

Holistic Evaluation of Automation Systems in the Fuel Distribution Industry

Sector Studies

Year: 2018 | Issue: 3



Introduction

The Petroleum Industry Association (PETDER), the leading fuel distribution industry NGO in Turkey, and PwC Turkey, are carrying out research and review activities within the framework of PETDER's mission*.

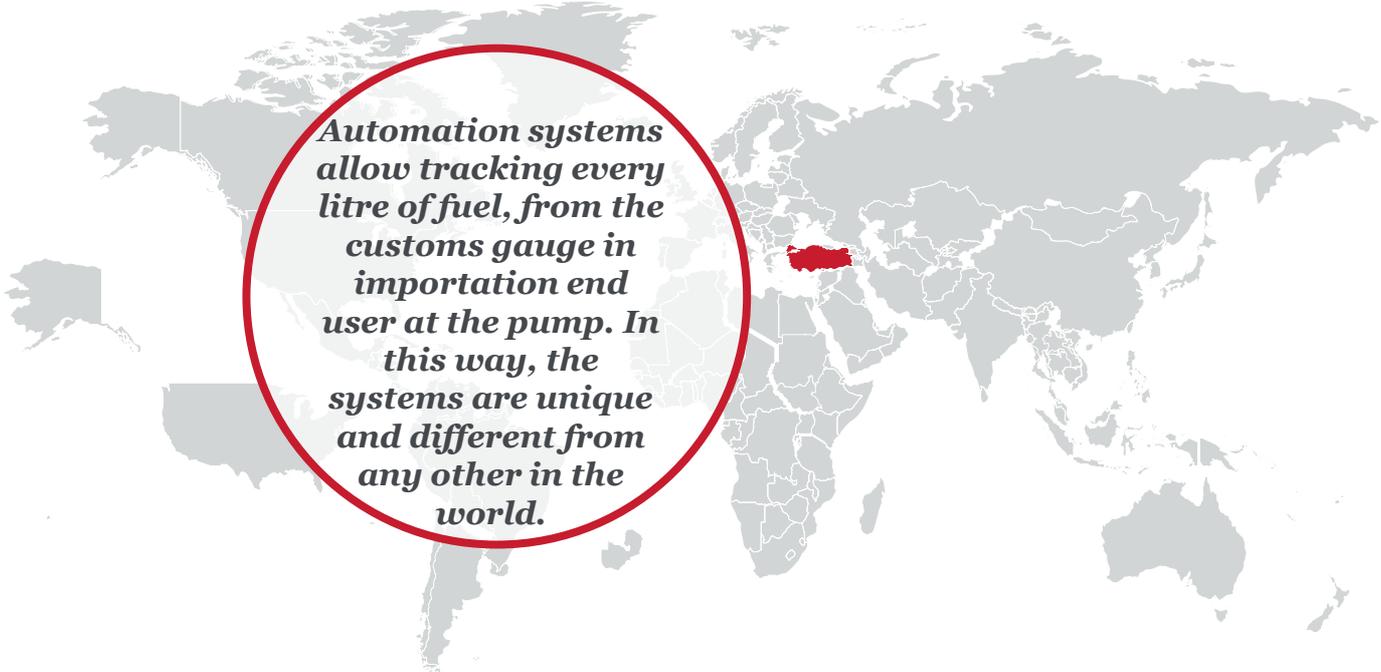
The industry contributes greatly to the Turkish economy with its more than 100 distributors, more than 100 storage facilities and approximately 13,000 dealers which provide service 24/7 across the country. Moreover, when we consider the span of an end user's portfolio and the public income the industry provides, we can see the industry has a large set of stakeholders.

In this context, as a third study, the automation systems in fuel distribution industry have been presented with a holistic approach, from the gauge to pump.

Along with the publicly available data sets (EMRA, TURKSTAT, etc.) information from players in the sector and other NGOs were used for analysis and examinations in the report. Figures obtained in quantitative and qualitative analyses are shared here, along with certain assumptions, with the aim of informing the reader.

