

State of California
Department of Motor Vehicles

Report to the Legislature of the State of California

REPORT ON ALTERNATIVE REGISTRATION PRODUCTS PILOT PROGRAM

October 2013 through June 2019

August 2019



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In Accordance with California Vehicle Code Section 4853

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INTRODUCTION	3
PILOT ADMINISTRATION	4
– Product Pilots	5
– Electronic Registration Card	5
– License Plate Wrap	7
– Digital License Plate	9
PROGRAMS IN OTHER STATES	14
– Arizona	14
– Pennsylvania	15
– Texas	16
– Washington	17
RECOMMENDATION	19

Executive Summary

Pursuant to Senate Bill 806 (Hueso, Chapter 569, Statutes of 2013), the Department of Motor Vehicles (DMV) conducted a pilot program to evaluate the use of alternatives to the department-issued stickers, tabs, license plates, and registration cards. The goal of the pilot program was to allow DMV to collaborate with the private sector to develop innovative ways to better serve customers while at the same time reduce processing and mailing expenditures for the state. This aligns with efforts to modernize the DMV. DMV, in collaboration with the California Highway Patrol (CHP), tested the operational capability and functionality of three products to determine the cost-effectiveness and feasibility of statewide implementation – the Electronic Registration Card, the License Plate Wrap, and the Digital License Plate.

Electronic Registration Card

The Electronic Registration Card, a digitized version of the traditional paper vehicle registration document, became operational in December 2015. Pilot participation grew from approximately 30 to 100 vehicles as of June 2019.

License Plate Wrap

The License Plate Wrap, which uses an adhesive license plate applied to a vehicle's front bumper in lieu of the traditional metal license plate, became operational in November 2015. Pilot participants grew from 25 to approximately 300 vehicles as of June 2019. The vendor used three different wrapping materials, and offered a standard white reflectorized plate, a Legacy plate, and a custom-designed beach background plate.

Digital License Plate

The Digital License Plate replaces the vehicle's traditional rear metal plate with an electronic screen. This pilot became operational in December 2015, with five vehicles. In 2017, the pilot grew to approximately 85 vehicles. In 2018, participation increased to approximately 1,400 vehicles. The pilot is projected to conclude with a population of approximately 1,500 vehicles.

Pilot Findings

In general, there were no significant law enforcement, DMV, or customer concerns with any of the three pilot products. As optional products, the cost is borne by the consumers, with minor fiscal impact to the state.

Recommendation

The department is encouraged by the results of the pilot and believes all three products meet the intent of SB 806 by delivering innovative technologies to Californians in a cost-effective manner. DMV believes all three products can be feasibly implemented through a collaborative effort amongst all impacted stakeholders. DMV will continue to work together with stakeholders from the law enforcement, governmental, consumer, and business communities to ensure these ever-evolving alternative products meet the needs of Californians. DMV recommends all three products be fully authorized in statute for permanent use.

Introduction

In 2013, Governor Brown signed Senate Bill (SB) 806 (Hueso, Chapter 569, Statutes of 2013), authorizing the Department of Motor Vehicles (DMV) to establish a pilot program to assess and review the use of alternative products for vehicle registration currently issued by the department (license plates, stickers, tabs, and registration cards). The purpose of the pilot was to allow the department to examine the functionality of innovative alternatives to standard registration products and to evaluate the cost-effectiveness and feasibility of implementation.

Pursuant to SB 806, DMV was required to complete this pilot program by January 1, 2017, and submit a report on the results to the Legislature by July 1, 2018. In 2016, Governor Brown signed SB 1399 (Hueso, Chapter 155, Statutes of 2016), which extended the pilot program to January 1, 2019, and submission of the legislative report to July 1, 2020. In 2018, Governor Brown signed SB 1387 (Beall, Chapter 520, Statutes of 2018), which extended the pilot program to January 1, 2020, and submission of the legislative report to July 1, 2020.

