CONFEDERAȚIA PATRONALĂ CONCORDIA
DIALOG PENTRU DEZVOLTARE

FUTURE OF MOBILITY IN ROMANIA | STUDY

July 2022

Studiu elaborat de: Deloitte. E3M MAKING AN IMPACT THAT MATTERS since 1845

Scope and Basis of Work

The main objective of the study – Developing a 2030 roadmap for the transport sector (two scenarios), including:

- Modelling the transport mix;
- Modelling transport activity by transport mode (e.g. passengers, freight);
    - Passengers – e.g. public & private, road, rail, aviation, etc.;
    - Freight – road, rail, inland waterways, etc.;
- Modelling the vehicle fleet evolution (by mode and fuel type) with a detailed segmentation (e.g. passenger & commercial vehicles split by light, medium & heavy transport);
- Estimating the evolution of carbon emissions originating from the production and utilization of each vehicle type and transport mode and subsequent energy sources;
- Modelling the energy mix for Romania – transport sector;
- Final energy demand (by transport mode and fuel type);
- Specific energy consumption (by transport mode);
- Necessary investments for implementing proposed policies and measures;
- Growth data and number of kilometers for each vehicle category.

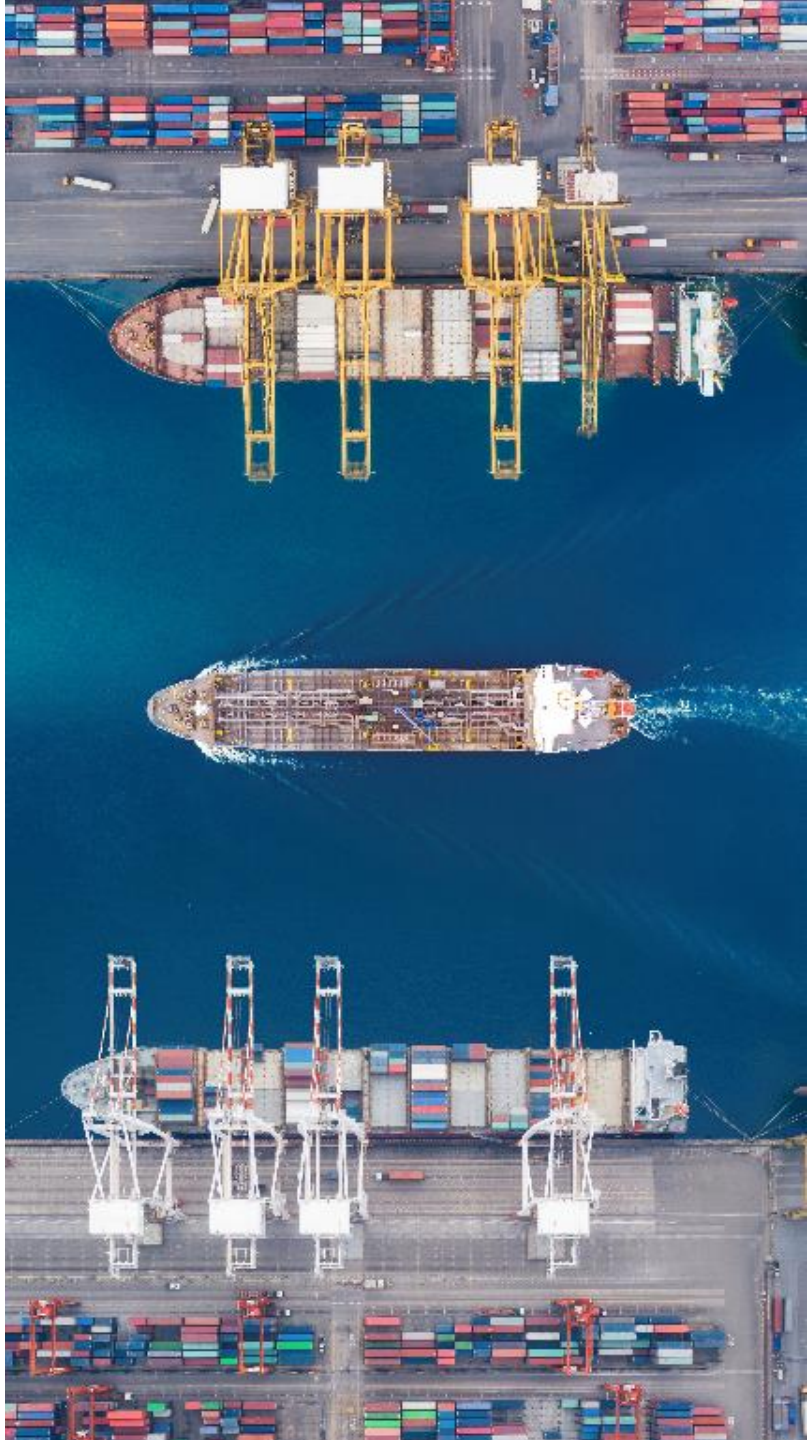
Information Sources
Main data sources include market data, historical / statistical and forecasted data using the PRIMES-Treove model in relation to the key transport sector drivers.

Limitations
The study covers only the scope previously mentioned.

The information, data and analysis presented were based on market data, historical / statistical data (publicly available) and forecasted data using the PRIMES-Tremove model developed by E3M; for each figure and table presented, the source is mentioned; therefore, although Deloitte endeavors to provide accurate and up-to-date information, it does not guarantee that such information is accurate as of the date of publication of the study, or that it will continue to be accurate in the future.

The information and data contained in this study is selective and can be subject to update, expansion, revision and amendment. The study does not claim to contain all of the information that any interested third party may require. Any statements, estimates and forecasts contained in this report reflect various assumptions of the expected results, assumptions that may or may not prove to be correct.

Contents



Glossary

A	Actuals
BEV	Full Battery Electric Vehicle
Bn.	Billion
CO2	Carbon Dioxide
DRPCIV	Directia Regim Permise de Conducere si Inmatriculare a Veh.
E	Estimated / Projected
EC	European Commission
ETS	Emissions Trading System
EU	European Union
EV	Electric Vehicle
GHG	Greenhouse Gas
GWh	Giga-watt hour
HDV	Heavy-Duty Vehicle
HEV	Hybrid Electric Vehicle
ICE	Internal Combustion Engine
INSSE	Institutul National de Statistica
kW	Kilowatt
Mil.	Million
Mt	Million tonnes
MtCO2	Million tonnes of CO2
MW	Megawatt
MWh	Megawatt hour
NECP	National Energy and Climate Plan
PHEV	Plug-in Hybrid Electric Vehicle
RED	Renewable Energy Directive
RES	Renewable Energy Sources
RES-E	Renewable Energy Sources in Electricity Generation
RES-T	Renewable Energy Sources in Transport
RFNBO	Renewable Fuels of Non-Biological Origin
TTW	Tank-to-Wheel
ZLEV	Zero and low emission vehicles

Study Context & Objectives

The Future of Mobility in Romania

Study Context

In the context of European decarbonisation trends, the National Energy and Climate Plan targets and the enhanced objectives of the Fit for 55 package, there is a need for Romanian to establish **a comprehensive and sustainable plan** for transitioning to **a green transport sector**, adapted to the specifics of each transport mode.

By 2030, the EU's Mobility Strategy aims for:

- 30 million zero-emissions cars in operation
- doubling the high-speed rail traffic
- automated mobility deployed at large scale
- market-ready zero-emission marine vessels

By 2050, the European Commission wants to achieve a fully operational, multimodal Trans-European Transport Network for sustainable and smart transport with high-speed connectivity.

Member States are required to invest 37 % of EU Recovery and Resilience Facility Funds on achieving climate objectives.

The revised proposal of the RED II aims for a GHG intensity improvement of 13% by also increasing the share of renewable fuels to 4,8% by 2030 (at EU level) comprised of RFNBOs and advanced biofuels. The business environment follows through by investing in production capacities and adapting to the new paradigm.

Key figures

16% of total GHG emissions in Romania are generated by the transport sector, making it the 3rd largest contributor[1]

18% is the enhanced RES-T target which the European Commission sets for Romania via the Fit for 55 package

55% GHG emissions reduction by 2030 is the target set by the EU in its transition to a low carbon economy

€73 bn. represents Romania's total financing needs across all transport modes for the completion and modernization of the transport network[2]

Source: 1) 2021 National GHG Inventory Report (2019 data); 2) Ministry of Transports: 2020-2030 investment plan

The Future of Mobility in Romania

Study Objectives

General objectives

To propose a roadmap of policies and measures for achieving the 2030 RES-T targets set for Romania, identifying the most economically and socially favorable path.

To raise awareness among public authorities, decision makers, the general public and the private sector with respect to the gap between the current GHG reduction outlook and 2030 targets.

To model 2 scenarios of the Romanian transport sector: the “As-Is” based on existing policies and the “FitFor55” with intensified GHG reduction measures to achieve the 18% RES-T target.

Detailed objectives

- Present aggregated indicators for the transport sector as well as for each transport mode: road, naval, rail and aviation.
- An in-depth review of road transport sub-segments: private transport (private cars), public transport and freight transport.
- Modelling the evolution of the Romanian vehicle fleet split into passenger vehicles and commercial vehicles (light, medium & heavy).
- Modeling Romania's energy mix, focusing on the renewable energy component (bio diesel, bio ethanol, bio methane, hydrogen, energy from renewable sources).
- Estimating the evolution of carbon emissions based on the specific energy sources of the Romanian vehicle fleet (i.e., fossil fuels, biofuels, natural gas, electricity and hydrogen).
- Modelling the Romanian transport sector activity, correlated with economic growth and motorization rate.
- Estimating the required resources to reach 2030 intensified targets.

Transport Sector Snapshot

Road-Rail-Maritime-Aviation

Romanian Transport Sector Snapshot

Road

Key figures & data

Vehicles registered in Romanian, 2020[1] *(mln. no. of)*

Motorcycles and mopeds	0,16
Automobiles	7,27
Buses and minibuses	0,05
Cargo vehicles	1,14
Special utility vehicles	0,05
Tractors	0,04
Total	**8,72**

Automobiles and cargo vehicles registered in Romanian by fuel type, 2020[1] *(%)*

	Automobiles	Cargo vehicles
Petrol	50,7%	9,7%
Diesel	48,3%	90,2%
Electric	0,1%	0,02%
Hybrid	0,6%	0%
GNC / GPL	0,3%	0,06%

Cargo vehicles registered in Romania by total maximum authorized mass, 2020[1] *(%)*

Under 3.5T	84,8%
3.5T to 7.5T	4,1%
7.5T to 12T	1,1%
12T to 40T	9,2%
Over 40T	0,8%

- Data shows **the number of electric and hybrid vehicles doubled in 2021** compared to 2020[2].
- Romania has **940 km of functional highway** and a road network of 86,7 ths. km (45% modernized)[1].
- As of December 2021, there are **747 normal and high-power public charging points** [3].
- **266 Mt (77%)** of total freight volumes were **transported by road** in 2020[1]
- **355 vehicles/'000** cap is the Romanian 2019 **motorization rate**; EU27 avg: 543 vehicles/'000 cap[4]

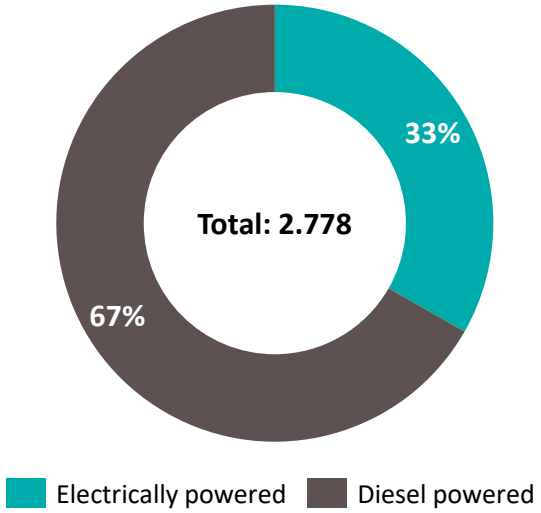
Source: 1) INSSE, 2021; 2) DRPCIV, 2021; 3) European Alternative Fuels Observatory; 4) Eurostat, 2021

Romanian Transport Sector Snapshot

Rail

Key figures & data

Locomotives and railcars registered in Romanian by fuel type, 2020[1] *(number of, %)*



- **70%** of locomotives and railcars, **36%** of freight railcars and **23%** of passenger railcars **have passed their standard depreciation period**

Rail network infrastructure in use in Romanian, 2020[1] *(km, %)*

Electrified lines	4.034 (37%)
Non-electrified lines	6.735 (63%)
Total	**10.769**
Main lines electrified	3.017 (50%)
Main lines non-electrified	2.973 (50%)
Main lines total	**5.990**

- Only **1,4% of freight cars** are capable of **multimodal transport**
- **50 Mt (14%)** of total freight volumes were **transported by rail** in 2020[1]
- **15% of passengers** in 2020 opted for **rail transport**, making it the 2nd largest share after road transport (82%)[1]

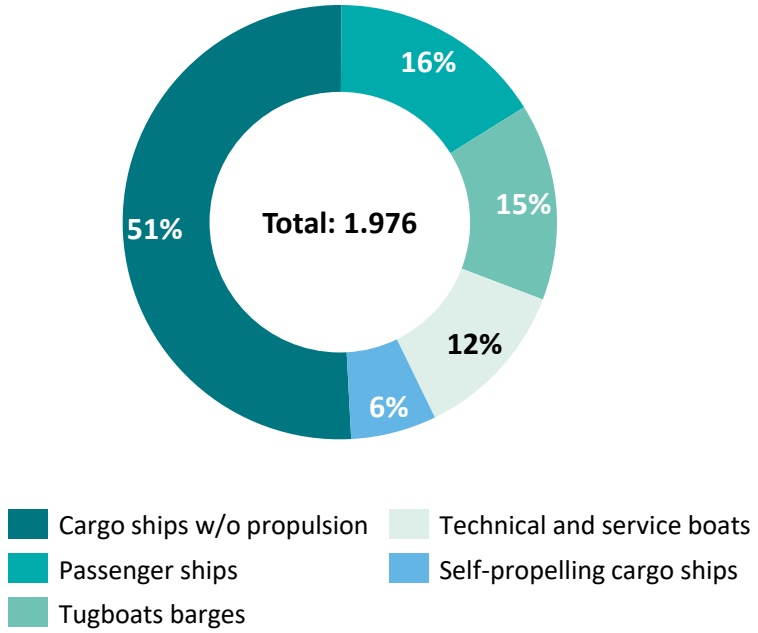
Source: 1) INSSE, 2021

Romanian Transport Sector Snapshot

Maritime – Inland Waterways

Key figures & data

Inland waterways ships registered in Romania, 2020[1] *(number of, %)*



- **30 Mt (9%)** of total freight volumes were **transported by inland waterways** in 2020[1] - 46% transported nationally, 44% internationally and 10% in transit
- **43%** of transported goods via inland waterways in 2020[1] is comprised of **ore**, whereas **32%** is comprised of **agricultural products** and **8% chemical products**
- **49%** of transported goods via inland waterways in 2020 have **traveled between 150 and 299 km[1]**
- In 2020 there were **2.763 km of navigable inland waterways[2]**, of which notably:
  - 1.075 km on the Danube river and 524 km on secondary arteries
  - 64 km – The Danube – Black Sea Canal
  - 28 km – The Poarta Alba – Midia Canal
  - 40 km – the Bega Canal

Source: 1) INSSE, 2021; 2) Ministry of Transport – 2020-2030 Investment Plan

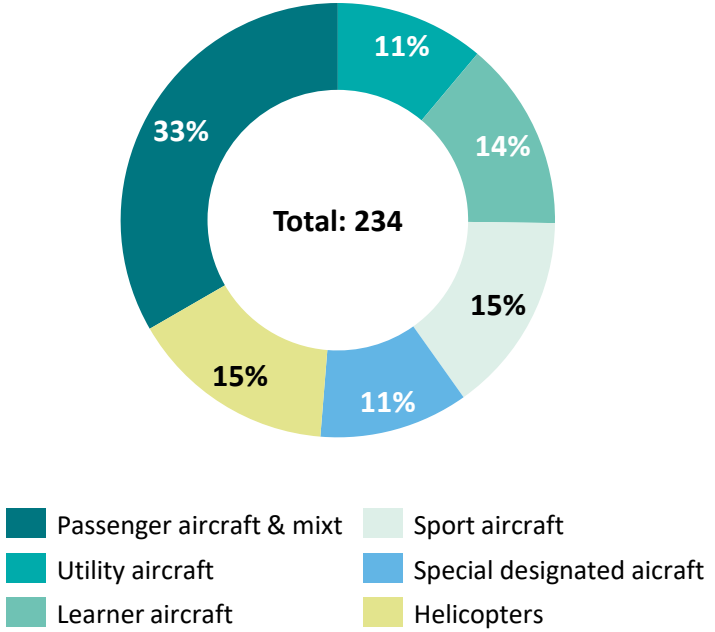
Romanian Transport Sector Snapshot

Aviation

Key figures & data

Civil aircraft registered in Romania, 2020[1]

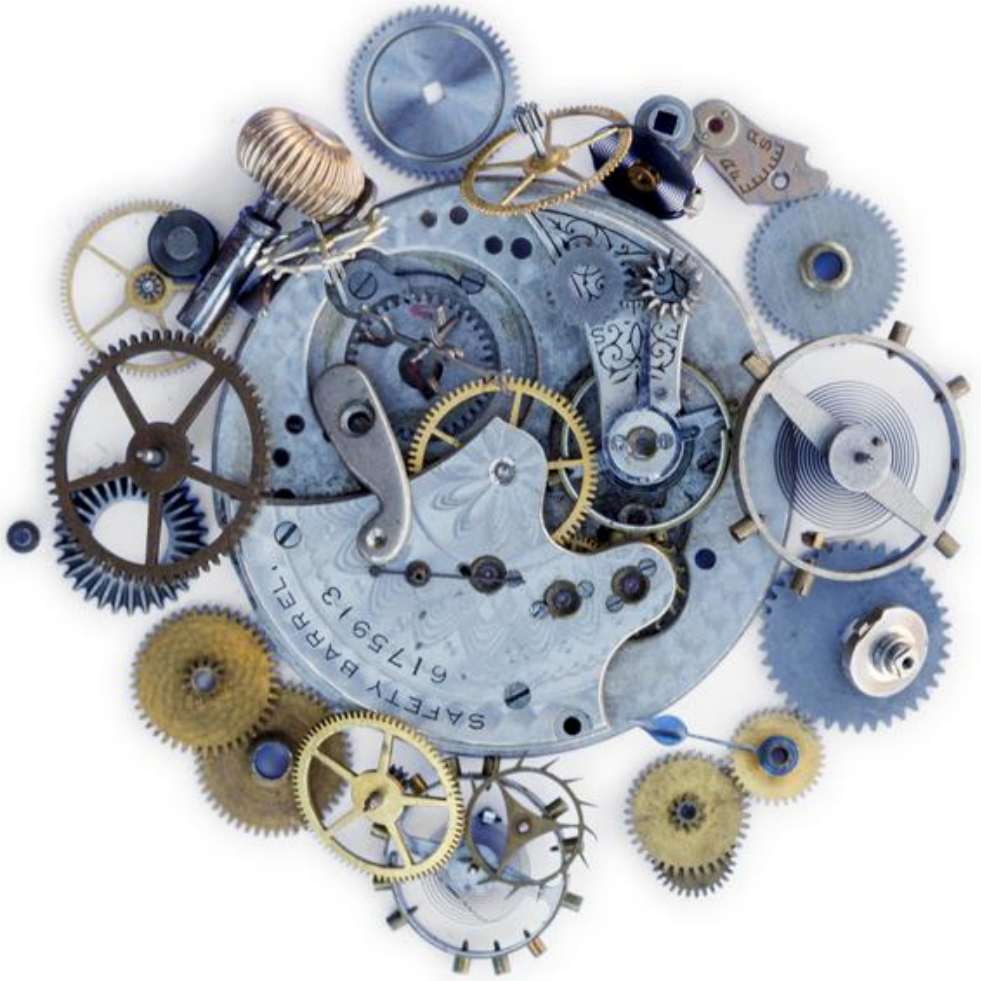
(number of, %)



- According to the Aeronautical Information Publication (AIP), there are **27 airports and 6 heliports operational in Romania as of 2021**. Of these, 9 are main international airports, 7 being secondary international airports, 11 national airports and 6 heliports.
- Traffic figures for **2019** show approximately **23 million passengers** have travelled through Romanian airports (14 million through Bucharest Henri Coanda airport alone)[1]
- In comparison, **2020 traffic figures show only 31% of the 2019 passenger volumes** (7,2 million in total[1]), a decrease caused by the pandemic
- Only **40 ths. tonnes** of freight were transported **by air** in 2020[1]

Source: 1) INSSE, 2021

Methodological Approach



Methodological Approach

Concordia stakeholders were consulted throughout the project development process

Define full modelling scope and base assumptions of the two scenarios.

Review and approve **As-Is** detailed assumptions with the project.

Review results of the **As-Is scenario** with project stakeholders and implement feedback.

Review and approve **FitFor55** detailed assumptions with the project.

Review results of the **FitFor55 scenario** with project stakeholders and implement feedback.

Review policy roadmap with project stakeholders and implement feedback.

Produce detailed assumptions list for **the As-Is scenario**, based on existing known policies, funding schemes, incentives, projects and investment plans.

Model the **As-Is scenario** and present results to project stakeholders.

Produce detailed assumptions list for the **FitFor55 scenario**, based on accelerated As-Is assumptions, mobility trends, other EU NECP strategies for the transport sector, stakeholder consultations and studies.

Model the **FitFor55** scenario and present results to project stakeholders.

Draw a transport sector policy roadmap for Romania in view of reaching 2030 Fit for 55 GHG reduction targets, based on sector-level studies, business environment proposals, mobility trends and the local infrastructure context.

Project Start

Finalize Study

*The following Concordia members, who represent key sectors for the future of transport, have contributed towards this study prepared by Deloitte and E3M for the Concordia Employers Organisation: Federaţia Asociaţiilor Companiilor de Utilităţi din Energie (**ACUE**), Federația Patronală Petrol și Gaze (**FPPG**), Organizatia Patronala a Societatilor Feroviare Private din Romania (**OPSFPR**), Uniunea Națională a Transportatorilor Rutieri din România (**UNTRR**).*

*An important contribution was also made by Asociația Constructorilor de Automobile din România (**ACAROM**), **Asociația Energia Inteligentă**, **Clariant** and **DPWorld**, who are important players in the transition to clean transport.*

Methodological Approach

The study uses the same modelling methodology as the one used by the European Commission in its elaboration of the Fit For 55 projections

Model inputs (not limited to):

Known policies and measures

- Existing national policies and measures
- Identified best practices at European level
- Inclusion of technological innovations
- Inclusion of infrastructure developments (e.g. new motorways, multi-modality)
- Obligations for the Romanian transport sector (e.g. DAFI directives, RES, FQD)

Historic data for model calibration

- Vehicle stock
- Final energy demand
- Specific energy consumption
- Transport activity

Primes-Tremove Model

MAIN CHARACTERISTICS OF THE MODEL

Detailed – includes elements of economic, financial, technical, environmental, behavioral nature
Market-oriented – market equilibrium prices determine supply and demand
Dynamic – considers the evolution of demand according to market prices and the evolution of supply based on costs and capacities

Outputs

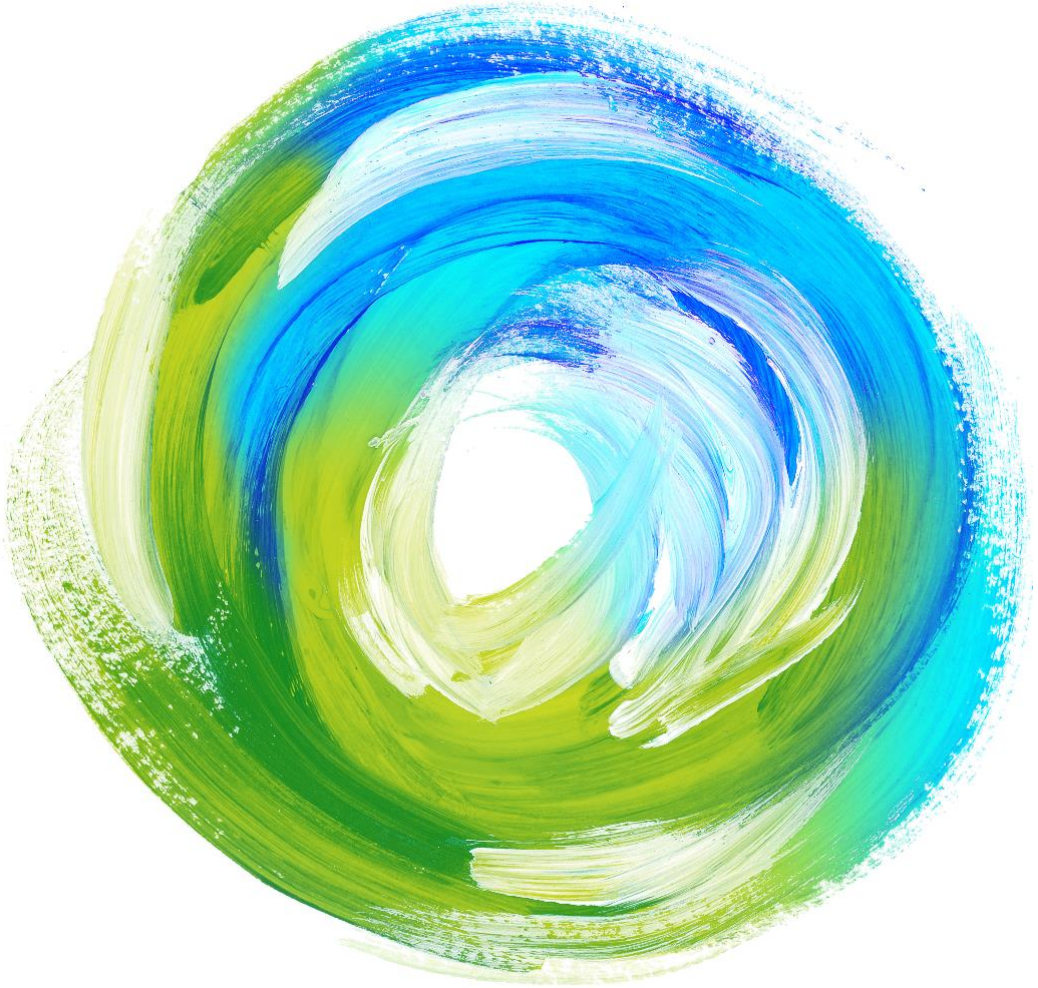
- **Scenario 1:** baseline "As-Is" scenario projection derived from existing policies, incentives, projects and investment plans and a gap analysis between CO2 emissions in the base scenario and GHG intensity reduction targets
- **Scenario 2:** an accelerated "FitFor55" scenario projection and gap analysis showing the difference in CO2 emissions as well as RES-T targets compared to the baseline scenario

2030 projections (not limited to):

- Vehicle stock (composition projections)
- Final energy demand by transport mode
- Specific energy consumption by transport mode
- Transport activity projection by transport mode
- CO2 emissions by transport mode
- RES-T share evolution

Future of Mobility in Romania

Scenario Assumptions



Future of Mobility in Romania – Scenario Assumptions

The As-Is scenario policy assumptions

Continue the "**Rabla**" and "**Rabla Plus**" programmes for renewing the national vehicles stock.	Placing **biofuels** on the market produced only from raw materials **meeting the defined sustainability criteria**; increase share of 1st and 2nd generation biofuels in transport.	Promoting d**evelopment of production and of the infrastructure** required for penetration of alternative fuels, including **LPG, CNG and LNG**.
Upgrading urban public transport and rail transport infrastructure; extending the Bucharest metro; increasing public transport usage	Fostering passengers' use of rail transport (to the detriment of road transport) through the implementation of the **EU Roadmap to a Single European Transport Area.**	**Promoting electromobility in road transport**; developing the infrastructure required for electrical and hybrid vehicles; promoting the use of renewable energy in road transport.
Restricting traffic of conventionally fueled vehicles **in city centers**.	Introducing high and strict **environmental fees** to limit the purchase of polluting used vehicles.	Implementing **EU fleet-wide standards for CO2 emissions** for light and heavy vehicles in accordance with Regulation (EU) 2019/631 and (EU) 2019/1242.

The "As-Is" Scenario

- The "As-Is" scenario quantifies the future of the Romanian transport sector up to 2030 starting from the existing context and by anticipating national policies (**including PNRR targets**), also assuming the continuation of policies that stimulate a decrease in GHG emissions arising from the transport activity
- The "As-Is" scenario is broadly aligned with the EU Reference 2020 scenario, including existing EU legislation (e.g. CO2 standards, RED II, Fuel Quality Directive, Alternative Fuel Infrastructure Directive)

Future of Mobility in Romania – Scenario Assumptions

The FitFor55 scenario policy assumptions

Implementation of distance-based charging of heavy goods vehicles (**distance-based road vignette**).	**Higher intensity in achieving modernization of rail infrastructure** (both railroads and rolling stock) and **Danube navigation infrastructure**.	**Subsidizing port fees and purchase of vessels** propelled by compressed natural gas (CNG), or liquefied natural gas (LNG), or by hydrogen, or powered by electricity.
Re-calibration of the regulatory framework with respect to adopting new modes of transport – **simplifying the authorization processes for charging network / alternative fuels network.**	Extension of the "**Rabla**" program to **commercial vehicles**.	**Greater LNG / CNG network and higher uptake of LNG / CNG vehicles**. LNG blending with biomethane for trucks; **LPG as transition fuel** given the existing network and evolving emissions cutting technology.
Increase in conventional fuel prices especially for diesel (through **higher fuel excises**).	An **accelerated shift of road traffic** (passengers and goods) **to rail** compared to the As-Is scenario.	Incentives for digitalisation of local public transport (**intelligent transport systems**). Implementing a "**Green Bus"** purchase programme.

