



## 29.1 Major Developments in 2017

2017 was a positive year regarding to new passenger car registrations, which globally had a moderate increase (+7.9%) compared to 2016, reaching a global amount of about 2 million cars which makes Italy the fourth biggest market in the European Union. Also sales of alternative fuel vehicles increased (+24 %) due to the benefit from demand for LPG-fueled cars, the sales of which registered the biggest absolute value, while sales of battery and hybrid electric vehicles (especially plug-in hybrid electric vehicles) registered the highest percentage increases compared to the previous year.

The efforts to promote and financially support the introduction of cleaner vehicles were continued. Even if the national policy does not give direct incentives for purchasing electric vehicles, other incentives for use and circulation were confirmed in 2017: the exemption from the annual circulation tax (ownership tax) for a period of five years from the date of the first registration and after this five-year period electric vehicles benefit from a 75 % reduction of the tax rate applied to equivalent petrol vehicles. Further, electric vehicles receive a discount from various insurance companies and finally, in some big municipalities (for example Milan and Rome) they benefit of free parking in urban areas and free circulation in limited traffic areas. On the other side, some dealerships of different brands reserved a bonus to people scrapping or trading in their outdated diesel cars for hybrid ones. The fiscal advantage of super amortization was confirmed but limited to only instrumental vehicles.

Looking at charging infrastructure, the implementation of the National Plan for Electric Charging Infrastructure and the European Directive on Alternative Fuel Infrastructure is in progress. Further Enel, the largest Italian electric utility, launched its plan to provide Italy with an appropriate charging infrastructure.

These are good premises in a Country where global statistics still show a very low diffusion of hybrid (about 0.5 % and 3 % respectively in car fleet and sales) and electric (about 0.02 % and 0.1 % respectively in car fleet and sales) vehicles and charging infrastructure while, on the other side, hybrid and electric vehicles have positive perspectives: Italy has the highest motorization rate combined with the

oldest vehicle fleet in Europe and these could be driving forces (in addition to the mandatory constraints in CO<sub>2</sub> emissions by 2020 and the air quality control) to usefully capitalize on a nationwide project of e-Mobility industrial development the numerous, major competencies boasted in Italy.

### **29.1.1 Legislation, Funding, Incentives and Taxation**

In Italy, direct incentives (discount, VAT exemption) to purchase electric vehicles are not provided, but some incentives for use and circulation are present: exemption from the annual circulation tax (national policy), deductions on some tariffs, for example exemption from parking and tolls payment, free transit in limited traffic areas, exemption from total or partial disruption to traffic (regional or municipal policy, which regards less than 50 % of national citizens).

Electric vehicles are exempt from the annual circulation tax (ownership tax) for a period of five years from the date of the first registration and after this five-year period they benefit from a 75 % reduction of the tax rate applied to equivalent petrol vehicles. Further, electric vehicles receive a discount from various insurance companies.

The national legislation does not consider hybrid electric vehicles (petrol/electric or diesel/electric). Some regional administrations have acted autonomously: in the Lazio Region, for example, owners of new hybrid electric vehicles are exempt from the ownership tax for a period of three years from the date of the first registration.

In some big municipalities (for example Milan and Rome) electric vehicles are exempt from payment in reserved parking areas and can enter the limited traffic areas.

According to the “Balance Law”, the fiscal deduction in terms of super amortization was confirmed for year 2017, but limited to vehicles directly used for carrying on company’s business. Multipurpose vehicles, or vehicles used by employees, are excluded from the benefit.

Incentives dedicated to charging infrastructure are in terms of direct investments (national policy), that is, Public Administration directly participating to the development of charging infrastructure, co-financing projects presented by Regions and Local Authorities. The instrument to incentivize charging infrastructure is the National Plan for Electric Charging Infrastructure (PNIRE) by the Ministry for Transport and Infrastructure. The first version of PNIRE was

issued in 2013, successively updated in 2014 and, more recently, in 2015: this last version became effective in 2016<sup>56</sup>.

The Government has implemented the European Directive on the deployment of alternative fuel infrastructure (DAFI 2014/94/ EU) issuing the National Legislative Decree n. 257, issued on December 16, 2016 and become effective on January 14, 2017.

The PNIRE and the National Legislative Decree n. 257 define the national strategy for the widespread diffusion of electric vehicle charging infrastructure. In this strategy, some interesting arguments can be highlighted:

- A target of 4,500 ÷ 13,000 slow/accelerated charging points and more than 2,000 ÷ 6,000 fast charging stations on the national territory by 2020, giving priority to urban areas which belong to metropolitan cities and, successively, suburban areas, extra-urban roads, state roads and highways;
- The “technology neutral” approach to realize environmental targets by means of each type of alternative fuel;
- New fuel stations – or the ones under renewal – must provide methane or natural gas and install charging stations for electric vehicles;
- Public Administrations are required to buy 25 % at least of methane, natural gas or electric vehicles, when substitute their fleets;<sup>57</sup>
- Within December 31, 2017, municipalities must update their building regulations to meet the requirements for supplying alternative fuels and, starting from June 1, 2017, new buildings<sup>58</sup> or the ones under significant renovations must provide connections to install charging stations for electric vehicles.

To implement the PNIRE, that is to receive governmental funds, the Decree 4/8/2017 by the Ministry for Infrastructures and Transport requires metropolitan cities, municipalities and municipalities associations with more than 100,000 inhabitants to provide and adopt new Urban Plans for Sustainable Mobility.

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<sup>56</sup> In 2016 the Ministry for Economic Development adopted the strategy document “Piano Nazionale di Sviluppo – Mobilità Idrogeno Italia”, that has been developed by a core working group of experts in abidance to the European Directive on the deployment of alternative fuel infrastructure. It proposes a roadmap for the deployment of fuel cell electric vehicles as well as associated hydrogen refueling stations from 2020 through to 2050, the details of which are in the report of the previous year [1], together with the description of FCEV demonstration projects.