Pilot Administration

The department issued a Request for Proposal (RFP) in March 2014, and received responses from four vendors. The RFP required the responding vendors to submit a working prototype of the proposed product, which were reviewed and evaluated by the department and the California Highway Patrol (CHP). One of the vendors provided only a concept of the product and was unable to continue in the evaluation process. The three remaining vendors provided a prototype or production sample. The DMV and CHP conducted road testing to assess these products for compliance with traffic safety standards and regulations. Each of the three pilot products received approval from DMV and CHP to operate legally on California highways for the purpose of the pilot, providing the participants maintained their traditional registration documents.

In 2015, the department awarded and executed non-competitive bid contracts through January 1, 2017, with the three vendors to participate in the pilot program. The products included in the pilot program were an Electronic Registration Card, a License Plate Wrap, and a Digital License Plate. With the extensions of the pilot program approved under SB 1399 and SB 1387, the vendor contracts were amended to extend the pilot program to January 1, 2019, and to January 1, 2020, respectively.

In September 2016, the department facilitated a single-product contract amendment for Reviver Auto (formerly ReviverMX), the Digital License Plate vendor, to enable digital display of custom images on the Digital License Plate

when the vehicle was legally parked. This contractual agreement required the vendor to provide these custom images to DMV and CHP for approval. This concept is still under development.

In order to participate in the pilot program, participants had to maintain current vehicle registration. For each participant, DMV staff issued a vehicle-specific participation letter, which stated the participant's authorized use of the pilot product on California highways. Participants were required to keep the pilot participation letter, as well as the original department-issued registration product and the traditional registration documentation in the vehicle at all times to be made available for law enforcement, as needed. Prior to the start of the pilot program in 2015, and with each pilot extension, the department informed law enforcement and courts on the program and the authorized use of the alternative products.

CHP's Commercial Vehicle Section tested the Digital License Plate and the License Plate Wrap, using the standard California white license plate as the baseline. CHP's involvement allowed the department to evaluate how the alternatives to the existing metal license plate would uphold requirements for the visual and physical properties of department-issued license plates (e.g., the plates must be reflectorized and readable from a distance of at least 75 feet). The testing was conducted at various CHP locations in Sacramento and occurred at the beginning of the pilot in 2015 and periodically thereafter, when a vendor made product updates. CHP conducted the following testing activities:

- Human eye observation testing to evaluate the License Plate Wrap's and Digital License Plate's visibility and legibility under various light conditions, distances, and angles using established standards.
- Automated License Plate Reader (ALPR) testing to assess the two products' ability to be accurately and effectively detected and recorded by at various distances and angles. ALPRs are widely used by law enforcement, toll road authorities, and transportation agencies.

The pilot program was managed within existing staff resources. The department tracked staff hours to maintain the pilot, and extended financial costs for the products. From fiscal year (FY) 2015/16 through June 2019, DMV staff spent 1,130 hours on the pilot at a cost of \$39,693. A summary of the staff hours and costs per pilot per year is shown in Figure 1 on the next page.

Figure 1. Hourly Breakdown of Staff Hours and Costs per Fiscal Year.

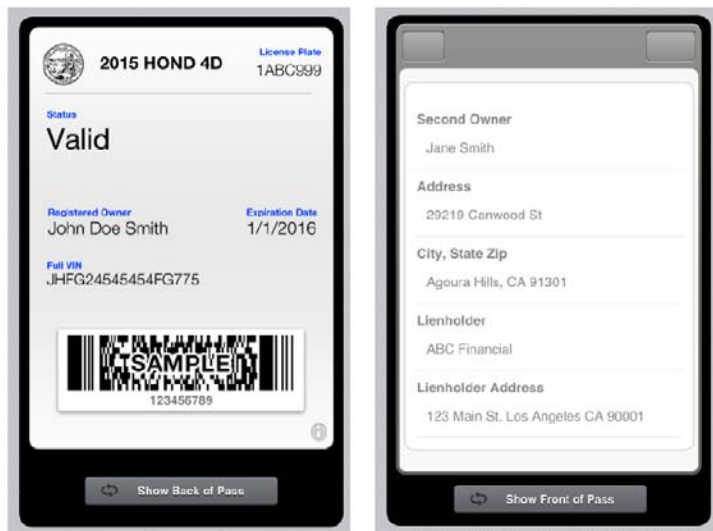
	FY 2015-16		FY 2016/17		FY 2017/18		FY 2018/19		Total	
	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
Electronic Registration Card	41	\$ 1,452	79	\$ 2,790	42	\$ 1,461	33	\$ 1,162	195	\$ 6,865
License Plate Wrap	103	\$ 3,608	86	\$ 3,027	85	\$ 2,996	116	\$ 4,084	390	\$ 13,715
Digital License Plate	84	\$ 2,955	67	\$ 2,341	130	\$ 4,576	158	\$ 5,562	439	\$ 15,434
Report	13	\$ 440	18	\$ 616	0	\$ -	75	\$ 2,623	106	\$ 3,679
Total	241	\$ 8,455	250	\$ 8,774	257	\$ 9,033	382	\$ 13,431	1,130	\$ 39,693