The "FitFor55" Scenario

- **The "FitFor55" scenario is modeled in view of achieving an 18% RES-T share**
- The "FitFor55" scenario considers intensified policies assumed in the "As-Is" scenario as well as new national policies inspired by EU NECPs and mobility trends
- The "FitFor55" scenario is broadly aligned with the MIX scenario of the EU's Fit For 55 package – a core policy scenario that analyzes the initiatives of the EU Green Deal; it accounts for the revised RED III and AFID Directives and strengthened CO2 emissions standards for cars and vans
- The "FitFor55" scenario is compared with the "As-Is" scenario in order to analyze the gap to 2030 GHG emissions reduction targets and to the 18% RES-T for Romania

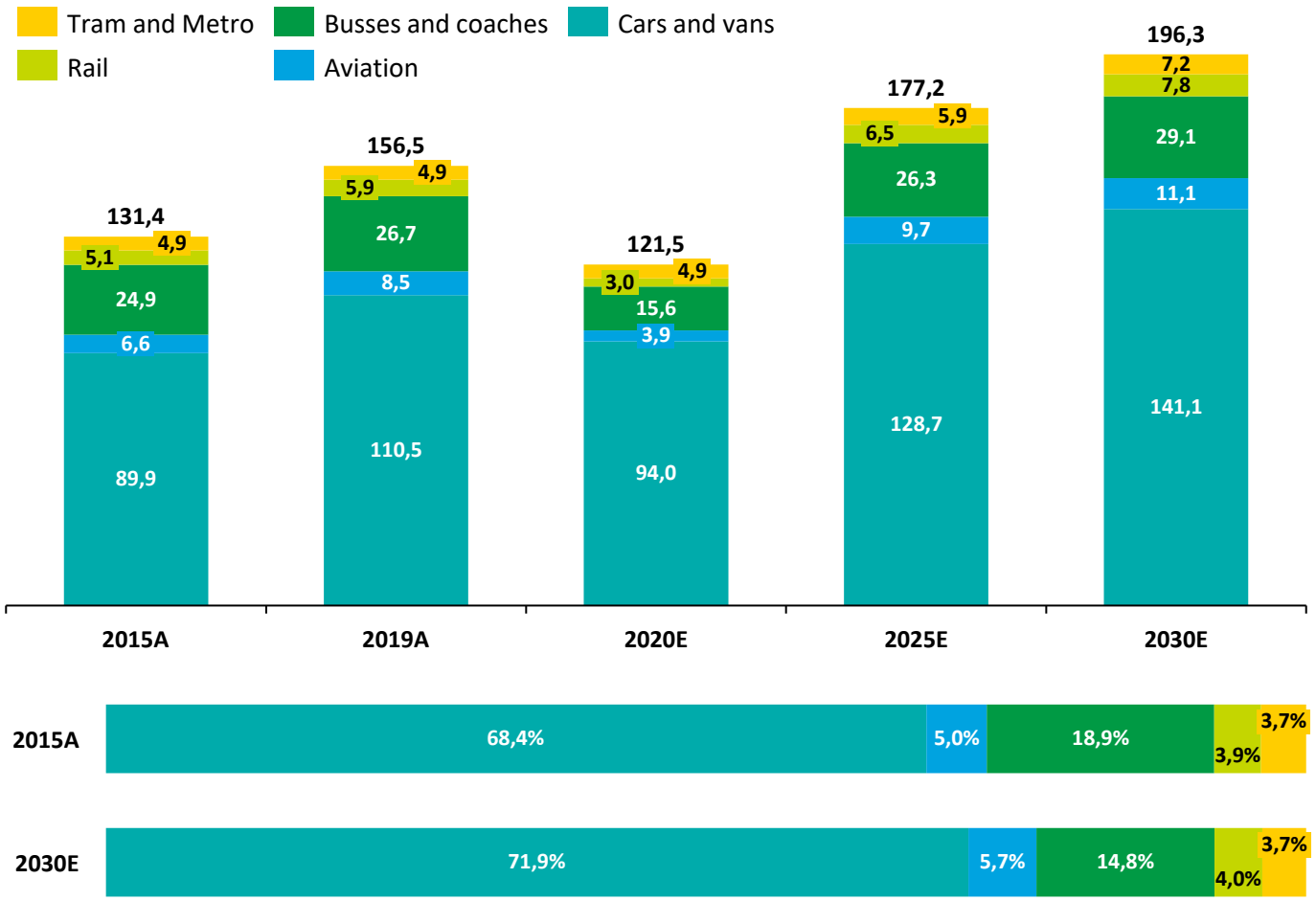
Future of Mobility in Romania

The As-Is Scenario

As-Is Scenario – Passenger transport activity 2015 - 2030

Strong growth in passenger transport activity is projected in 2030 driven in particular by to economic growth

Passenger transport activity[1] *(Gtkm)*



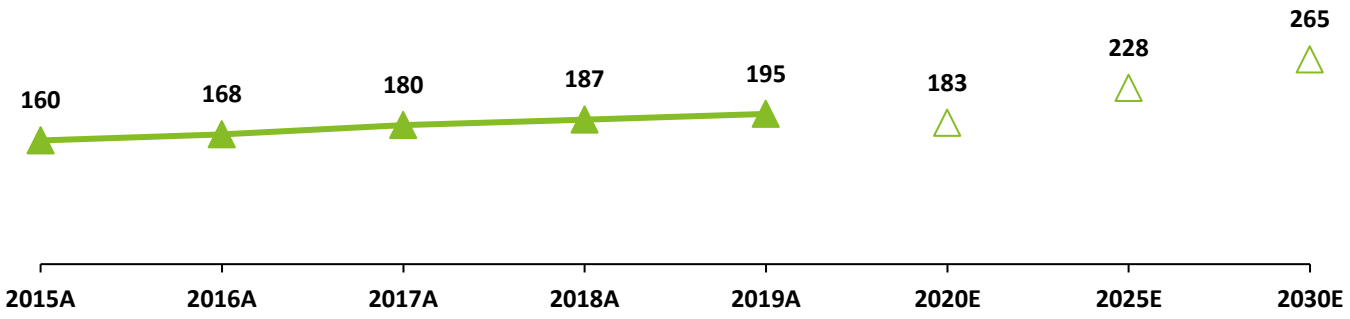
Overview

- Activity of all passenger transport modes is set to increase by 25% in 2030 compared to 2019, incentivized by a favorable economic environment (i.e. higher motorization rate).
- 2020 activity represents a trend exception, caused by the COVID-19 pandemic.
- The modal share of passenger cars increases by 4% in 2030 compared to 2019, to the detriment of public road transport.
- Rail, tram and metro combined activity increases by almost 50% in 2030 compared to 2019; these modes retain their modal share.
- Activity in aviation grows by approximately 2,7% per year in 2025-2030, broadly aligned with the expectations of EUROCONTROL.

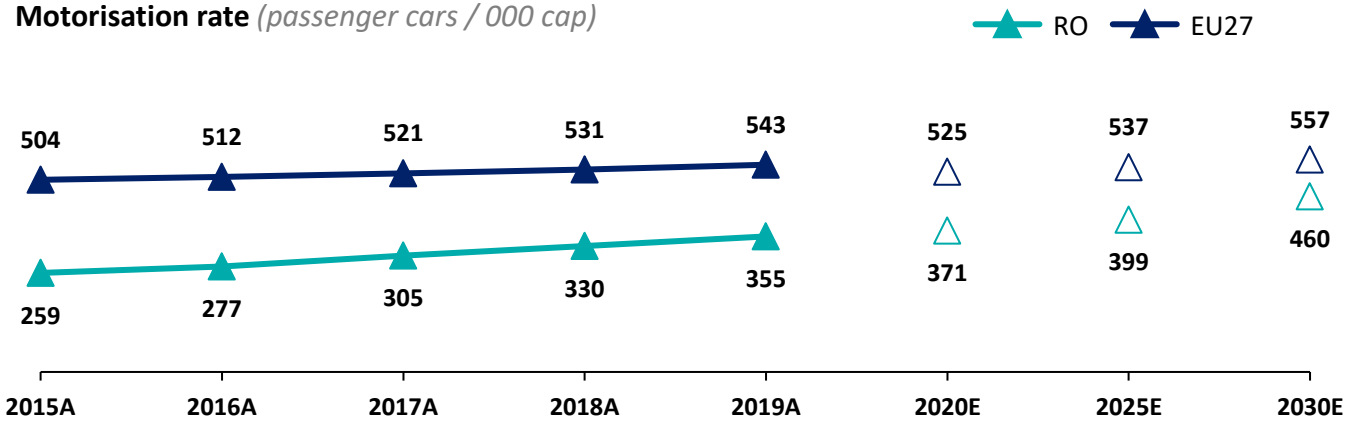
Source: 1) 2015 & 2019 Actuals (A) based on EUROSTAT Transport Statistical Pocketbook 2021; 2020 – 2030 Estimated (E) via PRIMES-TREMOVE

As-Is Scenario – Motorisation rate

Gross Domestic Product – Romania *(bn. €$_{2015}$; adjusted for inflation)*



Motorisation rate *(passenger cars / 000 cap)*



Sources on macroeconomic assumptions and population:

- Long-term population and GDP growth trends based on the 2021 Ageing Report: Underlying Assumptions and Projection Methodologies. European Economy 11/2020", DG ECFIN, aligned on the Eurostat EUROPOP 2019 projection
- Short-term and medium-term GDP growth projections based on Spring 2020 DG ECFIN forecast

Source for projection: PRIMES-TREMOVE

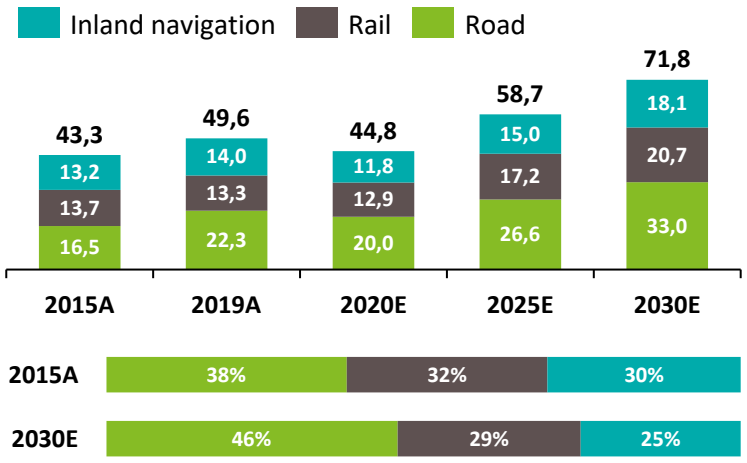
Overview

- Following a difficult 2020 that saw the economy impacted by the pandemic, a strong GDP growth is projected by 2030, which acts as a driver of activity growth and consequently as a driver of increased uptake of passenger cars.
- The motorisation rate (vehicles per capita) increases over time and reduces the gap with the EU27 average, however remaining below the EU27 average.
- The motorisation rate increases from approx. 355 vehicles / 1000 inhabitants in 2019 to approx. 460 vehicles per 1000 inhabitants in 2030 (30% increase).

As-Is Scenario – Freight transport activity 2015 - 2030

Strong growth in freight transport activity is also projected in 2030 driven in particular by to economic growth

Freight transport activity[1] *(tonnes-kilometres Gtkm, %); territoriality principle applied for road transport*

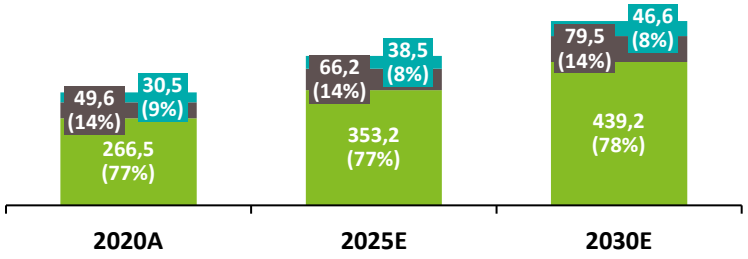


22 Gtkm is the 2019 EUROSTAT data for road freight transport activity in Romania by applying the **territoriality principle**; pandemic impact included

vs.

61 Gtkm is the 2019 EUROSTAT data for road freight transport activity (national & international haulage – applying the nationality principle) carried out by **vehicles registered in Romania**

Freight transport activity *(volumes transported*[2] *Mt, %)*



Freight transport activity growth CAGR *(%)*

	2020 - 2025	2025 - 2030	2020 - 2030
Inland navigation	↗4,8%	↗3,9%	↗4,3%
Rail	↗5,9%	↗3,7%	↗4,8%
Road	↗5,8%	↗4,5%	↗5,1%

Overview

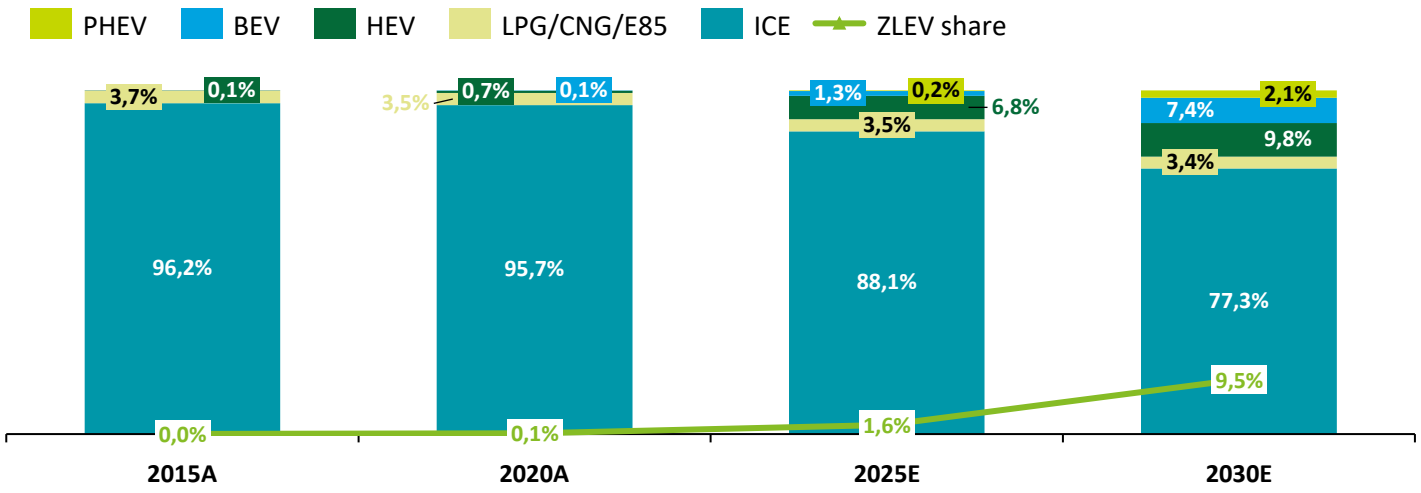
- The "territoriality" principle is applied to road freight transport activity, in line with EU statistical standards; the figures assume activity of heavy vehicles circulating on the territory of Romania irrespective of the nationality of the vehicle.
- Significant growth in freight transport activity by almost 65%, between 2015 and 2030, driven by GDP growth.
- Steeper increase is projected for road and rail freight transport, by 48% and 56%, respectively in 2030 compared to 2019.
- Freight transport activity of inland navigation increases by almost 30% in 2030 compared to 2019.
- Freight transport by inland navigation loses modal share, owing to the steeper increase of road and rail freight transport.

Source: 1) 2015 & 2019 Actuals (A) based on EUROSTAT Transport Statistical Pocketbook 2021; 2) 2020 Actuals (A) based on 2020 INSSE transport statistic; volume estimations are derived by applying modal activity growth estimations
Source for projection: PRIMES-TREMOVE

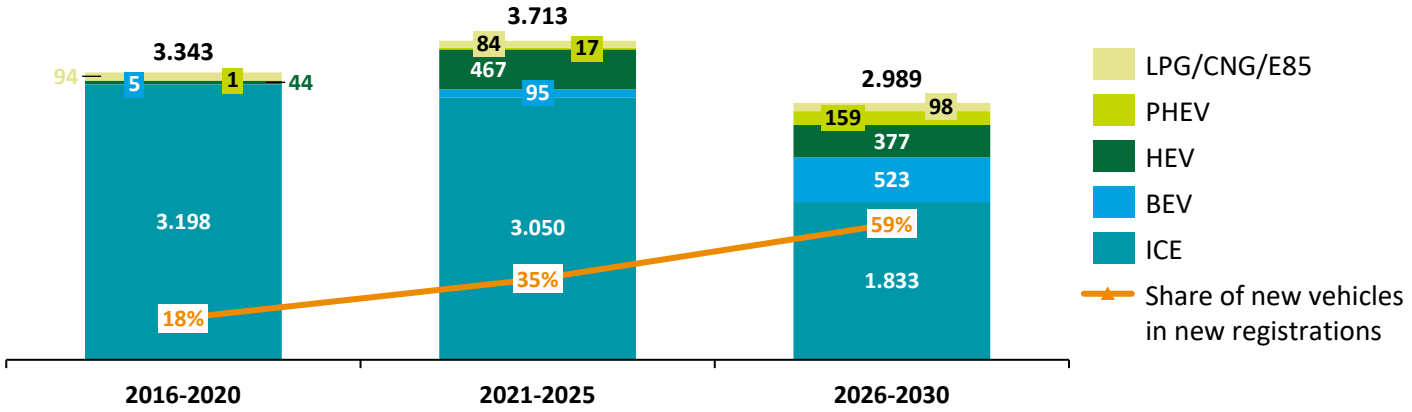
As-Is Scenario – Passenger cars fleet (1/2)

A strong growth is projected in new car sales driven by economic growth and policies for phasing out polluting vehicles

Passenger cars fleet composition *(%)*



Passenger cars new registrations (new vehicles and imported 2nd hand market) *(000 cars / 5 year period)*



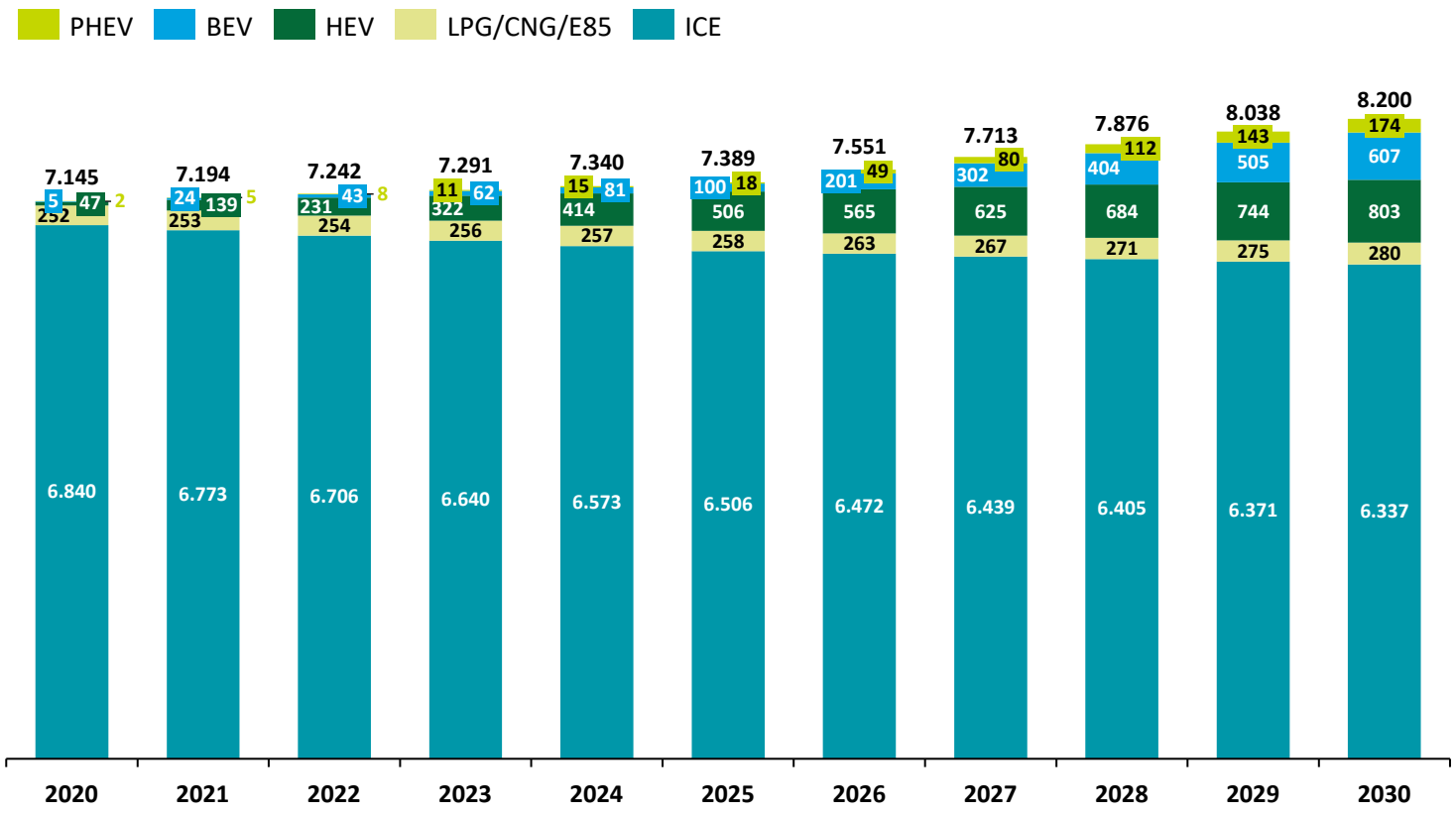
Source for projection: PRIMES-TREMOVE

Overview

- Increase of the passenger cars stock in 2030, by approx. 18% compared to the stock in 2019, i.e. from about 6.9 million vehicles in 2019 to almost **8.2 million vehicles in 2030.**
- New cars and 2nd hand vehicle registrations lead to a modernization of the passenger cars fleet (more efficient vehicles, phasing out EURO 3 & 4) – thus a **ZLEV share in 2030 of approx. 10%.**
- New car sales increase their share in new registrations over time to almost 60% in 2030; the remainder is comprised by 2nd hand vehicle registrations.
- The bulk of new electric vehicles registration is projected to occur after 2025.
- Public charging infrastructure reaches approx. 40,000 chargers.

As-Is Scenario – Passenger cars fleet (2/2)

Passenger cars fleet, projected annual evolution *(000 vehicles)*



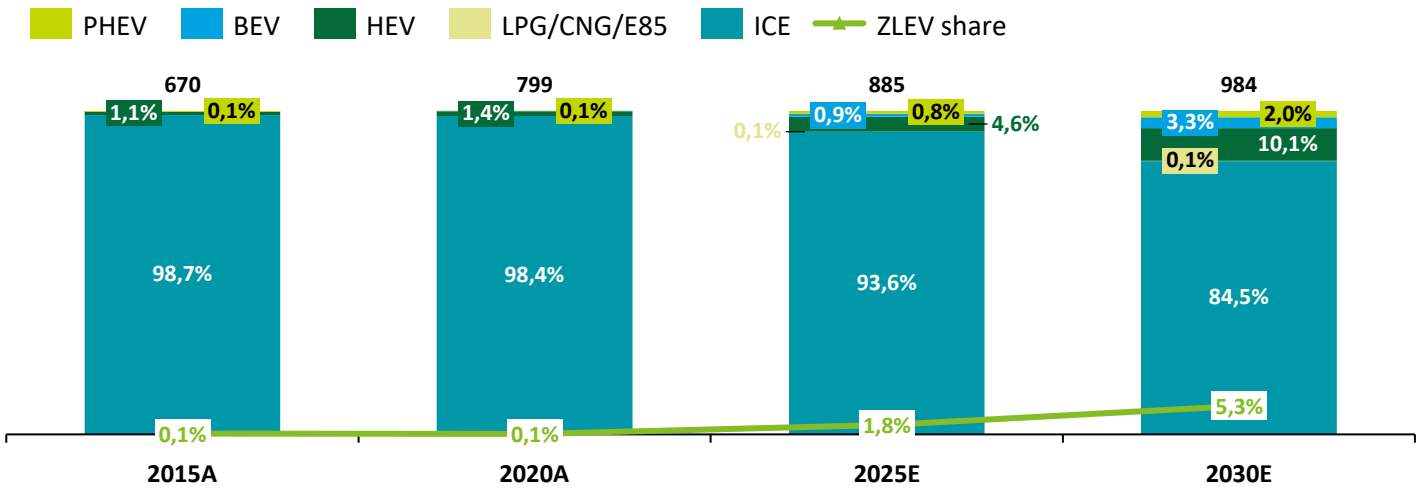
Overview

- The passenger car fleet annual projections are linear interpolations of 5-year projection periods; thus, it is possible for deviations to occur. The projections are based on several assumptions:
  - Economic growth driving motorisation rate increase: a growth in new vehicle registrations (new and 2nd hand vehicles): 670 ths. new yearly registrations between 2021 and 2030[1]
  - New vehicle registrations is partly offset by the replacement of the ageing fleet, assuming a continuation of the Rabla programme
- **Some considerations in the model may or may not reflect the actual situation in Romania, e.g.: impact of Covid19 on the Romanian market, disposable income for the purchase of cars, growth of GDP in 2021 (actual) versus projections.**

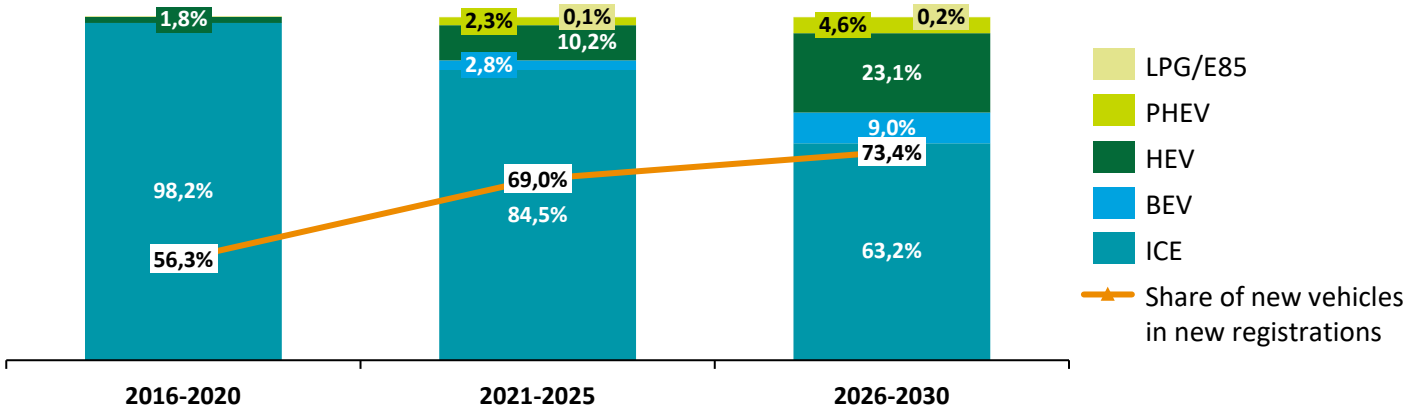
Source: 1) See previous slide: "As-Is Scenario – Passenger cars fleet (1/2)
Source for projection: PRIMES-TREMOVE

As-Is Scenario – Commercial vans fleet

Vans commercial fleet composition *(%, ths. of)*



Composition of new vans registrations *(000 cars / 5 year period)*



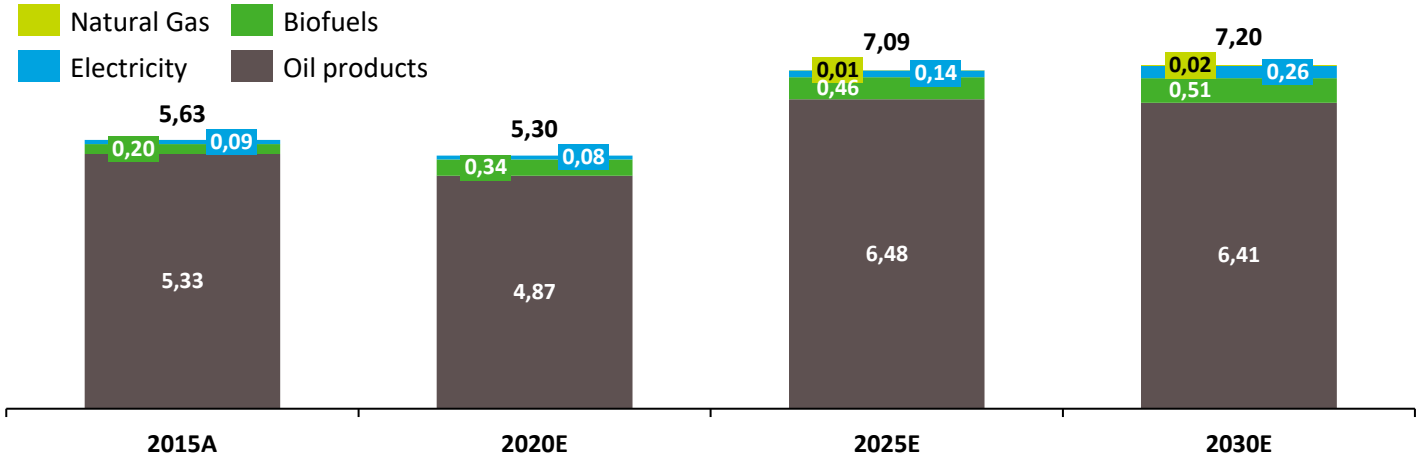
Source for projection: PRIMES-TREMOVE

Overview

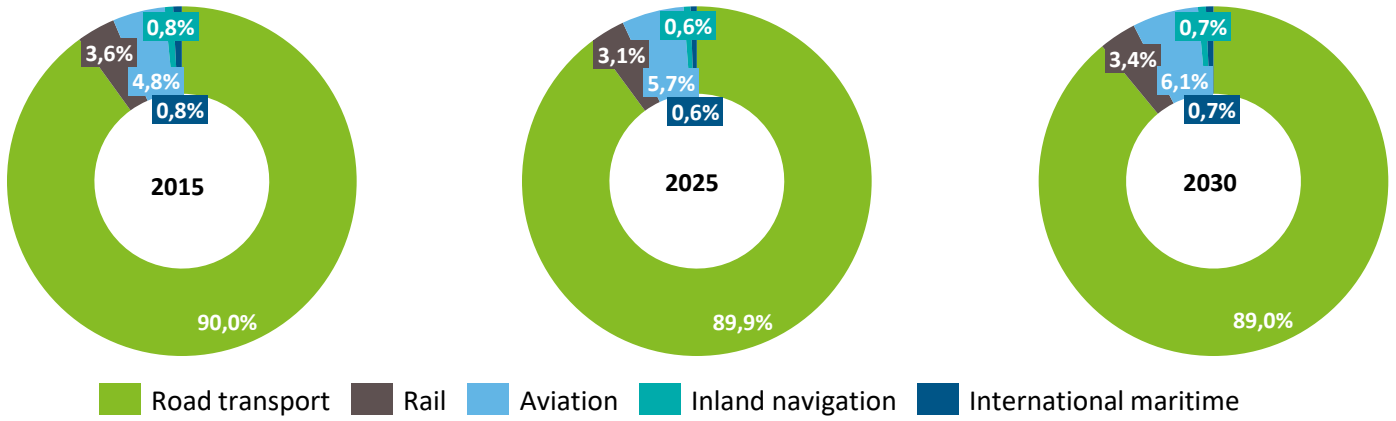
- 2030 sees an increase of the vans stock, by almost 25% compared to 2020 levels – **approx. 0.98 million vans in 2030.**
- Almost 85% of the vans fleet in 2030 is comprised of conventional internal combustion engines.
- Uptake of full hybrid vans is projected to occur from 2021 onwards, improving to some extent the efficiency of the commercial fleet.
- The bulk of new electric vans registration is projected to occur after 2025.
- By 2030, almost 3 quarters of newly registered vans will be new vehicles, as low emission technologies are maturing in the commercial vans sector.