<sup>57</sup> Chamber of Deputies draft law n. 4083 (actually under examination) requires Public Administrations to buy only full electric road vehicles as from 1 January 2020.

<sup>58</sup> New buildings for not residential use, with a surface bigger than 500 m<sup>2</sup> and new residential buildings with 50 apartments at least

Following the Balance Law 2017, the “Strategic national plan on sustainable mobility” is in preparation. It contains provisions for replacing bus fleets in the public transport: stop “Euro 0” and “Euro” 1 buses (7,200 units, ACI source), 5,000 new buses will be put into service in 2018 and 1,500÷2,000 from 2019 to 2033.

In November 2017 the Ministry for Economic Development and the Ministry for Environment issued the final version (after public consultation) of the National Energy Strategy (SEN), which has a section dedicated to transport and sustainable mobility, where several measures are mentioned: local regulation (to limit the circulation of pollutant vehicles in urban areas, free entrance of HEVs and EVs in limited traffic areas, preferential lanes and parking for zero emissions vehicles), revision of fiscal systems on transport (registration and owner taxes, duties on petrol and diesel, etc.), sharing and smart mobility, strengthening of charging infrastructure for alternative fuel vehicles, enhance public transport.

A lot of initiatives from stakeholders, environmental and user Associations, representatives of Local/Central Public Administrations and Research Organizations have been held, suggesting recommendations to policy makers for a better mobility planning: the “Tiscar Round Table”, a joint resolution by the Public Works and Environment Committees of the Senate of the Italian Republic, the “Metropolitan Chart on Electromobility”. They recommend direct incentives for purchasing EVs and fiscal advantages, incentives to replace old vehicles with AFVs, use of EVs in Public Administration’s fleets, banning motorcars fueled by fossil petrol and diesel within 2040 and introducing BEVs and PHEVs (target 3 % of the market within 5 years), circulation tax linked to vehicle’s pollution, clear identification of zero emission vehicles in the “Rules of the road”, to use PNIRE co-funds also to purchase vehicles for electric car sharing, local regulation, incentives for charging infrastructure, charging points in new residential buildings and also in already existing ones.

As an effect of legislation and initiatives from Ministries, regions and municipalities, various funding were activated in 2017.

The Ministry for Environment issued 15 million EUR for projects on efficiency, mobility and climate in minor islands and 75 million EUR to municipalities for a National Experimental Program about “home-school and school-home mobility” aimed to reduce traffic, pollution and stops of cars near schools and working sites, by means of bike & car sharing & pooling.

An Industrial Plan for the city of Rome was issued with more than 500 million EUR (about 100 by municipality, 90 by Lazio region, and 330 by the Ministry for

Economic Development) for sustainable mobility & energy, renewal of public transport vehicle fleets, car sharing and 700 new electric vehicle charging stations.

The Apulia region issued 50,000 EUR for EV domestic charging points fueled by renewable energy sources (max 1,500 EUR per allowed installation).

Emilia Romagna provides incentives to buy new light commercial vehicles: 2,500 EUR for scrapping and replacing of an old vehicle with a new alternative fuel vehicle (with a maximum of 200,000 EUR per company).

The Lombardia region issued 15 million EUR for the diffusion of electric vehicles and their charging infrastructure in municipalities. Further, this region provides incentives on private charging points: 1,500 EUR per charging point in case of charging system with a single socket, 1,000 EUR per socket in case of charging systems with several sockets, until a maximum of 10,000 EUR per applicant.

In the Mobility Plan of the Sardinia region, 15 million EUR were issued to increase the electric vehicles fleet and charging infrastructure, with 650 new charging stations planned.

The Bolzano Province provides incentives to buy electric (4,000 EUR) and hybrid plug-in electric (2,000 EUR) cars. Further, the exemption from annual circulation tax for five years and then 77.5 % (instead of 75 % as for the national policy) reduction of the tax rate. Finally, incentives are provided for EV charging infrastructure: 1,000 EUR per charging station.

In the Mobility Plan for the Trento Province, investments were planned for 21 million EUR.

The Italian electric mobility wins the confidence of important international bodies too: the European Investment Bank issued 230 million EUR in favor of Florence municipality for a three years investments plan in "smart city projects". Sustainable mobility is a part of it.

### **29.1.2 Research**

The National Research Council of Italy (CNR) has been studying for different years the development of an integrated system between electric mobility and energy production from renewable energetic sources and storage. The application of this study is the integration of alternative sustainable mobility systems, Intelligent Transport System (ITS) by the means of an ICT platform directed to systems, infrastructures and electric vehicles, fuel cell and hybrid (fuel cell and battery) vehicles. Another area of study is the management of energetic flows inside the hybrid propeller: it gives information to build simulation models of the energetic flows and pollutants generation. This study wants to define and

experimentally evaluate the best control strategies for the optimal management of the propulsion system. Finally, CNR studies the different types of energy storage systems (batteries and supercapacitors) for electric vehicles.

The Italian National Agency on New Technologies, Energy and Sustainable Economic Development (ENEA) in 2017 continued its activities relating to the “Sustainable Electric Mobility” project, included in the National Research Program for the Electrical System founded by the Ministry for Economic Development. These activities include studies and researches to realize support instruments for planning and/or evaluating electric mobility and developing innovative technologies for charging infrastructures, especially the investigation of the impacts of electric mobility on the transport system in an urban context and the development of useful instruments for Local Public Transport (LPT) Companies or Local Administrations. Here is a list of the activities made by ENEA in 2017:

- Studies on dynamic wireless charging, in terms of system design and implementation on a little size experimental vehicle.
- To design the transformation of a conventional vehicle into a mobile fast charging station to be used as a rescue track. This study is aimed to establish a road rescue service useful to remove the uncertainties on residual range when travelling long distances and create new working opportunities for service companies along roads or call-services.
- Risk analysis and management of the residual risk for batteries in electric vehicles. Even if batteries and their management systems are subject to hard safety tests, the risk analysis (and experience) shows that there is the possibility of undesired events. This study analyses different arguments: failure of safety systems during vehicle use and recharge, crash situations, fire.
- Studies on support instruments for LPT: to evaluate technical feasibility and economic convenience of electric traction in public road transport lines for a major city; to run energy consumption measures of urban buses in real operative contexts.
- Optimal location of charging infrastructures. Following the indications from PNIRE, a growth of the charging infrastructures network, able to manage the increasing request from users is a priority for the diffusion of electric mobility. An operative instrument, able to join the request from users (according to their real movements) and the implementation of a “fuzzy” decisional logic to produce a spatial distribution of charging points.
- Development of an instrument, aimed at electricity distributors, able to predict the needs of electric mobility in an urban area.

