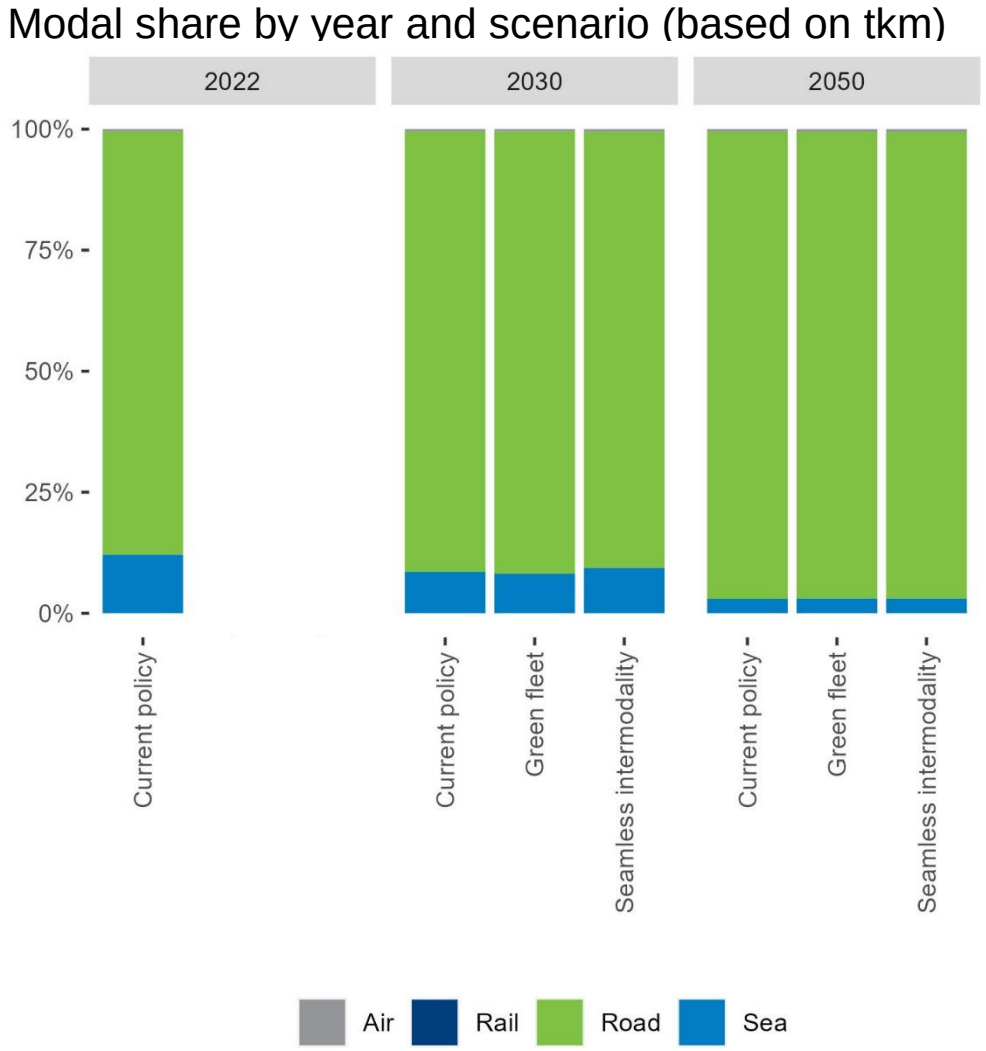
Zero-emission trucks are the most effective measures to decarbonize road freight

Savings from intermodal transport are lower than in the green fleet scenario, at 22%.

CO_2 emissions by year and scenario (ttw)



Modal shares do not vary significantly between scenarios



Green Fleet Scenario: Calls-to-action

Follow international best practices in adopting fuel economy or CO_2 emission standards for trucks.

Identify use cases for early adoption of zero-emission trucks in the Philippines and incentivise fleet conversions.

Promote efficient ships, for example, with differentiated port fees depending on the environmental performance of vessels and investment incentives.

Seamless Intermodality Scenario : Calls-to-action

Invest in port capacity expansions and maximise utilisation of existing assets to enable maritime transport to capture a higher modal share.

Streamline and digitalise processes to reduce dwell times at cargo transfer points.

Incentivise and enable asset sharing, for example through promoting digital technologies and platforms to connect logistics operators.

What is the successful pathway to reaching the climate goal for freight transport in the Philippines?

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SIPA Philippines Wrap up

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