As-Is Scenario – Fuel consumption in the transport sector

Fuel consumption in transport *(Mtoe)*



Share of total fuel consumption by transport mode



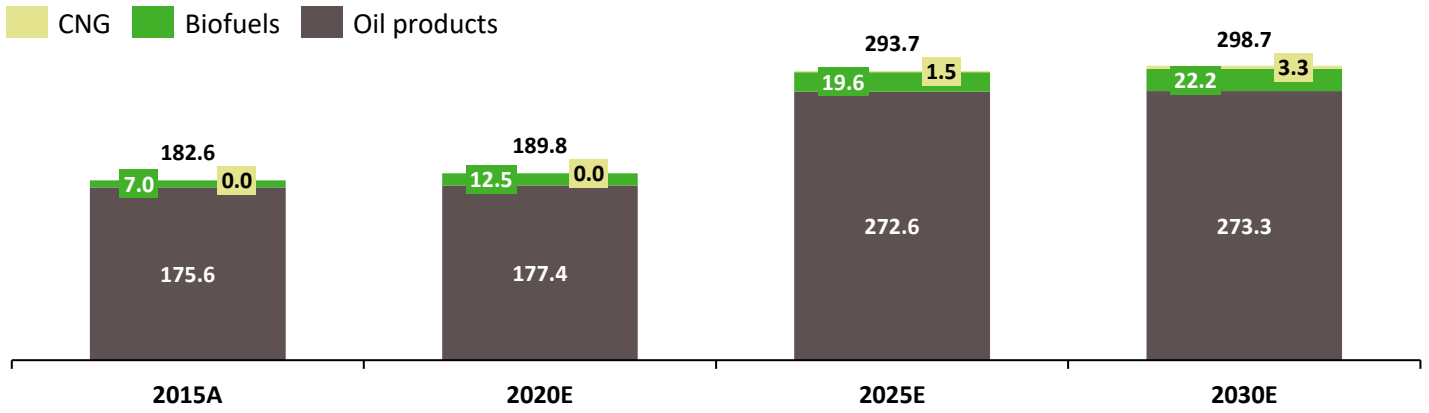
Source for projection: PRIMES-TREMOVE

Overview

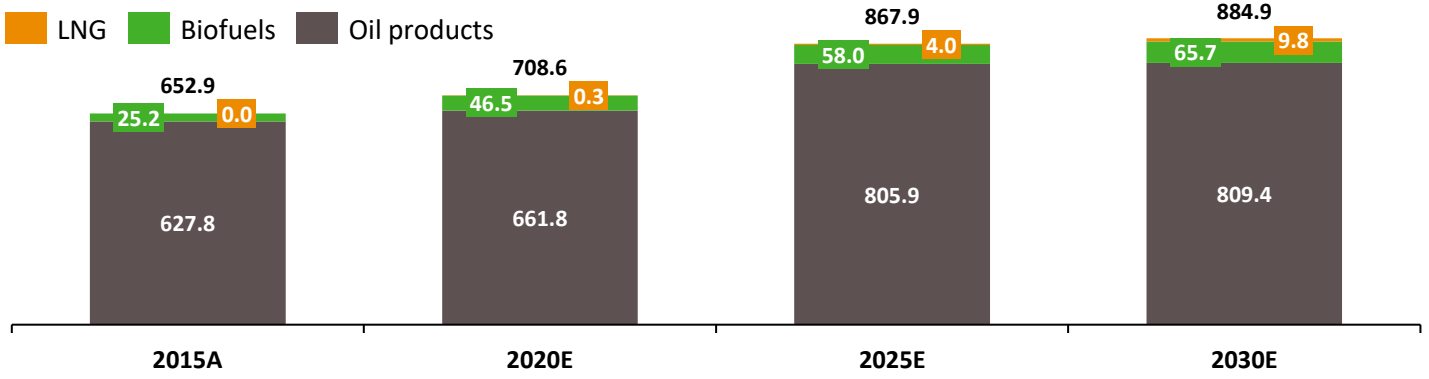
- Fuel use in transport grows by 25% between 2015 and 2030, driven primarily by the growth in oil products consumption.
- There is an increase in biofuel uptake due to the persistence of ICE in road transport.
- Electricity consumption increases in both road and rail transport.
- Minor uptake of natural gas in freight road transport and inland navigation.
- Road transport is the main fuel consumer, followed by aviation and rail.
- The share of fuel consumption by segment remains relatively unchanged between 2015 and 2030.

As-Is Scenario – Medium and heavy-duty truck fleet fuel consumption projections

Medium duty trucks fleet (< 16 t) – fuel composition *(ktoe)*



Heavy duty trucks fleet (> 16 t) – fuel composition *(ktoe)*



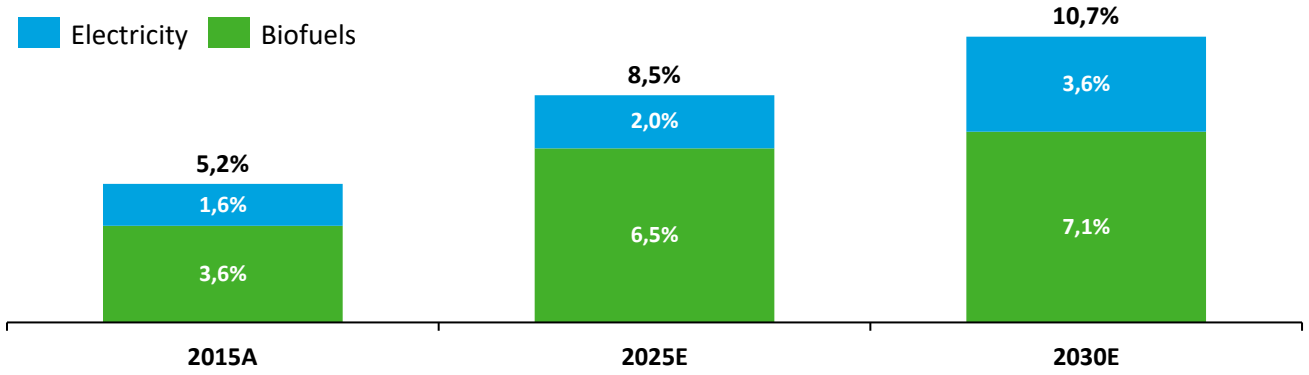
Source for projection: PRIMES-TREMOVE

Overview

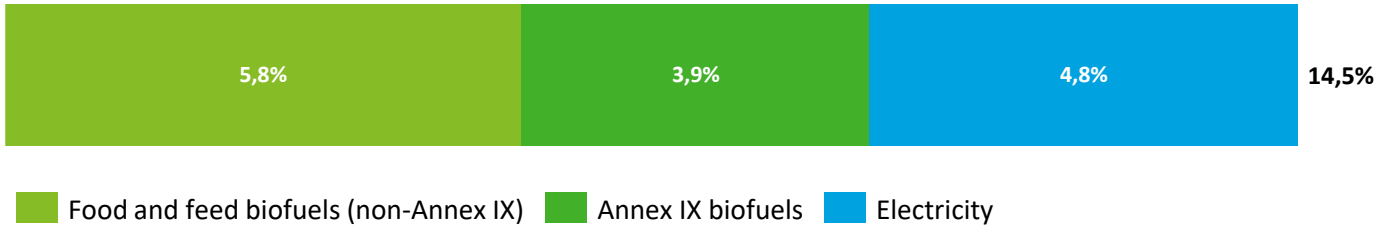
- Fuel consumption in the medium and heavy-duty vehicle fleet is set to increase in the next decade, driven by a favorable economic setting. However, the greater part of the increase occurs between 2020-2025 (2020 is impacted by the pandemic), whereas the trend stabilizes between 2025-2030. This is attributed to more efficient commercial vehicles and shift towards rail
- The adoption of CNG / LNG takes off only in 2025; by 2030 both fuel types will comprise just over 1% from total fuel composition for these sub-segments of commercial transport
- Electricity, H2 and synthetic fuels in both medium and heavy-duty trucks will most probably be available after 2030, as vehicles using these types of fuels become commercially and operationally viable from a technological standpoint
- Biofuels are part of the fuel mix today and will continue to be so for the future; the share of biofuels in total fuel consumption is set to increase by approx. 1 percentage point between 2020-2030

As-Is Scenario – Renewable fuels in transport and RES-T share

Share of renewable fuels in transport (excl. multipliers) *(%, calculation in energy terms)*



RES-T in 2030 *(%, calculation based on RED II provision)*



Overview

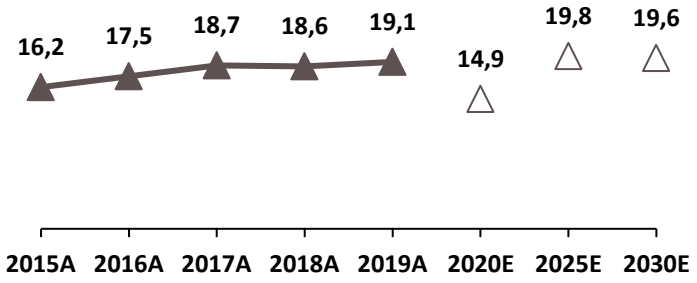
- In 2030, renewable fuels represent approximately 10% of total fuel consumption in transport (excl. multipliers).
- Road and rail transport are the main consumers of renewable fuels.

- Approx. 6% of RES-T is achieved by uptake of food- and feed-based biofuels (i.e. <7% cap of RED II).
- The remaining 9% of RES-T is achieved by Annex IX biofuels and electricity (i.e. promoted through the use of RED II multipliers).
- Annex IX biofuels represent about 25% of total biofuels use in transport (in energy terms).

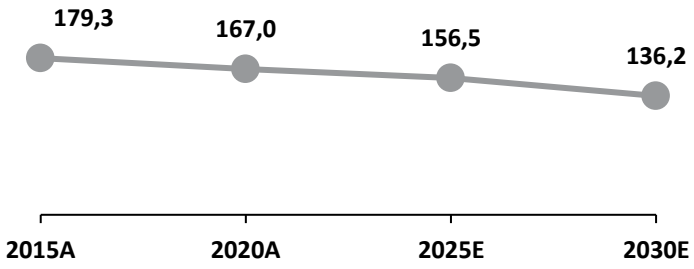
Source for projection: PRIMES-TREMOVE

As-Is Scenario – CO2 emissions in the transport sector (1/2)

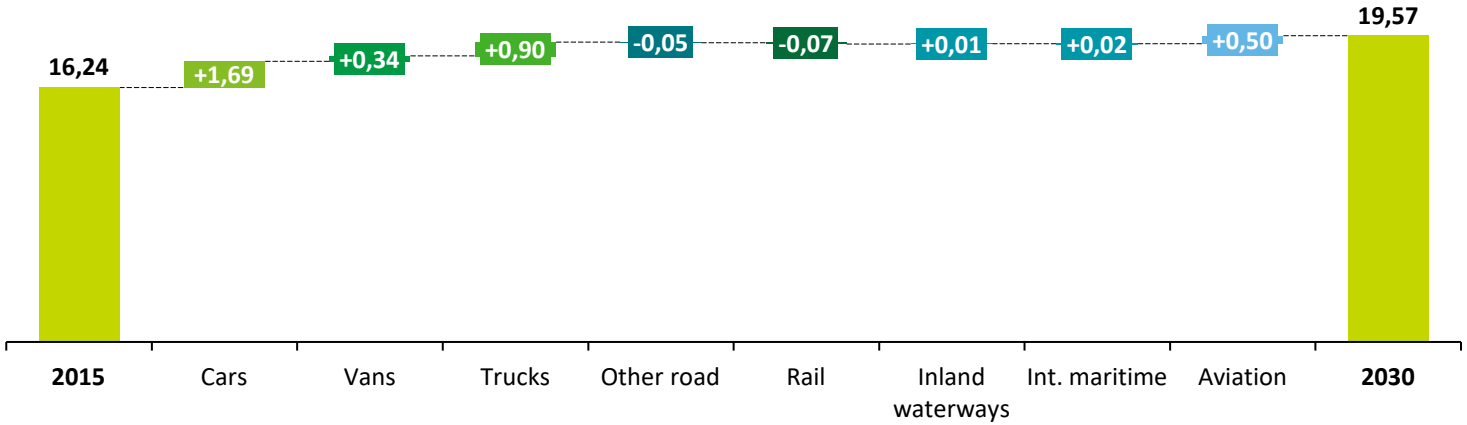
CO2 emissions in transport *(Mt CO2)*



CO2 intensity of the passenger car fleet *(gCO2/vkm)*



Tank-to-Wheel CO2 emissions in transport 2015-2030 *(Mt CO2)*



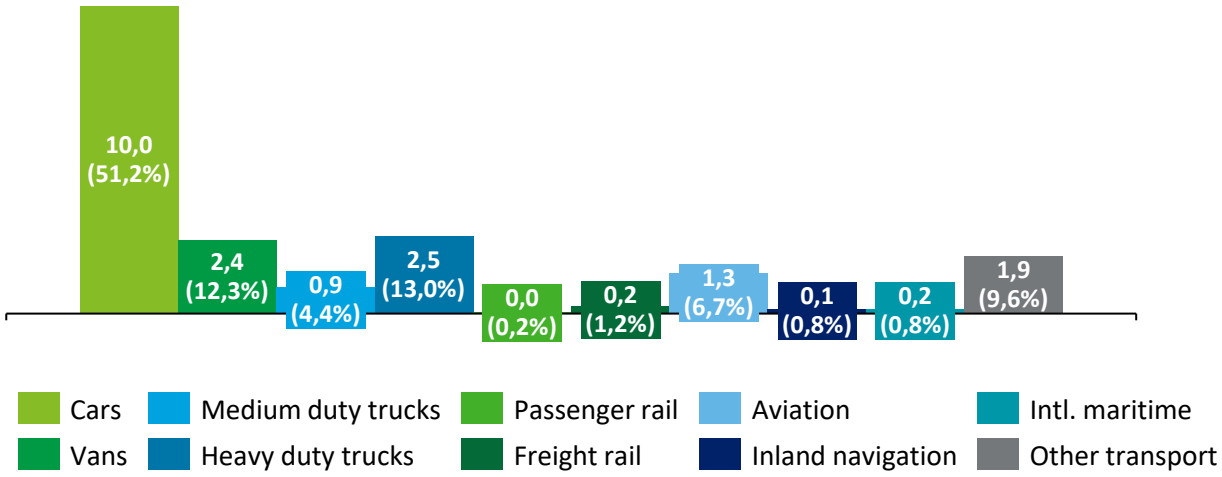
Source: Historical data based on EEA; projections based on PRIMES-TREMOVE

Overview

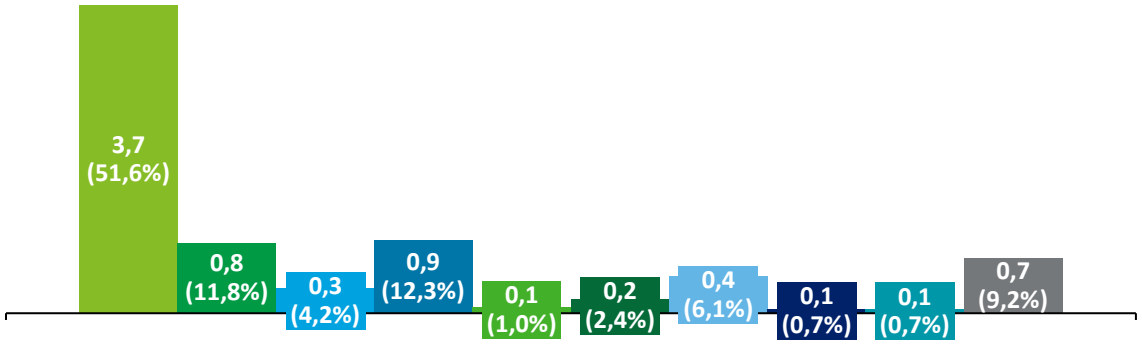
- Tank-To-Wheel CO2 emissions increase by 20% between 2015 and 2030
- The high increase in transport activity leads to an increase of emissions despite the strong activity growth of rail and waterborne transport
- The increase is mainly attributed to road transport modes even with electrification and energy efficiency improvements
- An increase in aviation activity also contributes to emissions growth

As-Is Scenario – CO2 emissions in the transport sector (2/2)

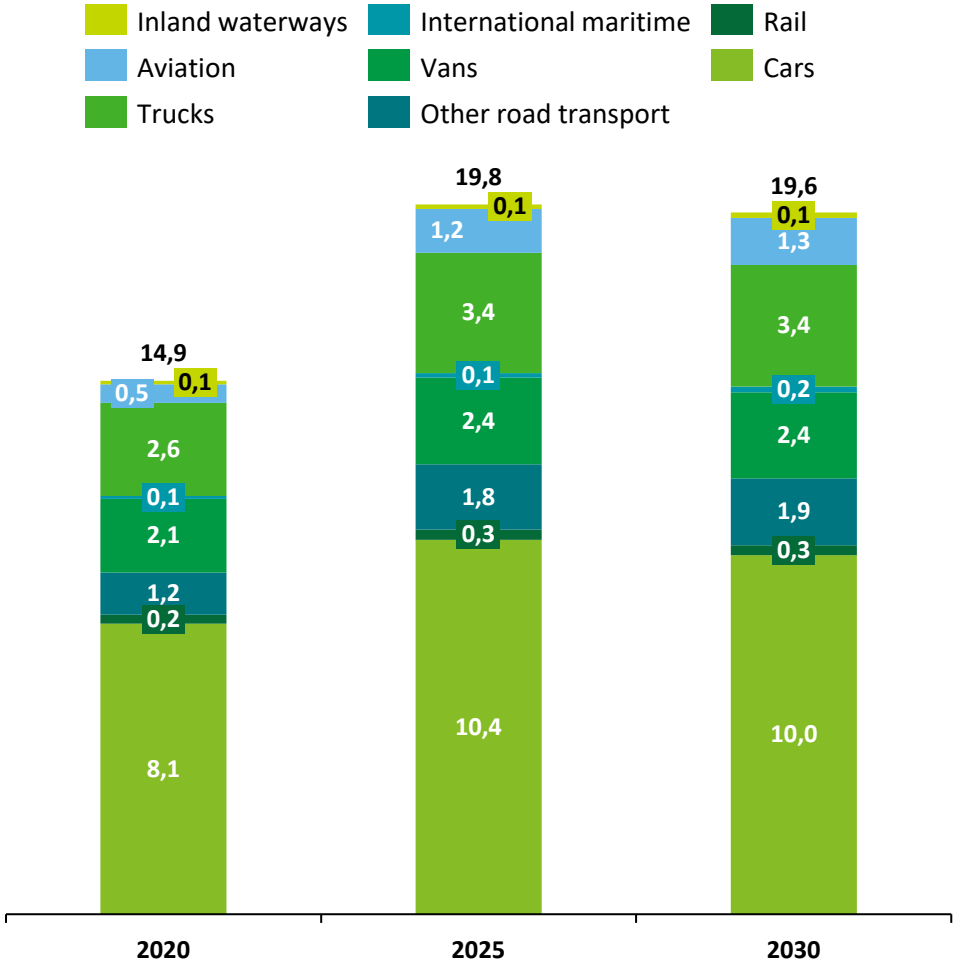
CO2 emissions by transport segment in 2030 *(MtCO2)*



Fuel consumption by transport segment in 2030 *(Mtoe)*



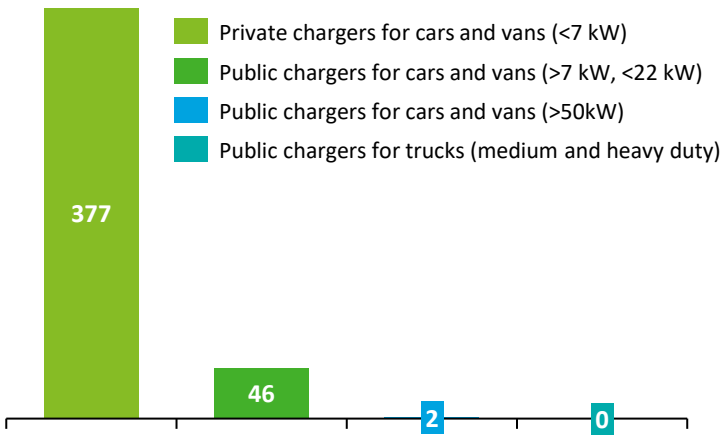
Tank-to-Wheel CO2 emissions in transport by segment 2020 – 2030 *(MtCO2)*



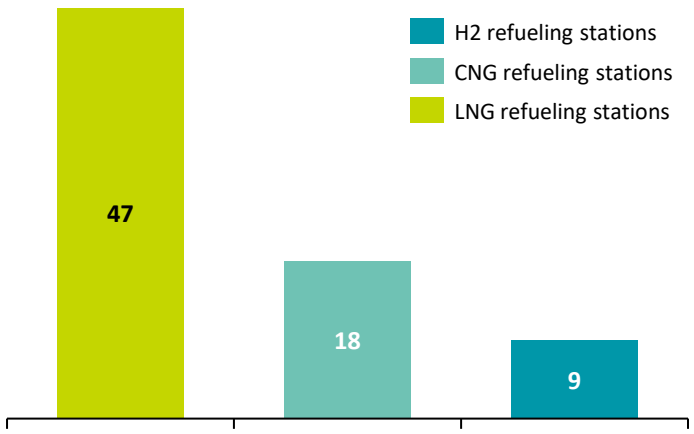
Source for projection: PRIMES-TREMOVE

As-Is Scenario – Alternative fuel infrastructure (1/2)

Charging points in 2030 *(number of, '000)*



Refueling stations in 2030 *(number of)*



Charging point rations in 2030

CP ratio (private:public charging points)	7,9	
CP ratio (public)	17,4	EVs/CP
CP average power (public)	17,3	kW/CP

End-user fuel prices in 2030[1] *(Eur/toe)*

Diesel	1443,4
Petrol	1627,5
Natural gas	564,1
LPG	1125,1

Overview

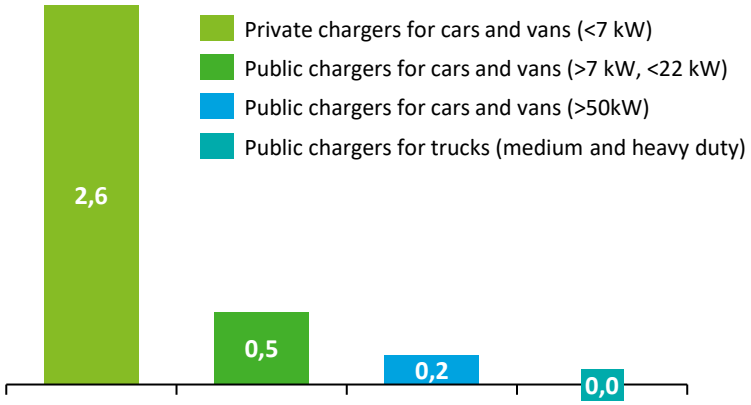
- Slow charging points represent 99% of the total number of electricity charging points in 2030
- At the same time, LNG refueling stations represent 60% of total non-oil refueling stations
- Petrol and Diesel in 2030 will be considerably more expensive compared to less carbon intensive fuels; the price of petrol and diesel refers to the fuel blend price (i.e. incl. biofuels etc.)
- By 2030, the number of private charging points will be approximately 8 times higher than the number of public charging points

1) Prices are for private end users (i.e. for the general public)

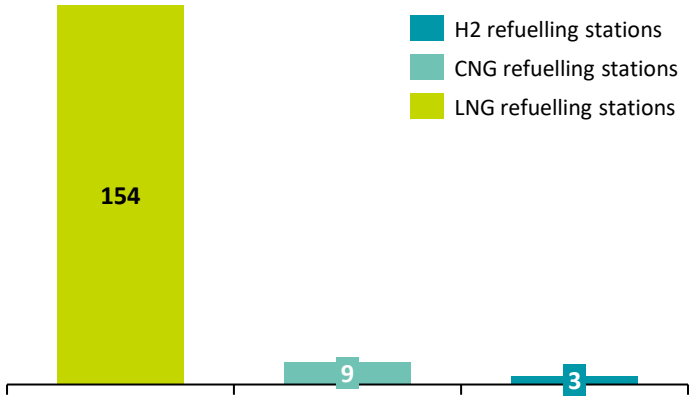
Source for projection: PRIMES-TREMOVE

As-Is Scenario – Alternative fuel infrastructure (2/2)

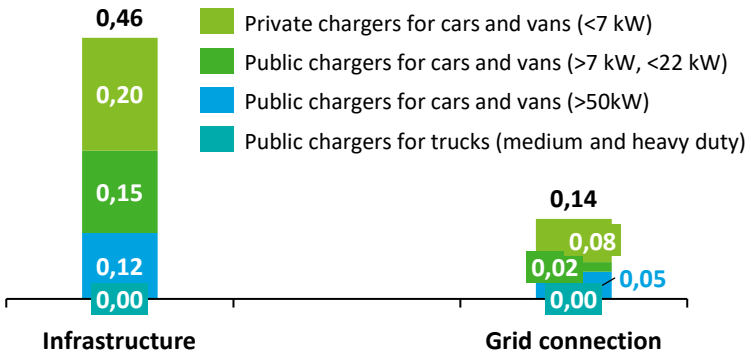
Installed capacity of electricity charging points in 2030 *(GW)*



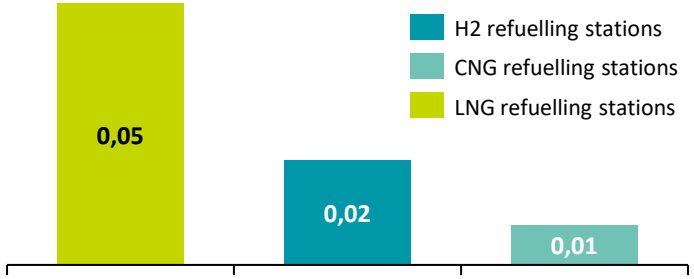
Installed capacity of refueling stations in 2030 *(t/day)*



Necessary private and public investments in charging points by 2030 *(bn. EUR)*



Necessary private and public investments in refueling stations infrastructure by 2030 *(bn. EUR)*



Source for projection: PRIMES-TREMOVE

Overview

- In 2030, the total installed capacity of private and public electricity charging points is approx. 3,3 GW, driven largely by private chargers (up to 7kW) – almost 78% of total installed capacity.
- LNG infrastructure in 2030 will be most developed compared to other alternative fuels. Hydrogen will only be penetrating the market
- Total projected investment in alternative fuels infrastructure by 2030 amounts to approximately 700 mil. EUR.
- For the recharging infrastructure, 77% of total necessary investments are allocated for developing recharging points (0,46 bn. Euro), whereas the remaining 23% is allocated to grid connection costs.

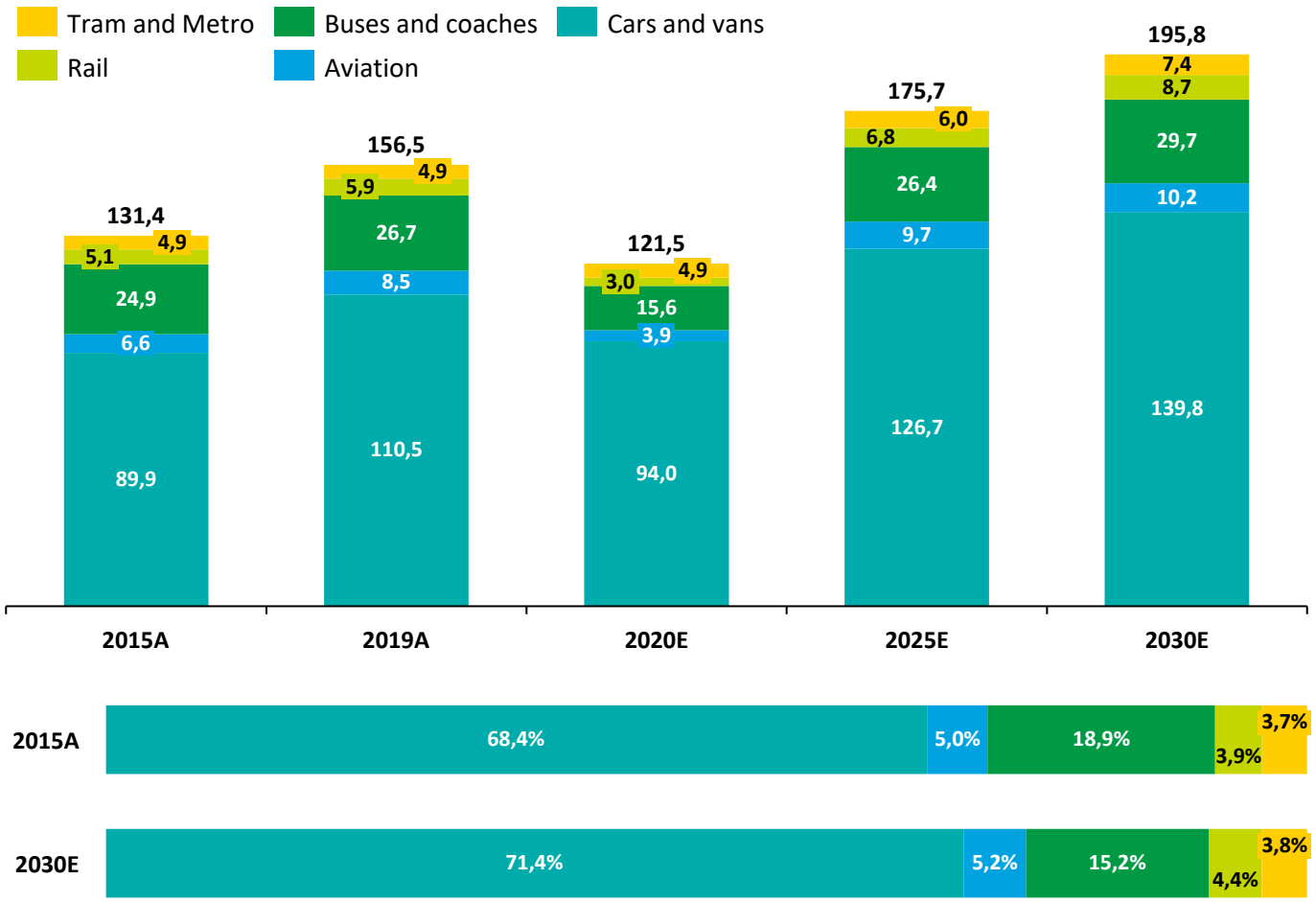
Future of Mobility in Romania

The FitFor55 Scenario

FitFor55 Scenario – Passenger transport activity 2015 - 2030

Romanian economic growth drives a strong increase in transport activity by 2030 in both As-Is and FitFor55 scenarios

Passenger transport activity[1] *(Gtkm)*



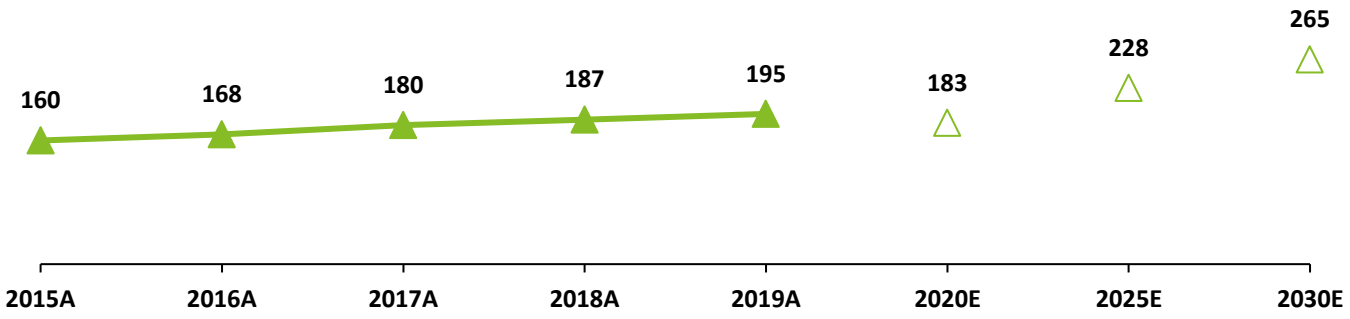
Overview

- Similar to the As-Is Scenario, activity of all passenger transport modes is set to increase by 25% in 2030 compared to 2019, incentivized by a favorable economic environment (i.e. higher motorization rate).
- The overall modal shares over time are also similar to those seen in the As-Is Scenario, with passenger cars and commercial vans representing an increasing share in overall passenger transport activity
- However, the FitFor55 Scenario results in higher modal shifts towards passenger rail transport, buses and coaches than in the As-Is to the detriment of cars and vans
- 2020 activity represents a trend exception, caused by the COVID-19 pandemic.