- User safety and protection from residual electromagnetic fields during electric vehicle charging.

“Ricerca sul Sistema Energetico” (RSE), another main research institute together with CNR and ENEA, has been working for different years on electric mobility, not only vehicles but especially their impacts on the grid and the optimization of mobility in the context of the wider energetic scenario. A study realized by RSE evaluates the impact of 10 million electric cars (a third of which battery electric vehicles and two thirds plug-in hybrid electric vehicles) in Italy in 2030: on the basis of this scenario, consistent with the ones made by other research organizations, considering the development of electricity consumptions expected in the future, the impact of charging electric cars would be an energy increase of 5 % (18.7 TWh out of 362 TWh) which can be managed at a national level without having to build new power stations or electricity grids.

### 29.2 HEVs, PHEVs and EVs on the Road

In 2017, overall new passenger car registrations increased by about 7.9 % compared to 2016, reaching a global amount of 1,970,497. The positive trend of previous years has continued and Italy is the fourth biggest market in the European Union. New battery electric passenger car registrations increased by 42.8 %, while registrations of new plug-in hybrid electric passenger car (+102.4%) accounted for the strongest growth. In total new electrically chargeable passenger cars increased significantly by 71.2 %. The demand for new hybrid electric passenger cars continued to grow (+70.2 %). New other alternative fuel (natural gas, LPG, ethanol) passenger car registrations had a moderate growth (11.2 %). Totally, new alternative fuel passenger car registrations increased by 24 %.

An analysis of sales based on categories of customers [2] shows that private customers bought fewer (-1.9%) than in the previous year. The drop was considerably higher in the case of purchase by companies (-11.3%): this would be pretty obvious after the boom (+24.7 %) caused in 2016 by the super amortization, no longer available in 2017 for all companies, but limited to only instrumental vehicles. In fact, rent companies belong to one of the few categories which have taken this fiscal advantage and their purchases increased (+18.8 %). Cars registered by manufacturers and dealers had a strong growth (52.3 %) so to balance the market share there is a reduction of private customers.

A large increase was registered for sales of hybrid electric passenger cars, thanks to the continuous extension of range: these vehicles went beyond the share threshold of 3 %. Nevertheless the strong growth in sales of battery and plug-in hybrid electric passenger cars, the share in sales for these type of vehicles still remains

about 0.1 % with respect to the total. This is due to various reasons. The first one is the high purchase price – which in other countries is balanced by significant fiscal deductions – and the low number of charging infrastructure. In addition to this, there are consumers’ doubts about electric vehicles (range anxiety). In fact, in Italy the owners of “fully electric” cars are mostly companies or rent companies or public administrations: new electric passenger cars registered in 2016 belong to companies for about 85 % and natural persons for only 15 %. But something is moving, thanks to the National Plan for Charging Infrastructure and the European Directive on alternative fuels, recently adopted by the Government.

Figure 1 shows the share (following the European standard on pollutant emissions, from Euro 0, the most polluting, to Euro 6, the cleanest) of circulating passenger cars, updated on January 1, 2017.

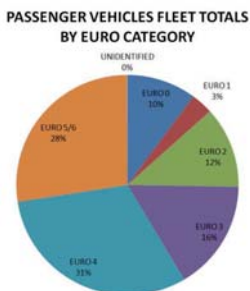


Figure 1: Share of circulating passenger cars (Source: ENEA elaboration on ACI data)

A certain attention towards electric vehicles is beginning: free parking and circulation in limited traffic areas are reserved to electric vehicles in many cities, there are various projects included in the mobility urban plan based on electric vehicles (services, logistics of goods and car sharing). Electric energy distributors have established partnerships with car makers to promote services based on electric vehicles, as it is in the announcements for car sharing services issued from various Italian cities. In 2017, 6,644 shared vehicles were counted in Italy: the electric share of these vehicles is growing, thanks to some operators which based their service on electric vehicles (Share’ngo, Drivenow, BlueTorino). A reduction of “Station Based” demand and, on the other side, strengthening of “Free Floating” was registered. The diffusion of bike sharing is growing too, especially because of “Free Floating”: in a total of 29,404 shared bikes, 12,800 belong to this type of service. About scooter sharing service, in 2017 EniJoy terminated the service, but other new operators are entering the market: MiMoto (Milan), eCooltra, ZigZag (Rome). The total amount of shared scooters is 500. Figure 2 shows the statistics on sharing mobility in the last three years.



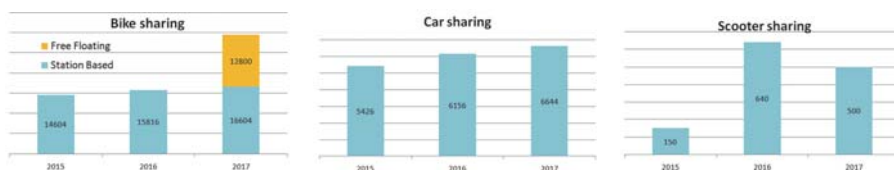


Figure 2: Statistics on sharing mobility in the last three years (Source: “Sharing Mobility Laboratory – Second National Report” preview, 15 November 2017)

Fully electric cars are starting to be present in Italian municipalities with various examples. Car makers are interested to promote electric mobility, for this reason in the latest years have established agreements with public administration, municipalities (delegation vehicles or vehicles for Municipal Police), regions, trade associations and private companies (for example vehicle rent Company). Also the security force started to use electric vehicles.