We hope that this document will be useful to all stakeholders, especially to the industry players who invest in the infrastructure and plants necessary to meet increasing demand and the ever-changing needs of customers.

**PETDER advocates proactively for improvement in all aspects of the petroleum industry and carries out research and development activities to produce relevant, reliable and objective information which can be shared to shape industry policies and strengthen its advocacy role.*



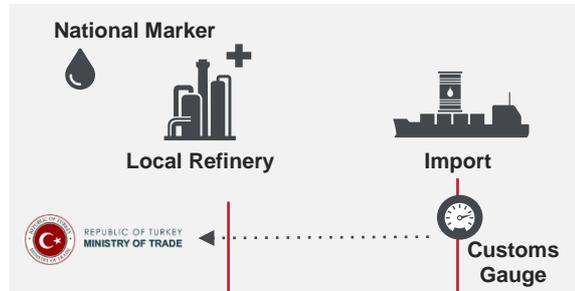
Automation systems allow tracking every litre of fuel, from the customs gauge in importation end user at the pump. In this way, the systems are unique and different from any other in the world.

The fuel industry bears significant investment and operating costs for the effective installation and operation of automation systems with its refineries, distributors and dealerships.

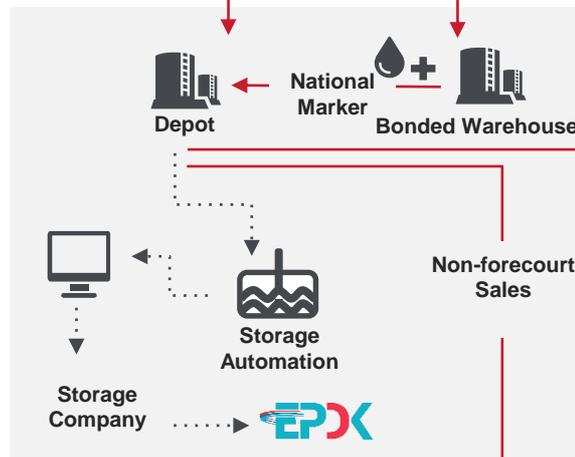
Automation Infrastructure in Turkey

Automation systems, which are implemented in Turkey as a whole, are infrastructure systems which allow fuel to be tracked from supply until the end consumer at every step and throughout thereby related activities. Along with these automation systems, national marker is still being used to detect illegitimate fuel sales.

