ECCO

THE ITALIAN CLIMATE CHANGE THINK TANK

THE NATIONAL ENERGY AND CLIMATE PLAN

A plan for action

SECTORAL SCENARIOS

Transport sector

SECTORAL DECARBONISATION SCENARIOS

The new version of the NECP must update national and sectoral targets on the basis of a more ambitious EU- wide greenhouse gas (GHG) reduction target of **-55% by 2030 compared to 1990 levels,** as redefined with the approval of the *"Fit for 55"* package, i.e. the set of directives and regulations that sets climate and energy objectives for Member States aligned with the climate neutrality objective in 2050.

This objective translates into the achievement of the objectives set out in the following table:

	Unit of measure	Data 2021	Fit for 55 target
Greenhouse gas reduction targets			
ETS reduction target (compared to 2005)	%	-47	-62
Effort Sharing reduction target (compared to 2005)	%	-17	-43,7
Absorption Increase Target (LULUCF)	$MtCO_{2eq}$	-27,5	-35,8
Renewable Targets			
Share of RES in gross final energy consumption	%	19	38,4%-39%
Share of RES in gross final energy consumption in transport	%	8	29%
RES share in gross final consumption for heating and cooling	%	20	29,6%-39,1%
Share of hydrogen from RES on the total used in industry	%	0	42%
Energy efficiency targets			
Primary energy consumption	Mtep	145	115 (±2.5%)
Final energy consumption	Mtep	113	94,4 (±2,5%)
Annual savings in final consumption	Mtep	1,4	73,4

Table 1 – *Objectives of the National Integrated Energy and Climate plans as identified by the Fit for 55 Package. The ETS objective is intended at EU level, while other targetsare to be seen at national level. (Source NECP 2023)*

Without considering the emissions under EU ETS which have a EU-wide reduction target[1], in line with the new objectives, national emissions by 2030 relating to the sectors included under the *Effort sharing Regulation* should fall from the current 284$MtCO_{2eq}$ to **194 $MtCO_2eq$[2],** meaning more than 30% compared to 2021 levels. It is important to underline that the reduction target is only the end point of a reduction trajectory with **binding annual targets,** so that any non-compliance in each of the years cumulates over the period 2021-2030.

[1] Equal to -62% compared to 2005, and also includes emissions from the maritime and aviation sectors.

[2] Estimated by applying a reduction of -43.7% compared to the 2005 level of 343.8 MtCO2e and as also indicated in the 2023 NECP proposal https://commission.europa.eu/system/files/2023-07/ITALY%20-%20DRAFT%20UPDATED%20NECP%202021%202030%20%281%29.pdf

In addition, **under current policies,** and taking into account the effects of measures adopted up to 2021, including those defined in the NRRP (National Recovery and Resilience Plan), an emissions gap of more than 10 $MtCO_{2eq}$ already appears in 2021. As shown in the table below, this gap, continues to grow to 52.5 $MtCO_{2eq}$ by 2030 in the absence of further measures.

	1990	2005	2021	2025	2030
			MtCO2 eq.		
Greenhouse gas emissions (excluding LULUCF), of which:	**523**	**594**	**418**	**373**	**350**
ETS Sectors		248	132	124	110
Effort Sharing Industries (ESR)		344	284	263	246
Effort Sharing Objectives (*)			273	241	194
Distance to ESR targets			***10,9***	***22***	***52***

Table 2 – *Historical greenhouse gas emissions and projections under current policy baseline for the ETS and non-ETS sectors. Source: ISPRA - NECP 2023*

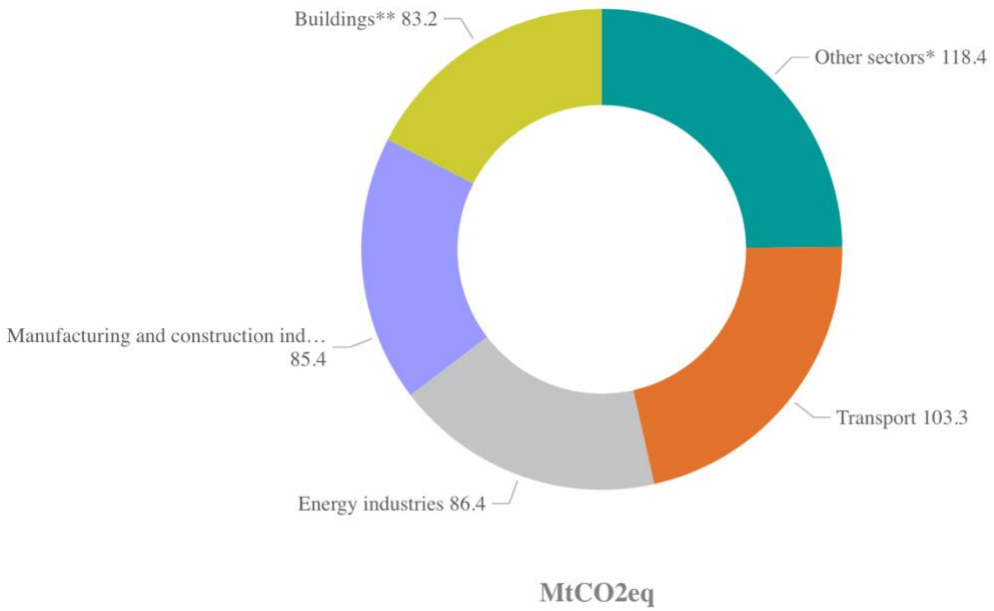

Figure 1 – *Contribution of individual sectors to total GHG emissions in 2021. Consistent with the NECP scenarios and the greenhouse gas inventory, the building sector includes emissions from Agriculture 'energy'; Other sectors include the remaining fugitive and non-energy emissions (Industrial Processes, Agriculture and Waste).*

The Effort sharing sectors, for which it is necessary to achieve annual and binding reduction targets for Italy, include the building and transport sectors, both of which are very significant in terms of emissions, accounting respectively for about 29% and 36% of the total ESR[3] sectors and the industrial sector with installed capacity of less than 20MWt (14% of the total ESR including emissions deriving from industrial processes and the use of products (IPPU)). Agriculture (only non-energy, i.e. livestock and crops, 11%) and waste (7%) are also included (Figure 1).

[3] Source: Table 5.5 https://www.isprambiente.gov.it/files2023/pubblicazioni/rapporti/rapporto_384_2023_le-emissioni-di-gas-serra-in-italia.pdf, 2021 data

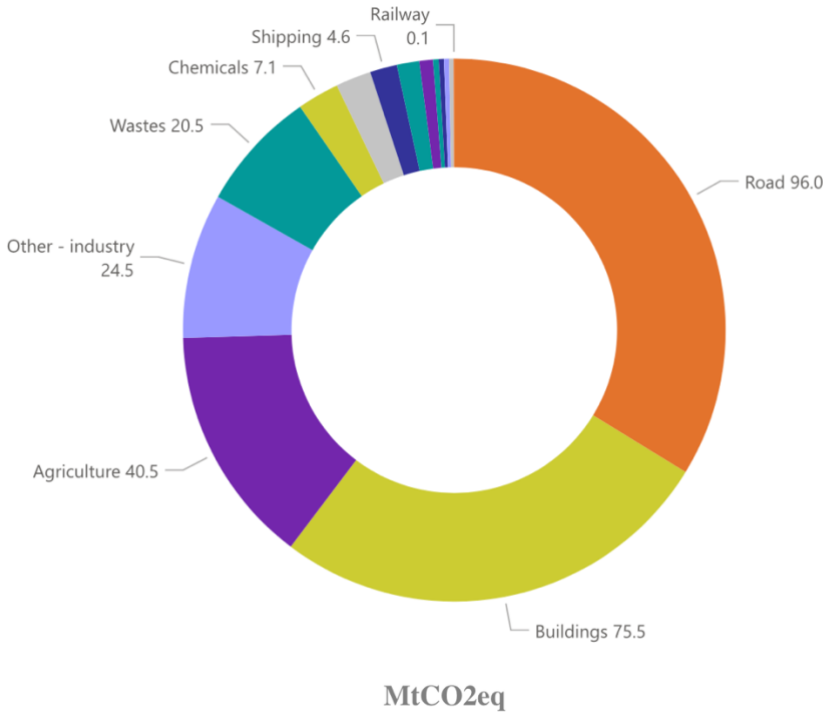

Figure 2 – *Emission contribution of the individual sectors compared to the total included in Effort Sharing. Date 2021. ECCO elaboration on ISPRA2021 data.*

In order to be able to analyse and make alternative or complementary proposals to those currently present in the NECP, a *bottom-up* 2021-2030 emissions scenario has been developed, i.e. **starting from the policies and their expected effect,** in order to highlight their risks and opportunities. The scenario, called ECCO-FF55, has been developed for the four main macro-sectors of energy production and use: power, buildings, industry and transport. These account for 76% of emissions and are the sectors with the greatest abatement potential by 2030. The work is not based on the use of a model, strictly speaking, but on a simplified **bottom-up evaluation methodology developed to associate emission reductions with the policies and measures framework, providing information on their priorities and effectiveness, investment needs and the reform framework needed to enable the transformation.**

For each sector, the following chapters will show:

1. The main characteristics of the sector, the emission share, the historical trends and the main drivers of these trends.
2. The main differences compared to the NECP2023 scenario.
3. The policies underpinning the ECCO scenario, highlighting priorities and, where possible, integrating cross-cutting dimensions, in particular the financing of measures.