In 2017, the Italian demand for light commercial vehicles (< 3.5 t) declined (-3.4 %) while sales of medium and heavy weight trucks (> 3.5 t) registered a growth (+4.5 % and +8.4 % respectively). The fiscal benefit of the super amortizing was continued but limited to only instrumental vehicles.

In 2017, new buses and minibuses registrations reached 3,357, with an increase (+20.3 %) compared to 2016 (2,791 vehicles sold). This confirms the expected big growth, also in relation with public tenders for new fleets. IVECO (the main Italian bus manufacturer) is providing 120 new hybrid buses in the framework of the plan to renew ATM’s (the local public transportation company in Milan) fleet. As regards FCEVs, a national survey in 2015 showed that at least 68 enterprises are currently active in the field of Fuel Cells and hydrogen technologies in Italy. In spite of this, only 13 FCEVs are registered and circulating in Italy at the time of writing (one Toyota Mirai, twelve Hyundai ix35 of which two are police cars).

Statistics for the total vehicle fleets and sales in Italy are reported at the end of the chapter, in Table 3.

### 29.3 Charging Infrastructure or EVSE

In Italy about 10,000 charging points can be estimated, 7,000 ÷ 7,500 (around 75 %) of them are charging points in private areas. The situation is in continuous progress, because the National Plan for Electric Charging Infrastructure (PNIRE), issued by the Ministry for Infrastructures and Transport (MIT) has to be applied. As a consequence of this, a general upward trend, shown in Figure 3, is registered but, on the other side, the inventory of charging infrastructures is particularly complicated: the results, to the best of actual abilities have been obtained by the

European Alternative Fuel Observatory’s (EAFO) web site and are resumed in Table 1.

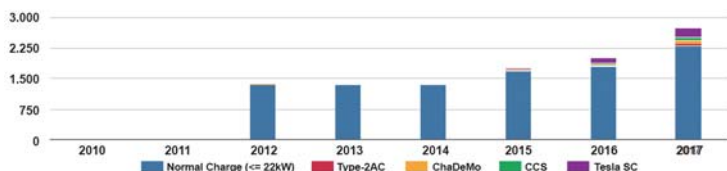


Figure 3: Total number of electric vehicle charging positions in public areas (Source: <http://www.eafo.eu/electric-vehicle-charging-infrastructure>)

Table 1: Information on charging infrastructure in 2017 (Data source: EAFO)

Charging Infrastructure on 31 December 2017	
Chargers	Quantity
AC Level 1 Chargers	2,298 <sup>a</sup>
AC Level 2 Chargers	
Fast Chargers	223 <sup>b</sup>
Superchargers	220 <sup>c</sup>
Inductive Charging	n.a.
<b>Totals</b>	<b>2,741</b>

<sup>a</sup> charging points ≤ 22 kW in public areas, updated on 6 February 2018

<sup>b</sup> charging points > 22 kW in public areas, updated on 6 February 2018

<sup>c</sup> very (> 50 kW) fast Tesla charging points, updated on 6 February 2018

In 95 Italian provinces (see Figure 4) there is at least one public charging point. Charging points are concentrated in the main urban areas and cities, but thanks to the first installations of EVA+ project, the location of charging stations is now arriving very close to main highways in Italy. Several Apps keep track of the charging stations and help drivers to plan the charge: among others, Chargemap, evway, Open charge map, e-go Ricarica (by Enel), D-Mobility (by Duferco Energia).



Figure 4: Map of charging infrastructures for electric vehicles (Source: website [www.colonnineelettriche.it](http://www.colonnineelettriche.it))

Some tests on electric vehicle charging, performed by the specialist magazine “Quattroruote” [3] with different charging power and type of vehicle, are shown in Table 2.

Table 2: Examples of electric vehicle charging (Data source: [3])

Examples of EV charging								
Type	Service operator	Location	Max power allowed by vehicle	Charging time (in minutes)	Energy charged kWh	Cost (1) EUR	Cost per min (2) EUR	Cost per kWh (2) EUR
50 kW CC	ENEL	Ronco Scrivia	50 kW CC or 7 kW AC	32	20.2	6.73	0.210	0.333
22 kW AC	DUFERCO ENERGIA	Pont Saint Martin	50 kW CC or 7 kW AC	60	7.0	2.50	0.042	0.357
43 kW AC	ENEL	Rodengo Saiano	22 kW AC	54	22.5	11.72	0.217	0.521
07 kW AC	GARDA UNO	Salò	22 kW AC	120	13.7	5.00	0.042	0.365

(1) Paid

(2) Calculated

Using the app “e-go Ricarica”, Enel offers the charging service by app for the cost of 0.217 EUR per minute until January 15, 2018 from then on it will be 0.366

EUR. Using Enel drive card, the sign of a service agreement is required and the tariff is 0.40 EUR per kWh.

PNIRE is the instrument which rules the development of charging infrastructure: it establishes a target of 4,500 ÷ 13,000 normal power charging points (i.e. power equal or lower than 22 kW) and 2,000 ÷ 6,000 high power charging stations (i.e. power bigger than 22 kW) by 2020. Under the push of PNIRE, various regions have already implemented Electric Mobility Plans and/or guide lines for the development of electric mobility. Dedicated plans for all other regions are in progress.

On November 9, 2017 Enel launched its plan to provide Italy with an appropriate charging infrastructure. According to the study made by Enel & Polytechnic of Milan to prepare the plan, under the assumption of a fleet of 360,000 e-cars (against the 6,000÷7,000 e-cars now on the road) 12,000 charging stations would be required. Enel will use 100 to 300 million EUR, resulting from company investment, European funds and drivers' contribute, this is not going to be a part of electricity tariff and a burden on the electricity bill. Targets for Enel's Plan are:

- 2,700 charging points by 2018,
- 7,000 charging stations by 2020,
- 14,000 charging stations by 2022.

By the first half of 2018, Enel will install 250 charging stations in parking areas of Conad's sale points<sup>59</sup> throughout Italy: 40 Fast Charge Stations (50 kW) very close to main highways, enclosed in EVA+ project, and 210 Pole Stations (22 kW).