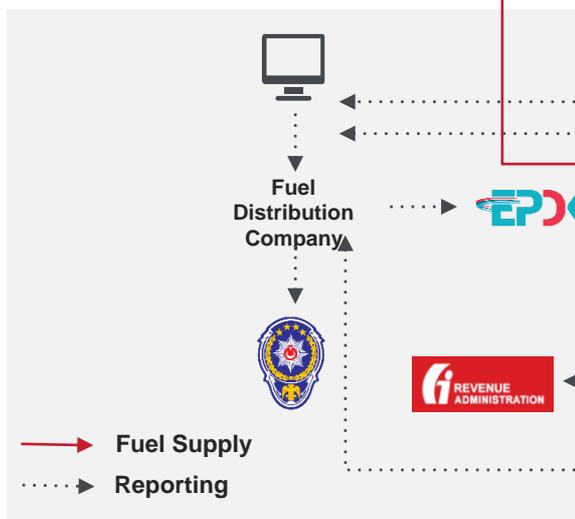
I Supply



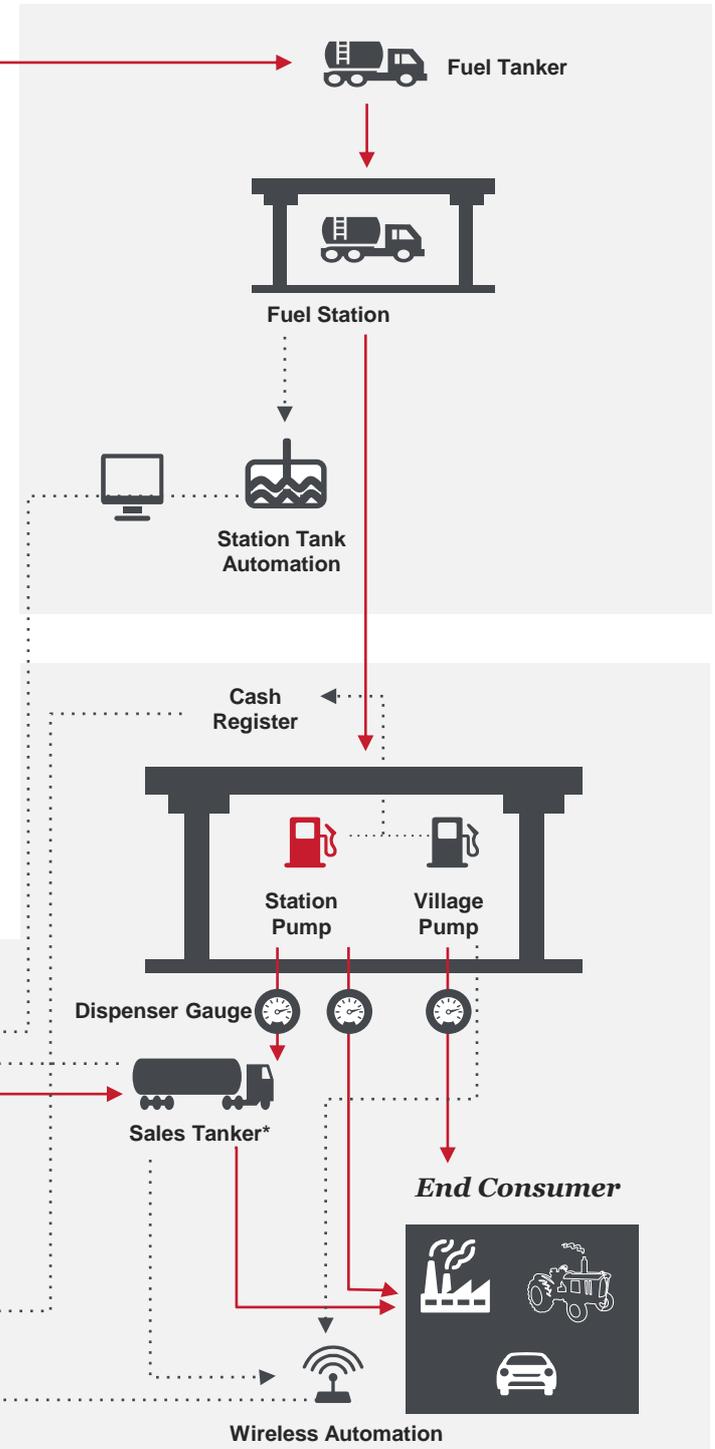
II Storage



IV Sales



III Station Supply



→ Fuel Supply
 Reporting

Although various tracking and control systems are used in fuel distribution markets around the globe, the automation infrastructure in Turkey is unmatched in the benefits it provides to companies, institutions and regulatory bodies.

Source: Fuel Distribution Companies, PETDER, PwC Analysis

*Automation systems are implemented only on tankers used for agricultural sales. They are not mandatory on tankers used for non-forecourt sales.

Automation Stages

Today, automation systems are used in some European countries at certain points in the fuel distribution network (partially in storage). In Turkey, however, automation systems allow tracking of fuel at every stage from the point of supply to the end consumer and the relevant institutions are notified throughout these stages. Assessed as a whole, the automation systems in Turkey and the comprehensive activities conducted are unique globally.



I Supply

The fuel products in Turkey's distribution network are either imported or supplied from domestic refineries by processing crude oil. In this stage, import products pass through gauges implemented in each and every terminal containing at least one bonded warehouse, and is transferred to fuel customs warehouses. Fuel passing through the gauges is instantly reported to the Ministry of Trade. National marker is added to fuel that is processed in refineries during the supply stage, and the fuel is then transferred to tanks with customs clearance.