Attached to the document, a table is provided with concrete examples of 'flagship measures' for each sector, which shows the information that would be necessary to be able to **accompany each measure from its design to its implementation.** Where possible, indicators for monitoring the measures have also been indicated.

The paper does not assume scenarios for process emissions from industry (7%), the LULUCF sector (Land Use, Land-Use Change and Forestry) (6% as removals), agriculture (9.6% energy and non-energy): for these sectors the scenario data have been taken as they are from NECP2023. Similarly,

the production potentials of biofuels were assumed to be equal to those of the NECP and a sensitivity analysis was carried out.

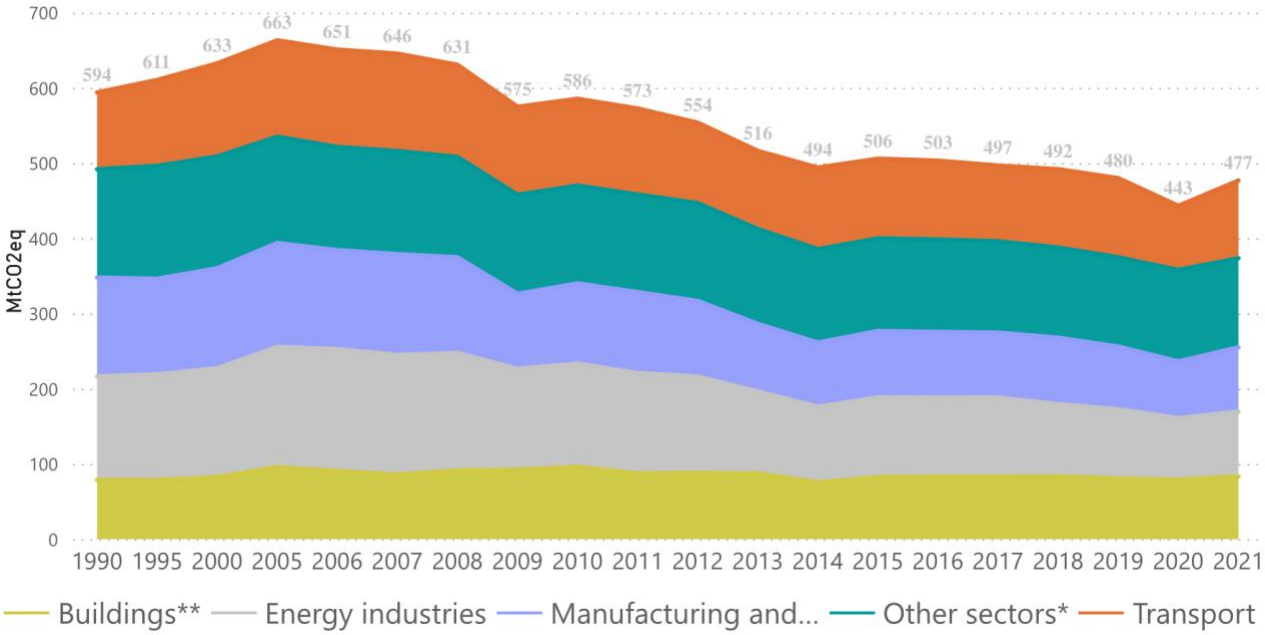

Figure 3 – *Historical evolution of GHG emissions by sector, excluding LULUCF. Other sectors* includes emissions from other energy and fugitive uses, agriculture (livestock and crops) and waste - Source: ECCO elaboration on UNFCCC data [MtCO2eq]*

The ECCO-FF55 scenario considers **Italy's commitment at the G7 towards a substantially decarbonised power system by 2035[4],** enhancing the results obtained from the dedicated modelling exercise. In addition to adhering to the commitments Italy made at the international level, this methodological choice is based on the need to **facilitate the transition across all economic sectors.** In general terms, within the energy consumption sectors, the main *drivers* of reduction are energy efficiency, the electrification of energy consumption, and the production and use of green hydrogen in hard to abate industries.

Only a competitive and decarbonised power system that guarantees stability and energy security for households and businesses can concretely enable the decarbonisation of the country 's energy consumption sectors and economic system. The ability to envision a new power system, able to effectively support the rapid uptake of renewables with appropriate and innovative solutions for stability and supply security forms, represents the foundation of a plan capable of achieving the objectives and aligning the country with the committed decarbonisation pathway.

Given the strategic relevance of the decarbonisation of the power sector, the ECCO-FF55 scenario is based on a modelling analysis explicitly developed for the power sector and fully integrates its results into the overall reduction scenario (i.e the ECCO-Artelys scenario).

[4] Comuniqué 2023 https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/20/g7-hiroshima-Leaders-communique/#:~:text=We%20reaffirm%20our%20commitment%20to,temperature%20rise%20within%20reach%20and, which recalls the communiqué of the previous year https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Europa_International/g7_climate_energy_environment_ministers_communique_bf.pdf

In the period 2021-2030, the ECCO-'*Fit For 55' (*ECCO-FF55) scenario envisages an overall reduction of **-54.5%** in GHG emissions **compared to 2005[5],** reaching a value of **270 MtCO2eq by 2030,** compared to **312 $MtCO_{2eq}$** in the NECP (cf. Table 84 of the NECP 2023), achieving the reduction targets set out in the 'Fit for 55' package for Italy.

According to the results of the ECCO-FF55 scenario:

- The sector contributing most significantly to the reduction is the **power sector**, which, accounts for 37% of total reductions. Here, the primary *drivers* include the robust penetration of renewables in the power system, as assumed in the ECCO- Artelys scenario.
- As far as energy emissions from the **manufacturing industry** are concerned, they contribute to the reduction by 22%[6]: the primary *drivers* considered for this sector include leveraging the **electrification** potential for medium to low-temperature process heat, targeting the use of biomethane in energy-intensive sectors, exploiting **green hydrogen** generated through the decarbonisation of the power system, and initiating the decarbonisation process of the **former ILVA of Taranto plant[7].**
- The **transport** sector contributes for 20% of the reductions. The envisaged measures primarily focus on **reducing the demand for private transport** through the *implementation* of policies outlined in the NRRP (National Recovery and Resilience Plan) and various planning tools for sustainable mobility. In this context, certain proposed amendments to the NRRP (National Recovery and Resilience Plan) regarding mobility measures are critically highlighted alongside the emphasised need for highly effective *governance* of the Plan in coordination with local government levels to ensure the successful implementation of these measures. The expected **increase in the number of Battery Electric Vehicle (BEVs)** in the fleet to 3.5 million cars is lower than the NECP's projection of 4.3 millions, despite policies being more focused towards fleet electrification. Regarding the **shipping sector,** reductions are anticipated due to the implementation of the NRRP (National Recovery and Resilience Plan) investments in electrifying national port docks (i.e. cold ironing) and partially replacing the ferry fleet for shipping people and vehicles to and from the islands[8].
- In the **building sector[9],** the contribution to the overall reduction amounts to approximately 16%. The principal drivers are the **enhanced electrification** of final consumption, achieved through the accelerated replacement of traditional heating systems with (exclusively) electric heat pumps, and an increase in the rate of **renovations up to 2030** from the current value of 0.37% to 4% by 2030. This represents a significant increase compared to the rate of 1.9%

[5] Reference year for EU climate and energy policies. This translates to 48% compared to 1990 emission levels, the basis for communicating the EU's commitment to the Paris Agreement. This is Italy's contribution to the Union's total contribution, which amounts to -55% compared to 1990 levels.

[6] On the basis of ECCO calculations, it is estimated that the push for electrification contributes to a reduction in particularly in the ESR sectors, which saw emissions reduced by 38% compared to 2005.

[7] In order to be consistent and to make comparisons, in line with the emission scenarios of the NECP, the emissions relating to the former ILVA of Taranto are counted partly in the energy industries sector (for the share relating to the production of coke) and, in part, in the industrial sector (for the production of steel from blast furnaces).

[8] This last contribution, considered in ESR, will have to be quantified as an ETS following the inclusion of the sector in the EU ETS, as provided for in the last revision of the Directive.

[9] It should be noted that, with regard to the 'energy' emissions of the agricultural sector which, following the classification of the inventory, are 'merged' with the civil sector, no specific measures have been envisaged, although the potential for reduction is quite significant (the sector emits about 7MtCO2eq). While respecting the objectives of the RED Directive, it could be envisaged to allocate at least part of the potential biofuels for heating and traction of agricultural machinery, moving the current SADs for the promotion of alternative fuels.

assumed in the NECP for the period 2021 to 2030. The measures supporting this scenario include targeted incentives for deep renovations and replacement of heating systems, based on a reform hypothesis for the current eco and superbonus mechanisms promoting energy efficiency.

The scenario accounts for the emission trends and the historical inertia observed within individual sectors, whilst identifying a framework of priority measures. These measures are distinctly aimed at bridging the emissions *gap* identified in the NECP, especially for the *Effort sharing* sectors, notably in transport, building and industry.