### 29.4 EV Demonstration Projects

Many programs/projects/initiatives, which Italian research institutes, companies or cities have taken part in, continued to be promoted and financed/co-financed in 2017 by the EU.

“Steve” is a project funded by the European Commission in the framework of the Program Horizon 2020. It involves 21 partners between universities, administrations and little/medium companies for the development of an innovative city electric car as a valid instrument to solve typical critical issues in urban centers. Torino and Venaria (Italy) Calvià (Spain) and Villach (Austria) will be pilot cities for this project.

“Smart-MR”, Sustainable Measures for Achieving Resilient Transportation in Metropolitan Regions, is a European project aimed to help local (municipal and

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<sup>59</sup> The brand Conad is one of the main supermarket chains in Italy.

regional) authorities to achieve resilient and low-carbon transportation and mobility in metropolitan regions. ATAC, the largest public transportation company in Rome, is the main stakeholder in the project.

Over the next three years E.ON (an international energy and e-mobility Company) and CLEVER (a Denmark based e-mobility service provider) will establish a network of 180 ultra-fast charging stations (150 kW with potential for upgrade to 350 kW) for electric vehicles in seven countries connecting Norway to Italy. The network is appointed as a European flagship project and has received 10 million EUR in funding support from the European Commission in the framework of Connecting Europe Facility Program.

Enel, as coordinator, and Austria's main utility Verbund are collaborating on a fast-recharging network project in Italy and Austria, alongside some of the world's largest EV carmakers including Renault, Nissan, BMW, and Volkswagen Group Italia (represented by Volkswagen and Audi). Electric Vehicle Arteries (EVA+) is aimed to create a fast charging infrastructure for electric vehicles on key roads and motorways in Italy and Austria. Over the course of the three-year project 200 multi-standard fast charge stations, each capable of offering all the fast charging standards (CSS Combo 2, CHAdeMO or AC charging) will be installed. Of the project's 200 columns, 180 Fast Recharge Plus columns (a technology developed by Enel that enables two vehicles to be simultaneously fast charged in 20 minutes) will be installed in Italy by Enel, while the remaining 20 will be installed by Verbund's subsidiary SMATRICES in Austria, also offering all fast charging standards. The project's budget is 8.5 million EUR, 50 % co-funded by the European Commission under the "Connecting Europe Facility" Program. A grant agreement worth a maximum of 4.2 million EUR was signed with INEA, the Innovation and Networks Executive Agency delegated by the European Commission and EVA+ was officially launched in Brussels in January 2017. The first 30 "Fast Recharge Plus" charging points (one infrastructure every 60 km) were installed by Enel on the route between Rome and Milan.

"Puglia Active Network" (Pan) is a project of Enel, supported by the European Community and the Ministry for Environment: co-financed with 85 million EUR under the EU NER 300 Program, it wants to promote the use and development of renewable sources, energy efficiency and electric mobility. In fact, the project includes, inter alia, to enable new services for citizens by developing of a network of charging infrastructure for electric vehicles on a regional scale. More than 70 intelligent and interoperable (which may be used by customers of different operators) charging infrastructures will be installed, distributed in about 40 sites of the municipalities, ring roads and access roads to major urban centers of the region,

as well as on the primary highway network. The project was officially launched in 2016 and the first phase of installation was completed in 2017.

The project “E-Vai 3.0”, launched by “FN Mobilità Sostenibile” (company of the group “Ferrovie Nord Milano”) in collaboration with Enel is a project of integrated mobility that combines railway and green car sharing using only electric vehicles. The project will be active until June 2018 in the municipalities of Varese and Saronno, with 12 cars and three charging stations respectively installed in parking areas (6 parking spaces each one) at Varese and Saronno’s railway stations.

The “E-Via” project, co-funded by PNIRE, will bring 35 charging stations into the region Val d’Aosta: 11 of them will be installed in the city of Aosta and 24 along the main roads and valleys of the region. The project started in February 2017 with the installation of the first charging station in Saint Vincent.

In December 2017, the “E-VIA - FLEX-E” project for the installation of 14 multi-standard Ultra-Fast Charging Stations in Europe was launched. The charging stations are ranging from 150 kW to 350 kW: 8 in Italy, 4 in Spain and 2 in France. The project is co-financed by the European Commission in the framework of the program “Connecting Europe Facility”.

In the works of the project “Mi Nuovo elettrico-Free Carbon City”, funded by Emilia Romagna Region, 130 charging stations will be installed in urban and interchange areas.

Enel and the City of La Spezia made an agreement for a pilot project which involves 8 electric cars and 5 electric bikes, which will be given to the force of the Municipal Police, and 16 charging points.

The “Green Way Primiero” is a project on sustainable mobility realized by the City of San Martino di Castrozza, aimed to demonstrate the substitution of conventional fuels in transportation with electric energy from local renewable energy sources. It involves the installation of 13 charging stations in public areas and 18 EVs for local public transport.

Enel, Nissan Italia and the Istituto Italiano di Tecnologia (IIT) made an agreement for a pilot project on company electric car sharing and V2G charging system. IIT will be the company where the car sharing will be realized, by the means of two electric cars Nissan Leaf and two bidirectional (V2G) charging station installed by Enel.

Many demonstration projects put together the interest on e-mobility and the Italian environmental beauty to realize examples of sustainable mobility in touristic zones.

“Ischia Isola verde” is an eco-tourism pilot project made by a collaboration between Enel and Emotion (a “green cars” service company), which combines 20 rental e-cars and 30 charging stations in hotels. “Sicily Eco tour” is collaboration between Enel, Renault and the rental car company “Sicily by Car”, which offers 200 Renault Zoe and 400 charging stations along tourist itineraries in Sicily. “Asinara Zero Emissions” is a project for substituting the diesel vehicles of Asinara Island’s Park Authority with electric vehicles. It is founded by “Fondazione di Sardegna” and also provides for purchasing and installing charging stations initially connected to the grid, but in the final part of the project to be integrated by a PV plant and an energy storage system to reduce the dependence from the grid as much as possible in favor of the use of “clean” energy.