II Storage

Fuel held at terminals is reported to EMRA every half hour via the calibrated level gauge automation systems implemented in every tank, whether the tank has customs clearance (depot) or not (bonded warehouse). Inventory reports received from automation systems are engaged in reporting a fuel company's current inventory to EMRA on a daily basis. In addition, 24/7 surveillance is provided with camera systems installed at the terminals. The imported product to be kept in the warehouses is nationalized by adding the national marker during filling the tank. In addition, **1.5-2 million m³** of fuel is constantly stored in depots and bonded warehouses in accordance with the obligation to hold national stocks. This shows that in Turkey, 10 billion TRY (2.5 billion USD) worth of fuel is constantly kept as inventory.*

*Calculations are based on prices/exchange rates from April 2018 and exclude refinery inventories, and are based on the 20-day national stock obligation.

Automation Stages

III Station Supply

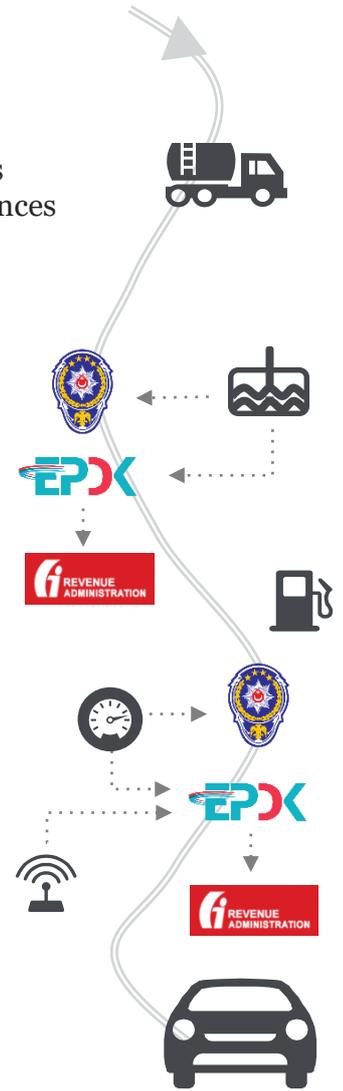
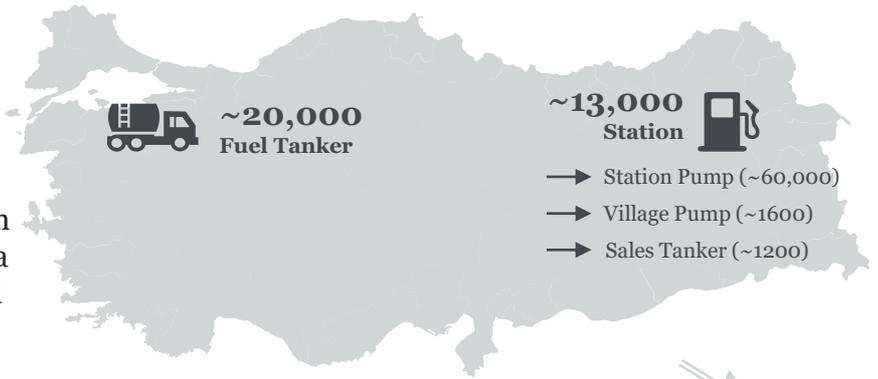
The station supply, which is provided via pipelines from depots and bonded warehouses to city centres/entrances in many countries, is provided entirely via fuel tankers in Turkey. The fuel is filled into different tanks for each product upon reaching stations, and fuel levels are monitored using the level gauge automation systems installed on the tanks. Distribution companies are required to report to EMRA every half-hour using the automation systems.