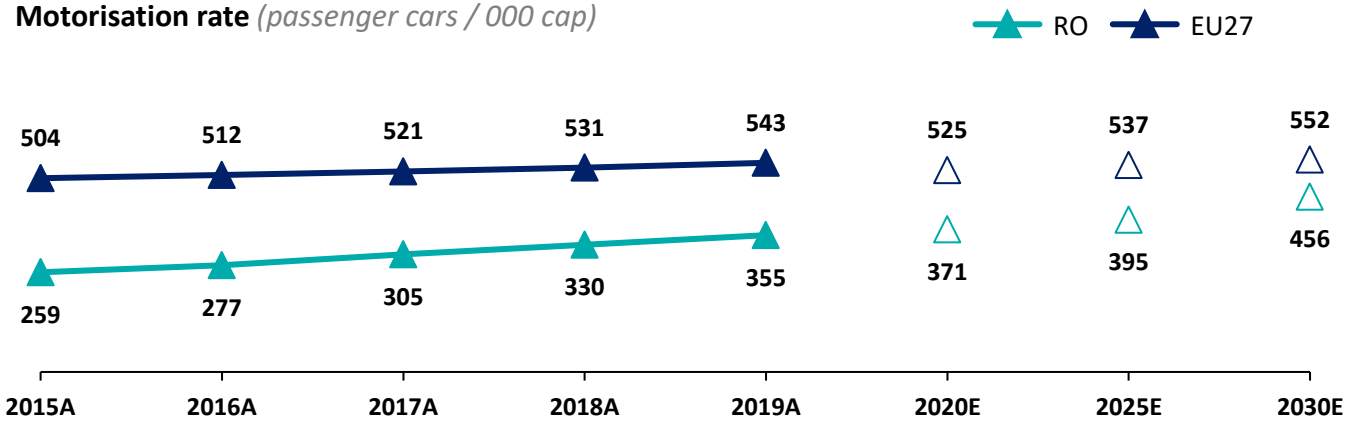
Source: 1) 2015 & 2019 Actuals (A) based on EUROSTAT Transport Statistical Pocketbook 2021; 2020 – 2030 Estimated (E) via PRIMES-TREMOVE

FitFor55 Scenario – Motorisation rate

Gross Domestic Product – Romania *(bn. €$_{2015}$; adjusted for inflation)*



Motorisation rate *(passenger cars / 000 cap)*



Sources on macroeconomic assumptions and population:

- Long-term population and GDP growth trends based on the 2021 Ageing Report: Underlying Assumptions and Projection Methodologies. European Economy 11/2020", DG ECFIN, aligned on the Eurostat EUROPOP 2019 projection
- Short-term and medium-term GDP growth projections based on Spring 2020 DG ECFIN forecast

Source for projection: PRIMES-TREMOVE

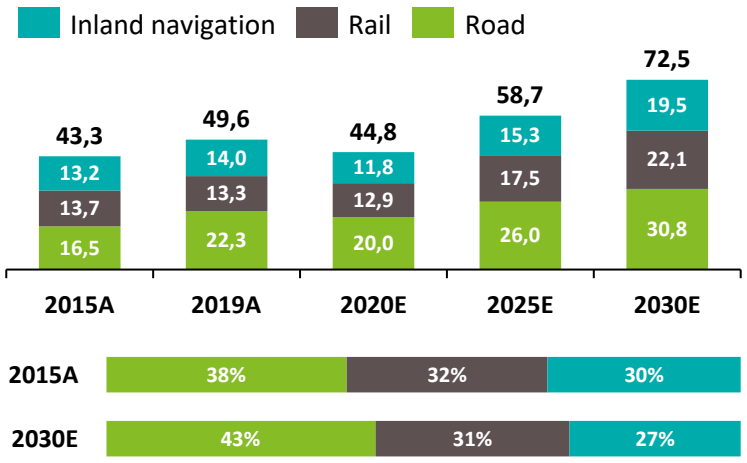
Overview

- Strong GDP growth acts as a driver of activity growth and consequently as a driver of increased uptake of passenger cars.
- The motorisation rate (vehicles per capita) increases over time and reduces the gap with the EU27 average; similar to the As-Is scenario, it remains below the EU27 average.
- The motorisation rate increases from approx. 355 vehicles / 1000 inhabitants in 2019 to approx. 456 vehicles / 1000 inhabitants in 2030 (compared to the 460 vehicles / 1000 inhabitants in 2030 in the As-Is scenario).

FitFor55 Scenario – Freight transport activity 2015 - 2030

Romanian economic growth drives a strong growth in transport activity by 2030 in both As-Is and FitFor55 scenarios

Freight transport activity[1] *(tonnes-kilometres Gtkm, %); territoriality principle applied for road transport*

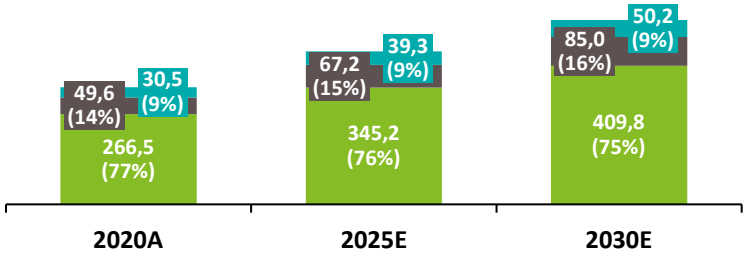


22 Gtkm is the 2019 EUROSTAT data for road freight transport activity in Romania by applying the **territoriality principle**; pandemic impact included

vs.

61 Gtkm is the 2019 EUROSTAT data for road freight transport activity (national & international haulage – applying the nationality principle) carried out by **vehicles registered in Romania**

Freight transport activity *(volumes transported[2] Mt, %)*



Freight transport activity growth CAGR *(%)*

	2020 - 2025	2025 - 2030	2020 - 2030
Inland navigation	↗5,2%	↗5,0%	↗5,1%
Rail	↗6,2%	↗4,9%	↗5,5%
Road	↗5,3%	↗3,5%	↗4,4%

Overview

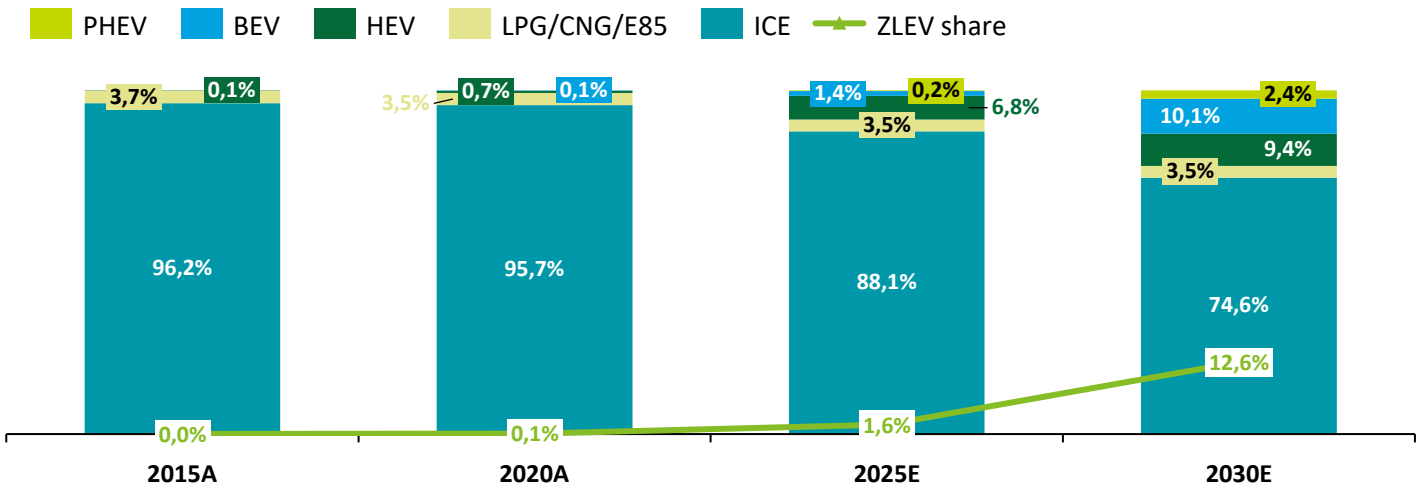
- The "territoriality" principle is applied to road freight transport activity, in line with EU statistical standards; the figures assume activity of heavy vehicles circulating on the territory of Romania irrespective of the nationality of the vehicle.
- The FitFor55 scenario shows an increase in freight transport activity by heavy duty trucks (similar trend to As-Is) but with a more moderate increase rate than in the As-Is.
- Modal shift of road freight activity to rail and inland navigation is intensified in the "FitFor55" scenario compared to the As-Is.
- However, road freight remains the main freight transport mode in 2030 in both scenarios.

Source: 1) 2015 & 2019 Actuals (A) based on EUROSTAT Transport Statistical Pocketbook 2021; 2) 2020 Actuals (A) based on 2020 INSSE transport statistic; volume estimations are derived by applying modal activity growth estimations
Source for projection: PRIMES-TREMOVE

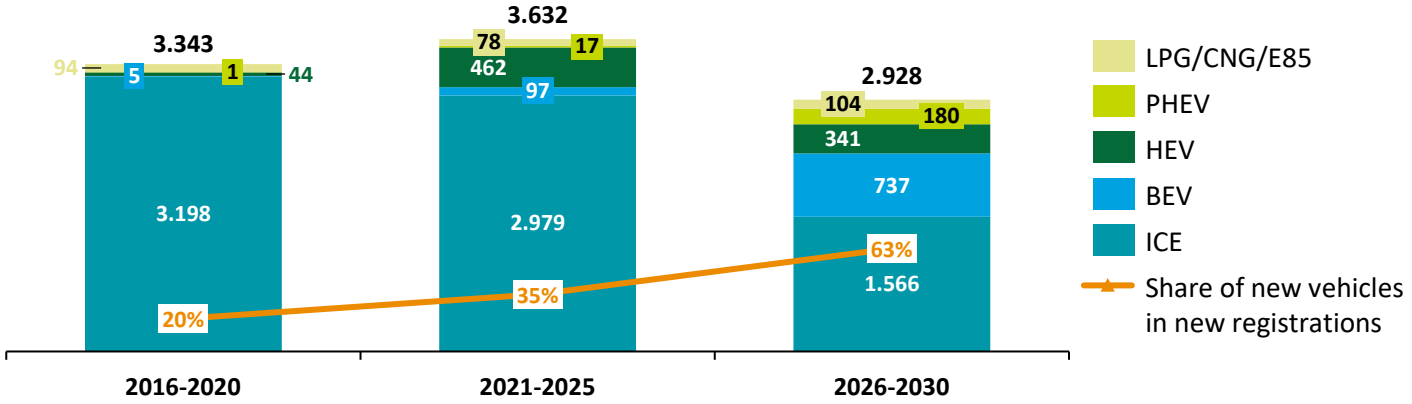
FitFor55 Scenario – Passenger cars fleet (1/2)

Compared to As-Is, new registrations are slightly less in FitFor55, due to activity reduction in the passenger cars segment

Passenger cars fleet composition *(%)*



Passenger cars new registrations (new vehicles and imported 2nd hand market) *(000 cars / 5 year period)*



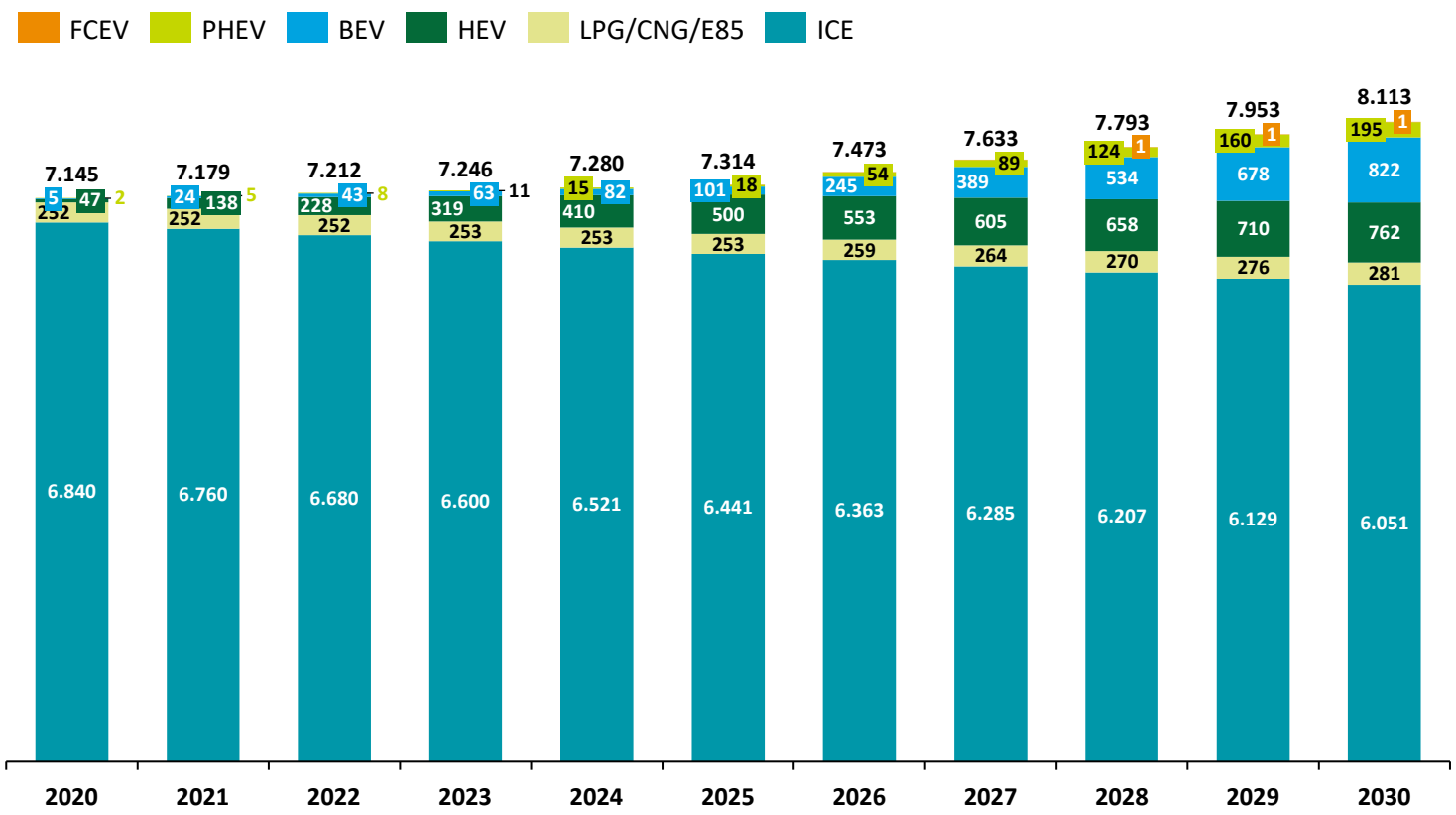
Source for projection: PRIMES-TREMOVE

Overview

- In both As-Is and FitFor55 scenarios, the passenger cars stock increases by approx. 18% in 2030 compared to 2019 (from 6.9 to > 8 mil. vehicles).
- In FitFor55, EVs increase their penetration in the stock to the detriment of ICEs and full HEVs.
- In 2030, in FitFor55 approx. 13% of cars in the stock are electric (BEV and PHEV), compared to 10% in As-Is.
- Publicly accessible charging infrastructure reaches 65,000 charging points (i.e. 25,000 chargers more than in the As-Is Scenario) based on the higher penetration of EVs in the market.
- Between 2025-2030, zero and low emissions vehicles make more than 1/3rd of new registrations in FitFor55, compared to about one-fifth in AS IS.
- New car sales increase their share in total new registrations over time to more than 60% in 2030 (due to EV penetration); the remainder of is comprised of 2nd hand vehicle registrations.

FitFor55 Scenario – Passenger cars fleet (2/2)

Passenger cars fleet, projected annual evolution *(000 vehicles)*



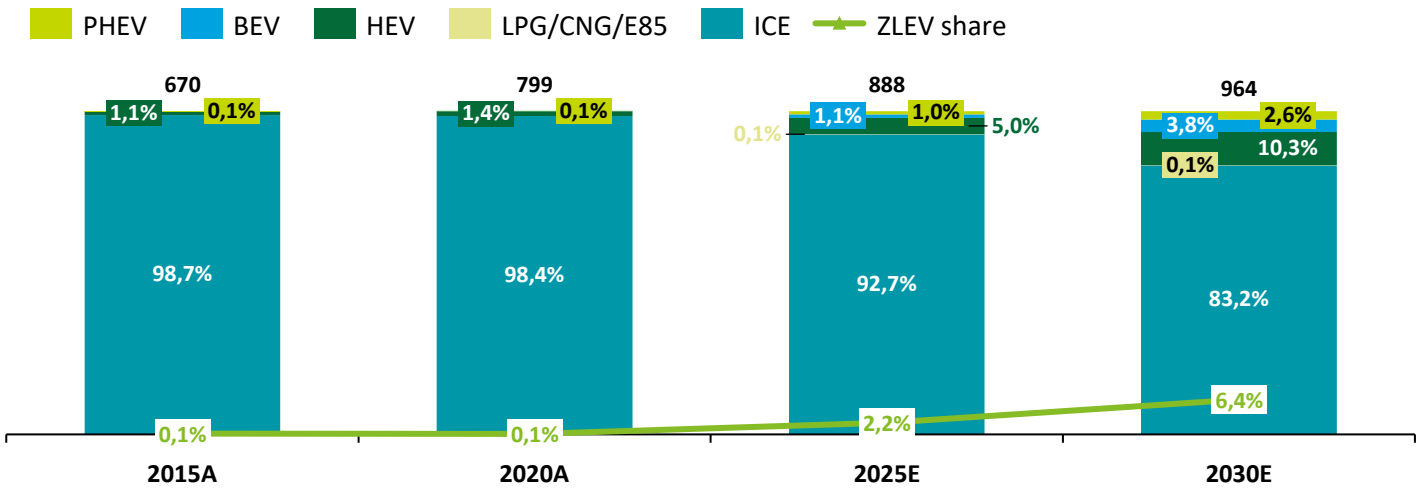
Source: 1) See previous slide: "FitFor55 Scenario – Passenger cars fleet (1/2)
Source for projection: PRIMES-TREMOVE

Overview

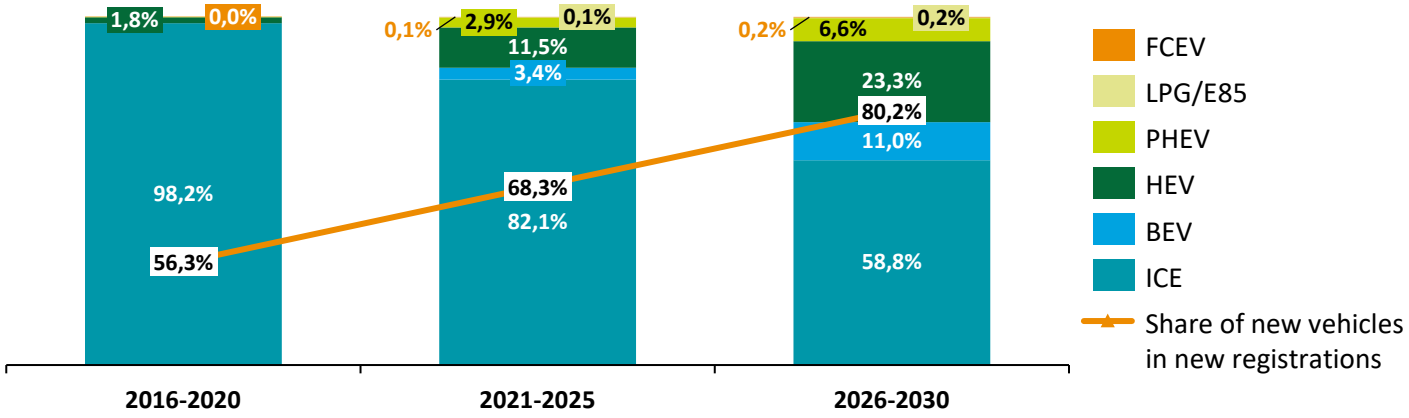
- **The passenger car fleet projection to 2030 represents what is required to achieve the FitFor55 2030 targets (i.e. 18% RES-T share).**
- The annual projections are linear interpolations of 5-year projection periods; thus, it is possible for deviations to occur. The projections are based on similar assumptions as to the As-Is Scenario:
  - Economic growth driving motorisation rate increase: a growth in vehicle registrations (new and 2nd hand vehicles): 656 ths. new yearly registrations (2021-2030);
  - New vehicle registrations is partly offset by the replacement of the ageing fleet, assuming an accelerated Rabla and Rabla Plus programme, and the extension to commercial vehicles;
- **Some considerations in the model may or may not reflect the actual situation in Romania, e.g.: impact of Covid19 on the Romanian market, disposable income for the purchase of cars, growth of GDP in 2021 (actual) versus projections**

FitFor55 Scenario – Commercial vans fleet

Vans commercial fleet composition *(%, ths. of)*



Composition of new vans registrations *(000 cars / 5 year period)*



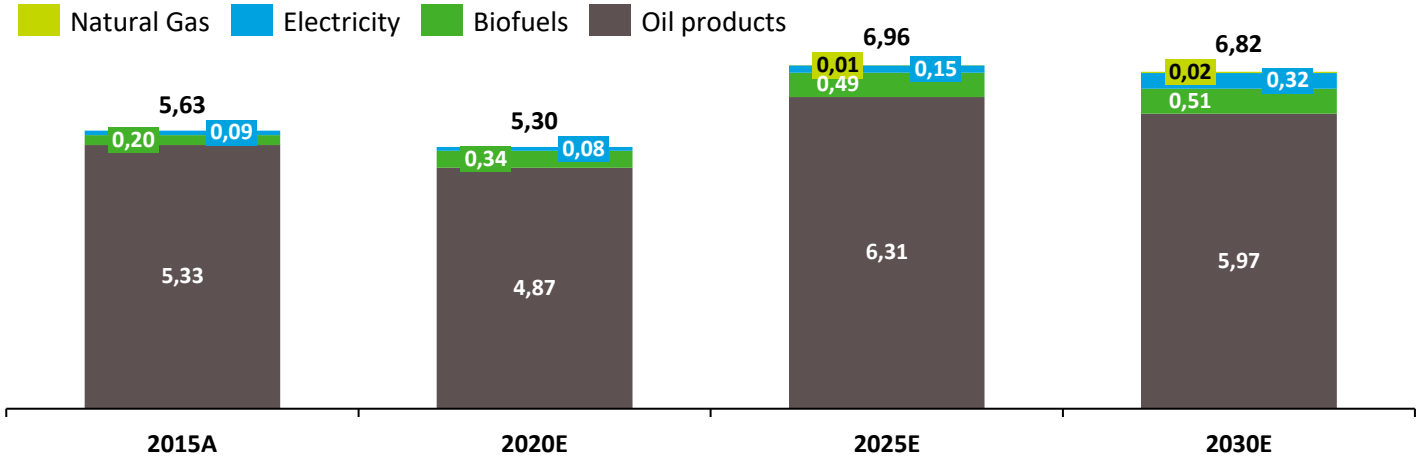
Overview

- In FitFor55, the vans stock increases in 2030, by approx. 23% compared to 2020 levels. In As-Is the increase is slightly higher (26%).
- More than 80% of the vans fleet in 2030 is comprised by conventional internal combustion engines in both scenarios.
- Uptake of full hybrid vans is projected to occur from 2021 onwards, improving to some extent the efficiency of the commercial fleet.
- The bulk of new electric vans registration is projected to occur after 2025.
- In FitFor55, compared to As-Is, the uptake of electric vehicles after 2025 is to the detriment of new registrations of internal combustion engines.

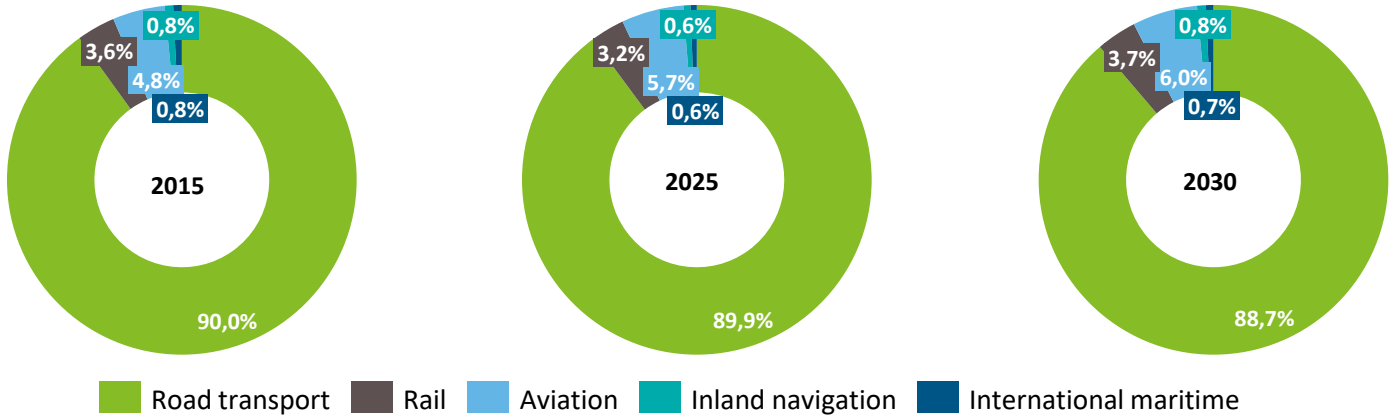
Source for projection: PRIMES-TREMOVE

FitFor55 Scenario – Fuel consumption in the transport sector (1/2)

Fuel consumption in transport *(Mtoe)*



Share of total fuel consumption by transport mode



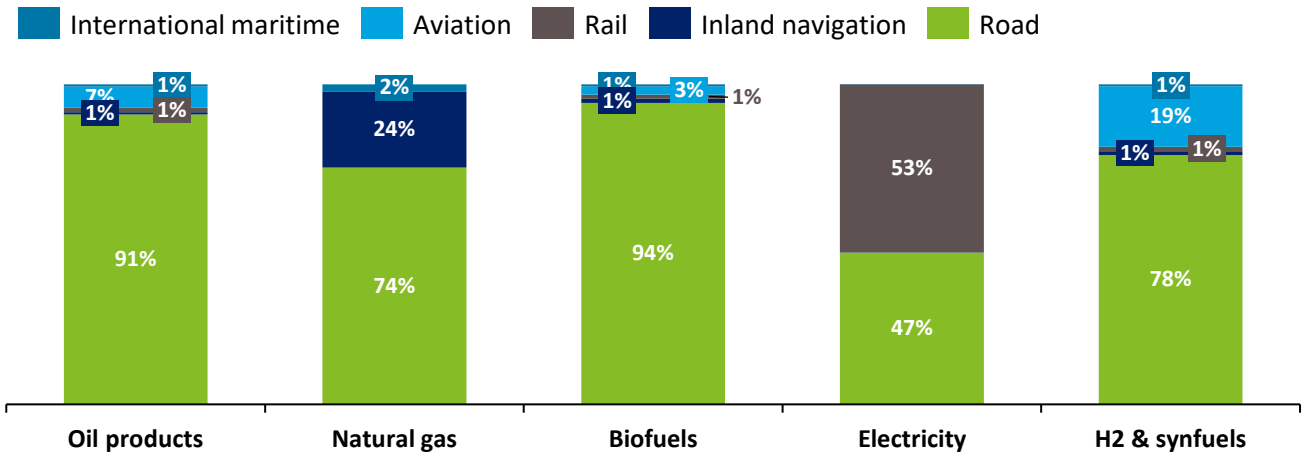
Source for projection: PRIMES-TREMOVE

Overview

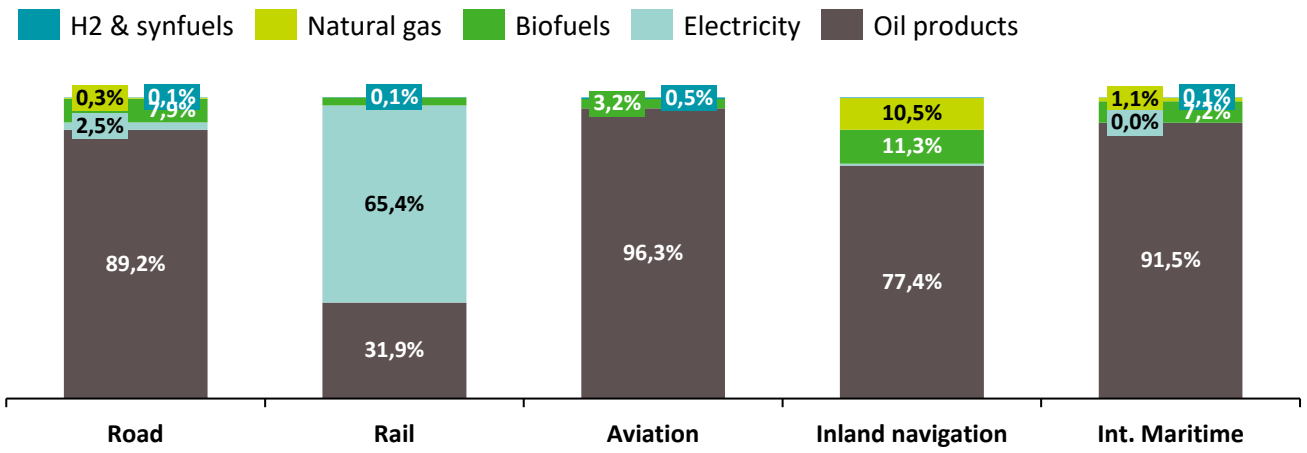
- Fuel use in transport grows by 20% between 2015 and 2025, driven by the growth in consumption of oil products and biofuels.
- The increase in biofuel uptake compared to 2015 is due to the persistence of ICE in road transport.
- In 2025-2030, fuel consumption slightly declines due to the penetration of electricity, to the detriment of ICE in road transport.
- Fuel consumption in transport is lower in FitFor55 compared to As-Is (by about 5%) in 2030, primarily due to lower consumption of oil products but also biofuels.
- In contrast, FitFor55 leads to an increasing uptake of electricity and natural gas and projects an emergence of hydrogen in road transport and synthetic fuels by 2030 (in international maritime).