### 29.5 Outlook

The prospects for EVs, PHEVs and HEVs in Italy are judged positively and with a significant growing trend in the medium to long term with higher attention from media general public and authorities. The major driving force for most countries and car makers in Europe will be the mandatory constraints in CO<sub>2</sub> emissions by 2020. In addition to this, the air quality control in Italy will further improve the introduction of low and zero emission vehicles to mitigate the local environmental emergency, also thanks to the initiatives of regional and municipal authorities integrating the initiatives of the central government and various Ministries.

Finally, a further impulse is expected by the EU directive for the installation of a clean fuel infrastructure throughout Europe with approved national plans for implementation by 2020 and beyond. The National Plan for Electric Charging Infrastructure prepared by the Italian Government is operative, and the one for hydrogen refueling infrastructure is already prepared by the Ministry for Economic Development and ready to become operative. The presence of charging infrastructures will drive the growth of clean vehicles.

As indicated in [4], Italy boasts numerous, major competencies that can be usefully capitalized on in a nationwide project of industrial development of e-Mobility, particularly in the areas connected with:

- bodywork and interiors: within R&D, there is a solid and prestigious tradition with engineering and design companies, as well as in bodywork manufacture and the design of interiors;
- electronic components: Italy is the second country in the world in terms of trade balance of electrical conductors for voltages above 80V;
- charging equipment: Italy excels in the engineering, industrial design and manufacture of electrical charging equipment – with companies such as

- Enel, Bitron, Ducati Energia, Scame and ABB – that permit the launching in the short-term of a plan to develop a grid infrastructure on a national level;
- electrical grid: Italy is in the vanguard in this area and is developing projects and international collaboration in the development of Smart Grids, Smart Charging and Vehicle to-Grid technologies, including on a world level;
  - mobility services: Italy has a long-standing tradition in the production of light electrical vehicles, electric bicycles and motorcycles, and a framework is emerging of innovative companies specialized in the development of software, applications and technological solutions for managing mobility, including intermodal.

Conversely, the battery and electric motor sectors are less-covered than their foreign competitors, however, in both sectors, there are interesting development opportunities for Italy, in particular in the battery energy storage market, where Italian knowhow in inverter production for industrial automation and energy generation from renewable sources could serve as a driver, and could be transferred and adapted to the e-Mobility sector.

Considering Italy and the overall perimeter of e-Mobility (motor vehicles, motorcycles, buses and commercial vehicles), the value chain involved represents a very significant range of activity, with 160,000 companies, a workforce of over 820,000 employees and annual revenues of nearly 390 billion EUR. Taking into account the electric motor vehicle market alone (not included: motorcycles, buses, commercial vehicles) and the turnover that can be generated in each stage of the value chain, a study [4] by Enel and “The European House - Ambrosetti” Consulting Group estimates that in the different development scenarios (lower, middle, upper, accelerated) hypothesized, an overall turnover of between 24 and 100 billion EUR by 2025 and between 68 and 303 billion EUR by 2030 could be activated, see Figure 5. This is a significant impact, of which Italy could capture a relevant share in the component, bodywork and interiors sectors, as well as in the area of electric charging equipment, in addition to those that develops predominantly nationwide, that is the electricity grid, recycling and second life. It would be possible, therefore, to generate a value of between 14 and 59 billion EUR in Italy by 2025 and between 41 and 180 billion EUR by 2030.



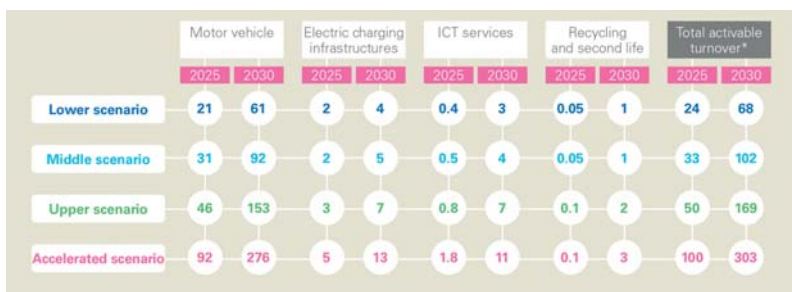


Figure 5: Estimate of the cumulative revenues activatable along the electric car value chain as of 2025 and 2030 (absolute value in billions of euros), 2017 (Source: The European House - Ambrosetti data elaboration, 2017)

Figure 6 shows hypothetical scenarios of the spread of electric motor vehicles (BEVs and PHEVs) in the Italian car fleet and Figure 7 illustrates hypothetical scenarios of the spread of electric charging points and the ratio of electric motor vehicles (EVs) and charging points in Italy as of 2025 and 2030.

The histograms refer to hypothetical growth in the number of electric motor vehicles (BEVs and PHEVs) on a national level in the various development scenarios for the years 2025 and 2030, respectively 3 and 9 million electric motor vehicles in the accelerated scenario, with 30,000 public charging stations – 1.5 million private wall-boxes and 45,000 public charging stations – 4.5 million private wall-boxes.

Great expectations are on the Italian car manufacturer FCA, who is planning the production of some electric models of its range (Doblò). Maserati, a famous brand of the FCA Group for luxury and high performances cars, will be the pioneer company in the Group to develop hybrid and electric technologies. In 2019 it will start the production of plug-in hybrid electric cars and will further launch the first model of a fully electric car. The target would be electrifying 50 % of FCA’s models within 2022 [5].