With tank level tracking, it is crosschecked whether each filling made to tanks is invoiced and within the tolerance range (3%) determined by the EMRA. Differences that exceed the tolerance range or instances of supply without an invoice are reviewed due to the risk of unregistered supply, and the station involved is monitored. EMRA is notified in the event of a legal risk.

IV Sales

After the fuel is transferred via the tankers to the station, fuel sales to the end user are conducted through station pumps, village pumps and sales tankers (agricultural and non-forecourt sales). The use of gauges is mandatory in sales to end consumers through stations, village pumps and agricultural sales tankers, and during the filling at non-forecourt sales tankers; if the filling is made via a station. Instant reporting is provided to EMRA with the automated gauges installed to every pump. In addition, tank filling and pump sales data is consolidated every month and a reconciliation is made with each dealer in accordance with the tolerance range determined by EMRA.

In this context, a communication infrastructure was established to ensure uninterrupted data transmission from the village pump and agricultural sales tankers to EMRA. Instant reporting is provided to EMRA through wireless automation systems on village pumps and agricultural sales tankers. **99.5%** of retail fuel sales in Turkey are conducted through station pumps. Even so, in addition to investments in stations, automation and gauge investments are also made in each and every sales channel.



Automation Systems Investment Costs¹

In Turkey, all investment and operation costs for the automation systems dedicated in the fight with illegitimate fuel are undertaken by the sector.

				Unit Investment Cost (\$)	Total Investment Cost (\$)
I Supply	Bonded Warehouse Gauge	Number of gauges ² (~120)	×	350,000	= 42,000,000
					+
II Storage	Depot and Bonded Warehouse Tank Automation	Total Number of Tanks with EMRA Licences (~1,280)	×	22,000	= 28,160,000
					+
	Terminal Surveillance Systems	Number of Terminals (~100)	×	70,000	= 7,000,000
					+
III Station Supply	Station Tank Automation	Number of Stations x 4 ³ (~52,000)	×	1,000	= 52,000,000
					+
IV Sales	Pump Automation	Total Number of Pumps ⁴ (~60,000)	×	1,200	= 72,000,000
					+
		Village Pump Automation	Number of Village Pumps with EMRA Licences (~1,600)	×	4,500
					+
	Agricultural Sales Tanker Automation	Number of Agricultural Sales Tankers with EMRA Licence (~1,200)	×	6,250	= 7,500,000
					=
					~216 million \$

Thanks to investments made in automation systems by distribution companies, fuel can be tracked and monitored until it reaches the end consumer. Considering the investment items and their average costs, the total investment in automation systems is approximately **216 million USD** (~1 billion TRY) at current prices.

¹Exchange rates on 30 June 2018 are adopted in the calculations.