FitFor55 Scenario – Fuel consumption in the transport sector (2/2)

Share of fuels consumption by segment, 2030 *(%)*



Share of fuels consumption by segment per fuel, 2030 *(%)*



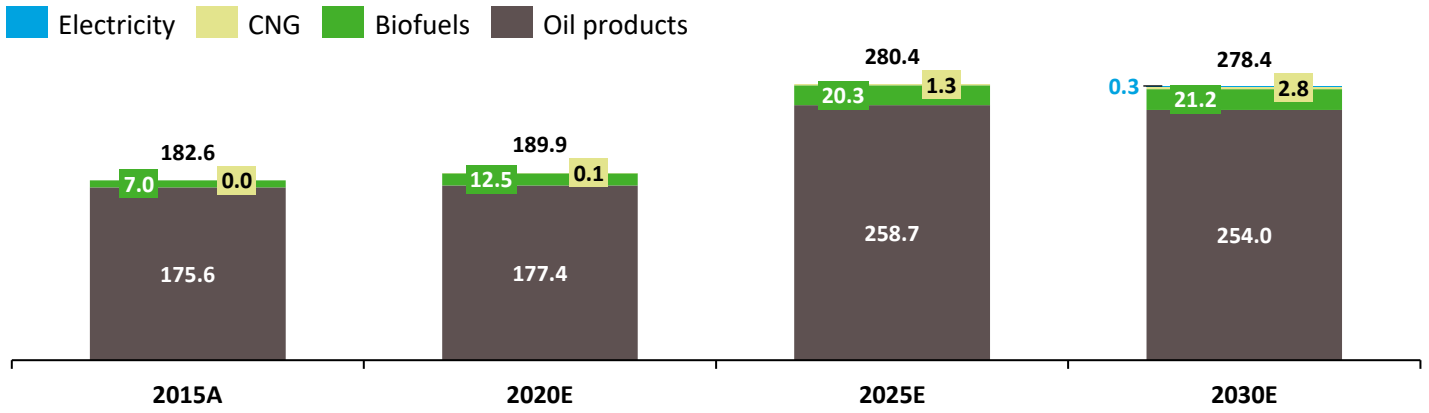
Source for projection: PRIMES-TREMOVE

Overview

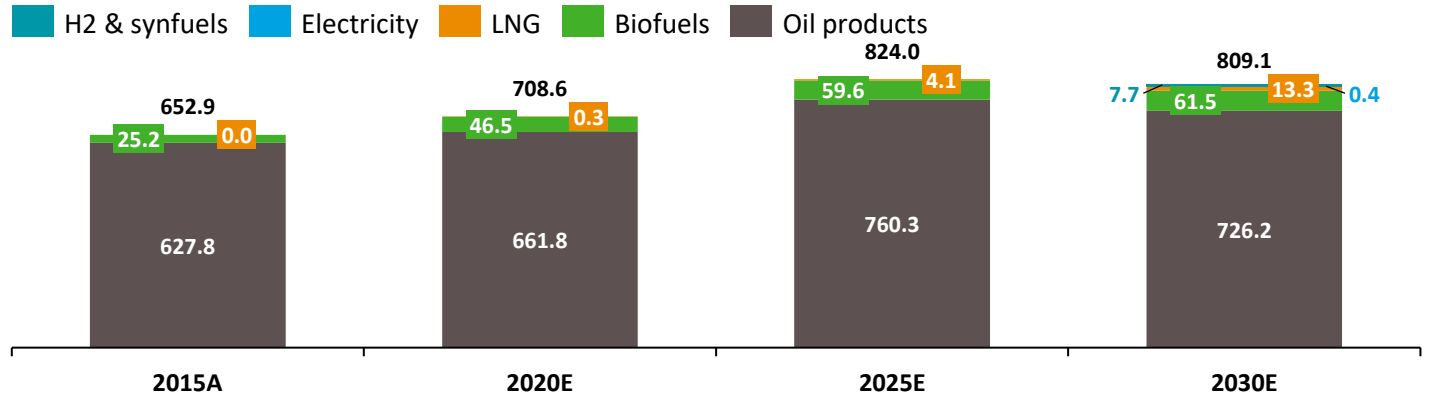
- The share of fuel consumption (including alternative fuels) by segment remains relatively unchanged between 2015 and 2030.
- Road transport is the main consumer of oil products, biofuels and a major consumer of electricity and natural gas.
- Aviation, as the second largest fuel consuming sector, drives the uptake of oil products, biofuels and synthetic fuels.
- Electricity consumption in transport is almost evenly split between Rail and Road.
- Natural gas finds most applications in the maritime sector.

FitFor55 Scenario – Medium and heavy-duty truck fleet fuel consumption projections

Medium duty trucks fleet (< 16 t) - fuel composition *(ktoe)*



Heavy duty trucks fleet (> 16 t) - fuel composition *(ktoe)*



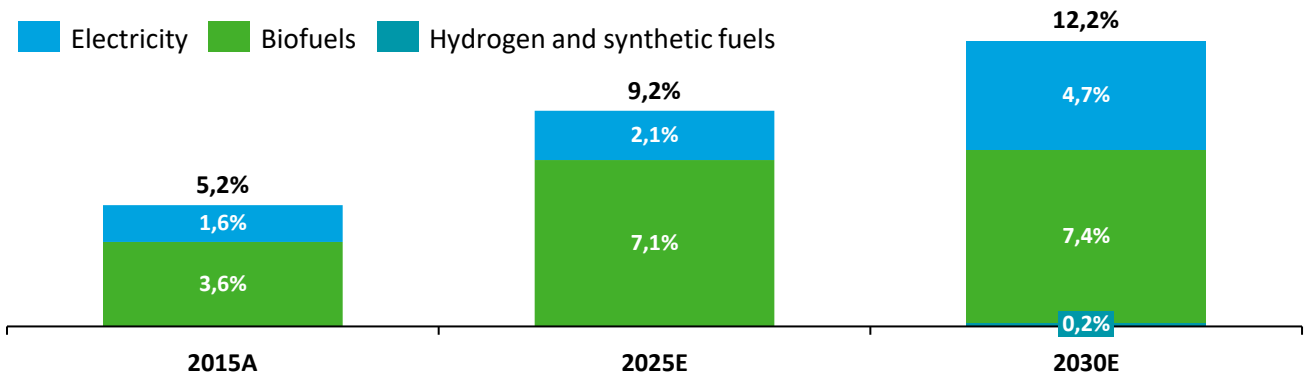
Source for projection: PRIMES-TREMOVE

Overview

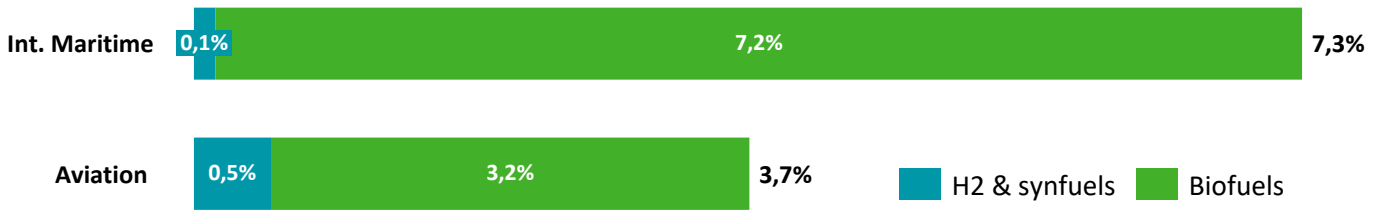
- Similar to the As-Is Scenario, fuel consumption in the medium and heavy-duty vehicle fleet is set to increase in the next decade in the FitFor55 scenario. The more moderate increase however is driven by an accelerated uptake of more efficient vehicles, corroborated with a slight decrease in road freight activity.
- 2020 estimates also account for the pandemic impact
- The adoption of CNG / LNG takes off only in 2025; by 2030 both fuel types will make 1.6% of total fuel composition for these sub-segments of commercial transport (1% in the As-Is).
- Electricity, H2 and synthetic fuels in both medium and heavy-duty trucks will most probably be available in the latter part of the decade.

FitFor55 Scenario – Renewable fuels in transport and RES-T share (1/2)

Share of renewable fuels in transport (excl. multipliers) *(%, calculation in energy terms)*



Renewable fuel consumption in aviation and international maritime
(%, based ReFuel EU aviation and Fuel EU maritime initiatives)



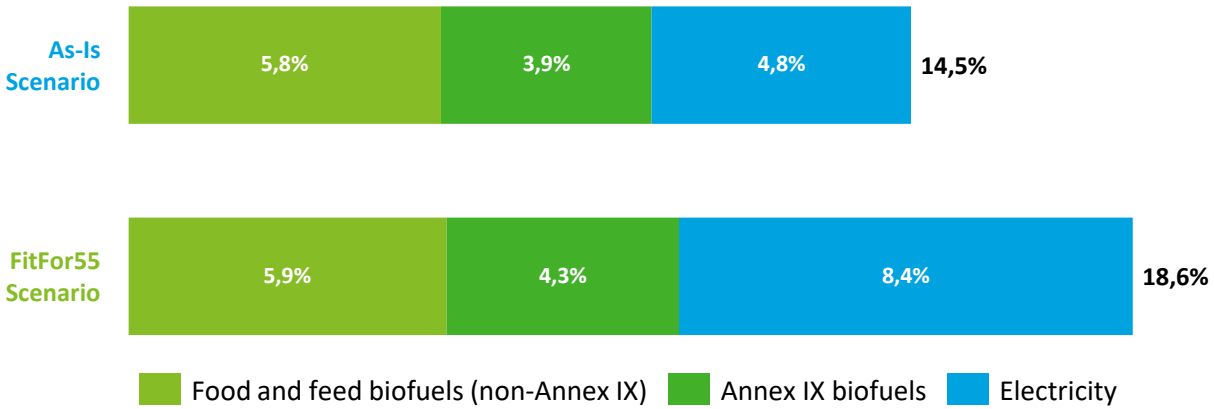
Overview

- Renewable fuels represent more than 12% of total fuel consumption in transport (excl. multipliers).
- Compared to As-Is their share in 2030 increases by 1.6%, mainly due to the uptake of electricity.
- The share of biofuels in the fuel mix increases until 2025 and remains relatively stable thereafter.
- The uptake of biofuels and synthetic fuels in aviation and maritime is policy-driven (FuelEU Maritime and ReFuel EU Aviation).
- While RFNBOs (e.g. hydrogen and synthetic fuels) emerge in the latter part of the decade, their share in Romania's total fuel consumption is projected to approx. 0.2%. This contrasts with the EU-wide target of 2.6% RFNBOs by 2030, a target that depends on the transport sector mix of each member state, thus it does not cascade the same for all countries. One of the main limitations to a greater uptake in Romania is due to the maritime subsector, which is less developed in terms of infrastructure compared to other countries.

Source for projection: PRIMES-TREMOVE

FitFor55 Scenario – Renewable fuels in transport and RES-T share (2/2)

RES-T in 2030 *(%, calculation based on RED III provision)*



GHG intensity target (as per RED III proposal, i.e. -13% vs reference fuel GHG intensity) *(%)*

-7,9% in the As-Is Scenario **vs.** **-9,9%** in the FitFor55 Scenario

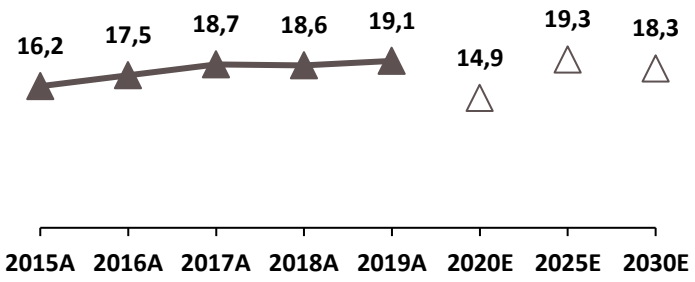
Overview

- In FitFor55, RES-T reaches 18.6% compared to 14.7% in As-Is.
- In both scenarios almost 6% is met by the uptake of food- and feed-based biofuels (i.e. < 7% cap of RED II).
- In FitFor55 the remaining share of 12.7% is reached by Annex IX biofuels and electricity (i.e. promoted through the use of RED II multipliers).
- Compared to As-Is, the increase in RES-T is driven by the increase in electrification of road and rail, with a parallel increase of renewable electricity supply.
- In 2030, RES-E in FitFor55 scenario is approx. 60%, while in As-Is RES-E is approx. 50%.

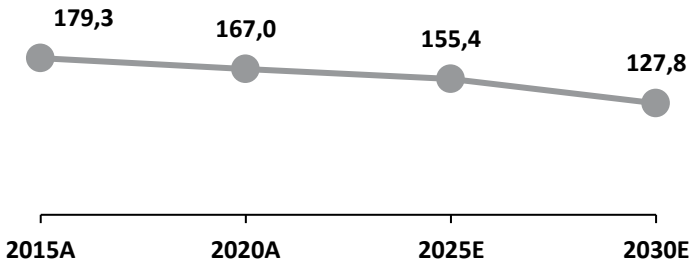
Source for projection: PRIMES-TREMOVE

FitFor55 Scenario – CO2 emissions in the transport sector (1/2)

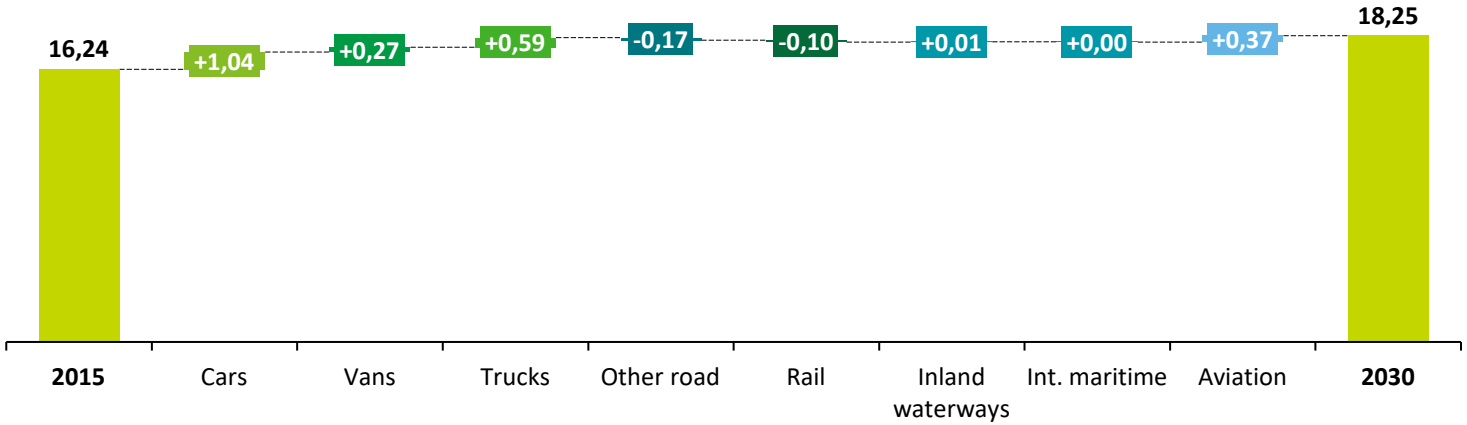
CO2 emissions in transport *(Mt CO2)*



CO2 intensity of the passenger car fleet *(gCO2/vkm)*



Tank-to-Wheel CO2 emissions in transport 2015-2030 *(Mt CO2)*



Source: Historical data based on EEA; projections based on PRIMES-TREMOVE

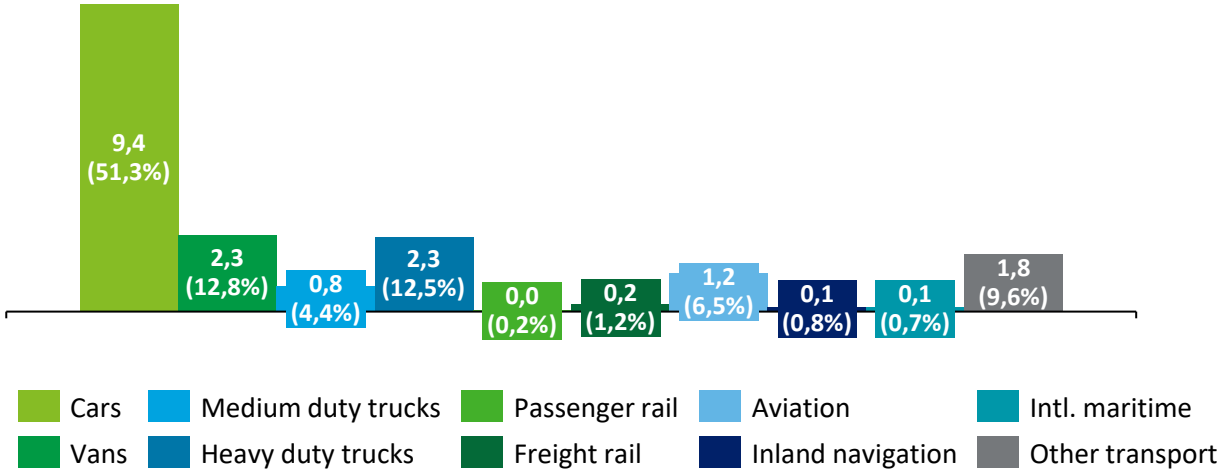
Source for projection: PRIMES-TREMOVE

Overview

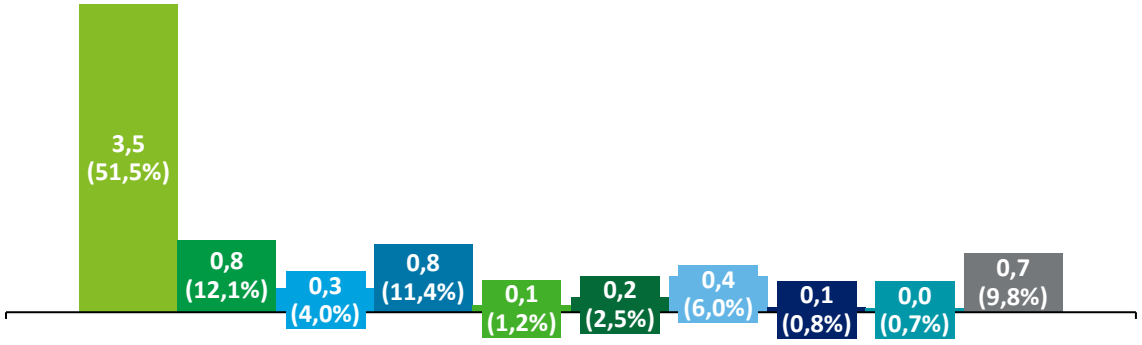
- In the FitFor55 Scenario, Tank-To-Wheel CO2 emissions increase by 12% between 2015 and 2030.
- Emission increase is driven by high increase in transport activity, despite the strong growth in less carbon intensive modes of transport such as rail and inland waterways, and despite network electrification and energy efficiency advances. However, such measures do limit the impact of increases transport activity.
- **In the FitFor55 scenario, CO2 intensity of the passenger car fleet as well as overall CO2 emissions in transport is lower by approx. 7% (8.4 gCO2/vkm, 1.3 MtCO2) compared to the As-Is.**

FitFor55 Scenario – CO2 emissions in the transport sector (2/2)

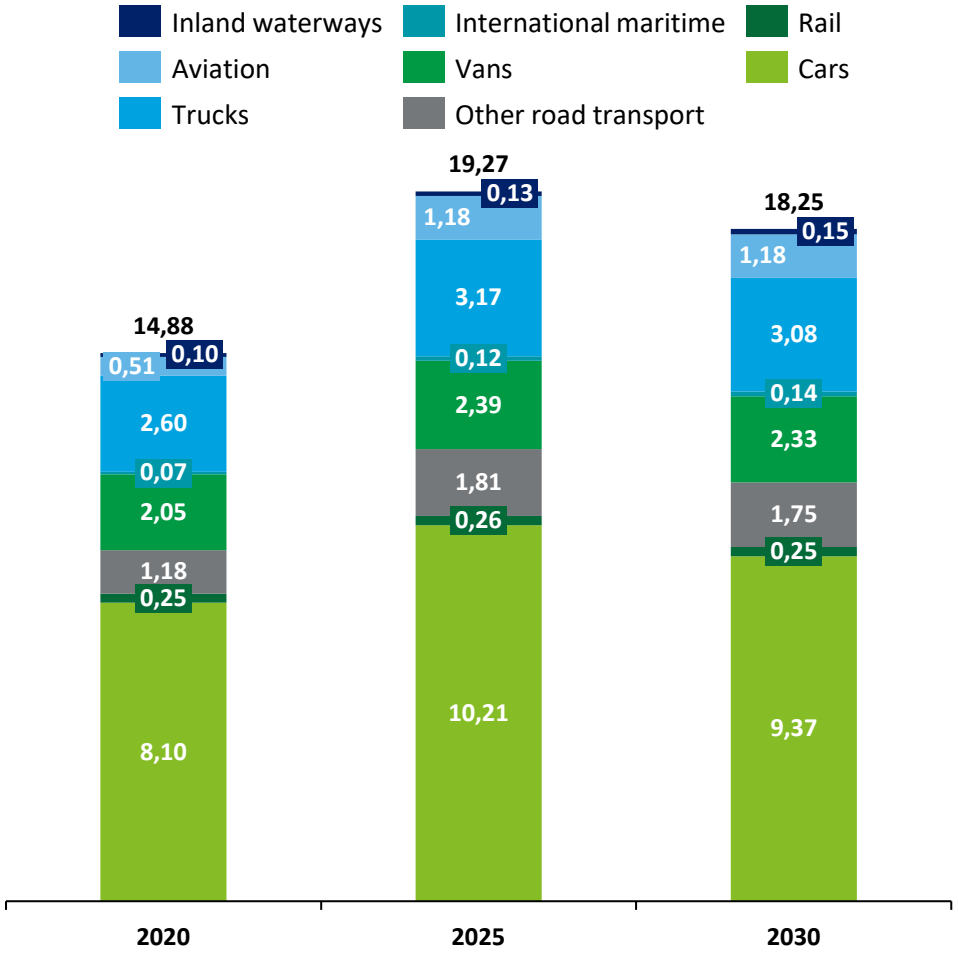
CO2 emissions by transport segment in 2030 *(MtCO2)*



Fuel consumption by transport segment in 2030 *(Mtoe)*



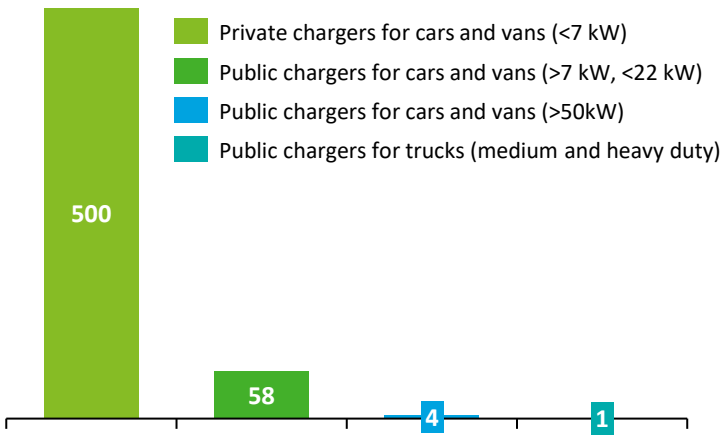
Tank-to-Wheel CO2 emissions in transport by segment 2020 – 2030 *(MtCO2)*



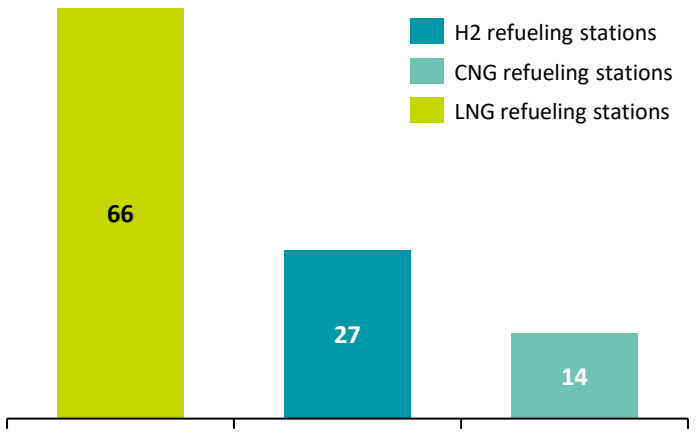
Source for projection: PRIMES-TREMOVE

FitFor55 Scenario – Alternative fuel infrastructure (1/2)

Charging points in 2030 *(number of, '000)*



Refueling stations in 2030 *(number of)*



Charging point rations in 2030

CP ratio (private:public charging points)	8,0	
CP ratio (public)	17,4	EVs/CP
CP average power (public)	18,8	kW/CP

End-user fuel prices in 2030[1] *(Eur/toe)*

Diesel	1675,7
Petrol	1765,2
Natural gas	1079,5
LPG	1616,9

Overview

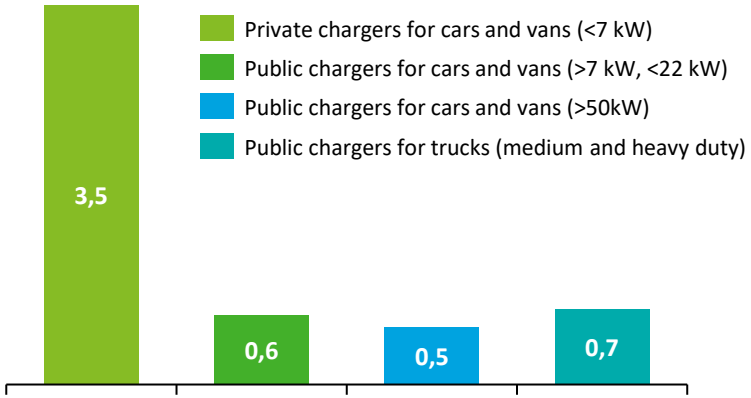
- In the FitFor55 Scenario, the shares of different types of charging points and refueling stations remain the same as in the As-Is, but the overall network infrastructure increases considerably, especially in the private chargers segment.
- LNG refueling stations represent 60% of total non-oil refueling stations by 2030, whereas H2 refueling takes 2nd place, in front of CNG
- Petrol and Diesel in 2030 will be considerably more expensive compared to less carbon intensive fuels, slightly more expensive than in the As-Is Scenario; the price of petrol and diesel refers to the fuel blend price (i.e. incl. biofuels etc.)
- By 2030, the number of private charging points will be approximately 8 times higher than the number of public charging points.
- As such, the projected figures for CP ratios are similar to the As-Is, but with an improved average installed power

1) Prices are for private end users (i.e. for the general public)

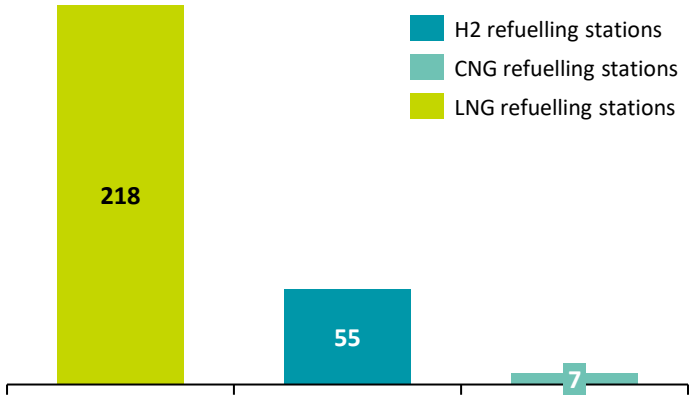
Source for projection: PRIMES-TREMOVE

FitFor55 Scenario – Alternative fuel infrastructure (2/2)

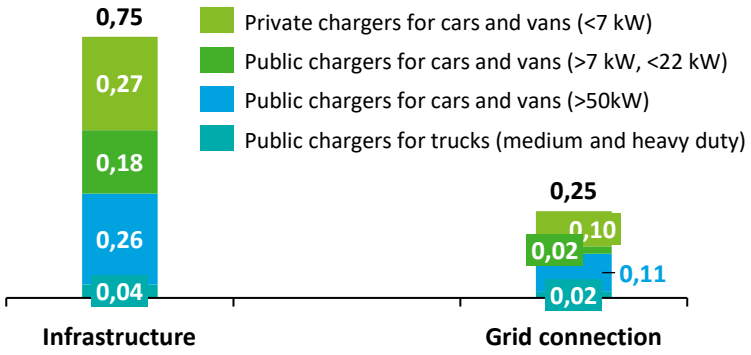
Installed capacity of electricity charging points in 2030 *(GW)*



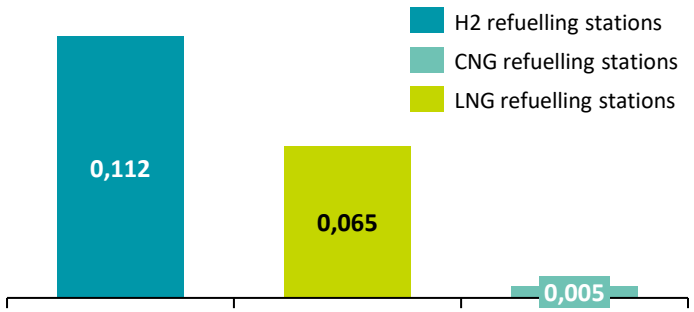
Installed capacity of refueling stations in 2030 *(t/day)*



Necessary private and public investments in charging points by 2030 *(bn. EUR)*



Necessary private and public investments in refueling stations infrastructure by 2030 *(bn. EUR)*



Source for projection: PRIMES-TREMOVE

Overview

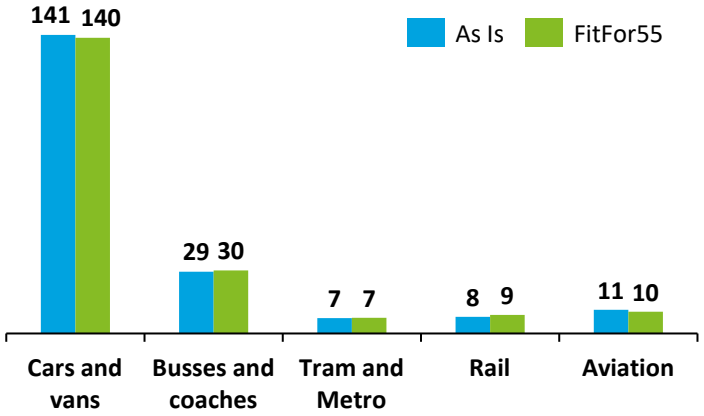
- In the 2030 FitFor55 Scenario, the total installed capacity of private and public electricity charging points is approx. 5,3 GW, driven largely by private chargers (up to 7kW).
- LNG infrastructure in 2030 will be the most developed compared to other alternative fuels. Hydrogen will be emerging on the market, requiring the most capital for extending the refueling network.
- Total projected investment in alternative fuels infrastructure by 2030 amounts to approximately bn. 1,19 EUR.
- For the recharging infrastructure, 75% of total necessary investments are allocated to developing recharging points (0,75 bn. Euro), whereas the remaining 25% is allocated to grid connection costs.