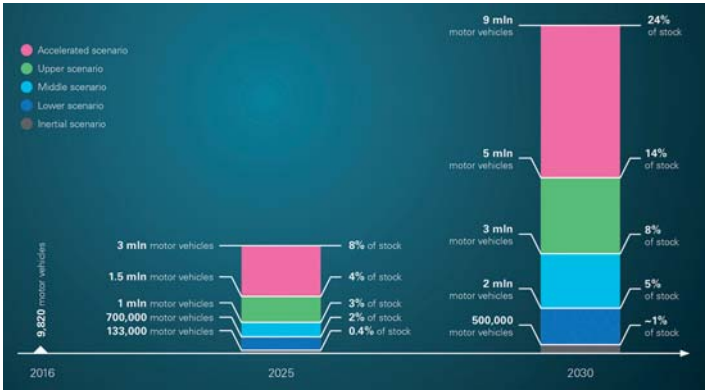


Figure 6: Hypothetical scenarios of the spread of electric motor vehicles (BEVs and PHEVs) in the Italian car fleet as of 2025 and 2030 (absolute number and as a percentage of stock). Source: The European House - Ambrosetti data elaboration, 2017

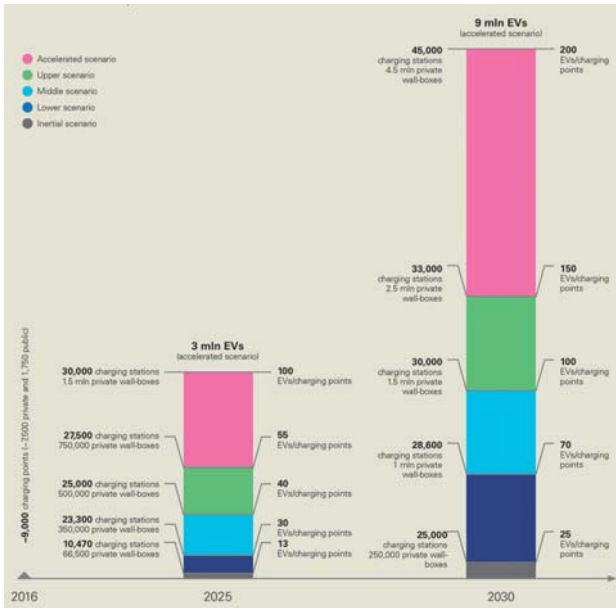


Figure 7: Hypothetical scenarios of the spread of electric charging points (public charging stations and private wall-boxes) and the ratio of electric motor vehicles (EVs) and charging points in Italy as of 2025 and 2030. Source: The European House - Ambrosetti elaboration based on Enel estimates, 2017

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Table 3: Distribution and sales of EVs, PHEVs and HEVs in 2017 (Data source: see legend)

Fleet Totals on 31 December 2017					
Vehicle Type	EVs	PHEVs	HEVs	FCVs	Total <sup>f</sup>
2- and 3-Wheelers <sup>a</sup>	500,000 <sup>a</sup>	n.a.	n.a.	n.a.	43,600,000 <sup>b</sup>
Passenger Vehicles <sup>b</sup>	7,710 <sup>c</sup>	5,513 <sup>c</sup>	181,296 <sup>c</sup>	13 <sup>d</sup>	37,876,138 <sup>c</sup>
Buses and Minibuses <sup>c</sup>	n.a.	n.a.	n.a.	n.a.	97,817 <sup>c</sup>
Light commercial vehicles <sup>d</sup>	3,738 <sup>c</sup>	n.a.	303 <sup>c</sup>	n.a.	3,752,540 <sup>c</sup>
Medium and Heavy Weight Trucks <sup>e</sup>	24 <sup>c</sup>	n.a.	n.a.	n.a.	1,400,080 <sup>c</sup>
<b>Totals without bicycles</b>	<b>11,472</b>	<b>5,513</b>	<b>181,599</b>	<b>13</b>	<b>51,726,575</b>

Total Sales during 2017					
Vehicle Type	EVs	PHEVs	HEVs	FCVs	Total <sup>f</sup>
2- and 3-Wheelers <sup>a</sup>	161,642 <sup>b</sup>	n.a.	n.a.	n.a.	1,943,280 <sup>b</sup>
Passenger Vehicles <sup>b</sup>	1,967 <sup>e</sup>	2,646 <sup>e</sup>	63,398 <sup>e</sup>	n.a.	1,970,497 <sup>e</sup>
Buses and Minibuses <sup>c</sup>	n.a.	n.a.	n.a.	n.a.	3,357 <sup>e</sup>
Light commercial vehicles <sup>d</sup>	n.a.	n.a.	n.a.	n.a.	193,533 <sup>e</sup>
Medium and Heavy Weight Trucks <sup>e</sup>	n.a.	n.a.	n.a.	n.a.	44,007 <sup>f</sup>
<b>Totals without bicycles</b>	<b>3,609</b>	<b>2,646</b>	<b>63,398</b>	<b>n.a.</b>	<b>2,444,674</b>

n.a. = not available

<sup>1</sup> UNECE categories L1-L5

<sup>3</sup> UNECE categories M2-M3

<sup>5</sup> UNECE categories N2-N3

<sup>a</sup> Data on bikes available only, source: ANCMA

<sup>c</sup> Data source: ENEA elaboration on ACI data (1 January 2017)

<sup>e</sup> Data source: ACEA

<sup>2</sup> UNECE categories M1

<sup>4</sup> UNECE categories N1

<sup>6</sup> Including non-electric vehicles

<sup>b</sup> Data source: ENEA elaboration on ANCMA data

<sup>d</sup> Data source: ENEA

<sup>f</sup> Data source: ENEA elaboration on ACEA data

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Table 4: Available vehicles and their prices in Italy (Data source: national automotive magazine "Quattroruote", N. 748, December 2017)