Pilot Products

Electronic Registration Card

The Electronic Registration Card allows participants to access basic vehicle registration information through a mobile application developed by Motor Vehicle Software Corporation (MVSC). MVSC is an active and long-time member in the department’s Business Partner Automation Program, where it serves as one of four First Line Service Providers that facilitate processing of vehicle registration transactions with the department. The application is available on mobile devices using iOS¹ and Android² operating systems. Identity management and access to the Electronic Registration Card application were managed by the vendor.

Figure 2. iOS Sample Layout



¹ iOS is the primary mobile device operating system created and trademarked by Apple, Inc.

² Android is the primary mobile device operating system created and trademarked by Google, LLC.

Figure 3. Android Sample Layout

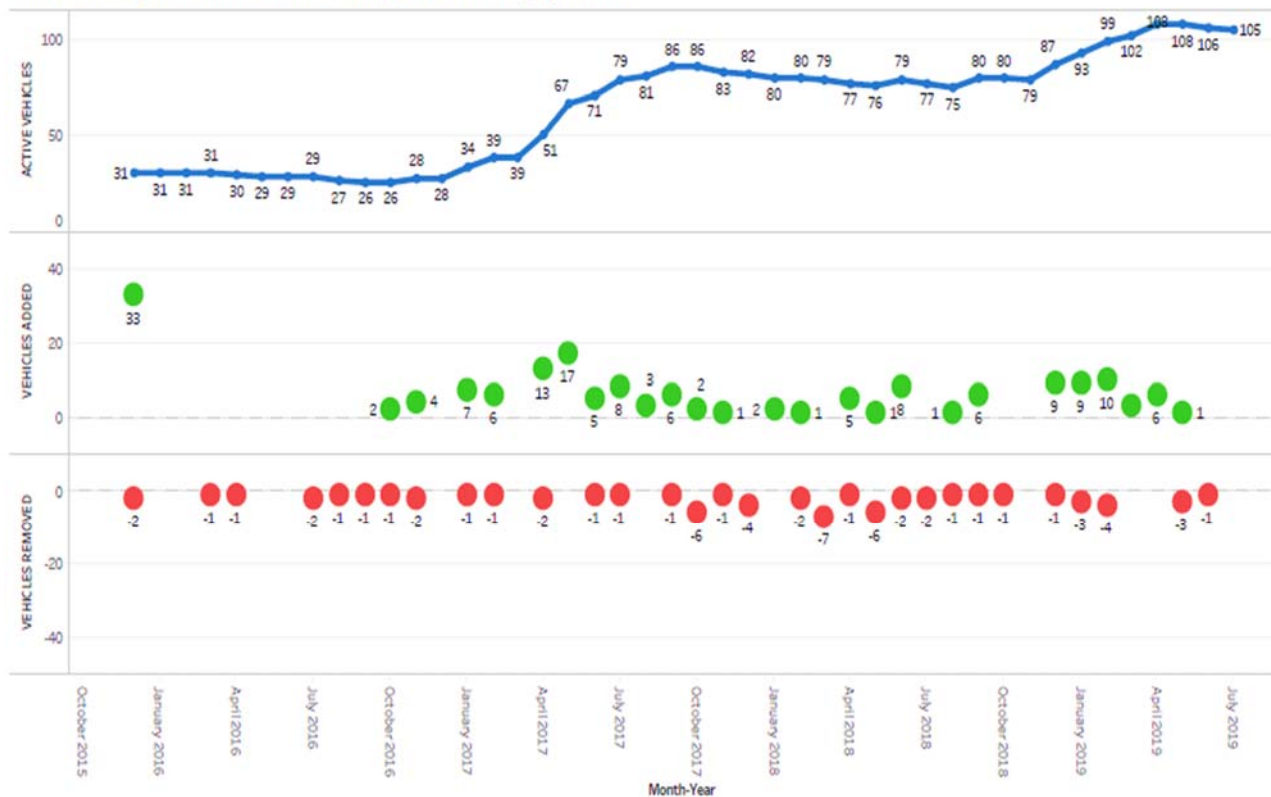


Registered Owner CUSTOMER NAME ADDRESS CITY STATE, ZIP	Make DODG	Model Year 2008	Body Type Model 4D
	Vehicle Identification Number 1B3LC46K38N585273		
	License Plate 1SAM123		Expiration 03/20/2016

The pilot’s participants were employees and associates of MVSC. The Electronic Registration Card was not made available to the broader public. Pilot participation with the Electronic Registration Card averaged 29 vehicles from its implementation in December 2015 until spring 2017. The participation steadily increased in fall 2017, and then stabilized until 2019. Starting in 2019, the pilot grew to approximately 110 vehicles. Figure 4 shows the Electronic Registration Card Pilot Participation Activity by Month.

Figure 4.

Electronic Registration Card Pilot Participation Activity By Month



The vendor reported a start-up and development cost of \$3,850. This included the programming necessary to create the application. The vendor reported an average of \$134 per month in maintenance costs to administer the program.

The department is unaware of any stakeholder concerns related to the Electronic Registration Card and recommends it to be offered permanently. DMV plans to further partner with CHP and other law enforcement entities to examine its reliability to accurately, timely, and efficiently update vehicle registration information in real-time during traffic safety stops and law enforcement investigations. Additionally, this would allow time to evaluate the programming components to implement a business process that expands registration card options for customers.