	2005	2030	
		NECP	ECCO-FF55
		MtCO2eq	
From ENERGY USES, of which:	**488**	**232**	**189**
Energy Industries	160	51	41
Industry (including manufacturing other comb.)	92	41	34
Transport	128	77	64
Building sector	96	56	43
Of which agriculture*	9,2	7	7
Other energetic and fugitive uses	12	7	7
From OTHER SOURCES, of which:	**106**	**81**	**81**
Industrial Processes	46	33	33
Agriculture (cultivation and livestock)	35	32	32
Waste	24	16	16
Total (excluding LULUCF)	**594**	**312**	**270**
LULUCF	-36	-35	-35
Of which ESR	**344**	**216-223**	**193**
Distance to ESR targets		**22-29,1**	**-1**

Table 3 – *Historical evolution of GHG emissions by sector (source: ISPRA) and emission scenario for 2021-2030 (source: ECCO elaboration)*

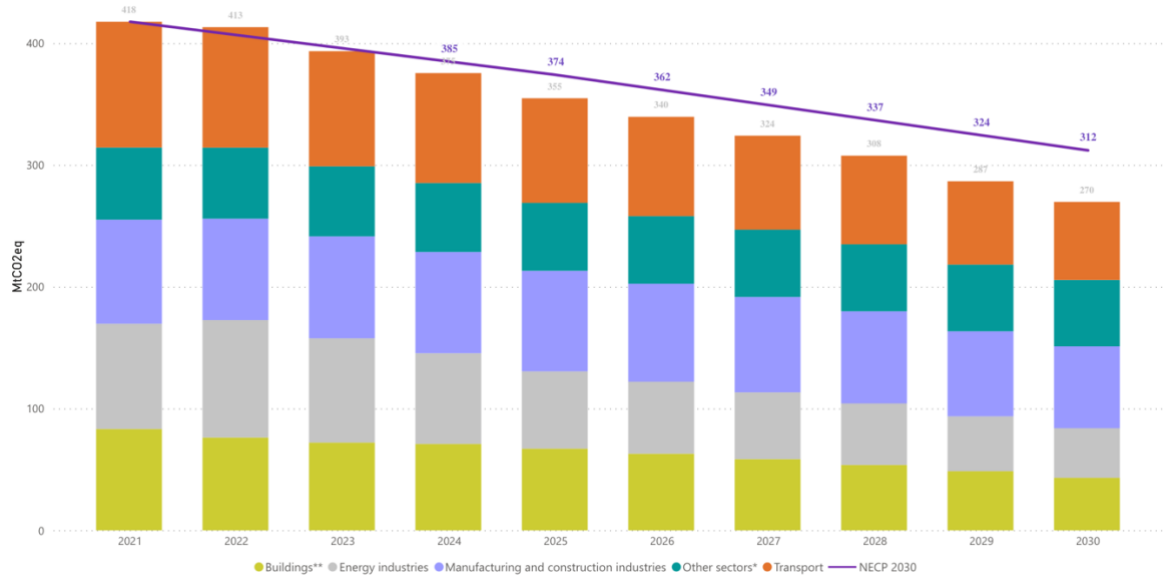

Figure 4 – *ECCO-FF55 emission scenario for 2021-2030, excluding LULUCF, and comparison with NECP scenario - Source: ECCO elaboration [MtCO2eq]*

TRANSPORT SECTOR

The main features of the transport sector

- In 2021, greenhouse gas emissions from the transport sector account for 103.3 million metric tons of CO2 equivalent (MtCO2eq) and represent 24.5% of the national total. Road transport accounts for 93% of transport total, with emissions from private cars mobility dominating (60%). Transport emissions have increased since 1990.
- Italy's motorization rate, 672 cars per 1000 inhabitants in 2022, is the second highest in Europe. The adoption of pure battery electric vehicles (BEVs) is very slow compared to other major European economies. On average, the annual rate of new registrations for BEVs in Italy is less than 4%, notably lower than the European average of over 10%.
- Around 77.6% of citizens' journeys in Italy occur within urban areas, typically ranging from 2 to 10 kilometers in distance. Additionally, approximately 60% of these journeys are systematic, meaning they occur regularly throughout the week.

The greenhouse gas emission reduction scenario

- In the ECCO-FF55 scenario, emissions from the transport sector are projected to amount to 64.1 MtCO2eq by 2030. This represents a significant reduction of 50% compared to the 2005 levels. The largest contribution to this reduction comes from road transport emissions, which are expected to decrease by 51.5% compared to 2005 levels.
- Compared to the NECP 2023 scenario, which forecasts transport sector emissions at 76.8 MtCO2eq in 2030, the ECCO-FF55 scenario achieves an additional reduction of 12.8 MtCO2eq by 2030.
- Instead of the NECP's goal of 4.3 million BEVs, the ECCO-FF55 scenario projects a maximum of 3.5 million BEVs by 2030. This adjustment is based on considerations of historical sales trends and the assumption of a **more impactful purchase incentive scheme** in the ECCO-FF55 scenario.
- The ECCO-FF55 scenario assumes by 2030 10% fewer vehicles in the circulating fleet and an average 15% reduction in mileage compared to 2021. The NECP does not quantify reductions in the rate of motorization and in the expected demand for private mobility.
- In the absence of other official sources, the ECCO-FF55 scenario considers the same amount of biofuels as in the NECP. However, the ECCO-FF55 scenario provides a **sensitivity analysis** with respect to the potentials assumed in the NECP and the consequences on emission reductions.
- For the shipping sector, the combined effect of port dock electrification measures provided for by the NRRP (National Recovery and Resilience Plan) and the partial replacement of the passenger ferry fleet with electric technologies were assumed.

Which policies by objective

- While the NECP scenario refers to current policies, the ECCO-FF55 scenario evaluates the **effects of targeted and synergistic** packages of measures aimed at promoting the electrification of the road vehicle fleet and reducing inefficient private transport demand. These measures include:
    - ***Electrification of the circulating fleet***:
        - Targeted car purchase incentives for electric vehicles only (BEV-*Battery Electric Vehicles)*.
        - Tax incentives to encourage electrification of corporate fleets.
        - Expanding the public fast charging network to support EV usage.
        - Rationalizing car taxation to incentivize the adoption of EVs.
    - ***Demand reduction (number and mileage of private vehicles):***
        - Rationalization of fuel taxation.
        - Increasing the provision of infrastructure and public transport alternatives to the private car for sustainable mobility.
        - Regulating urban circulation to restrict the use of polluting vehicles.

Priority Enabling Policies

- **Targeted allocation of public resources:**
    - **Reform of the Prime Ministerial Decree of 6 April 2022 on car purchase incentives** to support the sales of BEVs only. Extra-bonus provided under the new scheme are linked to both the income level of citizens' and vehicle efficiency. The reform includes subsidies for the installation of private and domestic Wallboxes for charging BEVs.
    - **Reform of taxation for company cars** (deductibility and taxation of fringe benefits) according to a bonus-malus system based on CO2 emission parameters, i.e. 100% deductibility for BEV vehicles.
    - **Reform of car taxation** (registration and ownership) by adopting progressivity criteria according to vehicle emission parameters.
- **Regulatory measures – coherence of the governance framework**
    - **Update of the National Plan on Electric Vehicle Charging Infrastructure (PNIRE),** and finalization of fast and ultra-fast charging infrastructures as envisaged by Mission 2, Component 2, Investment 4.3 of the NRRP.
    - **Completing the projects and installations outlined in the National Recovery and Resilience Plan** for Mission 2 Component 2 and Mission 3 Components 1 and 2, as well as the Complementary National Plan, the Social Cohesion Fund, the 2022 Budget Law.
    - **Addressing delays in implementing regulatory measures on traffic restrictions for polluting vehicles,** as stipulated in Article 7, paragraph 9 of the Codice della Strada amended by Law Decree 78 of 2022 (Article 7.1).

In 2021, the transport sector recorded 103.2 MtCO2eq of GHG emissions, equal to 24.5% of the national total[10], up 1% compared to 1990. Road transport accounts for 93% of the total, with cars emissions (60%) dominating, followed by truck and bus (19%), light commercial vehicles (11%), motorcycles (3%).

[10] Considering energy emissions alone, i.e. net of process emissions typical of industry, the transport is the leading sector in terms of emissions, accounting for 31% of the national total.