Market-Price Comparison of Selected EVs and PHEVs in Italy	
Available Passenger Vehicles	Untaxed, Unsubsidized Sales Price (in EUR)
AUDI A3 SPB e-tron (petrol-electric plug-in hybrid)	39,550+41,150
BMW 330e iPerformance (petrol-electric plug-in hybrid)	47,150
BMW 530e Business (petrol-electric plug-in hybrid)	58,750
BMW 740e (petrol-electric plug-in hybrid)	99,550
BMW 225xe Active Tourer (petrol-electric plug-in hybrid)	38,100
BMW i8 (petrol-electric plug-in hybrid)	141,750
BMW X5 (petrol-electric plug-in hybrid)	74,700
BMW i3 (electric)	39,150+42,800
BMW/i3 (electric range extender)	43,850+47,500
CITROEN C-Zero (electric)	30,740
CITROEN E-Mehari (electric)	26,040+ 31,700
CITROEN E-Berlingo (electric)	33,000
DS 5 (diesel-electric hybrid)	50,600+55,100
FERRARI LaFerrari Aperta (petrol-electric hybrid)	1,860,001
FORD Mondeo (petrol-electric hybrid)	41,600
HONDA NSX (petrol-electric hybrid)	201,000
HYUNDAI Ioniq (petrol-electric plug-in hybrid)	33,750+36,250
HYUNDAI Ioniq (petrol-electric hybrid)	25,150+29,250
INFINITI Q50 (petrol-electric hybrid)	51,990+63,400
INFINITI Q70 (petrol-electric hybrid)	63,450+66,400
KIA Optima (petrol-electric plug-in hybrid)	44,000
KIA Niro (petrol-electric hybrid)	25,000+30,000
LAND ROVER Range Rover Sport (petrol-electric plug-in hybrid)	90,200+111,500
LAND ROVER Range Rover (petrol-electric plug-in hybrid)	124,500+140,500
LEXUS CT (petrol-electric hybrid)	31,750+37,200
LEXUS IS (petrol-electric hybrid)	41,000+51,000
LEXUS GS (petrol-electric hybrid)	53,000+76,100
LEXUS LS (petrol-electric hybrid)	117,300+152,600
LEXUS RC (petrol-electric hybrid)	46,000+53,000
LEXUS LC (petrol-electric hybrid)	105,000+115,500

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LEXUS NX (petrol-electric hybrid)	47,500+58,950
LEXUS RX Hybrid (petrol-electric hybrid)	69,000+76,000
MERCEDES C 350e (petrol-electric plug-in hybrid)	50,101
MERCEDES C 300 (diesel-electric hybrid)	49,408
MERCEDES GLC 350e (petrol-electric plug-in hybrid)	57,063+63,560
MERCEDES GLE 500e (petrol-electric plug-in hybrid)	85,050
MINI Countryman (petrol-electric plug-in hybrid)	38,050+41,300
MITSUBISHI Outlander (petrol-electric plug-in hybrid)	46,850+52,850
MITSUBISHI i-MiEV (electric)	29,900
NISSAN Leaf (electric)	33,070+ 37,935
NISSAN e-NV200 Evalia (electric)	37,361+ 39,811
PEUGEOT iOn (electric)	28,151
PEUGEOT Partner Tepee (Electric)	33,000
Porsche Panamera E-Hybrid (petrol-electric plug-in hybrid)	114,043+121,729
RENAULT Scenic (diesel-electric hybrid)	29,100+35,100
RENAULT Grand Scenic (diesel-electric hybrid)	30,600+36,600
RENAULT ZOE (electric)	23,300+ 39,200
SMART fortwo Electric Drive (electric)	23,920+ 28,840
SUZUKI Swift (petrol-electric hybrid)	17,690+19,190
SUZUKI Baleno (petrol-electric hybrid)	17,600
SUZUKI Ignis (petrol-electric hybrid)	16,800+19,000
Tesla Model S 75 kWh (electric)	72,640+87,680
Tesla Model S 100 kWh (electric)	111,130+ 151,530
Tesla Model X 75 kWh (electric)	94,480
Tesla Model X 100 kWh (electric)	114,530+160,930
TOYOTA Yaris (petrol-electric hybrid)	19,500+22,250
TOYOTA Auris (petrol-electric hybrid)	24,500+29,300
TOYOTA Prius (petrol-electric plug-in hybrid)	41,600
TOYOTA Prius (petrol-electric hybrid)	29,450+36,300
TOYOTA C-HR (petrol-electric hybrid)	32,800
TOYOTA RAV4 (petrol-electric hybrid)	34,100+41,050
VW e-up! (electric)	28,100
VW Golf (petrol-electric plug-in hybrid)	39,650
VW e-Golf (electric)	39,600
VW Passat (petrol-electric plug-in hybrid)	47,900+48,900
VOLVO V60 (diesel-electric plug-in hybrid)	59,870

VOLVO S90 (diesel-electric plug-in hybrid)	72,950
VOLVO V90 (diesel-electric plug-in hybrid)	75,910
VOLVO XC60 (diesel-electric plug-in hybrid)	70,350+75,550
VOLVO XC90 (diesel-electric plug-in hybrid)	81,100+125,750

A fuel cell SUV from Hyundai is expected to be available for sale in summer 2018.

### Vehicles Incentives from Car-Dealers

Until December 31, 2017, an offer by some Toyota dealerships gave a bonus of between 5,000 and 8,000 EUR to people scrapping or trading in their outdated (6 months, at least) diesel vehicle for an hybrid one. Other examples are given in Table 5.

Table 5: Examples of discounts from different car dealers (Data source: [6])

Examples of Discounts Offered from Different Car-Dealers	
Car Model	Discount (in EUR)
Lexus NX Hybrid	9,000
Hyundai Ioniq	3,250
Kia Niro	3,100
Suzuki Ignis	1,900
Toyota C-HR Hybrid Active	4,450 (any old vehicle traded-in)

### References

- [1] IEA\_HEV\_TCP\_Report2017 “Hybrid and Electric Vehicles - The Electric Drive Chauffeurs”
- [2] “Quattroruote” Magazine, N. 750, February 2018, pages 206÷207
- [3] “Quattroruote” Magazine, N. 750, February 2018, pages 149÷155
- [4] Enel, The European House – Ambrosetti, “E-Mobility Revolution – Impacts on Italy and its industrial value chain: Italy’s agenda”, 2017
- [5] “Quattroruote” Magazine, N. 749, January 2018, Annex page 44
- [6] “Quattroruote” Magazine, N. 748, December 2017, pages 210÷211