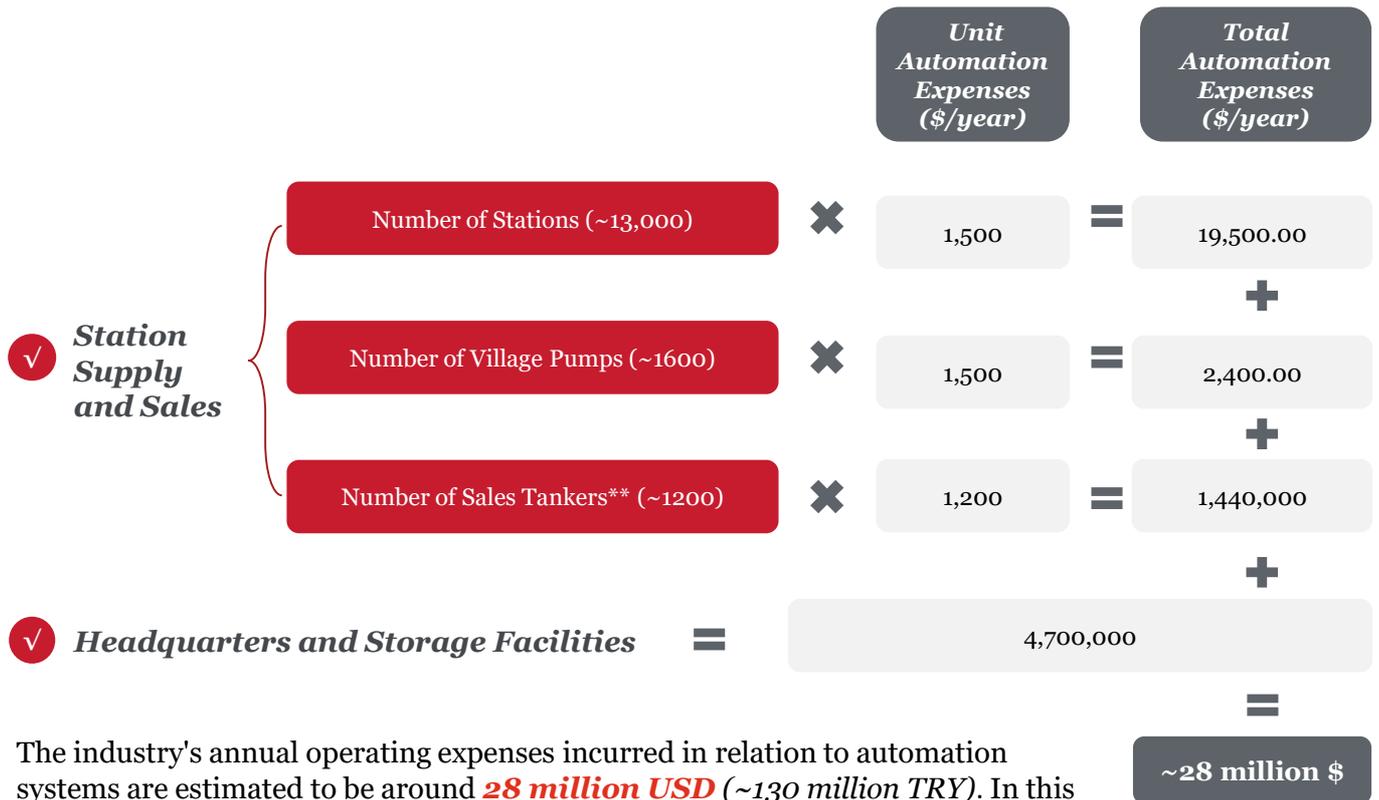
²Estimated based on the information received from distribution companies.

³It was assumed that four products are found in each station on average, and that a single tank was used for each product.

⁴It was assumed that 4-5 pumps are found in stations on average.

Other Expenses Related to Automation Systems*

Apart from the investments in automation systems in the fight against illegitimate fuel, the maintenance and repair expenses of terminals and stations in terms of the sustainability of the system and the expense items such as personnel and software for automation systems also constitute significant costs. The obligation to stop sales in the event of a malfunction in an automation system creates the need for a wide service network and spare equipment inventory. This service results in significant cost for the industry due to the need to treat malfunctions as soon as possible.



The industry's annual operating expenses incurred in relation to automation systems are estimated to be around **28 million USD** (~130 million TRY). In this case, the automation operating expense for 2017 is **0.1 ¢** (0.4 kurus) per litre.

The fuel distribution industry bears a significant amount of investment and operating costs for the installation, operation and maintenance of automation systems.

*Exchange rates on 30 June 2018 are used in the calculations.

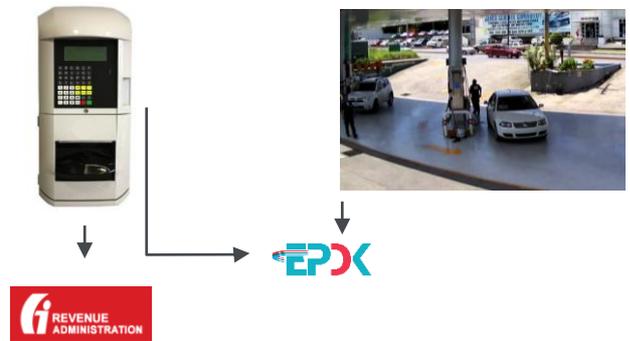
**Automation systems are found only on tankers used for agricultural sales. They are not mandatory on tankers used for non-forecourt sales.