License Plate Wrap

The License Plate Wrap was developed and deployed by a Southern California-based company named License Plate Wrap. The company aimed to provide an alternative for motorists who need to display a front license plate, but do not want to drill mounting holes into their vehicle's front bumper. The License Plate Wrap is a physically-issued registration product, which has no technology components. The company developed the alternative of using a naturally adhesive, vinyl-like, and smooth wrapping material to apply commercial graphics to vehicles.

In response to the Request for Proposal, the vendor stated the License Plate Wrap material very durable, light reflective, and resistant to extreme weather temperatures. Neither the vendor nor the participants reported issues with the License Plate Wrap maintaining its adhesiveness to the vehicles or its durability. Figure 5 provides a sample image of a white reflectorized License Plate Wrap.

Figure 5. License Plate Wrap Sample Image



During the pilot, the vendor used three different wrapping materials. From testing, the CHP reported that the standard California white version of the License Plate Wrap in all three materials were visible and readable by the human eye observer and detectable by the ALPR at various light conditions, distances, angles, and satisfied statutory requirements related to plate size and reflectivity.

In January 2019, the vendor provided two more samples of the License Plate Wrap for testing: a Legacy plate (black background with yellow letters) and a plate with a vendor-designed beach background image. CHP reported the Legacy and beach plates were visible and readable by the human eye observer and was detected by the ALPR. The vendor has issued the Legacy plate; however, the beach background plate has not been made available.

Twenty of the License Plate Wrap participants display disability license plates, as they provide transportation services to persons with disabilities and often use blue zone parking. Neither the vendor nor law enforcement officers reported any issues regarding the front License Plate Wrap as acceptable, including when parked in disabled parking locations.