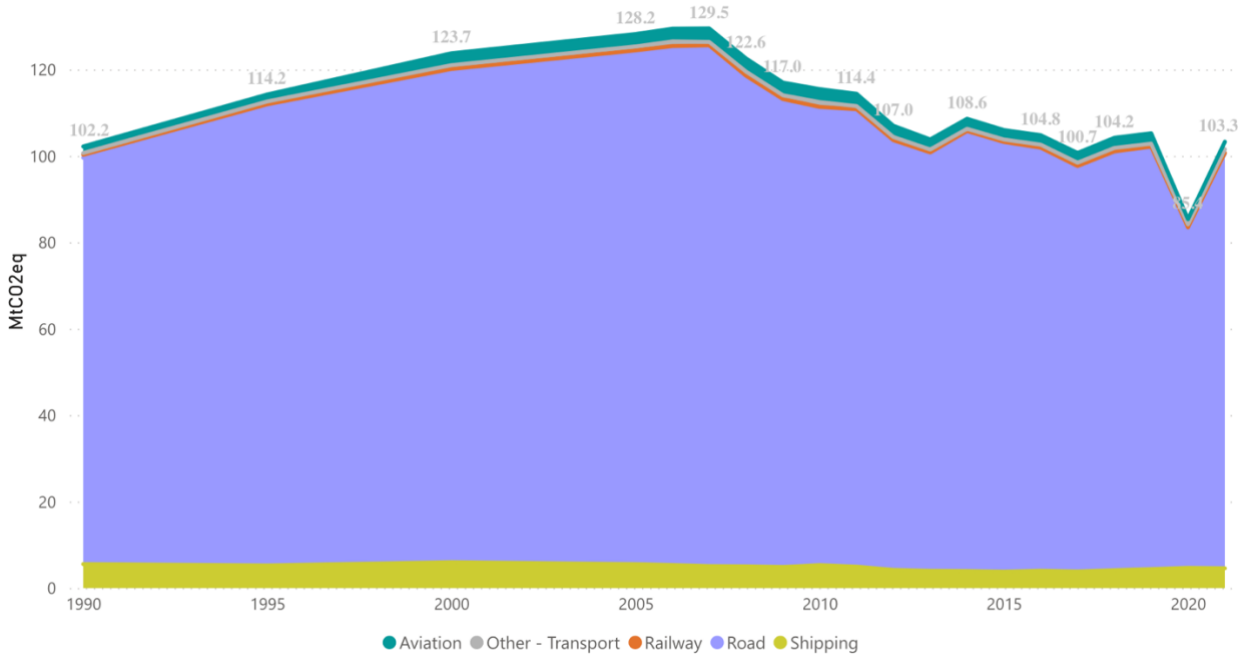

Figure 5 – *Greenhouse gas emissions from transport 1990-2021 (MtCO2eq) – Source: Data processing from ISPRA National Emissions Inventory*[11]

Regarding road transport, based on ISPRA database of average emission factors for the vehicle fleet on the road[12], the specific emissions of passenger cars result around 165 gCO2/km. For light commercial vehicles, the figure is 243 gCO2/km, which becomes 668 gCO2/km for trucks and 727 gCO2/km for buses. Two- wheelers have an average specific emissions of 99 gCO2/km.

TYPE OF VEHICLE	BILLION OF vehicle-km	EMISSIONS (MtCO2)	AVERAGE SPECIFIC EMISSIONS (gCO2/km)
Car	**390,71**	**64,52**	**165,14**
Petrol	108,99	17,64	161,89
Diesel	230,08	38,48	167,26
LPG Bifuel	24,67	4,27	173,00
Bifuel Methane	13,55	2,44	179,99
Diesel Plug-in Hybrid (PHEV)	1,90	0,27	140,82
Gasoline Plug-in Hybrid (PHEV)	1,39	0,18	127,82
Gasoline Hybrid (HEV)	9,07	1,24	136,66
Electric (BEV)	1,05	0,00	0,00
Light commercial vehicles	**49,00**	**11,92**	**243,30**
Truck	**26,70**	**17,84**	**668,39**
Bus	**4,03**	**2,93**	**727,04**
Motorcycle	**28,53**	**2,83**	**99,31**

Table 4 – *Mileage, total emissions and specific emissions of road vehicles Source: ISPRA/Copert data processing.*

[11] https://unfccc.int/ghg-inventories-annex-i-parties/2021

[12] The database of average emission factors for the vehicle fleet in Italy (isprambiente.it)

From an energy point of view, in 2021 the final energy consumption of the sector was 35.2 million tonnes of oil equivalent (Mtoe), of which 33.7 Mtoe as petroleum refining products (95% from imported crude). More than 90% of consumption is associated with road transport, with a preponderant share of private cars (61%), followed by heavy transport by trucks and buses (19%) and transport by light commercial vehicles (11%).

As of 2022, the national car fleet comprised about 40 million cars, mainly petrol and diesel[13]. The Italian average motorisation rate of 672 cars per 1,000 inhabitants is well above the European average (567 cars/1000 inhabitants)[14].

The private car is the most popular mode of transportation for Italians. According to Isfort's Audimob surveys for 2022[15] (with partial data for the first half of the year), approximately 64% of total journeys were conducted using private cars. Among these journeys, approximately 77.6% occurred within urban areas and covered distances of less than 10 kilometers. In terms of purpose, work-related travel accounted for 32.4% of total journeys, while family-related travel (including trips to school) constituted 32.1%, and leisure travel represented 30%. The majority of these journeys were systematic and occurred regularly on weekdays, with around 60% taking place during peak hours.

In 2022, the car market performance saw the registration of 1.3 million new cars, a figure that has remained relatively constant since 2020. Among these registrations, vehicles in the CO2 emission range between 61 and 135 gCO2/km were prevalent, accounting for 66.7% of the total. A significant portion of these vehicles were electrified HEV hybrid models, totaling 448.2 thousand units, primarily running on petrol. The breakdown of new registrations by fuel type is as follows: 365.3 thousand traditional petrol models, 257.8 thousand diesel models, 118.1 thousand LPG models, and 10.7 thousand CNG models. Additionally, there were 67.3 thousand new registrations of PHEV plug-in hybrid cars and 49.2 thousand of BEV battery electric vehicles.

The historical trend of the BEV market in Italy shows a rapid increase starting from 2019, reaching a peak in demand in 2021, when a bonus incentive scheme was in force for promoting this type of vehicles, including those purchased on a leasing base. With the entry into force of the **Prime Ministerial Decree** of 6 April 2022 for incentives, which reduced the amounts granted compared to the 2021 scheme, there was a **sharp slowdown of the BEV car market,** with a 27% reduction in sales compared to the previous year.

In the first eight months of 2023, there were 40.8 thousand new BEV registrations (+33% compared to the same period in 2022). Despite this growth, **in comparison with other European countries Italy still lags behind:** as of July 2023, BEV registrations in Germany reached 270 thousand units, 155 thousand in France, 176 thousand in the United Kingdom.

Regarding EV charging infrastructure, as of September 2023, Italy had 47,288 charging points for electric vehicles installed, marking a significant increase of 44% compared to the same period in 2022. These charging points are distributed across 26,069 stations located in over 17 thousand locations, primarily on public land. The distribution of charging infrastructure across different regions

[13] ACI Studi e ricerche - Autoritratto 2022
[14] Motorization rates in the EU, by country and vehicle type - ACEA - European Automobile Manufacturers' Association
[15] 19th Report on the Mobility of Italians – ISFORT

shows a higher concentration in the northern regions and Lazio, compared to the central and southern regions as well as the islands[16].

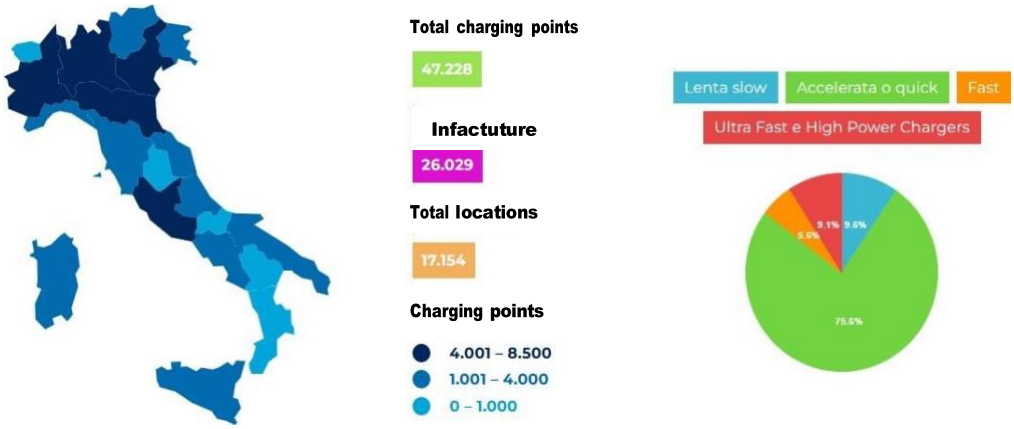

Figure 6 – *Charging infrastructure in Italy (Source: Motus-e)*

DESCRIPTION OF THE ECCO-FF55 SCENARIO

Given the significant contribution of emissions from road mobility, the ECCO-FF55 scenario analysis and simulations focused primarily on this sector, particularly emphasizing variables with substantial decarbonization potential:

1. Electrification of the vehicle fleet[17];
2. Reduction in the number of vehicles and average mileage.

The **ECCO-FF55 scenario** quantifies the impact of policies aimed at further promoting the electrification of passenger cars fleet, which translates into **3.5 million BEV vehicles** on the road by 2030. The estimate aligns with a **realistic sales trend** for these vehicles in the upcoming years, assuming the implementation of a **renewed and more impactful incentive scheme for BEV purchase** coupled with the expected decrease in the purchase costs of these vehicles.