Future of Mobility in Romania

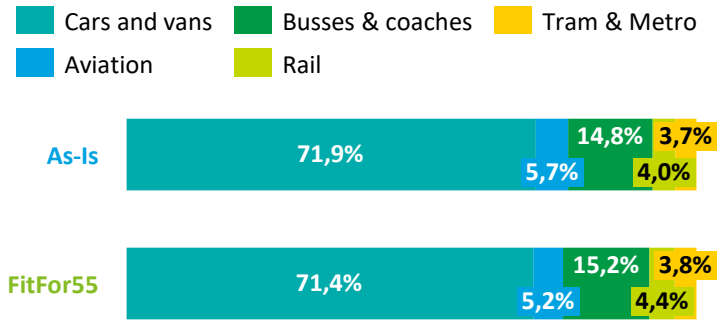
Scenario Comparative Analysis

Scenario Comparative Analysis – Overall Results (1/11)

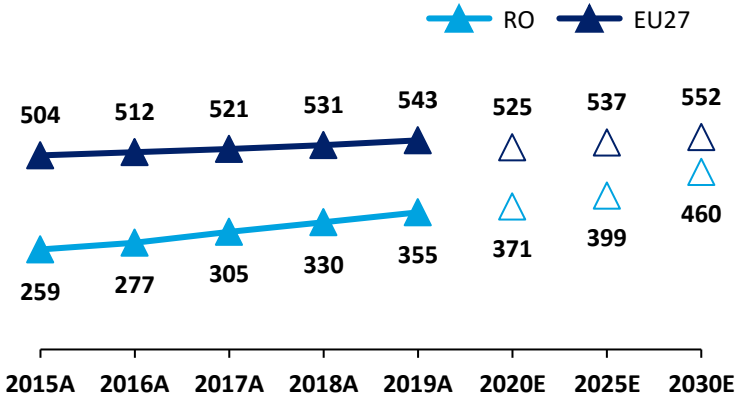
Passenger transport activity in 2030 – FitFor55 vs As-Is projections *(Gpkm)*



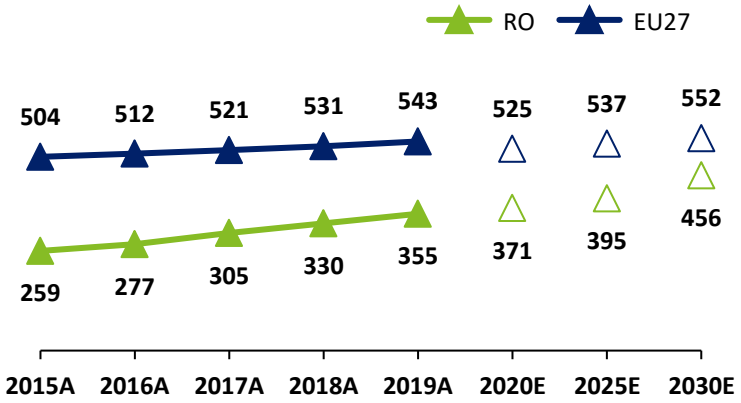
Passenger transport modal shares in 2030 – FitFor55 vs As-Is projections *(%)*



Motorisation rate – As-Is projections
(passenger cars / 000 cap)



Motorisation rate – FitFor55 projections
(passenger cars / 000 cap)



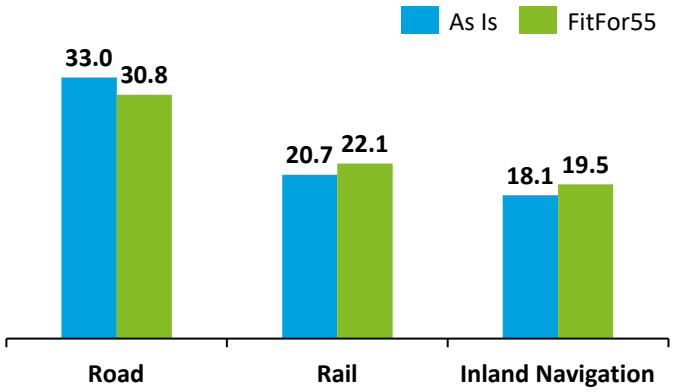
Key differences

- Compared to the As-Is, passenger transport activity in the FitFor55 Scenario sees an increase in the use of public transport, especially after 2025:
  - ➢ Activity shifts from cars to public road and rail modes (0.5% or approx. 0.8 Gpkm).
  - ➢ Approx. 0.2% (or 0.5 Gpkm) of passenger transport shifts to soft modes.
- Overall passenger transport activity in 2030 is slightly lower in the FitFor55 Scenario (195,8 Gpkm), compared to the As-Is (196,3 Gpkm).
- Intra-EU 2030 aviation activity reduces and is partly substituted by rail due to fuel taxation policies and re-emergence of EU Night Trains.
- The 2030 increasing motorisation rate in the FitFor55 Scenario remains slightly below the As-Is, due to a higher retirement and renewal rate of the vehicle stock, as well as the increase in rail and public transport activity.

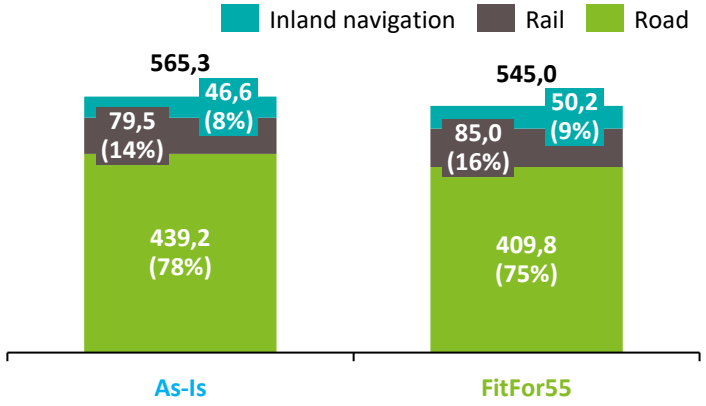
Source for projection: PRIMES-TREMOVE

Scenario Comparative Analysis – Overall Results (2/11)

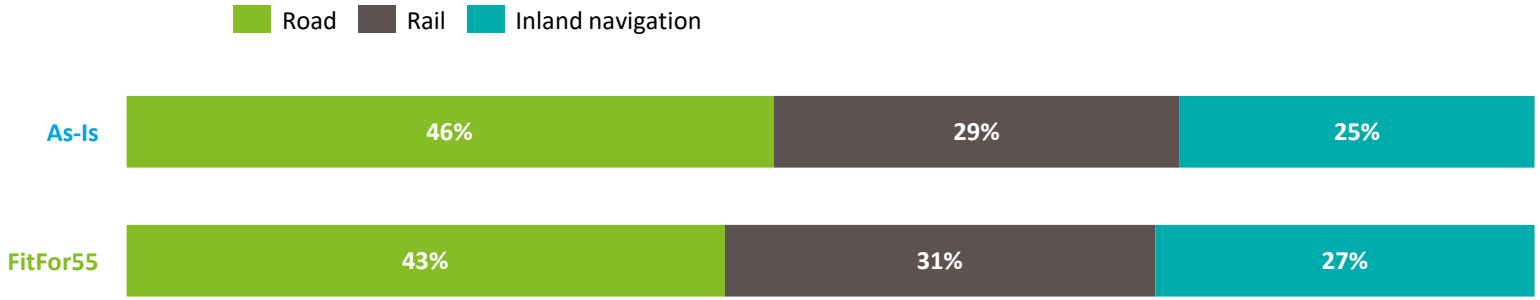
Freight transport activity in 2030 - FitFor55 vs As-Is projections – *(Gtkm); territoriality principle applied for road transport*



Freight transport activity in 2030 – FitFor55 vs As-Is projections *(volumes transported[2] Mt, %)*



Freight transport modal shares in 2030 – FitFor55 vs As-Is projections *(%); territoriality principle applied for road transport*



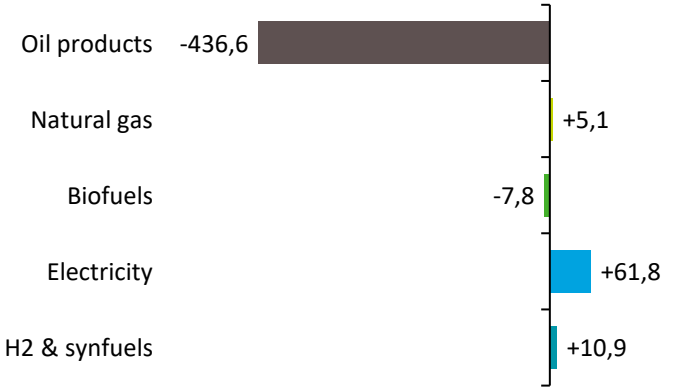
Key differences

- Freight transport activity sees a considerable increase by 2030 in both scenarios.
- Although the overall freight transport activity by 2030 is higher in the FitFor55 Scenario than in the As-Is expressed in Gtkm (72.5 vs 71.8), in terms of actual tonnage of transported goods, the As-Is takes the lead.
- However, the road transport activity increase is more moderate in the case of the FitFor55 Scenario – part of the road freight activity shifts towards rail and inland navigation.
- Road freight activity remains the dominant freight transport mode in 2030 in both scenarios, regardless of the modal shifts.

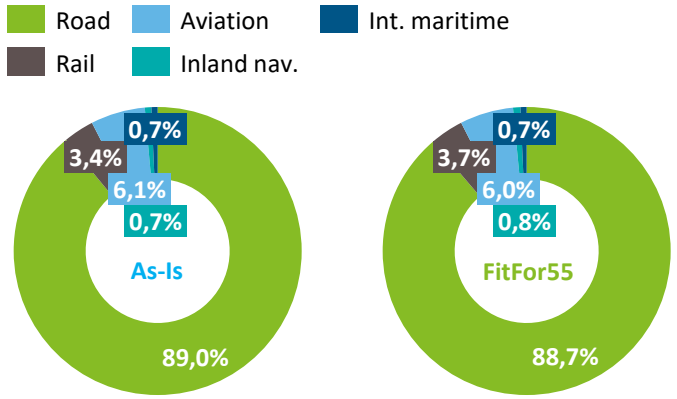
Source for projection: PRIMES-TREMOVE

Scenario Comparative Analysis – Overall Results (3/11)

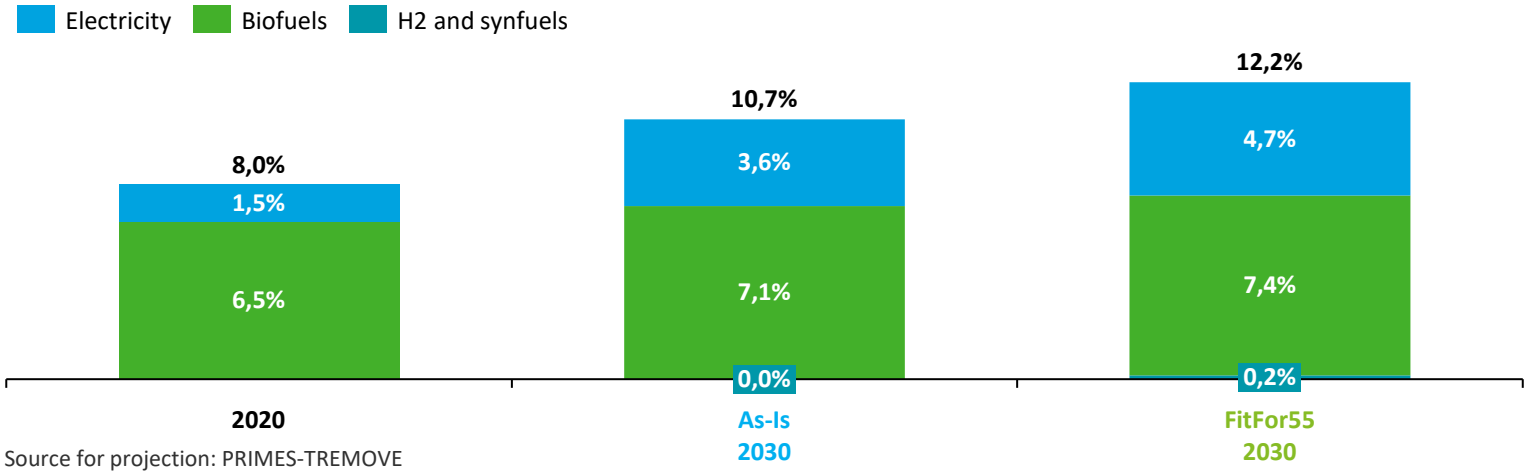
Fuel consumption in 2030 – FitFor55 vs As-Is *(ktoe)*



Share of total fuel consumption by segment in 2030 – FitFor55 vs As-Is *(%)*



Renewable fuels in transport (no multipliers) – FitFor55 vs As-Is 2030 projections *(%)*



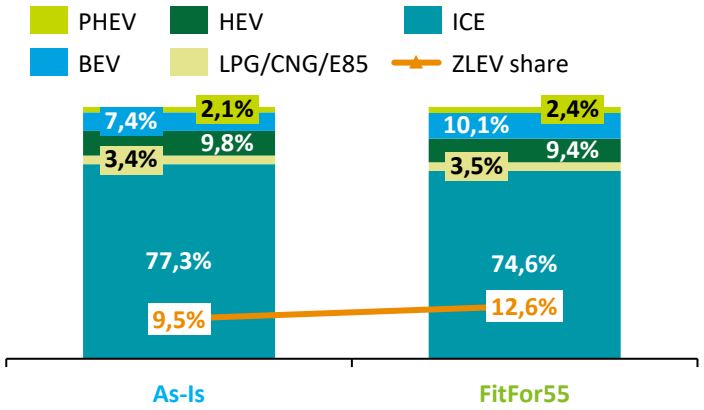
Source for projection: PRIMES-TREMOVE

Key differences

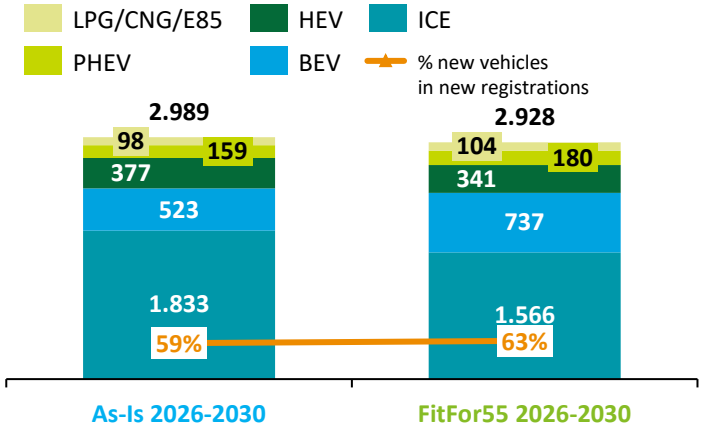
- Overall fuel consumption in transport is lower in the FitFor55 Scenario by 5% compared to the As-Is, primarily due to a decrease in consumption of oil products, but also biofuels (based on RED III, with the introduction of RFNBOs). These are partly compensated by the emergence of H2 and synfuels and a higher uptake of electric vehicles.
- The changes in fuel consumption shares by transport mode between the 2 Scenarios are broadly aligned with the shifts in passenger and freight transport activities: from cars and vans to rail and public transport, from road freight to rail and inland waterways.
- The share of renewable fuels in the FitFor55 scenario is higher by 1.6% pp, originating from the uptake of electricity.
- H2 and synfuels take a minor share however in both scenarios, considering a slower pace in infrastructure development and the specific transport mode mix of Romania.

Scenario Comparative Analysis – Overall Results (4/11)

Passenger cars fleet composition in 2030 – FitFor55 vs As-Is projections *(%)*



Passenger cars new registrations– FitFor55 vs As-Is
(000 cars / 5 year period)



Passenger cars fleet in 2030 – Fitfor55 vs As-Is *(mil., number of)*

8,2 mil.

in the As-Is Scenario

vs.

8,1 mil

in the FitFor55 Scenario

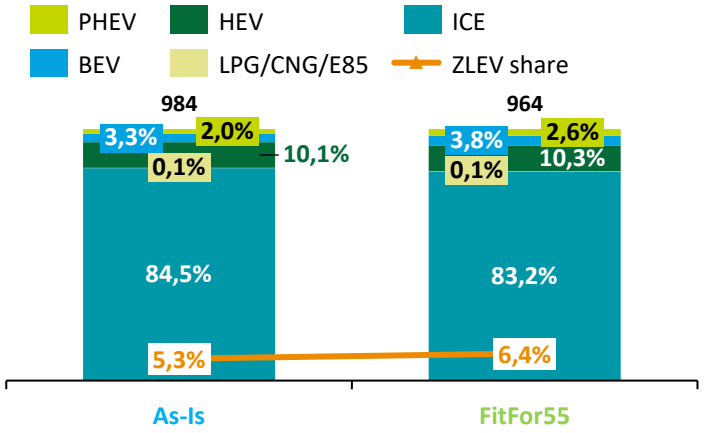
Key differences

- The projected passenger car fleet is slightly lower in the FitFor55 Scenario than in the As-Is in 2030 owing to activity reduction in the passenger cars segment and the dynamics of new registrations.
- A higher uptake of vehicles powered by alternative fuels in the FitFor55 scenario can be noticed, especially for BEVs and PHEVs (13% of the fleet). This is supported by a more generous network of public chargers in the FitFor55 Scenario, approximately 25,000 more public chargers than in the As-Is.
- In terms of registrations, new vehicles in new registrations take a higher share in the FitFor55 Scenario. Despite this fact, overall vehicles registrations are higher in the As-Is, due to less influence from policies for renewal and retirement and a higher projected activity in the passenger cars segment.

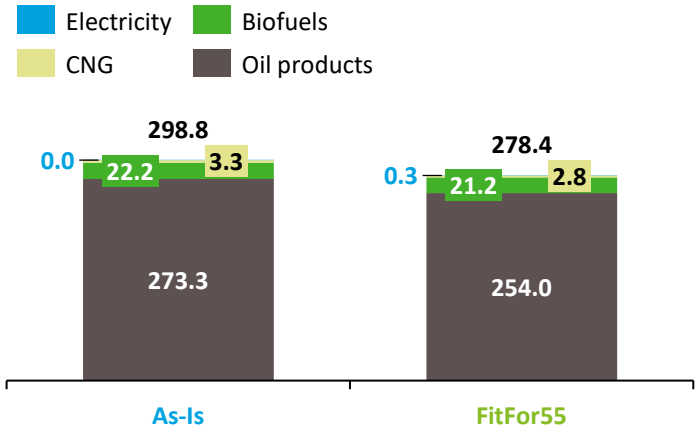
Source for projection: PRIMES-TREMOVE

Scenario Comparative Analysis – Overall Results (5/11)

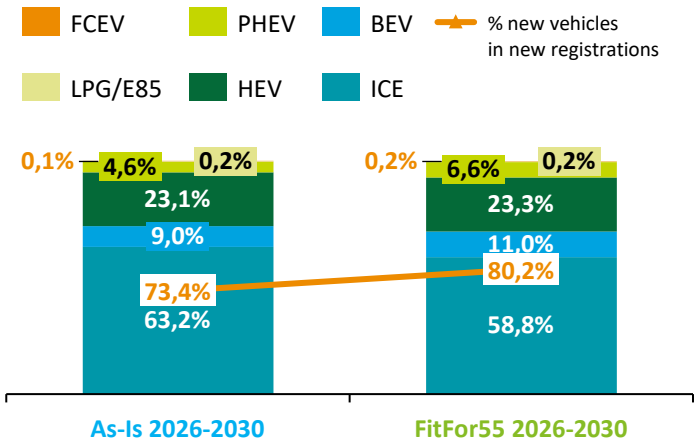
Vans commercial fleet composition in 2030 – FitFor55 vs As-Is projections *(%, ths. of)*



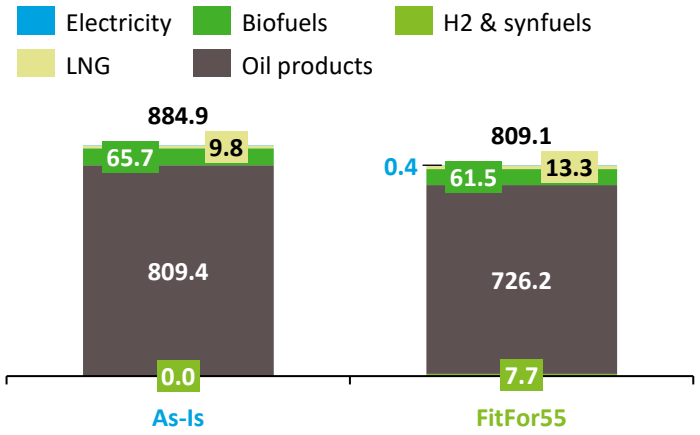
Medium duty trucks fleet (< 16 t) in 2030 - fuel composition – FitFor55 vs As-Is *(ktoe)*



Composition of new vans registrations– FitFor55 vs As-Is *(000 cars / 5 year period)*



Heavy duty trucks fleet (> 16 t) in 2030 - fuel composition – FitFor55 vs As-Is *(ktoe)*



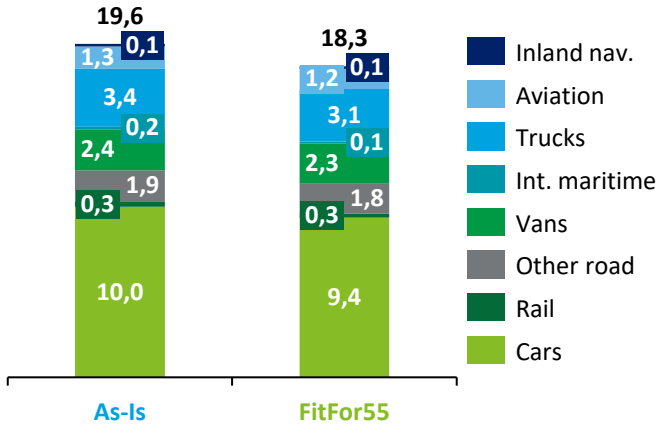
Key differences

- Like the passenger cars fleet, the 2030 commercial vans stock in the FitFor55 Scenario is lower compared to the As-Is, owed to a greater vehicle replacement rate and the lower intensity of road freight transport activity; this is further reflected in total commercial vehicle fuel consumptions.
- Reliance of commercial vehicles in 2030 on ICEs is predominant in both scenarios, hence the continuance of oil products taking the largest share within fuel composition mix.
- New BEV & hybrid vans registrations will have a greater uptake after 2025 in the FitFor55 Scenario, to the detriment of ICEs.
- By 2030 CNG & LNG will make 1.6% from total fuel composition of medium and heavy-duty trucks (compared to 1% in the As-Is).
- Electricity, H2 and synthetic fuels in both medium and heavy-duty trucks will be introduced only in the FitFor55 scenario in the latter part of the decade.

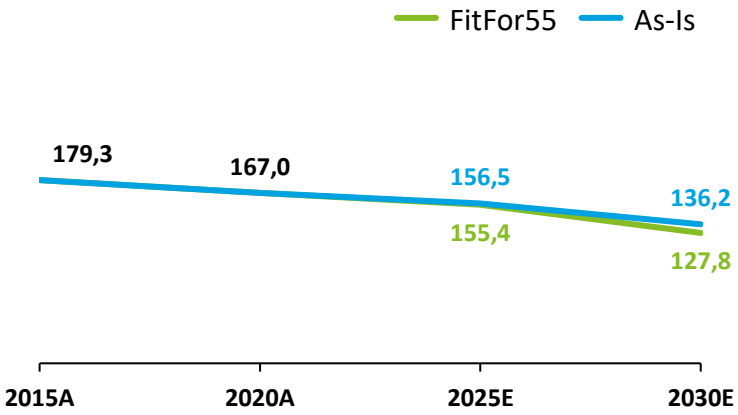
Source for projection: PRIMES-TREMOVE

Scenario Comparative Analysis – Overall Results (6/11)

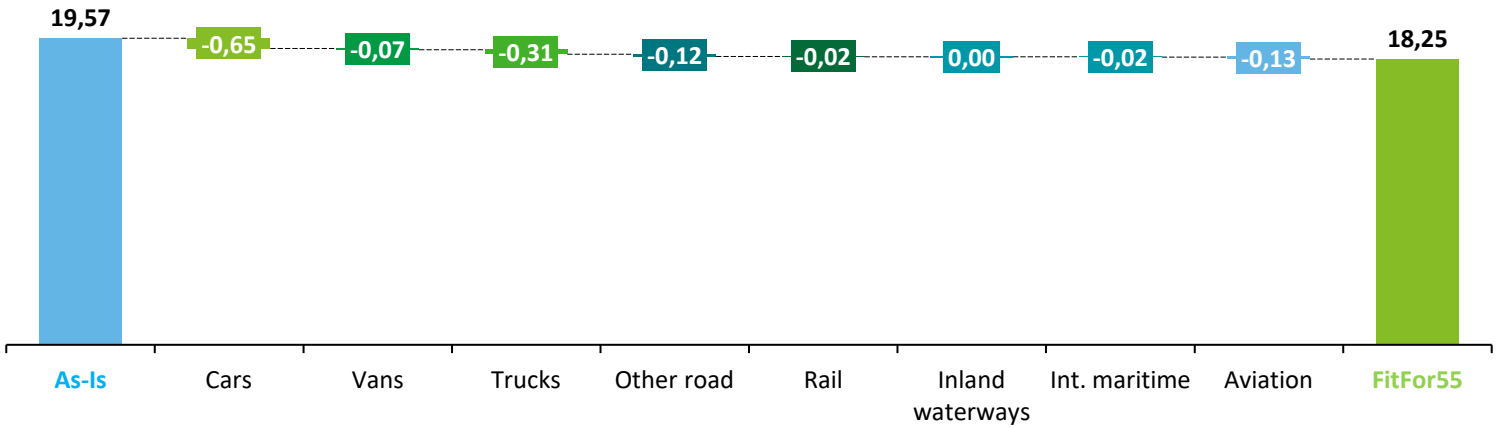
Tank-to-Wheel CO2 emissions in transport by segment in 2030 – FitFor55 vs As-Is *(MtCO2)*



CO2 intensity of the passenger car fleet – projections in FitFor55 compared to the As-Is scenario *(gCO2/vkm)*



CO2 emissions between the As-Is and the FitFor55 scenario in 2030 compared by segment *(MtCO2)*



Source for projection: PRIMES-TREMOVE

Key differences

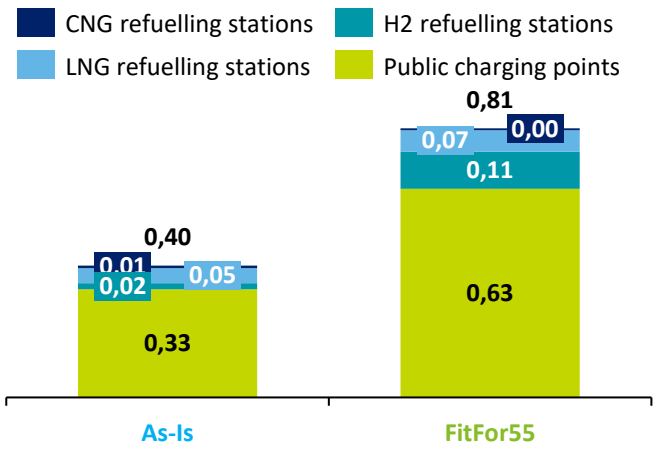
- Despite the decarbonisation policies and greater reliance on more environmentally friendly travel, emissions in both Scenarios are set to increase by 2030 compared to 2015 levels (by 12% in the FitFor55 Scenario and 20% in the As-Is). This is largely owed to the overall increase in transport activity.
- However, in the FitFor55 Scenario, CO2 intensity of the passenger car fleet as well as overall CO2 emissions in transport is lower by approx. 7% (8.4 gCO2/vkm, 1.3 MtCO2) compared to the As-Is.
- The reduction is mainly attributed to carbon intensity improvements of the cars segment (50%), decarbonisation of road freight and activity shift to other modes (22%), and the shift of intra-EU aviation activity to rail (10%).
- Decoupling of CO2 emissions of passenger cars from market growth occurs at a higher pace after 2025 in the FitFor55 Scenario.

Scenario Comparative Analysis – Overall Results (7/11)

Difference in user costs in FitFor55 compared to the As-Is scenario in 2030 per segment and cost type (not including infrastructure) *(bn. EUR / year)*

	Capital	Fuel	Other	Total
Cars	-0.10	0.42	-0.12	0.21
Vans	-0.04	0.11	-0.08	-0.01
Trucks	-0.15	0.09	-0.17	-0.23
Other Road	0.14	0.08	0.05	0.26
Rail	0.50	0.02	0.11	0.63
Aviation	-0.01	0.03	-0.08	-0.05
Maritime	0.16	0.01	0.03	0.20
Total	0.50	0.76	-0.27	**0.99**

Investments in publicly accessible infrastructure* *(bn. EUR)*



End-user fuel prices in 2030 – FitFor55 vs As-Is[1] *(EUR/toe)*

	As-Is	FitFor55
Diesel	1443,4	1675,7
Petrol	1627,5	1765,2
Natural gas	564,1	1079,5
LPG	1125,1	1616,9

Charging point (CP) rations in 2030 – FitFor55 vs As-Is

	As-Is		FitFor55	
CP ratio (private:public charging points)	7,9		8,0	
CP ratio (public)	17,4	EVs/CP	17,4	EVs/CP
CP average power (public)	17,3	kW/CP	18,8	kW/CP

Key differences

- In 2030, total transport sector user costs in FitFor55 are higher by almost 1 bn Euro compared to As-Is. Higher costs are driven by more capital-intensive transport technologies (e.g. EVs, rail) and by higher fuel costs, especially for Natural Gas and LPG.
- In FitFor55 fossil fuel costs are higher primarily due the extension of EU ETS in road transport, but also due to higher excise tax stemming from the proposed new EU ETD;
- As excise tax, the analysis adopts the maximum between the proposed EU ETD rate and the current national excise tax, considering also a 10-year transition period between 2023-2033 (where applicable).
- Compared to the As-Is, an additional € 410 mil. is required in the FitFor55 Scenario for recharging and refueling infrastructure between 2021-2030 (excluding cost of private charging points and grid connection costs).