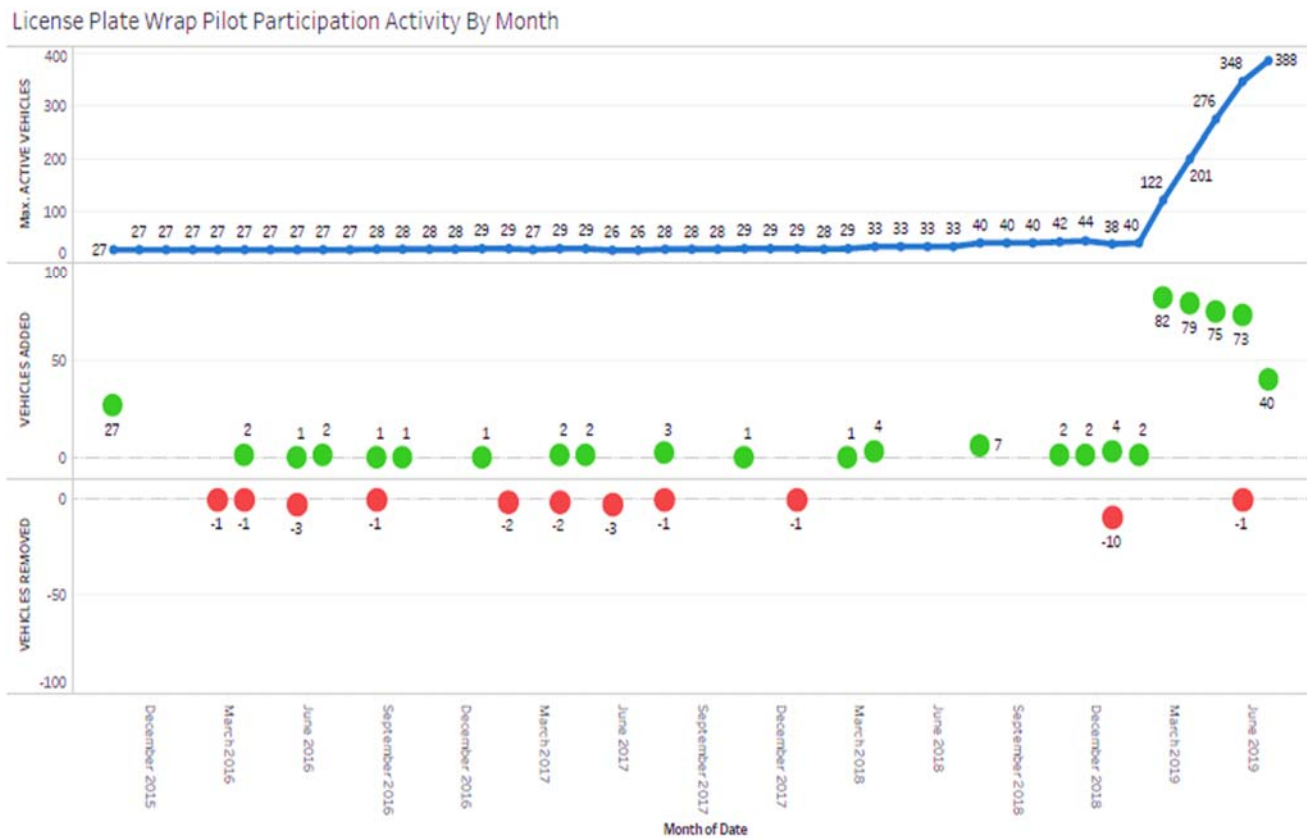
From implementation of the pilot in November 2015 until March 2019, the License Plate Wrap maintained a participation population of approximately 30 vehicles. Starting in March 2019, the volume of participating vehicles increased to approximately 180 vehicles. This increase was largely due to the launch of the vendor's website and the availability of customers to order the product online. The pilot's participation rates over the years are shown in Figure 6

With online orders, the License Plate Wrap is delivered to the customer with installation instructions. The vendor reported no issues with customers being able to install the product.

The most common display of the License Plate Wrap throughout the pilot was the standard white reflectorized plate. The vendor is currently selling the License Plate Wrap for \$50.

With no information technology components, the License Plate Wrap poses little information security risk to the department or its customers. On the License Plate Wrap website (licenseplatewrap.com), customers report the License Plate Wrap is secure and durable. Given this information, the department recommends this product be offered permanently.

Figure 6.