[16] Market Analysis - Motus-E
[17] Q&A Auto elettrica - ECCO (eccoclimate.org)

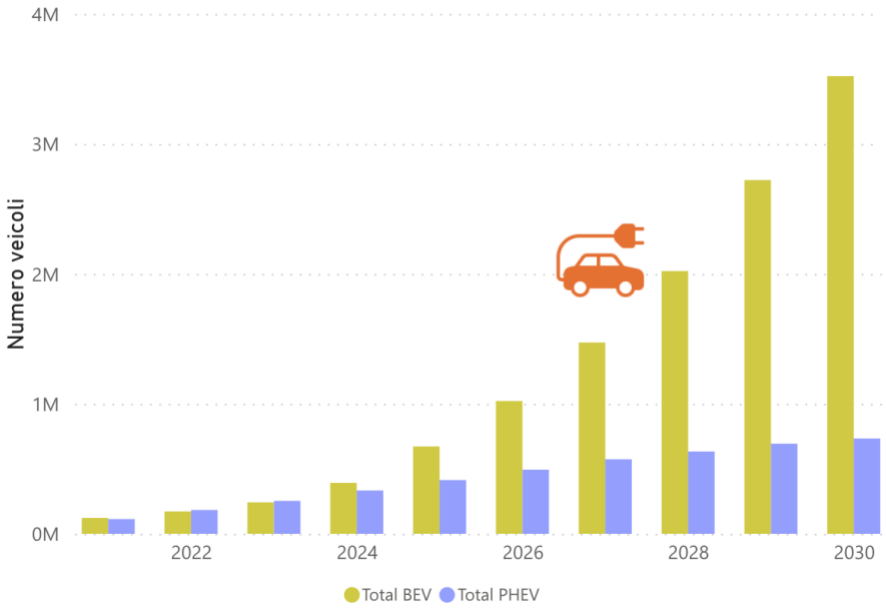

***Figure 7** – BEV and PHEV fleet in the ECCO-FF55 scenario*

In addition to the electrification of the car fleet, the scenario estimates the effect of an average **reduction of 10% in the circulating fleet compared to 2021,** for a total of about 4 million fewer cars[18]. This reduction aims to realign the country with the European average motorization rate[19] and is in line with the ambitions outlined in Italy's long-term strategy for greenhouse gas emission reduction in a trajectory compatible with the ambitions of the *Italy's long-term strategy on the reduction of greenhouse gas emissions*[20], which estimates 24 million vehicles on the road by 2050. Additionally a **15% reduction in average vehicle mileage** compared to 2021 values is also taken into account

In these assessments, the scenario takes into account the effects associated with expanding the availability of mobility services as alternatives to private cars. This is achieved through the implementation of projects outlined in the NRRP (National Recovery and Resilience Plan), particularly focusing on rapid mass transport, digitalization, enhancement of public transport in urban areas, growth of *sharing mobility* services. Additionally, the scenario considers the effects of the implementation of fiscal policies aimed at discouraging car ownership and usage, along with policies to regulate the circulation of polluting vehicles, particularly in urban areas[21].

Regarding the utilization of biofuels, the scenario relied on the potentials outlined in the NECP. However, a **sensitivity analysis was conducted** to assess the risks associated with achieving these targets, which are not assured, as emphasized in the NECP itself. The primary objective of this analysis was to uncover any risks originating from the possibility of overestimating the potentials of biofuels. According to the ECCO-FF55 scenario, **greenhouse gas emissions from the sector are projected to**

[18] In this configuration, the scenario considers an increase in the emission efficiency of the circulating fleet of 5% on average by 2030 compared to 2021. The estimation is based on: i) analysis of the historical trend of emissions of the vehicles and expected progress as a result of the new emission standards in place for cars and vans, as well as for heavy-duty vehicles; ii) projections of the main baseline studies.
[19] Passenger cars in the EU - Statistics Explained (europa.eu)
[20] LTS_Gennaio 2021 (mase.gov.it)
[21] The assessments also take into account the effects of changes in fuel prices expected from the introduction of the new ETS2 Regulation, as well as the effects of demographic dynamics and other macroeconomic variables (EU Reference Scenario 2020 (europa.eu)).

reach 64.1 MtCO2eq by 2030, marking a 50% reduction compared to 2005 levels (38% reduction compared to 1990 and 37.3% reduction compared to 2021)[22].

Compared to the NECP 2023 scenario, the ECCO-FF55 scenario shows a further 20% reduction in emissions (76.9 vs 64.1 $MtCO_2eq$), despite a lower penetration of electric cars in the circulating fleet. The difference is attributable a more ambitious implementation of policies aimed at offering more effective sustainable mobility services as alternatives to private cars, along with measures to discourage private car usage. **The main contribution to emissions reduction comes from road which sees a decrease of 51.5% compared to 2005 levels and 40.1% compared to 2021 levels.**

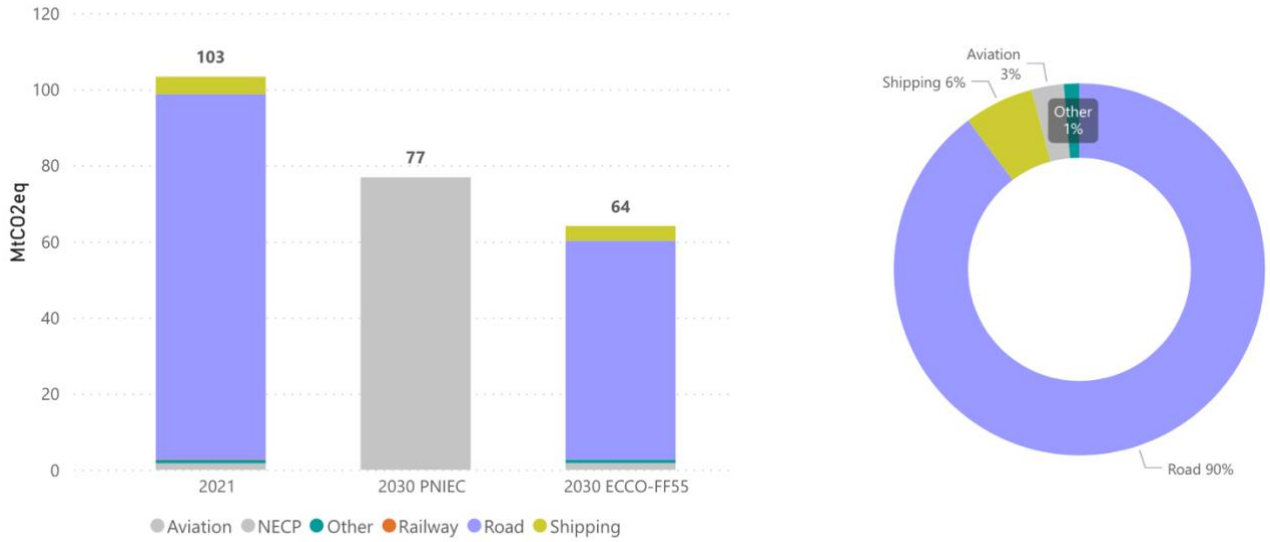

Figure 8 – *Transport emissions by mode (MtCO2eq) and % contributions to 2030 in the ECCO-FF55 scenario. Source: ECCO elaboration*

From an energy perspective, in the **ECCO-FF55 scenario the sector's consumption expected in 2030 amounts to 29.5 Mtoe,** compared to 32.6 estimated by the NECP 2023 scenario. Also in this case, the main contribution relates to the reduction of consumption in the road sector, which falls from 32.9 Mtoe in 2021 to 23.9 Mtoe in 2030, with a reduction of 27% and an incidence on the total of 81%, compared to the 87% registered in 2021.

[22] Including consumption for international aviation.

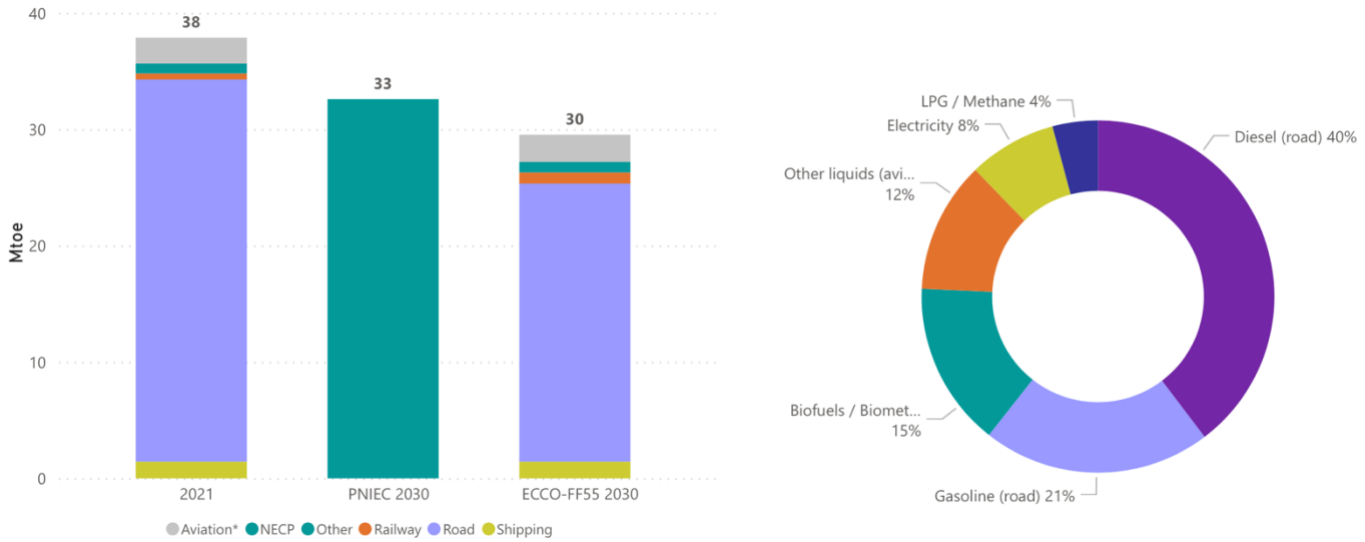

Figure 9 – *Transport energy consumption by mode (Mtoe) and fuel contributions in % in the ECCO-FF55 scenario. Source: ECCO elaboration*