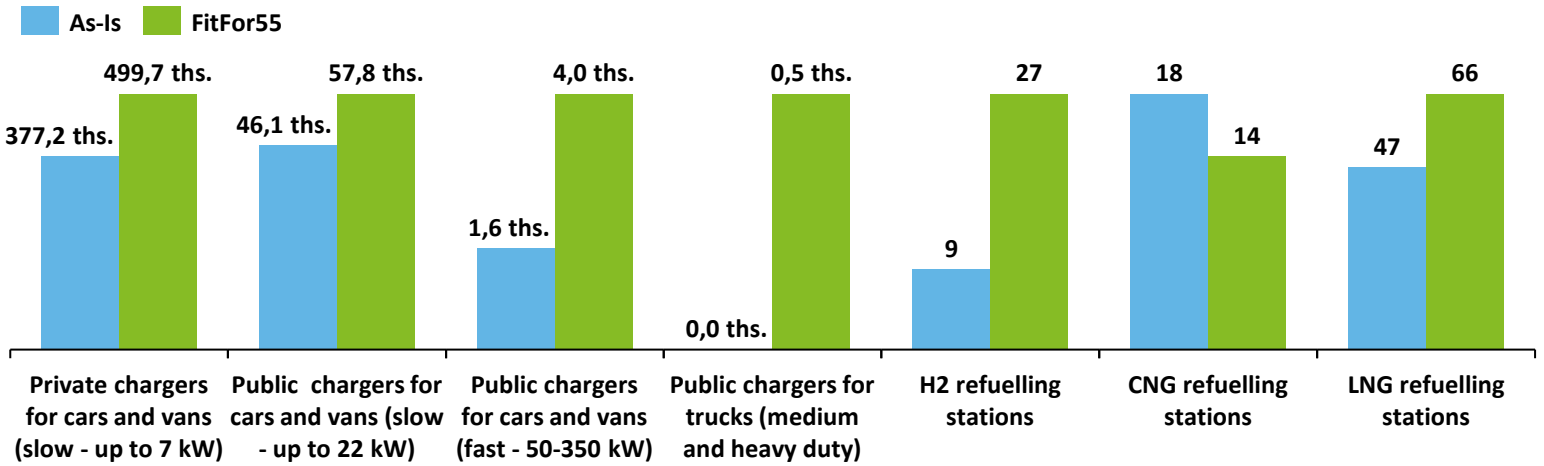
*Investments on publicly accessible infrastructure do not include private chargers

Source for projection: PRIMES-TREMOVE

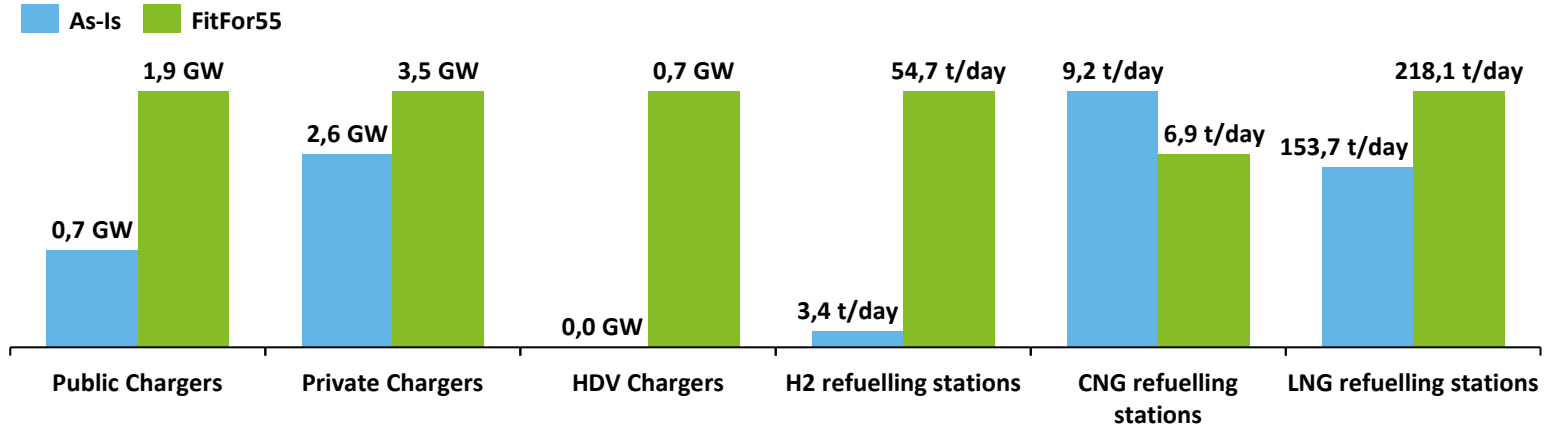
1) Prices are for private end users (i.e. for the general public)

Scenario Comparative Analysis – Overall Results (8/11)

Alternative fuel infrastructure – no. of electricity charging points and refueling stations in 2030 – FitFor55 vs As-Is



Alternative fuel infrastructure / installed capacity in 2030 – FitFor55 vs As-Is



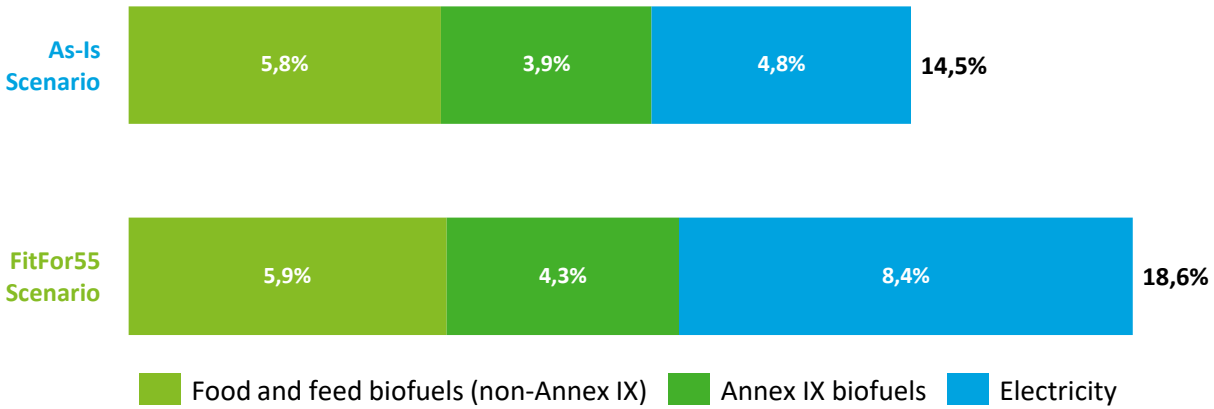
Source for projection: PRIMES-TREMOVE

Key differences

- The recharging and refueling infrastructure in the FitFor55 Scenario is comprised by an additional (to the As-Is):
  - +25.000 public charging points;
  - +130.000 private charging points;
  - +500 charging points for electric trucks;
  - +20 H2 stations;
  - +20 LNG stations.
- Approx. half of the additional investment in the FitFor55 Scenario are associated with uptake of EVs and the remaining are primarily associated with heavy road transport, namely for HDV chargers, and H2 and LNG stations.
- Consequently, a larger network of public and private chargers translates to an extra 2.8 GW installed power capacity in FitFor55.
- Greater emphasis on alternative fuels in the FitFor55 Scenario also translates into greater H2 and LNG refueling capacities.

Scenario Comparative Analysis – Overall Results (9/11)

RES-T in 2030 *(%, calculation based on RED II provision)*



GHG intensity target (as per RED III proposal, i.e. -13% vs. reference fuel GHG intensity) *(%)*

-7,9% in the As-Is Scenario **vs.** **-9,9%** in the FitFor55 Scenario

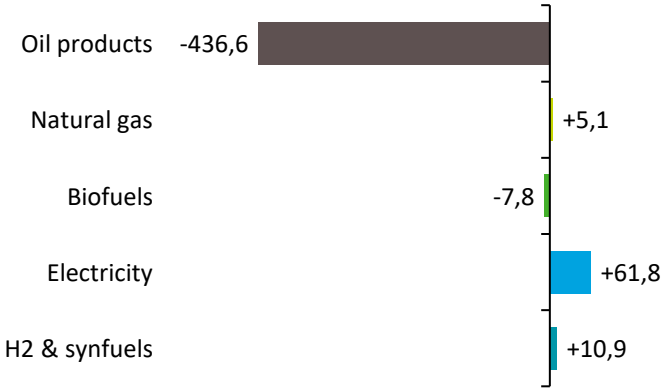
Key differences

- The policies and measures implied by the FitFor55 Scenario, sets the RES-T share at 18.6% by 2030 compared to 14.7% in As-Is.
- In both scenarios, almost 6% is met by the uptake of food and feed-based biofuels (i.e. < 7% cap of RED II).
- In FitFor55 the remaining share of 12.7% is reached by Annex IX biofuels and electricity (i.e. promoted through the use of RED II multipliers).
- Compared to the As-Is, the increase in RES-T is driven by the increase in electrification of road and rail, with a parallel increase of renewable electricity supply.
- RES-E in FitFor55 scenario is approx. 60% in 2030, while in As-Is RES-E is approx. 50%.
- However, despite reaching the target RES-T share in the FitFor55 Scenario, both Scenarios fall short of reaching the -13% fuel GHG intensity target as per the RED III proposal.

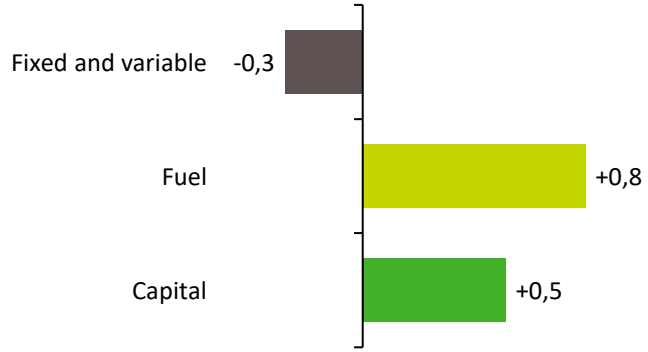
Source for projection: PRIMES-TREMOVE

Scenario Comparative Analysis – Overall Results (10/11)

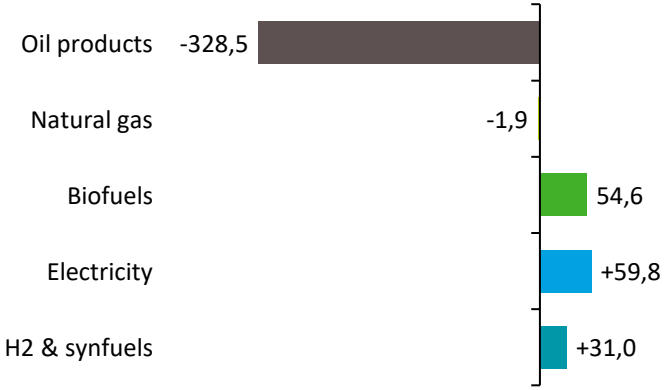
Fuel consumption in 2030 – FitFor55 vs As-Is *(ktoe)*



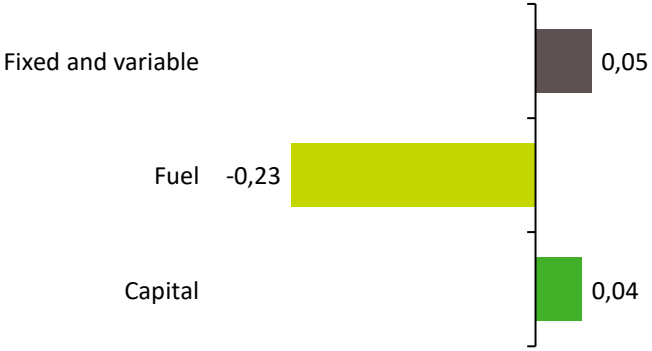
Difference in user costs in FitFor55 compared to the As-Is scenario in 2030 per cost type (not including infrastructure) *(bn. EUR / year)*



Fuel consumption in 2030 – minimum additional effort to reach GHG intensity target in 2030 *(ktoe)*



Minimum additional effort required to reach the GHG intensity target in 2030 per cost type (not including infrastructure) *(bn. EUR / year)*



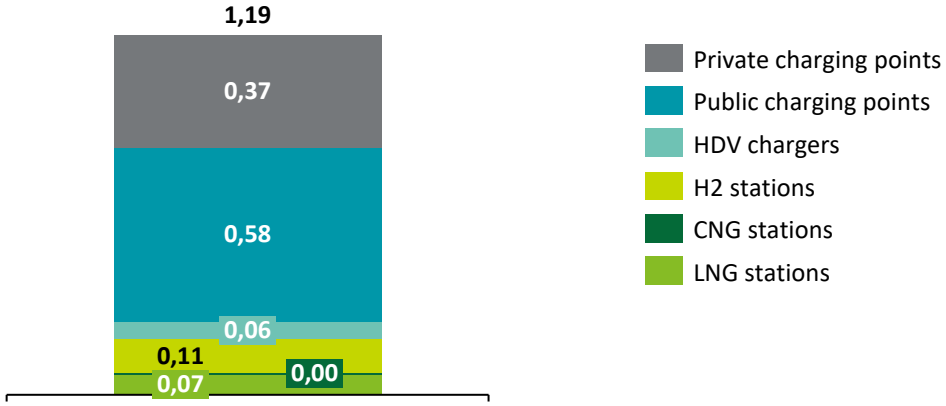
Source for projection: PRIMES-TREMOVE

Key differences

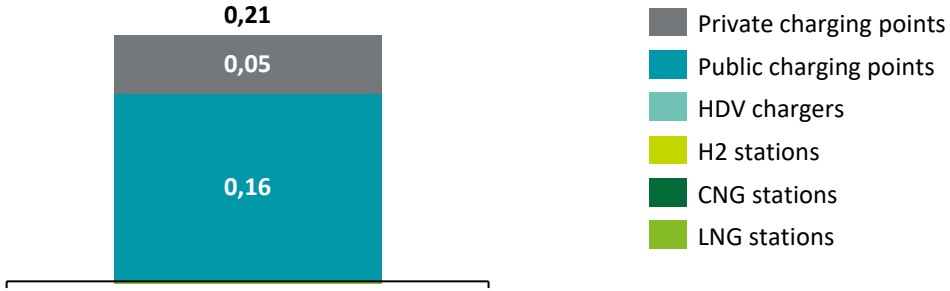
- Starting from fuel consumption projections in 2030, which sees a considerable cut for oil products in the FitFor55 Scenario compared to the As-Is, to reach the -13% GHG fuel intensity target for 2030 set out by the RED III proposal, a further consumption cut of 329 ktoe in oil products and 2 ktoe in natural gas is required. These would be partly replaced by an increase in consumption of biofuels, electricity and RFNBOs.
- At the same time, in terms of 2030 user costs, the minimum additional effort required to reach the -13% GHG fuel intensity target translates to spending an additional EUR 100 mil. / year on capital, fixed and variable costs, and a further reduction of EUR 230 mil. / year in fuel expenses.

Scenario Comparative Analysis – Overall Results (11/11)

Alternative fuel infrastructure - Private and public investments in FitFor55 2021-2030 (including grid connection costs) *(bn. EUR)*



Minimum additional investments required to reach the GHG intensity target in 2030 (including grid connection costs) *(bn. EUR)*



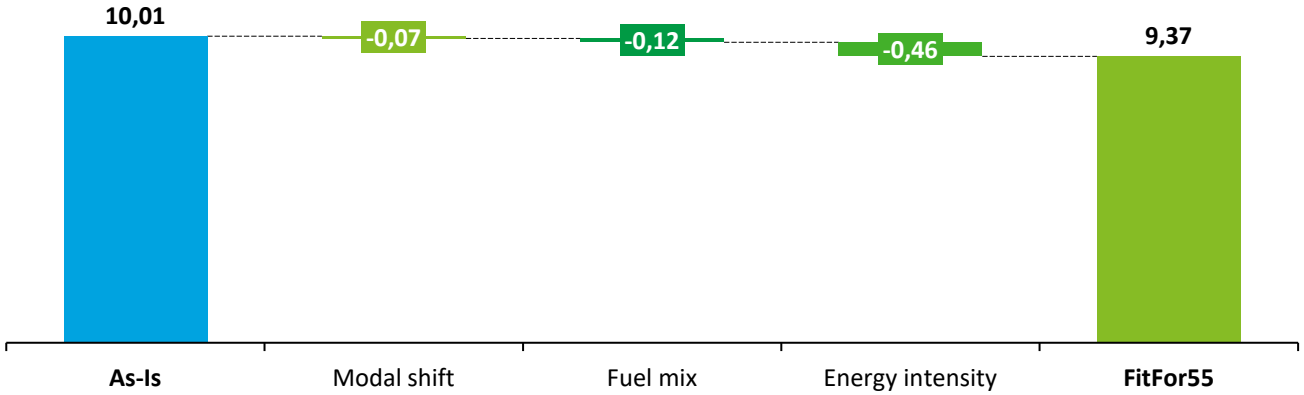
Key differences

- In addition to the approx. EUR 1,2 billion provisioned in the FitFor55 Scenario for investing in the alternative fuel infrastructure, thus reaching the 18% RES-T target, a further EUR 210 mil. is required to reach the -13% GHG fuel intensity target for 2030.
- The additional sum is intended to be used for further extending the private and public charging network, including upgrading the grid infrastructure to accommodate the extra demand.

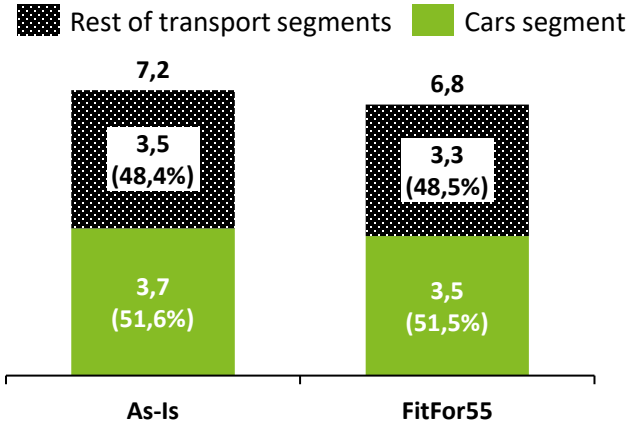
Source for projection: PRIMES-TREMOVE

Scenario Comparative Analysis – Cars Segment

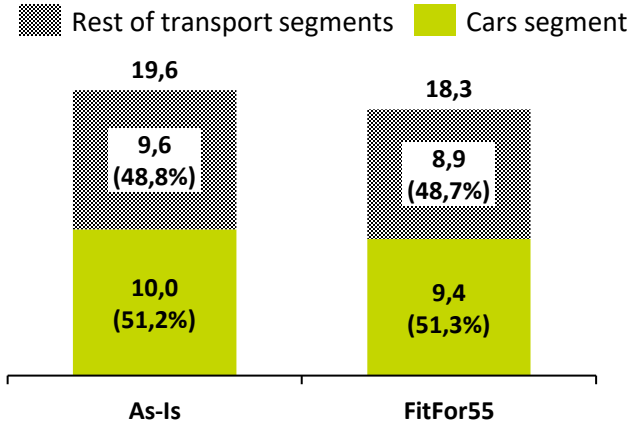
Emission reduction between FitFor55 and As-Is in 2030 by measure – cars segment *(MtCO2)*



Fuel Consumption in 2030 *(Mtoe)*



CO2 emissions in 2030 *(MtCO2)*



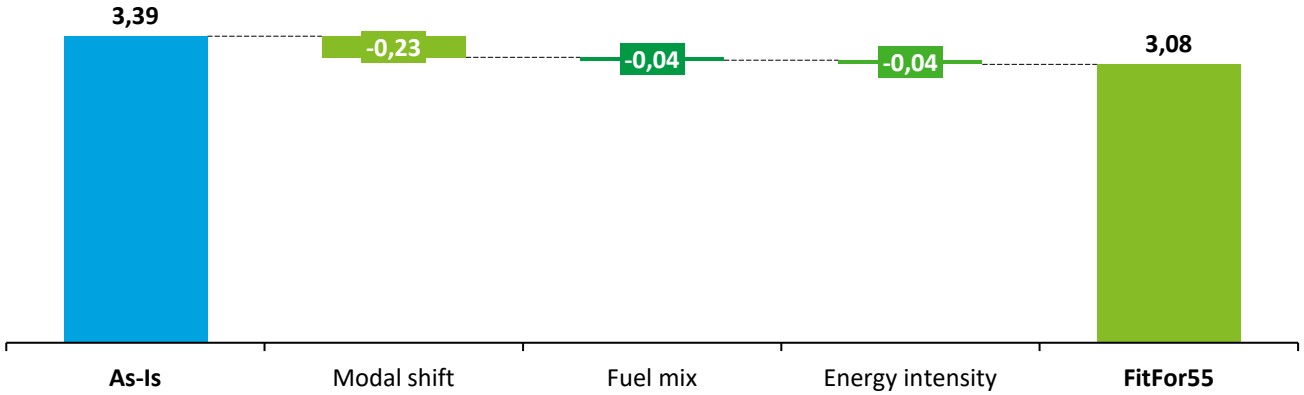
Key differences

- In 2030, the passenger cars segment accounts for approx. 50% of fuel consumption and CO2 emissions in the transport sector.
- Additional measures in FitFor55 lead to a reduction of approx. 5% in fuel consumption and 7% in the emissions of the cars segment in 2030 (compared to As-Is).
- **The main drivers for the additional emission reduction are energy and carbon intensity improvements due to the uptake of electricity.**
- Modal shift from passenger cars to public transport and soft modes has a comparably lower impact on emission reduction.
- **Additional costs of FitFor55 for the cars segment** amount to:
  - € 200 Mil., driven by higher fuel costs (due to the extension of the EU ETS and the EU ETD);
  - € 75 Mil. for publicly accessible charging infrastructure (an additional 25,000 chargers compared to As-Is).

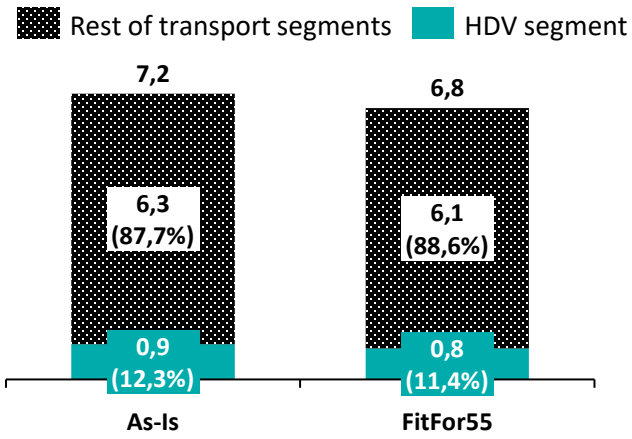
Source for projection: PRIMES-TREMOVE

Scenario Comparative Analysis – Heavy Duty Trucks Segment

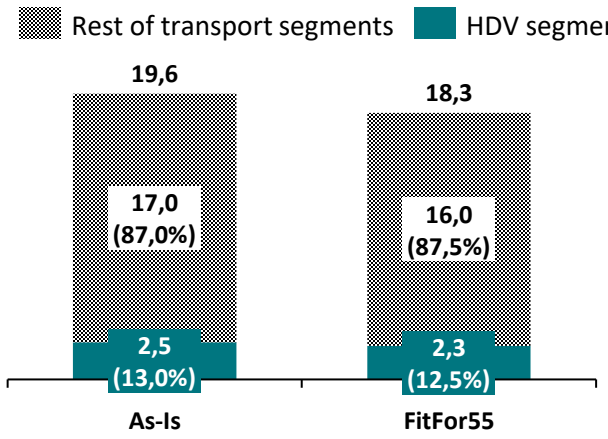
Emission reduction between FitFor55 and As-Is in 2030 by measure – trucks segment *(MtCO2)*



Fuel Consumption in 2030 *(Mtoe)*



CO2 emissions in 2030 *(MtCO2)*



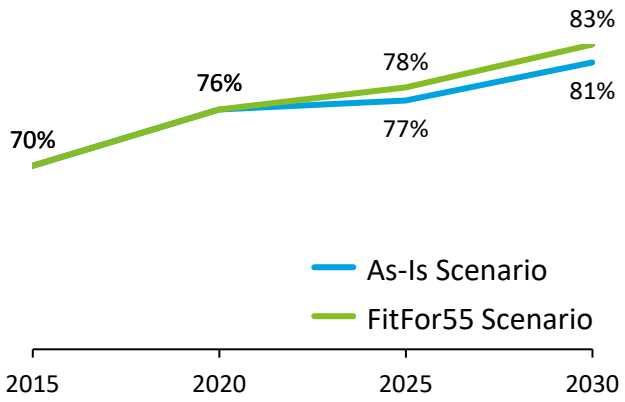
Source for projection: PRIMES-TREMOVE

Key differences

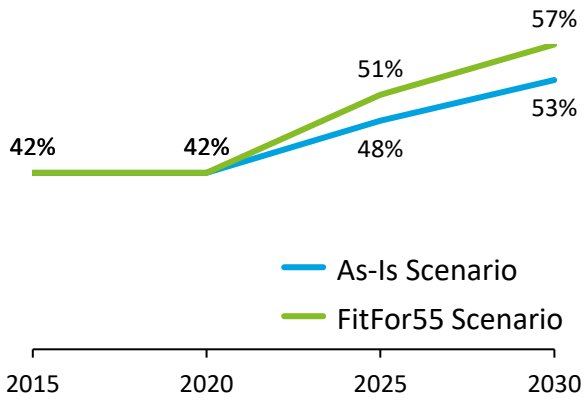
- In 2030, the HDV segment accounts for approx. 15% of fuel consumption and CO2 emissions of the transport sector.
- Additional measures in FitFor55 lead to a reduction of 12% in fuel consumption and 10% in the emissions of HDVs in 2030 (compared to As-Is).
- **The main driver for additional emission reduction is the modal shift from road freight to rail and inland waterways.**
- Measures that lead to the uptake of CNG and hydrogen (in heavier classes), contribute to the remainder of emissions reduction and to a lesser extent electric trucks (in lighter classes).
- The trucks segment in FitFor55 has lower costs compared to As-Is despite the slightly higher fuel costs, due to the reduction in activity.
- **However, compared to As-Is, the FitFor55 Scenario entails an additional 220 M€ for publicly accessible Hydrogen, CNG, LNG stations and chargers.**

Scenario Comparative Analysis – Rail Segment

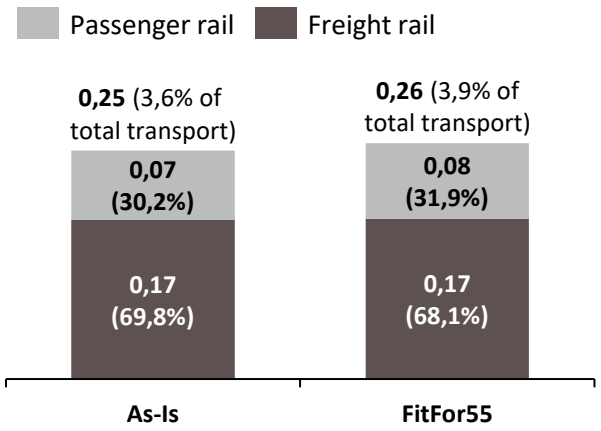
Electrification rate – Passenger rail *(%)*



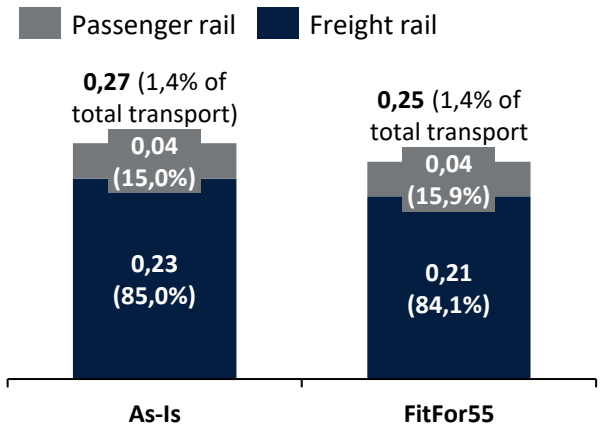
Electrification rate – Freight rail *(%)*



Fuel Consumption in 2030 *(Mtoe)*



CO2 emissions in 2030 *(MtCO2)*



Rail passenger includes tram and metro; Intermediate years are interpolated linearly

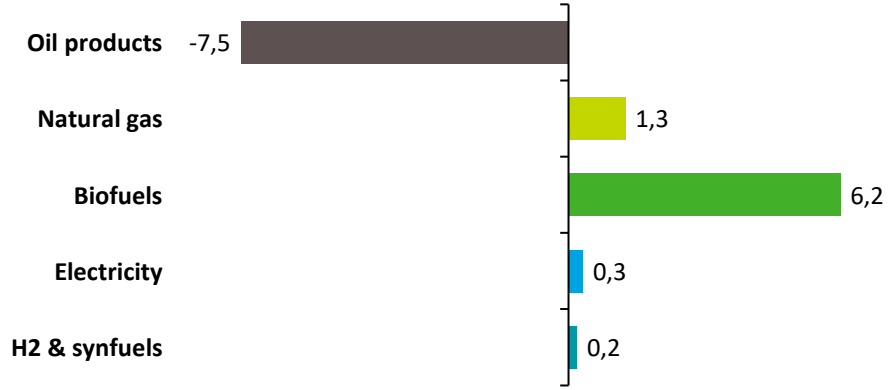
Source for projection: PRIMES-TREMOVE

Key differences

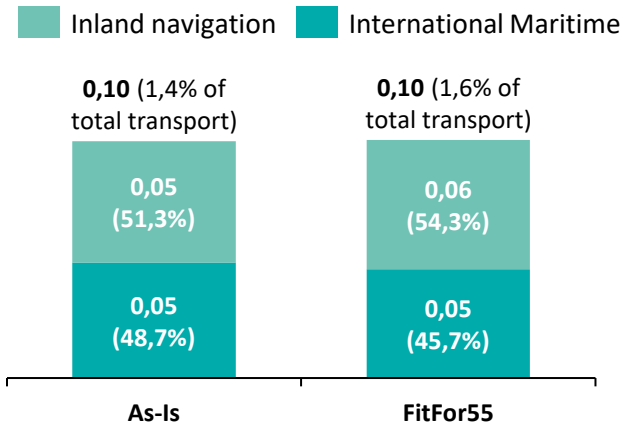
- In 2030, the rail segment accounts for approx. 4% of fuel consumption and 1,5% of CO2 emissions of transport.
- The main positive contribution in energy and emissions is from the freight segment.
- In As-Is, activity in the rail segment increases significantly compared to today, owing to a basket of policy measures on extension and upgrade of infrastructure.
- **In FitFor55, additional activity increase is mainly driven by modal shifts:**
  - **from freight road to rail, and**
  - **from intra-EU aviation to passenger rail**
- Despite the activity increase, emissions from the segment are slightly lower in FitFor55 compared to As-Is
- The driver for emission reduction in the rail segment is the increase in the electrification rate; the increase in electrification is steeper in rail freight