Costs of Other Systems Integrated With Automation Systems

a) National Marker

All operations and costs associated with the national marker, which is used along with automation systems to fight illegitimate fuel, are undertaken by distribution companies. All activities related to the national marker, which is procured under very strict conditions, from its supply, monitoring and addition to its control in accredited laboratories, is undertaken by fuel distribution companies.

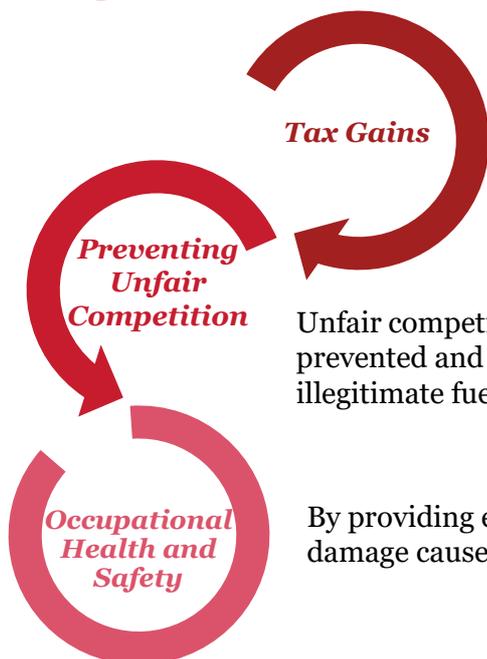


Cash Registers

In addition to the reporting via pump automation, new generation Cash Registers (CRs) will be designed for integration with fuel pumps to make tax tracking easier and transparent by providing fuel sales reports to EMRA and the Revenue Administration. In this way, the sales channel will be fully integrated into the control system, from supply until the pump.

By recording licence plates with the new generation CRs, expense fraud (e.g.: invoice trading) will be prevented. This way, in addition to revenue transparency in stations, EMRA will be able to review quantities, and the Revenue Administration will be able to check related tax automatically for the first time. The time estimated to complete the new generation CR systems is 1-2 years. CR systems provide the General Directorate of Security (EGM) with instant access to station sales data in relation to individual licence plates and thus play an important role in ensuring national security regarding suspicious vehicles.

Automation Systems and Fight Against Illegitimate Fuel Activities



It is estimated that the annual public revenue* generated by legalising 1-2 million tonnes of illegitimate fuel through investments and stricter penalties is **4-5 billion TRY**.

Unfair competition between distribution companies and dealers has been prevented and end user satisfaction has increased with the reduction of the illegitimate fuel usage that has created problems in the industry for many years.

By providing early detection, automation systems as a whole help minimize the damage caused by problems such as warehouse, tanker, line and pump leaks.

*April 2018 prices and taxes are used in the calculations.

PwC's aim is to build trust in society and provide solutions to important problems. We are a community consisting of more than 236,000 employees in 158 countries with a focus on providing high quality service in assurance, tax and advisory services.

PwC has provided service to the Turkish business community since 1981, and, with our professional staff of almost 1,700 people in five offices located in Istanbul, Ankara, Bursa and Izmir, we work to create the value desired by our clients.



PETDER
PETROL SANAYİ DERNEĞİ

The Turkish Oil Industry Association, PETDER, was established in September 1996 by a consortium of leading fuel distribution companies actively participating in the Turkish oil market and with the aim of forming a non-governmental organization supporting a spectrum of business activities in the downstream oil industry.

PETDER's primary target is to be a professional, strong, reliable and objective NGO, and it has always worked to that end.

Present PETDER members include Alpet, Aytemiz, Belgin, BP, ExxonMobil, GO, Opet, Petline, Petroyağ, Petrol Ofisi, Shell, Shell & Turcas, Total and TP.