



35.1 Major Developments in 2017

Turkey made national electric vehicles a priority in the past years and a consortium composed of five major corporations (Anadolu Group, BMC, Kıraca Holding, Turkcell and Zorlu Holding) supported by the government was established in November 2017 in order to develop Turkey's first locally produced national electric vehicle brand. The consortium has made a 15 year investment plan and targeted to have a running prototype by 2019 and start serial production in 2022. The vehicle is anticipated to have five electric models on a single modular platform and is planned to be exported as well as being sold in Turkey.

Furthermore, on the electric bus side; development, production and sales have been increasing in the past years. Turkish bus manufacturers introduced their fully electric vehicles during exhibitions in 2017. Karsan introduced its electrically drive midi-bus Jest Electric in Busworld Kortrijk. In addition, Bozankaya, Temsa, Otokar and Anadolu Isuzu have all showcased their electric buses, with ranges varying from 70 to 250+ kms. Bozankaya, a leader in the development of electric buses, has been sold more than 250 electric buses in the country with the main focus being İzmir metropolitan municipality. The company also agreed to deliver its Sileo brand all electric buses, with patented BMS system, to the several municipalities across Turkey in early 2018.

Moreover, The Electric Taxi Project was officially initiated in Istanbul, primarily using Renault "Zoe" EV vehicles, led by ITEO (Istanbul Chamber of Taxi Drivers) and funded by a private financial institution. Within this scope, charging stations were located at central car parks, taxi stands and shopping malls. Turkcell (country's largest mobile service operator) provided data service for the vehicles whereas the information technology services were provided by Ceia.



Figure 1: The Electric Bus fleet developed by Bozankaya delivered to Izmir Metropolitan Municipality (Source: Izmir Metropolitan Municipality)



Figure 2: The Electric Taxi Project demonstrated by ITEO, Greenway and Renault in Istanbul (Source: ITEO)

On the R&D side, The Scientific and Technological Research Council of Turkey – Marmara Research Center (TÜBİTAK MRC), within the Automotive Excellence Center, have also accelerated its research on vehicle and component level for electric and hybrid vehicle development, prototype building and testing in 2017. Various working prototypes have been developed regarding EV sub-components (electric motor, battery module/pack, battery management system, inverter and electronic control units) in the scope of different projects to be used in a wide range of vehicle applications. In addition, AVL Turkey, established its 2nd R&D

center in the country in order to conduct further research on autonomous and hybrid vehicle technologies.

On the university side, the 12th Efficiency Challenge Electric Vehicle competition on electro-mobile and hydro-mobile categories was held in Turkey in mid-2017. The competition was aimed to increase environmental awareness of university students and facilitate the development of new corresponding technologies and organized by TUBITAK. Çukurova University electro-mobility team won the electro-mobility competition by consuming 934 kW energy in 30 laps.



Figure 3: 12th Efficiency Challenge Electric Vehicle competition and Çukurova University Electromobility Team (Source: TUBITAK)

35.1.1 New policies, legislation, incentives, funding, research, taxation, etc.

Turkey has been using various legal and policy instruments to support electrification of transportation to encourage the use of hybrids and EVs. The taxation regulation, declared in late 2016, classify the special consumption tax (SCT) of conventional vehicles and hybrid vehicles based on engine cylinder volume; untaxed vehicle price and electric motor power. Also apparent tax advantage is valid for full EV vehicles.

The effects of SCT regulation on the sales of low engine volume conventional vehicle and hybrid vehicle (engine volume lower than 1,800 cc and electric motor

power >50 kW) were apparent in 2017 sales and shown in Table 2. Thus, Table 1 and Table 2 show the vehicle sales SCT (special consumption tax) categories for initial new passenger vehicles, motorbikes and electric/hybrid vehicles.

35.2 HEVs, PHEVs and EVs on the Road

35.2.1 Fleet

In Turkey, the total number of road motor vehicles in traffic increased by 1,128,521 in 2017 compared to the previous year and number of vehicles registered on traffic exceeded 22 million. The number of electric and hybrid vehicles on the road has also increased with the introduction of new models in the country. The total number of hybrid & electric vehicle sales in Turkey passed over 4,500 units at the end of 2017. Despite the increase of sales, H&EVs still incorporate a negligible fraction of the total vehicle sales. Most common engine size was 1,501-1,600 cc among cars (40.8 %) registered in 2017. Among all vehicles sold, passenger cars dominated the fleet with a 54.1 % of total fleet, followed by small trucks 16.4 %. By the end of year 2017, the average age of the total registered road motor vehicles became 13.1. Table 3 shows the total vehicle fleet with respect to vehicle types from 2013 to 2017. The HEV & EV new sales collected by the Automotive Distributors Association (ODD) are shown in Table 4.