Disaggregated by **energy source,** out of the 29.5 Mtoe of final consumption registered by ECCO-FF55 scenario, the share from fossil fuels accounts for a total of 22.7 Mtoe, 84% of which is used to power ICE vehicles (diesel 52%, petrol 27%, LPG and methane 5%), while 16% concerns consumption in the shipping and aviation sectors. Estimates of **total electricity consumption amount to 2.4 Mtoe, approx. 27.7 TWh,** of which 40% is associated with rail modes, 28% with road vehicles, and 32% with other modes of transport. The consumption of liquid biofuels and biomethane as included in the scenario relates to the 4.46 Mtoe assumed by the NECP.

Consumption of biofuels

In the ECCO-FF55 scenario, the consumption of biofuels matches the ambitions of the NECP, for a total of 4.46 Mtoe by 2030. Out of this amount, 63.4% (2.83 Mtoe) are liquid fuels (mainly biodiesel), one third of which is from feedstock competing with food and feed supply chains (*single counting*), and two thirds from the processing of waste (*double counting*, both advanced and non-advanced). Of the total amount of biofuels, 27.8% is advanced biomethane, whose contribution estimated by the NECP is 1.24 Mtoe. The remaining 8% are *Renewable Fuels of non-biological origin* (RFNBO, 0.39 Mtoe). Added to the electricity consumption from renewable sources as estimated in the ECCO-FF55 scenario, the overall scenario contribution of renewable energy sources from transport (RES-T) equals 6 Mtoe.

Calculated under the new RED III Directive (Renewable Energy Directive), this contribution amounts to about 33% of the total transport energy consumption estimated in the scenario, against the minimum target of 29% set by the directive. In terms of **saved emissions, the contribution of RES-T in the scenario amounts to 22% of the total, compared to the minimum 14.5% required by the directive.**

Considering the analysis of biofuel potentials outlined in the dedicated Box below, it appears prudent to reassess the assumed scenario hypothesis even for reduced quantities of biofuels through a sensitivity analysis. If the Renewable Energy Sources in Transport (RES-T) consumption of the ECCO-FF55 scenario were adjusted to meet the minimum targets of the Renewable Energy Directive III (RED III), it would necessitate reducing biofuel consumption by approximately 1.4 million tonnes of

oil equivalent (Mtoe). Consequently, this reduction would lead to an increase in scenario emissions of approximately 4.5 MtCO2e. This increase would raise the total emissions of the ECCO-FF55 scenario for the sector to 68.6 MtCO2eq, a value that is still **well below the emissions projected by the NECP2023 scenario** and still in line with European decarbonisation targets.

Given the particular complexity decarbonizing the transportation sector and the **relatively ineffective strategies implemented thus far in Italy**, it is advisable to intervene with a more targeted adjustment of various reduction strategies. This involves emphasizing the reduction of inefficient transport demand within a framework that balances with other solutions.

A comprehensive strategy might entail **reducing forecasted biofuel consumption while prioritizing the development of production chains for the most promising advanced biofuels**. This approach seeks to diminish the country's dependence on imported biomasses, a key objective of the Plan.

BOX – BIOFUELS AND THE NECP

The latest updates in the RED III regulatory framework[23] underscore the significance that the European legislature places on biofuels in attaining the 2030 road transport emission reduction objectives. However, the regulation's rationale refers to the necessity of limiting this contribution, with provisions for gradually transitioning its usage to ships and aircraft, as evidenced by the distinct bonus coefficients designated for these sectors. The potentials of biofuels in the NECP are explored below, given their substantial contribution to decarbonizing the transport sector (33% final consumption in the NECP compared to 29% in the RED III), even surpassing the ambitious targets established by the RED III.

Biofuels in the NECP

In the NECP 2023 scenario for transportation, the estimated consumption of biofuels amounts to approximately 4.1 Mtoe and to an additional 0.39 Mtoe of other synthetic fuels of non-biological origin, referred to as RFNBOs, bringing the total to 4.46 Mtoe. Out of this total, 93.6% (4.17 Mtoe) is used in road transport: 72% of this quantity comprises liquid products (2.63 Mtoe biofuels; 0.36 RFNBO), while 29% is advanced biomethane (1.19 Mtoe).

Biodiesel

The largest part of the over 2,6 Mtoe of liquid biofuels envisaged by the NECP for road transport is biodiesel, **produced in Italy and imported[24]**. For domestic production, the main reference points are Eni's plants in Porto Marghera, Gela and, in the future, Livorno[25], for which an installed production capacity of about 1.7 million tons is expected as early as

[23] Council and Parliament reach provisional deal on renewable energy directive - Consilium (europa.eu)
[24] In 2021, the consumption of liquid biofuels in Italy was 1.6 million tonnes, of which 1.57 (98%) was biodiesel. In total, 493,000 tons of biodiesel were produced domestically (31% of the total), but only 92,000 tons with local feedstock (6% of the total). 41% of the liquid biofuels released for consumption in Italy are produced with raw materials from China and Indonesia (cf. Energy in Transport 2005-2021.pdf (gse.it))
[25] The European Commission did not allow the financing of these projects with Community funds under REPowerEU in the NRRP funding review process.

2025[26]. To supply the plants, large quantities of **vegetable oil from agricultural raw materials grown in African countries**[27] are expected to be imported. Further biomass imports will involve Asian countries, particularly China and Indonesia, encompassing **both agricultural biomass[28] and biomass sourced from waste and refuse [29]**.

Considering the significant reliance on foreign imports for supplies, it appears less risky to decrease the quantities of consumption outlined in the NECP. This reduction could be achieved by implementing a **structural decrease** in consumption and emissions from private road transport while promoting and incentivizing effective sustainable mobility policies.

This approach becomes even more advantageous, particularly given the uncertainties surrounding the actual climate benefits of biofuels[30], including biodiesel derived from castor oil[31], along with the collective **costs associated** with subsidizing their production[32].

Biomethane

Regarding **biomethane,** the NECP projections indicate a final consumption across all sectors of 5 Mtoe, equivalent to approximately **5.7 billion cubic meters** of annual production by 2030. This **theoretical potential** is based on forecasts for further development of production chains, including *the* technological *upgrade* of biogas plants currently in operation. For transport, the consumption target is set at 1.24 Mtoe, equivalent to approx. 1.4 billion cubic meters of gas, or about a quarter of the estimated theoretical potential.

According to a study by ENEA (Italian National Agency for New Technologies) in 2019[33], the technical potential of advanced biomethane that can be produced in Italy amounts to approx. 4.2 billion cubic metres, or 3.7 Mtoe of energy, even without considering environmental and economic evaluations of possible alternative-competitive uses of agricultural biomass used in the production process. Even more conservative estimates

[26] 2023 Capital Markets Update & 2022 Full Year Results (eni.com). The company's plan calls for a capacity installed global production of more than 5 million tonnes of biorefining products by 2030 (see Appendix I). Eni's evolution: the long-term Strategic Plan to 2050.

[27] The reference concerns Eni's agri-feedstock projects in Africa, which envisage production in Kenya and Congo – and planned in Angola, Côte d'Ivoire, Mozambique and Rwanda – with the stated aim of supplying the company's biorefineries with over 700 thousand tonnes of castor oil by 2026 (cf. Agri-feedstock projects in Kenya and Congo | Eni). There are no known ILUC impact studies of these projects.

[28] Approximately one third of the biodiesel consumption envisaged by the NECP relates to so-called single-counting products, i.e. products derived from agricultural raw materials.

[29] The reliability of certification of origin for imported biomass derived from refuse and waste remains a concern due to potential fraud. Evidence supporting this concern can be found in reports such as the 2019 Report of the European Anti-Fraud Office (The OLAF report 2019 - Publications Office of the EU) and the 2016 Special Report of the European Court regarding the EU system for the certification of sustainable biofuels (The EU system for the certification of sustainable biofuels). A 2019 fact-checking survey conducted by the Italian Parliament further emphasized the real risk of adulteration of imported waste biomass at its origin with virgin vegetable oils, such as palm oil, to gain access to higher incentive quotas. Specifically, concerns about fraud pertain to imports of used cooking oil (UCO) and palm oil mill effluent (POME) (Parliamentary Acts camera.it).