Digital License Plate

Of the three pilot projects, the Digital License Plate, contracted with Reviver Auto (formerly ReviverMX) provided the most extensive change to a vehicle registration product. This is due to the Digital License Plate’s use of technology and physical change from a metal plate to a digital display. According to the company, the Digital License Plate had been in development since 2008; however, its participation in the California pilot was its first authorized deployment in the United States. Aside from the expected changes from a metal plate to a digital screen (including the digital screen, circuitry, a power source, and a housing), the Digital License Plate includes mobile phone technology for over-the-air updates, Global Positioning System, and accelerometers to read when the vehicle is in motion. During the pilot, participants were only allowed to have a Digital License Plate installed on the rear of the vehicle.

During the pilot, Reviver Auto developed three versions of the Digital License Plate, although only two, Slate and Rplate, were installed on vehicles. The first version, Slate, was a full color Liquid Crystal Display. On the next page, Figure 7 provides a sample image of the Slate Digital License Plate model. Also, on the next page, Figure 8 provides an image of the wiring harness hole and mounting bracket, which uses the standard four holes on the rear of many vehicles. Of note, the mounting bracket uses specially shaped “security screws” to prevent

unauthorized removal of the plate. If the plate is removed from the bracket, the plate is programmed to display a blank screen. According to the vendor, the main drawback was that it required a hole to be drilled into the vehicle (behind the plate), which was usually into the trunk for autos or possibly into the rear bumper for trucks.

Figure 7.



Figure 8.



In September 2017, the vendor transitioned from Slate to the current model, Rplate. Rplate is a black and white, e-ink display, compared to Slate's Liquid Crystal Display screen. Rplate is equipped with a white backlit display, which illuminates the background of the plate. CHP conducted visibility testing to evaluate the white backlit display at reflecting light from another source and reported concerns related to the plate's visibility, reflectivity, and illumination. DMV will continue to collaborate with the vendor to address stakeholder concerns.

In implementing the Rplate, the vendor allowed Digital License Plate participants to choose the standard white background with black lettering, or a plate with a black background and white lettering. An image of the standard Rplate design is shown in Figure 9, and a reverse Rplate is shown in Figure 10.

Figure 9. Standard Rplate design



Figure 10. Reverse Rplate design



The vendor's implementation of Rplate also included the vendor's Digital License Plate mobile application, Rconnect. Rconnect is designed to provide automated services to Digital License Plate customers, including billing, which allows for Rplate personalization, and to provide access to vehicle telematics, if available. Telematics is a process of taking Global Positioning System and other measurements to produce intelligence on where the vehicle is and where it has been, speed when driving, driving habits, and other measurements regarding a vehicle's operation. As required by California Vehicle Code Section 4853(c), the department collected no information regarding the current location or movement of vehicles with Digital License Plates.

As an advertised feature of the Digital License Plate, the vendor allowed users to select from a limited set of 94 alternative messages at the bottom of the plate (i.e., "Have a nice day.") As this product evolves and its use increases, the department expects further customization opportunities such as the use of logos and personalized messages. These changes require state approval and DMV will work with stakeholders to ensure Digital License Plates meet statutory and safety requirements.

The Digital License Plate uses existing information technology connections with the department through the Business Partner Automation program. Rconnect enabled Digital License Plate installers in dealers and shops to associate the vehicle identification number (VIN) with the serial number of the individual Digital License Plate. By doing so, the VIN and serial number transmitted by Rconnect to the vendor would allow the vendor to automatically search department records and display the correct license plate number on the Digital License Plate. Accordingly, as piloted, the Digital License Plate makes no change to the efficiency of the department's registration processes, which already provides opportunities for Business Partners to facilitate and automate registration services for motorists.

Installers do not have access to retrieve information from the application and can only input the VIN of the vehicle and serial number of the individual Digital License Plate unit. The Rconnect application is protected by encryption and standard password authentication for both participants and installers. The host and the vendor's Automated Voice Response System connection are also protected by encryption and password authentication.