Table 1: Special consumption tax classification categories for new conventional and electric only vehicles in 2017 (Data source: Official Gazette of the Republic of Turkey)

Special Consumption Tax for Conventional and Electric Vehicles					
Vehicle Type	Engine Cylinder Volume (cc)	Conventional		Electric Only	
		Untaxed Price (₺)*	Special Consumption Tax (%)	Electric Motor Power (kW)	Special Consumption Tax (%)
Passenger Vehicle	<1,600	<40,000 (7,540 EUR)	45	<85	3
		40,000-70,000 (7,540-13,195 EUR)	50	85-120	7
		>70,000 (13,195 EUR)	60	≥120	15
	1,600-2,000	<100,000 (18,853 EUR)	100		
		>100,000 (18,853 EUR)	110		
>2,000		160			
Motorbikes	<250		8	<20	3
	>250		37	>20	37

*Currency: Turkish Lira (₺); 7 June 2018 TCMB exchange rate: 1 €=5,3 ₺ ;

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Table 2: Special consumption tax classification categories for new hybrid vehicles in 2017

Special Consumption Tax for Hybrid Vehicles				
Vehicle Type	Engine Cylinder Volume (cc)	Electric Motor Power (kW)	Untaxed Price (₺)	Special Consumption Tax (%)
Passenger Vehicle	≤1,600			60
	1,601 ≤1,800	≤ 50 kW		110
			> 50 kW	<50,000 (9,434 EUR)
		50,000-80,000 (9,434-15,095 EUR)		50
		>80,000 (15,095 EUR)	60	
	1,801≤2,000			110
	2,001 ≤2,500	≤ 100 kW		160
		> 100 kW	<100,000 (18,853 EUR)	100
			>100,000 (18,853 EUR)	110
	>2,500 cc			160

*Currency: Turkish Lira (₺); 7 June 2018 TCMB exchange rate: 1 €=5,3 ₺

Table 3: Total vehicle fleet according to the vehicle types between 2013 and 2017 (Data source: TURKSTAT Road Motor Vehicle Statistics, December 2017)

Fleet Totals on 31 December 2017					
Vehicle Type	2013	2014	2015	2016	2017
Passenger car	9,283,923	9,857,915	10,589,337	11,317,998	12,035,978
Minibus	421,848	427,264	449,213	463,933	478,618
Bus	219,885	211,200	217,056	220,361	221,885
Light commercial vehicle	2,933,050	3,062,479	3,255,299	3,442,483	3,642,625
Truck	755,950	773,728	804,319	825,334	838,718
Motorcycle	2,722,826	2,828,466	2,938,364	3,003,733	3,102,800
Special purpose vehicle	3,6148	40,731	45,732	50,818	60,099
Tractor	1,565,817	1,626,938	1,695,152	1,765,764	1,838,222
Totals	17,939,447	18,828,721	19,994,472	21,090,424	22,218,945

35.2.2 Sales

Passenger car sales in 2017 decreased by 34,860 units compared to the previous year. When the passenger car market was evaluated according to the engine volumes, the passenger cars below 1,600 cc received the highest share of sales with 96.10 % (694,464 units). In 2017, there were 76 EV passenger cars sold in Turkey

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compared to 44 units the year before. On the hybrid passenger cars, 4,507 units were sold in 2017 where Toyota C-HR, a locally produced vehicle, led this segment.

Table 4: Passenger car market according to the engine/electric motor size between 2016 and 2017 (Data source: ODD Press Summary, December 2017)

Total Sales during 2017					
Engine Size	Engine Type	2016 (end of Dec)	2017 (end of Dec)	SCT Tax Rates	VAT Tax Rates (%)
≤1,600 cc	Gas/ diesel	729,324	694,464	45 – 60*	18
>1,600 cc ≤2,000 cc	Gas/ diesel	22,493	21,568	100 -110	18
>2,000 cc	Gas/ diesel	4,039	2144	160	18
≤85 kW	Electric	23	55	3	18
>85 kW ≤120 kW	Electric	0	0	7	18
>120 kW	Electric	21	21	15	18
≤1,600 cc	Hybrid	886	464	60	18
>1,600 cc ≤1,800 cc (≤ 50 kW)	Hybrid	0		110	18
>1,601 cc ≤1,800 cc (> 50 kW)	Hybrid	28	3704	45 - 60	18
>1,801 cc ≤2,000 cc	Hybrid	89	63	110	18
>2,000 cc ≤2,500 cc (≤ 100 kW)	Hybrid	0	0	160	18
>2,000 cc ≤2,500 cc (> 100 kW)	Hybrid	0	266	100 -110	18
>2,500 cc	Hybrid	35	10	160	18
Totals		756,938	722,759	Tax Rates	

* SCT tax rates differs between 45% and 60% based on regulation as previously shown in Table 2. New SCT taxation takes account of engine volume, electric motor power and pre-taxed price.