[30] Environmental sustainability of biofuels: a review - PMC (nih.gov);

[31] The CO2 emission savings of biodiesel produced from castor oil are estimated to be just over 60% compared to the emissions of conventional diesel (cf. Life cycle assessment of biodiesel production from selected second-generation feedstocks.

[32] Activity Report 2021 (ESM)

[33] Theoretical potential of advanced biomethane in Italy (enea.it)

come both from a study conducted by the Italian Biogas Consortium (CIB)[34], which suggests the actual potential is around **2.7 billion cubic meters less than projected in the NECP** and a study by the Green Bocconi Renewable Gas Observatory[35], indicate that the economic potential of biomethane ranges between 2 and 2.5 billion cubic meters in total.

In light of the aforementioned findings, it would be advisable to lower the potentials envisioned by the NECP. Moreover, meticulous monitoring of the quantities produced should be prioritised, especially concerning biodiesel and biomethane. **Contingency measures** should also be considered in the event that the projected potentials are not achieved.

POLICIES AND MEASURES UNDERPINNING THE ECCO-FF55 SCENARIO

Considering the significant emissions from road transport, the policies and measures outlined in the ECCO-FF55 scenario concentrated on the anticipated impacts on variables with the highest potential for decarbonization. This includes increasing vehicle electrification and decreasing the number of vehicles in the circulating fleet, as well as reducing average mileage, ultimately aiming to diminish the demand for private transport. The following packages of measures were deemed necessary to achieve this outcome.

Car Purchase Incentives

In terms of electrifying the vehicle fleet, simulations were conducted on the expansion of the market for pure battery electric cars (BEVs) in response to changes introduced to the DPCM of 6 April 2022, aimed at incentivizing the demand for non-polluting vehicles[36]. Specifically, **it was assumed that a reform of Prime Ministerial Decree would prioritize the sales of BEVs exclusively** [37] This would involve allocating incentives only to vehicles within the 0-20 gCO2/km emission range, alongside the introduction of income-based bonuses. Additionally, incentives would be provided for selecting more efficient and smaller vehicles. The series of measures considered can be summarized as follow:

- Incentives provided exclusively for the purchase of M1 vehicles (cars) in the 0-20 gCO2/km emission range.
- Increase in the unit value of incentives granted, similar to the scheme in force in 2021 – Expansion of purchase-related scrappage to include EURO5 vehicle categories - Introduction of bonus incentives for the purchase of more energy-efficient vehicles, particularly those in segments A and B.
- Introduction of premium incentives to assist individuals with medium and low incomes (based on ISEE Declarations), or implementation of a social leasing scheme similar to the French model.
- Expansion of access to incentives for legal entities for rental/leasing purposes.
- Expansion of incentives to support the installation of private and domestic charging infrastructure, including Wallbox).

[34] Potenzialità_biometano_Italia_DEFINITIVO.pdf (consorziobiogas.it)
[35] Quotidiano Energia
[36] Ecobonus (mise.gov.it)
[37] Electric mobility incentives: which ones? - ECCO (eccoclimate.org)

Car taxation

As an additional stimulus for car electrification, the effects of a reform in car taxation have been evaluated. This reform aims to **encourage the adoption of zero-emission cars while discouraging the selection of polluting vehicles**. Specifically, the proposed reform involves adjusting taxes on purchase (registration) and ownership (vignette) based on CO2/km emissions. Given that these taxes are collected at the regional level and by Autonomous Provinces according to local regulations, it is recommended that the NECP includes the preparation of a comprehensive policy document aimed at revising taxation in collaboration with local governments. This collaborative approach will ensure alignment and consistency in the implementation of taxation reforms across regions and provinces.

Company Fleets

Corporate vehicles represent a significant portion of new car registrations in Italy and are experiencing a growing trend. Additionally, these vehicles tend to have an average mileage that is over twice that of normal private users. The direct adoption of electric company fleets would therefore lead to a substantial and rapid reduction in emissions from private road mobility. Furthermore, considering the average turnover period of a company's fleet, which is typically around 36 months, the adoption of electric company fleets would accelerate the development of the second-hand electric vehicle market. This expansion would enhance the accessibility of electric vehicle technology to a broader range of citizens.

In light of these considerations, the scenario contemplates the **implementation of a tax reform for company car fleets aimed at incentivizing the adoption of zero-emission vehicles**. The key criteria for such a reform include: i) Adjusting the deductibility of costs associated with purchasing or leasing a corporate car based on CO2/km emission parameters, with increased deductibility for Battery Electric Vehicles (BEVs); ii) Revising taxation on car fringe benefits to incorporate a progressive tax structure based on the CO2/km emissions parameters of vehicles. By incorporating these criteria into the tax reform, the scenario seeks to encourage companies to transition towards zero-emission vehicles, thereby contributing to the reduction of emissions from road transportation and promoting the widespread adoption of electric vehicles[38].

Charging infrastructure for electric vehicles

The ECCO-FF55 scenario takes into account the anticipated effects of **expanding the electric charging infrastructure across the national territory**. Recognizing that the perceived lack of a robust charging network can deter consumers from purchasing electric vehicles[39], the scenario prioritizes the **update of the National Plan for electric vehicle charging infrastructure** (PNIRE). The goal is to achieve at least 100,000 stations with 200,000 charging points by 2030. As part of these projections, the scenario also incorporates the completion of the installation of all fast and ultra-fast charging infrastructures outlined in Mission 2, Component 2, Investment 4.3 of the NRRP by 2026. This entails establishing a minimum of 7,500 super-fast charging stations for electric vehicles on extra-urban roads (excluding motorways) and a minimum of 13,755 fast charging stations in urban centers.

[38] Politiche fiscali mobilità elettrica - ECCO (eccoclimate.org);
[39] EY Mobility Consumer Index 2023 | Download the report)

The scenario's projections also rely on regulatory interventions to address issues related to the installation of private charging points in common areas of buildings and the installation of Wallboxes or dedicated meters by individual users. These interventions aim to resolve issues such as authorizations, competencies, and technologies. Furthermore, the scenario evaluates the positive impact of increased adoption of private charging stations for businesses and employees. This assessment considers the dedicated fund established in accordance with Law No. 126 of 13 October 2020 and the Ministerial Decree of 25 August 2021, which governs its disbursement.

Fuel taxation and ETSII

In the ECCO-FF55 scenario, the impact of **fuel prices signals** on consumer behavior and potential responses towards reducing consumption is considered. The scenario assumes that **no interventions will be implemented to adjust fuel prices**, such as providing discounts on excise duties, even in the event of price increases due to market dynamics or policy effects. This decision is motivated by the recognition that such interventions can have **regressive and inequitable effects**, and it is instead prioritized to allocate public resources towards supporting the genuine mobility needs of low-income individuals, while also aiming to reduce fuel consumption[40].

Furthermore, the scenario evaluates the positive effects of an **energy sector tax reform** that introduces mechanisms to ensure the effectiveness of the fuel price signal, even if there is a reduction in the cost of energy products. Revenue generated from fuel excise duties should primarily be directed towards initiatives aimed at addressing mobility poverty[41] and facilitating the transition to a decarbonized transport system.

The scenario also considers the potential impact of extending the European Union Emissions Trading System (ETS) to the transport sector, referred to as ETS2[42], which is anticipated to come into effect no earlier than 2027, or in 2028 if energy prices are exceptionally high[43].

Sustainable mobility

In the ECCO-FF55 scenario, the contribution to emission reduction from a **decrease in passenger and freight mobility demand** through alternative sustainable mobility solutions is taken into account. This reduction is expected to be facilitated by investments outlined in the **National Recovery and Resilience Plan** (NRRP) for Mission 2 Component 2 and Mission 3 Components 1 and 2, as well as the Complementary National Plan, the Social Cohesion Fund, and the 2022 Budget Law.

In particular, these interventions encompass the development of new railway infrastructure at both national and regional levels, improvements in mass rapid transit systems, renewal of the bus fleet, enhancement of metropolitan railway nodes, establishment of urban cycle paths, and digitalization initiatives[44]. The total budget allocated for these interventions exceeds 90 billion euros, with most implementation timelines aligning with the expectations of the 2030 scenario.

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[40] Non rinnovare lo sconto sulle accise vale 9 mld di euro - ECCO (eccoclimate.org)
[41] Understanding transport poverty | Think Tank | European Parliament (europa.eu)
[42] EU Emissions Trading System for buildings and road transport ("EU ETS 2") | International Carbon Action Partnership (icapcarbonaction.com).
[43] This aspect, together with a relatively low forecast of the initial impact of the measure on the price of fuels - according to ECCO's estimates this would be an average increase in monthly expenditure on fuel of EUR 7 per vehicle - makes the impacts of the measure considered in the scenario marginal.
[44] The National Recovery and Resilience Plan (NRRP) (camera.it)

Effective financing and close coordination for implementation are crucial elements that must be integrated into the Plan Governance, in coordination with the structures responsible for reviewing the NRRP. Proposed amendments to the NRRP by the government to the EU[45] intervene on the objectives and timing of some investments deemed essential for the advancement of sustainable mobility services as alternatives to private car usage. Notable **critical changes referring to Mission 2 Component 2** include:

- Modifications to investments for strengthening cycling mobility (M2C2-I4.1), which involve the defunding of projects for tourist cycle paths and postponement of works in urban areas.
- Adjustments to the development of rapid mass transport (M2C2-I4.2), including delayed implementation of works and removal of references to selected cities and modal splits for planned works. In this regard, it is here emphasized the importance of enhancing the offer of light mass rapid transport services in metropolitan cities in order to reduce private vehicle traffic and related emissions by 2030.
- Rescheduling of implementation deadlines and flexibility requested for the composition of objectives concerning the development of electric charging infrastructures (M2C2-I4.3). In this regard, it is here emphasized the importance of equipping long-distance roads with an adequate number of fast and ultra-fast charging stations as quickly as possibile.