There are two models of the Rplate currently available, the Rplate Essential and the Rplate Pro. Each provides different levels of technology. The Rplate Essential is the current base model Digital License Plate. Aside from the hardware components related to the physical display of an image, the main technological feature of the Rplate Essential is that it uses mobile phone technology. When the Digital License Plate is installed on the mounting bracket, the Rplate Essential sends a mobile phone signal to the vendor to update the

plate with the license number assigned by the department. To this end, a mobile telecommunications service provider could be able to triangulate where a vehicle is located, as mobile service providers can today with mobile phones, but the vendor would not be able to. The Rplate Essential is available for purchase on the vendor's website³, and sells for \$499, which includes the first year's annual subscription of \$99 per year.

The Rplate Pro is the upgraded Digital License Plate model. It builds upon the Rplate Essential and adds telematics functionality to the plate and user through the Rconnect mobile application. The Rplate Pro is available for purchase on the vendor's website, and sells for \$799, which includes the first year's annual subscription of \$99 per year. The Rplate Pro has been promotionally priced at \$300 for public and large organizations to encourage large fleets to benefit from a centralized system of vehicle registration services and telematics, including vehicle location tracking. The City of Sacramento participated in the pilot and made use of this offer to be able to pilot the use of the vendor's single platform to manage registration, displaying a license plate, and making use of a vehicle tracking, as is common on the city-owned vehicles. A display of a government Exempt license plate design on a Digital License Plate is shown in Figure 11 on the next page.

The Rplate Essential does not collect Global Positioning System or other data, but it does send a signal to Reviver via mobile phone systems stating it is ready to be updated. This is in addition to receiving and storing the response (i.e., license plate display) from the vendor. When the vehicle is turned on, the Rplate Pro is constantly transmitting location information to the vendor when the plate is able to make a connection with the host. When the Rplate is out of service range, the plate stores the information until a connection can be made. The Rconnect application connects participants and the Digital License Plate dealers that install the Digital License Plates.

Figure 11.



³ Reviver Auto website: www.reviverauto.com

During the pilot, the vendor reported five incidences where Digital License Plate participants were stopped by law enforcement. In all incidences, the participants were stopped because the law enforcement officers believed the plates to be unauthorized license plates.

In January 2017, there was a stop reported near Walnut Creek. This traffic stop ended without incident, and the motorist was released after providing the officer the department-issued pilot participation letter. In May 2018, three stops were reported in one day in Los Angeles. In two of the stops, the motorists were released without incident. In one of the stops, the motorist was ticketed, as the officer did not believe the plate was authorized or the pilot participation letter was legitimate.

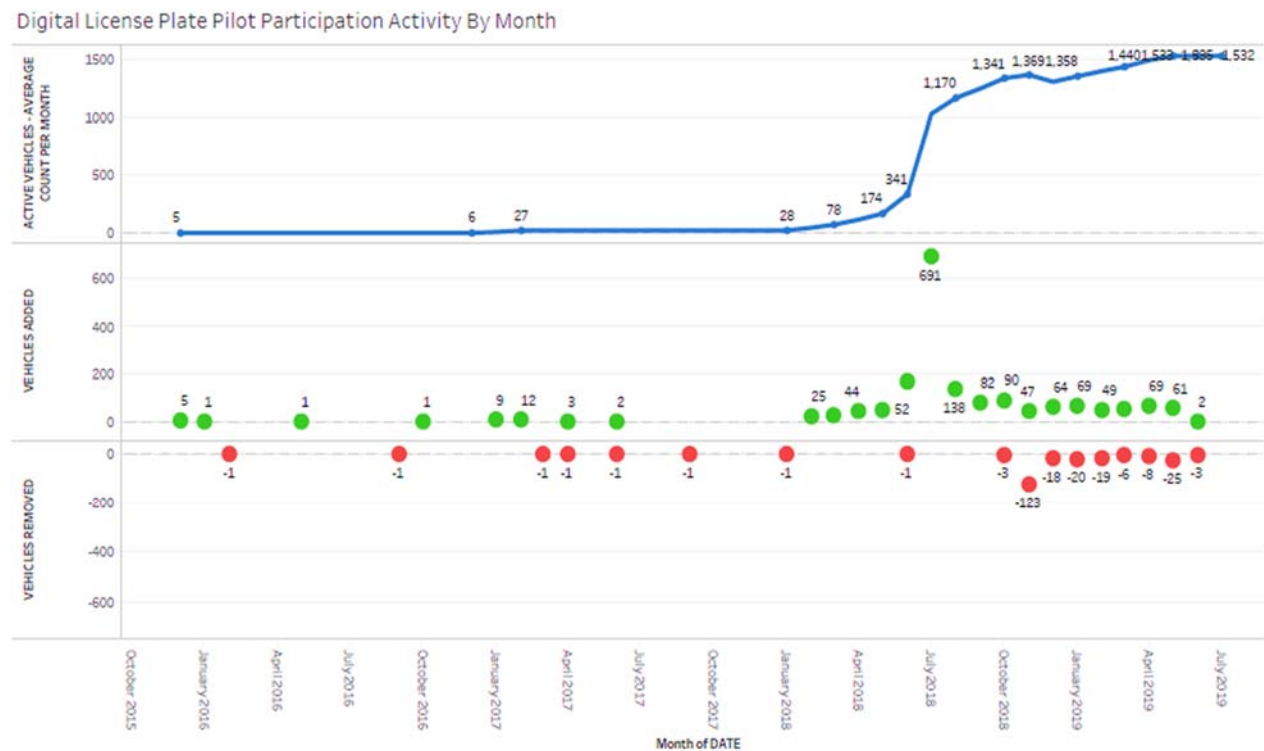
Following the three stops in one day, the department reissued the memos to all law enforcement agencies and courts. The department encouraged the vendor to reach out specifically to local agencies where the vehicles were registered and operating. In January 2019, a final stop was reported. Similar to some of the other incidents, the officer did not believe the Digital License Plate was authorized, and ticketed the motorist.

