Supply Chain–Based Solution to Prevent Fuel Tax Evasion: Proof of Concept

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Revenues from motor fuel and other highway use taxes provide the primary source of funding for the United States' transportation system, and ensuring all of these taxes are collected, remitted, and credited to the Highway Trust Fund is a priority for the U.S. Department of Transportation Federal Highway Administration (FHWA). In the past, loss of revenue due to tax evasion has been estimated to range from $1 billion annually to as much as 25% of total revenues. After the point of taxation was changed for both gasoline (1988) and diesel fuel (1994), significant increases in tax revenue were realized which were assumed to be due to decreased evasion. Additionally, diesel fuel that was to be used for off-road (non-taxable use) purposes was marked with a red dye, making it easier for on-road enforcement personnel to identify the fuel as having had all proper taxes paid prior to its use in the vehicle. However, there are still a number of extensive and convoluted schemes to evade fuel taxes that cannot be addressed by a single solution. Rather, a supply chain–based solution is needed. This research used evidential reasoning techniques, fuel markers, sensor devices, and vehicle tracking devices to monitor, track, and detect the transfer and movements of petroleum products between different locations and determine the "legitimacy" of the movements and fuel loading/unloading (Fig. 1). This fuel tax evasion (FTE) detection system has the potential to reduce or eliminate a number of FTE schemes, resulting in millions of dollars of additional revenue in the Highway Trust Fund.

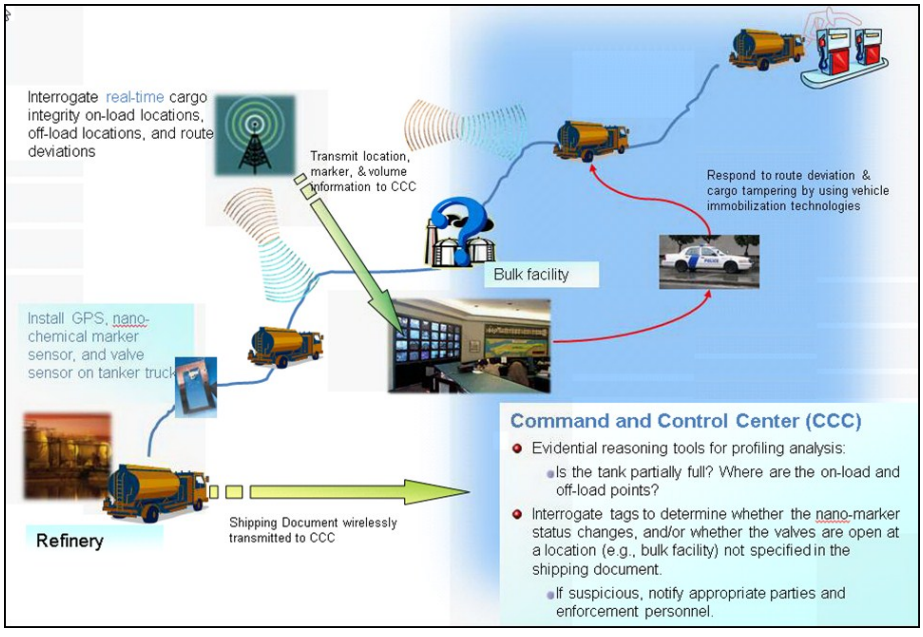

Fig. 1. A conceptual drawing of the proposed fuel tax evasion system.

For Federal tax purposes, the point of taxation for gasoline and diesel fuel is at the point of its removal from bulk storage at the terminal rack. Approximately half of the states in the United

States have the same point of taxation. However, the rest of the states have a point of taxation at the wholesaler/distributor level or below. This presents additional challenges in tracking untaxed fuel after it leaves the bulk storage. Some of the technologies introduced in this research project would be useful in tracking the “below the rack” (after the product leaves the bulk terminal) movement.

The goal of this research was to provide a proof of concept (POC) system for preventing (1) non-taxable (non-highway diesel use) or low-taxable (jet fuel) petrochemical products from being “blended” with taxable fuel products and (2) taxable fuel products from cross-jurisdiction evasion. The research worked to fill the need to validate the legitimacy of individual loads, offloads, and movements by integrating and validating, on a near-real-time basis, information from global positioning system (GPS), valve sensors, level sensors, and fuel-marker sensors. The FTE system components that were tested are shown in Fig. 2.