On the activities of Mission 3 Components 1 and 2, significant changes concern the allocation of funding for various railway works, including high-speed and regional transport, diagonal east-west connections, metropolitan railway nodes, and freight logistics. The government's report on the revision of the Plan[46], **acknowledges the overarching goals of the Mission but suggests the possibility of canceling some financing under the NRRP in the future. It reserves the right to implement measures to reprogram these resources while ensuring that the overall objectives are met**. **However, specific details regarding how and when these measures will be implemented are not provided**. Given the significance of these infrastructure works for achieving the 2030 transport decarbonization targets, there is a hope for further specific commitments from the government.

In addition to the anticipated effects of enhancing national and local sustainable mobility infrastructures, the ECCO-FF55 scenario recognizes the necessity for further actions, particularly in urban areas. These entails **raising the service standards for local public transport** by augmenting the number of seat-kilometers and frequency of rides, particularly during periods of peak traffic, such as rush hours associated with commuting to and from work or school. These times constitute over 50% of daily mobility demand and are characterized by high predictability. By enhancing public transport services to better align with these peak demand periods, the scenario aims to encourage greater utilization of public transit, reduce reliance on private vehicles, and ultimately contribute to the decarbonization of urban mobility.

Further advances considered in the scenario concern **advancements in urban and peri-urban transport planning through digitalization**. Digital technologies enable the monitoring of user travel patterns to and from key locations, providing valuable data for public administrations and transportation managers to organize more efficient and adaptable service offerings. Moreover, by cross-referencing this information with big data analysis of origin-destination flows in private

[45] PNRR - LE PROPOSTE DEL GOVERNO PER LA REVISIONE DEL PNRR E IL CAPITOLO REPOWEREU (camera.it)
[46] Revisione-e-aggiornamento-del-PNRR-parlamento-27-luglio-2023-1.pdf (osservatoriorecovery.it)

mobility, previously unidentified travel needs can be intercepted, facilitating the planning of additional actions to enhance service provision. This integration of digital tools and data analytics holds promise for optimizing urban transportation systems and improving overall mobility experiences for commuters and residents alike.

The significance of digitalizing information and its accessibility is further amplified within the anticipated implementation of **Mobility as a Service**[47], solutions. In MaaS, a variety of shared and collective mobility options – such as local public transport, trains, carsharing, bike-sharing, scooter-sharing, and ride-splitting, etc.[48] – are integrated into a cohesive service offering accessible to users for journey planning and scheduling. This integrated approach eliminates the necessity for individuals to own a private car, as they can conveniently plan and utilize various modes of transportation according to their specific needs and preferences.

Local car traffic regulation measures

In line with the NECP 2019, the ECCO-FF55 scenario emphasizes the prioritization of **policies aimed at limiting vehicle traffic within urban centres.** With the growing availability of alternative mobility services, such measures should be viewed as incentives for increased utilization of alternative modal solutions.

Effective coordination among relevant ministries and municipalities is essential to promote the adoption of traffic restriction measures in urban areas. This coordination is necessary to overcome regulatory delays associated with amendments to Decree Law 78 of 2022[49], which modifies Article 7.1 of the Codice della Strada[50] for the establishment of Limited Traffic Zones (LTZs) and Zero Emission Zones (ZEVs). Specifically, it is crucial that the ministerial decrees outlined in the aforementioned amendment are drafted, taking into account the impact of vehicle technologies. These decrees should extend and revise the pricing of traffic restriction zones to ensure an effective reduction in the circulation of the most polluting vehicles, which are less efficient in terms of greenhouse gas emissions.

MONITORING INDICATORS

Implementing a system to monitor the progress and effectiveness of interventions in relation to objectives is crucial for introducing necessary corrections to existing measures. The ECCO scenario identifies several indicators, many of which can be sourced from an existing public database with annual variability.

Indicators:

- Greenhouse gas emissions by mode of transport – Source: ISPRA
- Final energy consumption by mode of transport and type of fuel – Source: MEES/Eurostat
- Consumption of biofuels in transport – Source: ESM

[47] The Ws of MaaS: Understanding mobility as a service from a literature review (researchgate.net); Mobility as a Service: A Critical Review of Definitions, Assessments of Schemes, and Key Challenges (researchgate.net); A topological approach to Mobility as a Service - ICoMaaS Proceedings.pdf (lesscars.it)
[48] Il ventaglio della mobilità – Lesscars.it
[49] DECRETO-LEGGE 16 giugno 2022, n. 68 - Normattiva
[50] Servizi ACI - Art. 7. Regolamentazione della circolazione nei centri abitati.

- Fuel prices at the pump – Source: Mimit
- Emission intensity of the circulating vehicle fleet by type of vehicle – Source: ISPRA/Copert
- Trend in new vehicle registrations by emission bands – Source: Unrae
- Composition of the vehicle population and rate of motorisation – Source: ACI/Eurostat
- Numero punti di ricarica per tipologia e distribuzione territoriale - Fonte: Motus-e
- Replacement of the city bus fleet with electric buses – Source: Asstra
- Use of public transport and sustainable mobility rate – Source: Isfort/miscellaneous
- Adoption of restricted traffic zones in urban areas – Source: Isfort/miscellaneous
- Trend in shared mobility demand – Source: Sharing mobility observatory
- Progress of infrastructure projects for sustainable mobility – Source: Opendata Italiadomani

ESTIMATION OF INVESTMENT NEEDS

The ECCO-FF55 scenario projects investments in new vehicle purchases (including passenger cars, freight vehicles, and buses) totaling €422 billion for the period 2023-2030. This amount is approximately €65 billion less than the forecasts of the NECP scenario. The difference primarily stems from lower growth expectations in the BEV and PHEV markets in the ECCO-FF55 scenario, with projections of 3.5 million BEV units and 0.7 million PHEV units, compared to 4.3 million BEV units and 1.7 million PHEV units in the NECP scenario.

Within the ECCO-FF55 scenario, the estimates for investment in renewing the circulating car fleet amount to around €275 billion. Approximately €92 billion (33%) of this total is associated with the growth in BEV vehicle registrations.

VEHICLES / SCENARIOS	ECCO-FF55	NECP 2023
Electric vehicles (BEVs)	***92***	
Plug-in hybrid cars (PHEVs)	22	
Combustion Cars (ICE)	162	
Subtotal passenger cars	**275**	
Other Vehicles	147	
TOTAL	**422**	**525**

Table 5 – *Estimated investment in new vehicles*

According to Decree-Law No. 17 of 1 March 2022 (Article 22), €8.7 billion of public resources are allocated for the transition of the automotive sector, sourced from general taxation, forecasts of new revenues, and allocation of resources from reserve funds as outlined in Article 42 of the same decree. For the 2024 timeframe, fund resources totaling €2.7 billion have been allocated, with €1.95 billion earmarked for purchase incentives (Prime Ministerial Decree of 6 April 2022), of which approximately €1.2 billion remains unspent. Additionally, €750 million is allocated for the redevelopment and conversion of the automotive supply chain, in accordance with the Prime Ministerial Decree of 4

August 2022, sourced from facilities provided under the Contracts for Development and Agreements for Innovation[51]. Looking ahead to 2030, the remaining balance of the fund amounts to €6.75 billion.

The proposed reform of the current incentive scheme[52], suggests leveraging the inventories of the automotive fund to support private investments aimed at increasing the number of electric cars in the circulating vehicle fleet. This initiative also aims to lay the groundwork for an industrial policy focused on competitively transitioning the automotive sector towards electric vehicles.

However, to achieve the ultimate goal of transitioning to EVs, it is imperative to identify additional economic resources supported by appropriate financial instruments[53] These resources could potentially stem from the ongoing process of revising the objectives of the National Recovery and Resilience Plan (PNRR), as well as from a reassessment of environmentally harmful subsidies.

[51] Development contracts pursuant to art. 43 of Decree-Law No. 112 of 25 June 2008, converted, with amendments, by Law No. 133 of 6 August 2008: Innovation agreements activated under the Fund referred to in art. 23 of Decree-Law No. 83 of 22 June 2012, converted, with amendments, by Law No. 134 of 7 August 2012.
[52] Incentivi mobilità elettrica: quali? - ECCO (eccoclimate.org)
[53] Mappatura degli strumenti finanziari per la transizione green - ECCO (eccoclimate.org)

THE ITALIAN CLIMATE CHANGE THINK TANK

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