Scenario Comparative Analysis – Maritime Segment

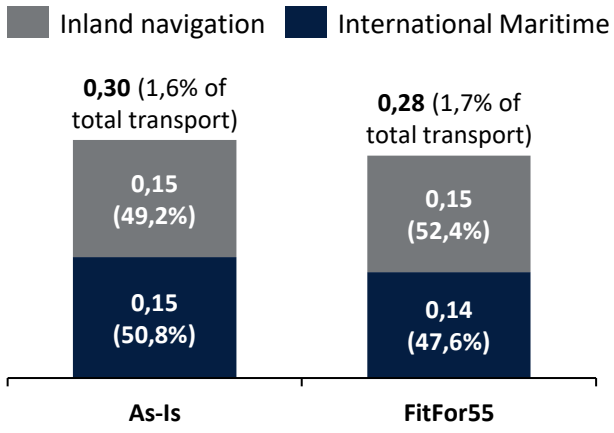
Difference in fuel consumption by fuel type between FitFor55 and As-Is in 2030 *(ktoe)*



Fuel Consumption in 2030 *(Mtoe)*



CO2 emissions in 2030 *(MtCO2)*



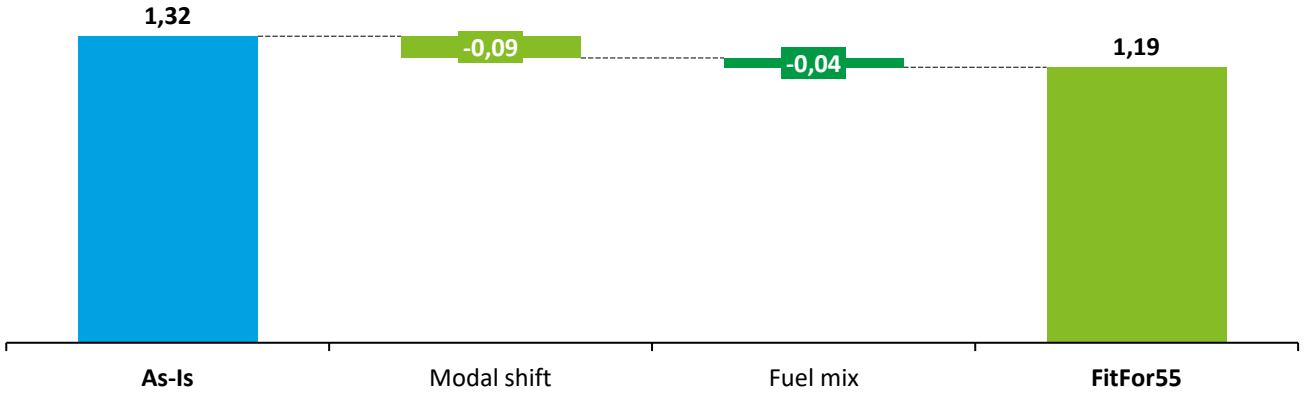
Source for projection: PRIMES-TREMOVE

Key differences

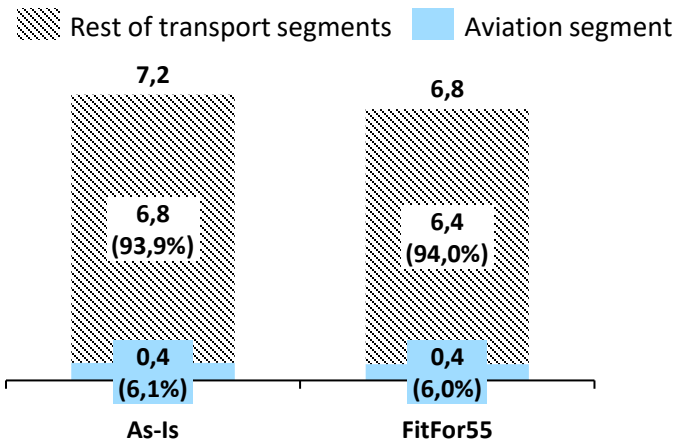
- In 2030, the maritime segment accounts for approx. 1,6% of fuel consumption and 1,7% of CO2 emissions of transport. Inland navigation and international maritime contribute by roughly equal shares.
- In FitFor55, activity in inland navigation increases due to modal shifts from road freight.
- Despite the activity increase, emissions in FitFor55 are lower than in the As-Is by about 7%.
- The main contribution in emissions reduction is due to the lower carbon intensity of the fuel mix used in maritime.
- Lower carbon intensity is achieved by fuel switch from oil products to biofuels and LNG, and to a lesser extend due to electricity and synthetic fuels.
- The uptake of biofuels and synthetic fuels is promoted through blending mandates (FuelEU Maritime initiative).

Scenario Comparative Analysis – Aviation Segment

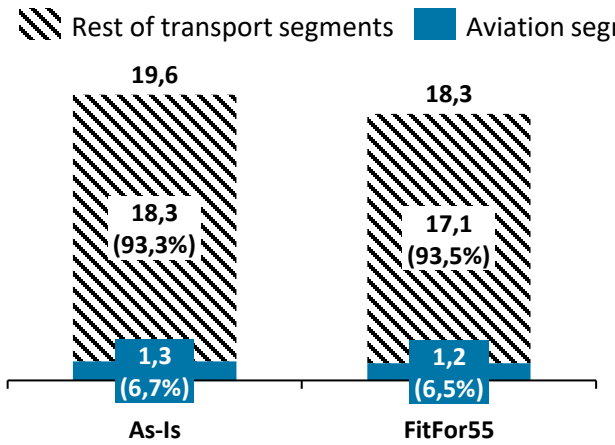
Emission reduction between FitFor55 and As-Is in 2030 by measure – aviation segment *(MtCO2)*



Fuel Consumption in 2030 *(Mtoe)*



CO2 emissions in 2030 *(MtCO2)*



Source for projection: PRIMES-TREMOVE

Key differences

- In 2030, the aviation sector accounts for approx. 6% of fuel consumption and 6,5% CO2 emissions of the transport sector.
- Additional measures in FitFor55 lead to a reduction of about 7% and 10% in fuel consumption and emissions, respectively, compared to As-Is in 2030.
- The main driver for additional emission reduction is modal shift from intra-EU aviation to rail, induced by income and substitution effects, stemming from the higher jet fuel price.
- The higher jet fuel price is due to biokerosene and synthetic kerosene blends that are promoted through blending mandates (ReFuel EU Aviation initiative).
- For aviation, FitFor55 leads to lower costs than As-Is, despite the higher fuel costs. That is primarily due to lower operational expenses stemming from the activity shift to rail.

The main vectors of decarbonisation assumed in the FitFor55 Scenario

18% RES-T in 2030 in the FitFor55 Scenario is driven by:

Modal shifts in the increasing passenger and freight transport activity:
- From cars towards public road, rail and soft modes;
- From road freight towards rail and inland navigation.

Sustained **renewal rate of the vehicle stock**, reaching a motorisation rate close to the EU average, with at least a 13% uptake of Zero and Low Emission Vehicles in passenger cars and 6% in the vans fleet by 2030.

Reduced reliance on oil products, replacing with **biofuels, electricity, H2 and synfuels**; compared to the As-Is, assume a price increases of 15% for diesel, 9% for petrol, 44% for LPG and doubling the price of CNG / LNG.

Investing a total of **€ 1,19 billion in the alternative fuels infrastructure** by 2030, meaning an additional € 410 mil. compared to the As-Is (excluding private charging points' costs and grid connection costs); this amounts to an additional 25.000 public charging points.

The minimum additional effort to reach GHG intensity is:

A further **consumption cut of 329 ktoe in oil products**. This would be partly replaced by an increase in consumption of biofuels, electricity and RFNBOs.

Spending an **additional € 100 mil. / year on capital, fixed and variable costs**, stimulating the reduction in fuel consumption amouting to EUR 230 mil. / year.

An extra **€ 210 mil. to be used for further extending the private and public charging network**, including upgrading the grid infrastructure.

The drivers in the FitFor55 Scenario lead to:

18% share of Renewable Energy Sources in the Transport sector (as per RED II – incl. multipliers)

… and the additional effort leads to:

-13% GHG intensity reduction target in the Transport sector in 2030 (as per RED III proposal)

Proposed Policy Roadmap

From study to practice – four first steps towards FitFor55

The FitFor55 Scenario sets the path and needs for 18% RES in the Transport sector. But how do we reach this goal?

Roadmap recommendations must be aligned with the process of updating the Integrated National Energy and Climate Plan (NECP), which is due to start in 2022 and be completed in June 2023.

The NECP governs and integrates policies and measures to meet the targets for using / increasing the share of renewable energy in the transport sector. The update aims to comply with the new Fit for 55 package set by the European Commission.

Establish Governance

Define and operate as soon as possible the **inter-institutional governance structure** that will **coordinate the process of monitoring, reporting, implementing and updating the Romanian NECP**; development of the 1st NECP involved no less than 17 governmental entities (11 Ministries, including the Ministry of Transport), but there are currently no clear rules on monitoring, reporting and implementing the plan. **Aligning the NECP with the Fit For 55 targets, must pe carried out under the coordination of the new Governance Structure.**

Standardize Objectives

Aligning the objectives of the various strategies, **plans and governmental programs** with a direct or indirect impact on the NECP (2030 horizon).

Ministries currently use different methodologies, data and assumptions in developing sector-specific strategies & projections, without considering cross-sector effects and interdependencies.

Communication & Consultation

Establishing **a permanent Advisory Group** consisting of various stakeholders (e.g. sector-specific associations, including the financial sector, trade unions, civil society) to contribute with their own experience and resources towards the **validation of policies and measures** that will affect both the business environment and the society as a whole.

Set the Framework

Developing **a stable and coherent fiscal and regulatory framework** that allows the implementation of policies and measures appropriate to the national context and ambitions, prioritizing the stimulation of private funding and the efficiency of public spending.

Policies and measures related to fuel supply and prices, infrastructure growth, financial incentives, tax incentives and prohibitions must be developed so that they work hand in hand and complement each other.

Proposed policy implementation timeline

2022-2023

1. Set the context

- Transpose the Fit For 55 package to national objectives and targets
- Commission the governance structure to report, monitor, implement and update policies and measures
- Adopt a cross-stakeholder standardized approach to reaching objectives
- Commission a framework for dialogue and consultation with relevant stakeholders
- Agree a long-term fiscal and regulatory framework

2023 - 2029

2. Transform

- **Coordinate and align secondary legislation** for the transport sector to stimulate car fleet renewal, grow the alternative fuels infrastructure and shift towards more environmentally-friendly means of transport
- Complement the regulatory framework with **financial support and tax incentives**, to encourage investments and hasten the adoption of carbon-reducing technologies
- Embrace **cross-cutting and mode-specific policies and measures** such as:
  - Establishing a regulatory framework for the entire H2 value chain – from generation to storage, distribution and usage
  - Incentivizing the growth of the charging infrastructure – both private and public
  - Promoting widespread use of low and zero carbon fuels – the most impactful pillar to decarbonize road transport with the potential of reducing emissions alone by 40% by 2050. Included alternative fuels: biofuels, electricity, LPG, CNG, LNG and H2
  - Implementing Low Emissions Zones and restrict access of Euro 3 & 4 vehicles
  - Extending Rabla and Rabla Plus programmes to commercial vehicles, especially incentivizing the acquisition of CNG / LNG compatible vehicles
  - Prioritize investment in electrifying rail lines or, where electrification is not cost-effective, by using trains with batteries or hydrogen fuel cells
  - Investing in improving navigation infrastructure on the Romanian-Bulgarian sector

2030

3. Reach Fit For 55 targets:

- 18% RES-T (Romania)
- -13% GHG intensity (Romania)
- 4,8% renewable fuels (EU wide)
- 55% CO_2 emission reduction for new cars and 50% CO_2 emissions reduction for vans (EU wide target)
- 5% sustainable aviation fuel (EU wide target)

4. Look beyond 2030

Re-assess the FitFor55 pathway in view of the **2050 goal of NET ZERO emissions**

Recommended sector-specific policies & measures (1/9)

Mode	Proposed policies
Cross-cutting policies 	***Regulatory measures*** ▪ Using the more comprehensive method to evaluate the real CO2 impact of fuels: well-to-wheel. Measuring at the tailpipe only (tank-to-wheel) distorts policy action to reduce CO2 in commercial road transport; ▪ H2 dedicated regulatory framework regarding "end-to-end" usage in transport - clean production, storage, transport, distribution, consumption; ▪ Develop a national strategy for the green hydrogen value chain, starting from production hubs and tailoring the refueling infrastructure around them, targeting easy public access to hydrogen refueling; ▪ Develop a national strategy and regulatory framework for “end-to-end” management of the EV lifecycle and EV sustainability, looking at: ➢ clean energy supply as part of the country-wide energy mix ➢ recharging infrastructure ➢ vehicle acquisition and attractiveness compared to ICE vehicles ➢ Minimum BEV charging capacity (at least 3kW) ➢ bi-directional charging benefiting grid stability and the BEV owner ➢ end-of-life management including battery recycling ▪ Implementation of a legal framework for the fiscal treatment of alternative fuels; introducing a more favorable taxation framework for low carbon transition fuels (CNG, LNG) and biofuels (e.g. biomethane, bioethanol) to make fuels sourced from renewable energy more economically viable. In the case of H2, a regulatory framework is first needed; ▪ Establish a biofuels monitoring system (accessible online) to ensure better information to the end user and the competent authority; ▪ Establish a central and independent monitoring system for EV charging infrastructure (publicly accessible online); ▪ Revise, complete and simplify the regulatory framework for the authorization of LPG and CNG refueling stations, to ensure adequate environmental protection standards and to ensure adequate monitoring of the quantities of LPG delivered in urban areas; ▪ Implementation of a regulatory framework for refueling vehicles and ships using LNG in safe and environmentally friendly conditions; ▪ Implementing a non-discriminatory policy between road and rail by the Ministry of Transports;

Recommended sector-specific policies & measures (2/9)

Mode	Proposed policies
Cross-cutting policies 	***Tax subsidies / Grants / Investments*** ▪ Developing two LNG terminals in the Galați river port and Constanța port for distribution purposes: LNG bunkers for inland and maritime shipping vessels, supply of LNG for road transport and industries; in the seaport of Constanța, to include a storage facility, cargo facilities for seagoing vessels and refueling of inland vessels; ▪ Stimulate the development of CNG and LNG refueling infrastructure via grants & subsidies; ▪ Establish financial instruments available to legal entities that intend to develop technologies and facilities to produce biofuels (and biomethane) from waste and non-food and non-feed raw material; biomethane can be used as a direct replacement of CNG/LNG with no need for any retrofitting, pertaining a high potential for emissions-cutting; ▪ Incentivize collective mobility solutions over private mobility solutions; Improve reach, links and interconnections between collective transport solutions; building and promoting intermodal transport capability; ▪ Establishing an Intermodal Project Management Unit, bringing together specialists in the field of rail, road, sea and air transport from the specialized departments within this ministry, as well as specialists in the field of logistics and intermodal transport. The role of the Unit will be to initiatie, develop, monitor and manage the intermodal transport strategy implementation; ▪ Granting "state aids" on the basis of subsidies to railway freight operators, owners of specialized train cars and rolling stock which may be upgraded, to cover the difference in costs between road and intermodal transport (carried out in the RO-LA system) through annual compensation funds from the state budget; ▪ A realistic market assessment of the potential of freight traffic in Romania. Maintaining an ongoing dialogue between the public and private sectors in line with national and regional planning strategies; ▪ Promoting an "intermodal transport culture" among transport personnel, thus providing training, development, qualifications and experience exchange in the field of intermodal transport; integration with curricula of transport related faculties;

Recommended sector-specific policies & measures (3/9)

Mode	Proposed policies
Cross-cutting policies 	***Tax subsidies / Grants / Investments*** ▪ Training potential beneficiaries of intermodal transport funds on funding opportunities and priorities in accordance with the requirements for funding from the Structural Funds or other funds; ▪ Invest in the development of intermodal centers in the immediate vicinity of logistics parks and industrial platforms (existing or potential): Timișoara, Oradea, Craiova, Sibiu, Brașov, București, Cluj Napoca, Galați, Iași, Bacău, Suceava, Târgu Mureș; ▪ Invest in the development of extensive customs services in locations with intermodal platforms near industrial parks; ▪ Create open and competitive digital platforms for logistics and mobility services;

Recommended sector-specific policies & measures (4/9)

Mode	Proposed policies
The Road Sector 	***Regulatory measures*** ▪ Establishing intermediate thresholds for verifying compliance with the standards on GHG emissions in light passenger transport (cars and vans) and heavy-duty transport, according to the provisions of EU Regulation 2019/631 and EU Regulation 2019/1242. Mid-term reviews should be carried every 3 years to determine whether an acceleration of the process is needed or whether the current measures are sufficient; ▪ Revise the regulatory framework for the registration of vehicles that are equipped with LPG systems, in order to improve the monitoring and tracking of LPG and CNG vehicle records; ▪ Include vehicles using CNG and LNG in the Greenhouse Gas Reduction Program in transport; ▪ Extend the sale of PHEVs beyond 2035, taking into account the low emission levels and high-performance technologies in development for this type of vehicles. Considering the current state and the speed required for developing the necessary infrastructure for EVs' adoption, PHEVs would be an essential lever in ensuring the necessary degree of mobility with low emissions; ▪ Consider mild Hybrid Electric Vehicles (mHEV) also as a lever for emissions cutting (transition technology), thus being granted similar benefits and incentives as for full hybrids; ▪ Weight bonus for alternative fuels powered LCV up to 4,2tons of GWV, also with Driving license B; Trucks >18t with alternative traction solutions (EV/Gas/H2/Hybrid) can received max. 1 tone upgrade on total GWV if technically approved from the OEM's to compensate partly the payload loss for heavier alternative propulsion solutions; ▪ Promote moving the inclusion of road transport under EU ETS up by one year - to 2025, which otherwise would take place in 2026, with opt-out clause until 2027 for private road transport; ▪ Road transport EU ETS scheme should cover all fuels, to ensure a level playing field; ▪ Potential phase-out of conventional ICE new vehicle registrations starting 2030;

Recommended sector-specific policies & measures (5/9)

Mode	Proposed policies
The Road Sector 	***Regulatory measures*** ▪ Implementation of distance-based charging of heavy goods vehicles (distance-based vignette) - Based on the "polluter pays" principle and other principles of environmental taxation, the current vignette system for road freight transport is to shift from a time-based system to a distance-based system. The additional revenue generated should be used for new investments in sustainable transport; ▪ Steer the Romanian vehicle fleet to the latest emissions standards, EVs and GNC / GNL; Restrict new vehicle registrations < Euro 4 by 2025; ▪ Implement Low Emissions Zones and restrict access of Euro 3 & 4 vehicles; assess the feasibility of also implementing Zero Emissions Zones favoring BEVs and PHEVs; ▪ Permitting and harmonizing the use of Eco-trucks for national and international operations; ▪ Eco-driver training and related skills monitoring should be incentivized and made a legal requirement; ▪ Consider LPG as transition fuel given the currently developed distribution network and the high potential of the evolving LPG technology for further emissions cutting compared to ICEs; ▪ Clarifying the tax treatment and billing of Electric Vehicle charging sessions to the final consumer; ▪ Updating the Administrative Code in order to allow municipalities to lease small areas necessary for the operators who want to develop charging infrastructure for electric cars; ▪ Implement urban vehicle access restrictions (UVARs) favoring bus and coach access over private cars; ▪ Increasing the number of parking spaces reserved for vehicles intended for taxi and / or car sharing services using alternative fuels and providing them with access to recharging points; ▪ Setting up a common national procurement process (cross-municipalities) for vehicles used in public passenger transport in order to obtain more efficient purchase prices for vehicles using alternative fuels;

Recommended sector-specific policies & measures (6/9)

Mode	Proposed policies
The Road Sector 	***Tax subsidies / Grants / Investments*** ▪ Reduction of annual tax, registration tax and periodic inspections costs for vehicles using alternative fuels (including CNG / LNG), continuation of free parking for all vehicles based on alternative fuels; continuation of tax exemptions for BEVs ▪ Provide grants and subsidies for the acquisition of all types of vehicles compatible with alternative fuels (including CNG / LNG); ▪ Extend Rabla and Rabla Plus programmes to commercial vehicles, also promoting the acquisition of CNG / LNG compatible vehicles, in line with incentives for fleet renewal and scrapping old / polluting vehicles; ▪ Reduced ownership taxation applicable to fleet owners based on BEV competency; additional incentive prorated with the accelerated change of BEVs (reduced tax to zero tax to fully BEV converted fleet in less than 5 years); ▪ Exempt public charging stations from connection taxes and subsidize network strengthening tariffs; lower duty tax for electric charging; ▪ Lower or cap taxes on bus and coach tickets and implement more favorable road user charges versus private cars; ▪ Building a fleet of green buses & impact assessments for the use of hydrogen-based buses; assisting local authorities with funds to acquire environmentally friendly buses (gradual implementation by 2030). In the initial years, the programme should also support the procurement of CNG and EURO-6 modern diesel buses and will subsequently focus on electric vehicles; ▪ Raise the direct acquisition financial threshold for the acquisition of BEV for providing more flexibility to public bodies; ▪ Governmental grants for local authorities / possibly private entities for constructing park & ride systems; ▪ Expedite the penetration of latest tech. through fleet renewal incentives: low-rolling resistance tires, waste-heat recovery, lightweight materials; ▪ Implement more intelligent traffic management systems (mostly intra-urban) and real time traffic information; e-corridors; ▪ Developing dedicated bicycle corridors (>1000 km) (and storage space) in cities and connection with the metropolitan areas;

Recommended sector-specific policies & measures (7/9)

Mode	Proposed policies
The Rail Sector 	***Regulatory measures*** ▪ Update rail transport legislation in view of a competitive local market and in line with the EEA market, including the rail energy distribution market; ***Tax subsidies / Grants / Investments*** ▪ Accelerating the modernization works on the Curtici - Simeria - Sighisoara - Brasov - Ploiesti - Bucharest - Constanta European Corridor - most important rail infrastructure project; ▪ Reforming the rail-related educational institutions and certifications, with the intent of increasing the number of much needed operational staff; ▪ Incentives & subsidies for the acquisition of electric and H2 railcars & traction units; incentives & subsidies for supporting the transformation of shunting locomotives into locomotives with batteries or fuel cells; ▪ Rehabilitation of the primary railway infrastructure network to allow for speed standards of 160km/h for passenger trains, 120km/h for freight trains, an axle load of 22.5 t and freight train length of 750 meters; ▪ Railways and local public transports, as environment friendly modes of transport, should be also further incentivized with a specific 10% dedicated funding under the Innovation Fund. 25 % of the total quantity of allowances covered by these sectors shall be auctioned and the revenues generated allocated to the Social Climate Fund; ▪ Increasing the use of electric traction in rail transport by investing in electrifying new lines or, where electrification is not cost-effective, by using trains with batteries or hydrogen fuel cells ▪ Implementation of the urban train concept in major cities, especially connecting Bucharest with its surroundings;

Recommended sector-specific policies & measures (8/9)

Mode	Proposed policies
Maritime – Inland Waterways 	***Regulatory measures*** ▪ Stimulate local supply and demand of sustainable and alternative fuels in inland waterways activity; increase % of alternative fuels (including LNG, LPG and hydrogen) in total fuel mix ***Tax subsidies / Grants / Investments*** ▪ Accelerating navigation infrastructure development and improvement of the Romanian-Bulgaria Danube corridor to boost sustainable freight transport; ▪ Subsidizing port fees charged for the mooring of vessels propelled by CNG or LNG, biomethane or by hydrogen, or powered by electricity; ▪ Supporting the purchase of new vessels powered by liquid biofuels, CNG or LNG, including that derived from biomethane, or by hydrogen, or powered by electricity; ▪ Subsidize port fees for vessels who don't use their auxiliary motors inside the harbor but use shore power (cold ironing);

Recommended sector-specific policies & measures (9/9)

Mode	Proposed policies
The Aviation Sector 	***Regulatory measures*** ▪ Implementation of RefuelEU Aviation – stimulate local supply and demand of sustainable aviation fuel production in view of reaching a 2% share of total aviation fuel consumption by 2025, 5% by 2030, 32% by 2040 and 75% by 2050 – as per the Fit For 55 package; ***Tax subsidies / Grants / Investments*** ▪ Modernizing airport infrastructure – Invest in renewing airport infrastructure to allow alignment with best practices in aircraft ground handling; invest in modernized air traffic management systems to streamline fuel consumption;

Funding the Transition

Financing opportunities in the transport sector (1/2)

1. National Recovery and Resilience Plan (PNRR)

PNRR proposes investments amounting to approximately €7.6 bn. in the transport sector

PNRR addresses several challenges related to greening the transport sector in Romania, such as:.

- Sustainable transport, decarbonisation and road safety
- High-performance management for quality transport
- Modernization and renewal of railway infrastructure
- Development of sustainable road infrastructure on the TEN-T network, traffic management and road safety
- Railway rolling stock

3. Social Climate Fund (SCF)

€72 bn. will be mobilized for the period 2025 – 2032 of which Romania cand receive up to 9.3%

SCF would be financed through 25% of the expected revenues from emissions trading for building and road transport fuels. SCF aims to provide dedicated funding to Member States to help citizens finance investments in the following sectors:

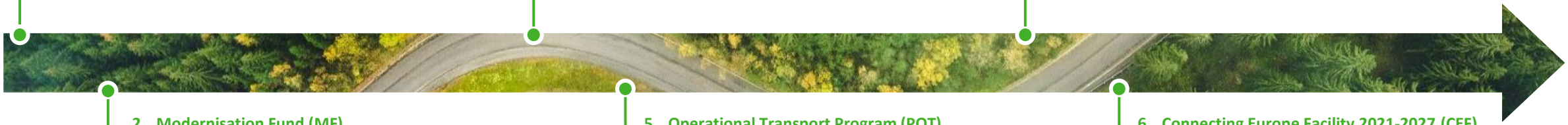
- **cleaner mobility**
- energy efficiency
- new heating and cooling systems

5. Regional Operational Programmes (POR)

The POR proposes investments that account for approximately €1.9 bn.:

The POR address the following investments areas:

- Infrastructure for alternative fuels
- Clean urban transport infrastructure & rolling stock
- Digitalisation within urban transport
- Newly built or upgraded secondary road links to TEN-T road network and nodes
- Other national, regional, local roads of access, newly built or reconstructed



2. Modernisation Fund (MF)

The total amount allocated for Romania in the MF for the period 2021 – 2023 is €12 bn.

Romanian finances the following key areas:

- **Biofuel production and adoption**
- **Green hydrogen**
- **Renewables & energy storage**
- Replacement of coal-based capacities
- High-Efficiency cogeneration
- Energy efficiency in industrial installations included in the EU-ETS
- Modernizing and expanding the power grid
- Nuclear energy

5. Operational Transport Program (POT)

Through the POT the transport sector benefits from investments of €4.5 bn.

The main areas that POT address are as follows:

- Improving connectivity by developing the TEN-T road and rail transport networks
- Improving nation mobility, sustainability and resilience in the context of climate changes by increasing the capacity and quality of rail transport
- Increasing the use of Danube and the utilization of maritime and fluvial ports
- Increasing safety in road transport network

6. Connecting Europe Facility 2021-2027 (CEF)

The budget for CEF 2021-2027 comes from the Multiannual Financing Framework and Cohesion funds and the EU transport sector receives €25.8 bn.

The CEF aims to support the achievement of the EU policy objectives in the transport, energy and digital sector. The completion of the core network corridors is the focus of this program, including:

- Interconnected and multimodal networks
- Modernize rail, road, inland waterway and maritime infrastructure
- Ensuring safe and secure mobility
- Closing missing links
- Promoting sustainability and digitalisation

Financing opportunities in the transport sector (2/2)

Upskilling and reskilling the automotive workforce

Starting with 2021 the European Commission supports the **Pact for Skills** signatories through:

- A networking hub, including: support in finding partnerships; linking with existing EU tools, e.g. Europass, Skills Panorama, EURES and the European Network of Public Employment Services; promoting the activities of the signatories
- A knowledge hub, including: webinars, seminars, peer learning activities; updates on EU polices and instruments; information on projects, tools instruments and best practices
- A guidance and resources hub, including: access to information on relevant EU funding; guidance to identify financial possibilities; facilitation of exchange between the Pact members and national/regional authorities.

The **European Battery Alliance** (EBA) was launched in 2017 by the European Commission, EU countries, and the industry. Batteries are a strategic part of Europe's clean and digital transition and a key enabling technology, essential to the automotive sector's competitiveness. Therefore, the Commission aims to make Europe a global leader in sustainable battery production and use. The European Battery Alliance aims to develop an innovative, competitive and sustainable battery value chain in Europe.

The **Automotive Skills Alliance** analyses and documents the skill needs by key themes through the expertise of the members, who work and collaborate in five subgroups dedicated to specific transition needs: Repair and Maintenance, Batteries, Hydrogen, IT, and Electronic Packaging.

- The goal of the Automotive Skills Alliance is to upskill 5% of the automotive workforce each year for seven years, which would result in around 700,000 people being upskilled throughout the entire ecosystem, representing a potential overall **private and public investment of €7 bn.**

Innovation and research in the transport sector

The revenues for the **Innovation Fund** come from the auctioning of EU ETS allowances from 2020 to 2030, as well as any unspent funds coming from the NER300 program. The Fund may amount to about **€10 bn**, depending on the carbon price. The Innovation Fund focuses on:

- Activities that support innovation in low-carbon technologies and processes, including environmentally safe carbon capture and utilization (CCU) that contributes substantially to mitigating climate change, as well as products substituting carbon intensive ones
- Activities that help stimulate the construction and operation of projects that aim at the environmentally safe capture and geological storage of CO2 (CCS);
- Activities that help stimulate the construction and operation of innovative renewable energy and energy storage technologies;

Horizon Europe has a budget of **€95.5 bn**. for the period from 2021-2027. This includes €5.4 bn. from the Next Generation EU instrument. The budget is divided into four pillars and 15 components to create a program that will support all the areas of Research and Innovation.

Mobility research opportunities in Horizon Europe will focus on the development of low-carbon and competitive transport solutions across all modes, such as: achieve zero-emission road transport, enhance the competitiveness of rail as a low-carbon mode of transport, make aviation cleaner and more competitive, overcome current shortcomings of the Air Traffic Management (ATM), enable low-carbon, smart, clean and competitive waterborne transport, reduce the impact of transport on the environment and human health, develop seamless, smart, safe, accessible and inclusive mobility systems, make automated and connected road transport safe and competitive, develop efficient and innovative transport infrastructure, develop the future transport network and integrated traffic management, enable multimodal freight logistics and passenger mobility services, increase transport safety across all modes, battery development

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