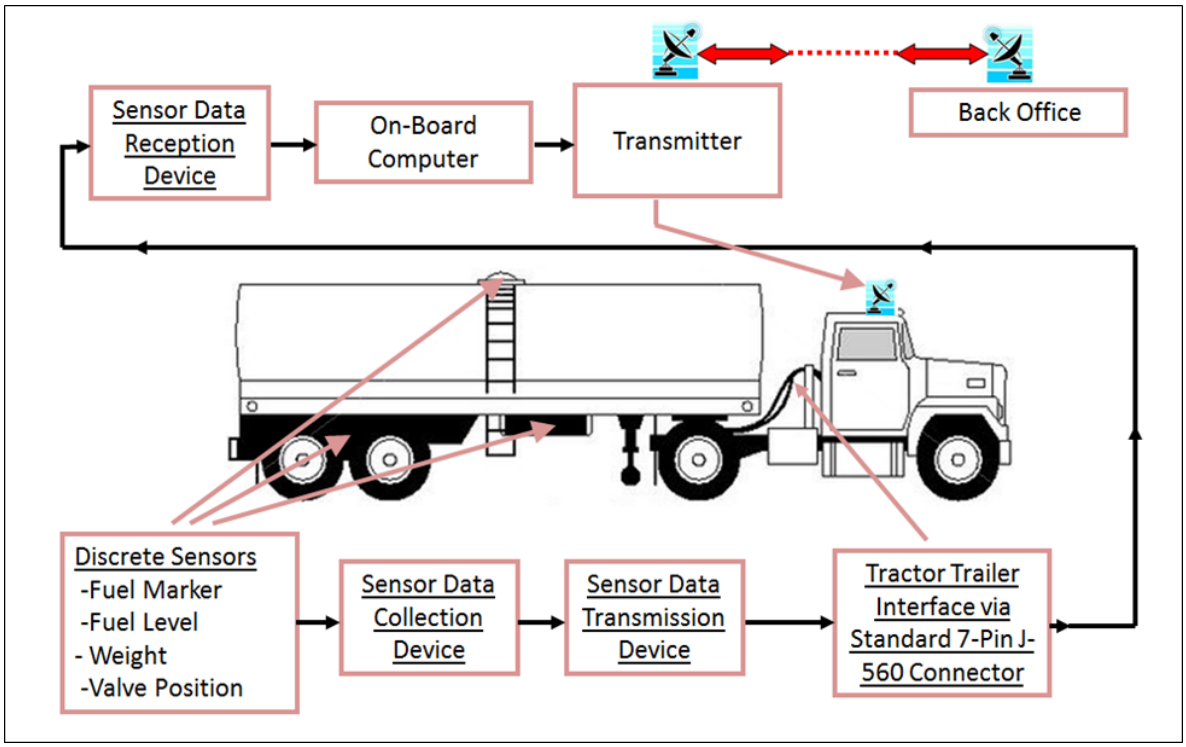

Fig. 2. Field tested components of the fuel tax evasion system.

The current approaches in identifying and preventing FTE are primarily through fuel tax enforcement, electronic registration and data reporting, and processing and analyzing fuel tax data. The enforcement activities include checking highway diesel users for dyed fuel in their tanks and audits of the gasoline tank truck delivery system. These approaches are time consuming, and they attempt to discover and investigate evasions after they have taken place. By monitoring in near real-time, this proposed solution provides enforcement staff with intelligence on a potential diversion of fuel or other tax evasion during such an event.

The major benefit of this conceptual system to the highway programs is the potential to increase the collection of fuel tax revenue. Also, this system allows for near-real-time notification of any suspicious variation in standard delivery processes as the tanker moves from the origin (e.g., terminal) to the destinations (e.g., retail outlet) on its delivery route. Therefore, the key metrics to measure the impacts of this research include, but are not limited to, the propensity and accuracy of detecting illegal blending and bootlegging; the ease and the costs (including both direct and indirect costs) of deploying the proposed system; the frequency and speed by which the communications center is notified of a potential illegal activity; and the transparency of the detection system to the carriers’ operations.

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