Furthermore, the breakdown of the vehicle sales with respect to various powertrains is shown in Figure 4.

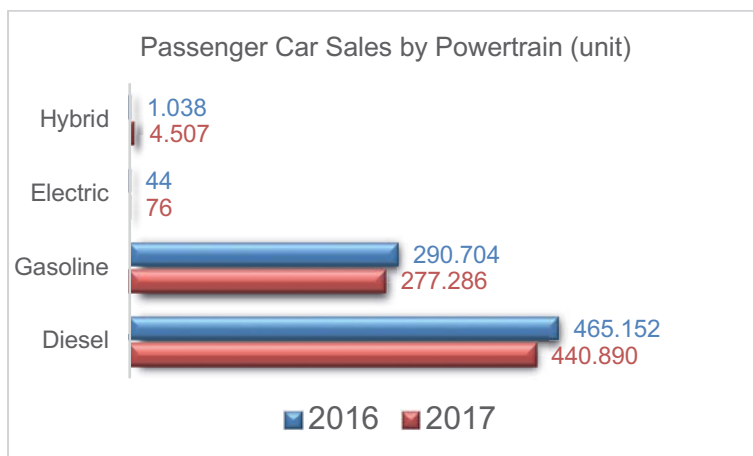


Figure 4: Passenger car sales by powertrain type (Data source: ODD Press)

When the passenger car market is examined according to average emission values in 2017, a significant increase on the passenger car sales with emission values between 140 g/km and 160 g/km is observed. Passenger cars with the emission values between 120 g/km and 140 g/km led the sales with 42.6 %. Moreover, Table 5 shows the passenger cars under 140 g/km CO₂ emissions accounted for more than 81 % of vehicle sales.

Table 5: Passenger car market according to average emission values in 2017 (Data source: ODD Press Summary, December 2017)

Passenger Car Sales during 2017 by Average Emission Values					
Average Emission Values of CO ₂ (g/km)	2016 (end of Dec)		2017 (end of Dec)		2017 / 2016
	Units	%	Units	%	%
<100 g/km	106,718	14.10	111,495	15.4	4.5
≥100 to <120 g/km	337,226	44.55	307,659	42.6	-8.8
≥120 to <140 g/km	186,582	24.65	167,311	23.1	-10.3
≥140 to <160 g/km	101,782	13.45	111,376	16.0	13.4
≥160 g/km	24,630	3.25	20,918	2.9	-15.1
Total	756,938	100.00	722,759	100.00	-4.5

35.3 Charging Infrastructure or EVSE

According to Republic of Turkey Energy Market Regulatory (EPDK) announcement, 400+ charging stations for electric vehicles are active in the country. The number of private companies on EVSE installation and charging infrastructure has slightly increased in 2017. In addition, gas station companies such as Alpet, Aytemiz have also joined the competition in collaboration with the

main charging infrastructure providers by establishing fast charging stations nearby their gas stations.

Installation efforts are mostly concentrated in shopping centers, hotels, restaurants, public buildings and auto-dealers in metropolitan municipalities. Esarj, currently the largest charging infrastructure provider, increased the charging capacity to 173 stations. The rest of the charging stations are owned by EVSE providers such as BD Oto, DMA, G-Charge, Voltron, Yesilgüç, Fullcharger, Greenway, Phoenix Contact. In terms of fast chargers, the numbers of stations built/planned are still a low fraction of the total existing stations.

Furthermore, in 2017, Gersan announced an agreement with Tesla Motors for installations of superchargers within previously announced locations in Turkey by Tesla Motors. A Map showing the charging stations by private companies throughout the country is shown in Figure 5. Some of active fast charging stations established by gas station companies are highlighted on Figure 6.



Figure 5: Map of Esarj charging stations throughout Turkey (Source: Esarj Electric Vehicle System Incorporated Company)



Figure 6: New fast charging stations implemented by gas stations in Turkey (Source: Aytemiz and Petrol Ofisi)