The steps taken by the department and the vendor, in addition to increased media attention about the Digital License Plate pilot, appear to be successful, as there have been no additional reported vehicle stops from law enforcement. Aside from the reported traffic stops, no other issues were reported to the department regarding customer experiences with the Digital License Plate.

The pilot largely remained at approximately five vehicles from late 2015 to 2016. In 2017, it rose to approximately 28 vehicles. The pilot participation started to increase rapidly in March 2018 to 1,400 vehicles. For the remainder of the pilot, the participation continued to increase up to approximately 1,500 vehicles.

Figure 12 shows the progression of the Digital License Plate participation.

Figure 12.



The department believes that the Digital License Plate is a viable license plate alternative and recommends it to become a permanent option for Californians. DMV will partner with its stakeholder communities as the Digital License Plate technology evolves to ensure stakeholder needs are met.

Programs in Other States

Since California began its pilot program, a few other states have also begun piloting or implementing similar products. Overwhelmingly, Digital License Plates have gained the most interest and traction in other states.

Arizona

The Arizona Department of Transportation is conducting a pilot, which has been active since early 2017. The goal of the pilot is to test the functionality, durability, and viability of Digital License Plates in Arizona’s areas with extreme high and low temperatures, as well as to test the ability to operate in areas with low/no-cellular connectivity. Arizona’s pilot is limited to 10 Arizona Department of Transportation-owned vehicles throughout the state. The Arizona Department of Transportation selected vehicles with higher monthly mileage to ensure that plate display devices are adequately exposed to the elements.

During this pilot project, the Arizona Department of Transportation collaborated with the Arizona Department of Public Safety, which performed readability and functionality testing. Through this testing, the Arizona Department of Transportation has found Digital License Plates:

- Readable from a distance of 100 feet during daylight
- Readable at night
- Do not have glare that cause the plates to be difficult to read
- Continue to operate when disconnected from the power source
- Maintain functionality and readability in extreme temperatures

As of January 2019, the Digital License Plate has been fully authorized by the Arizona Department of Transportation and Arizona Department of Public Safety, and been made available to the public for use as an alternative registration product. Arizona's license plate statute does not state that the plate must be metal. Therefore, no additional statutory authority was required for Arizona to implement this pilot, and to authorize the Digital License Plate. Although use of the Digital License Plate has been approved by the state, Arizona Department of Transportation's pilot project is still ongoing and is expected to be complete in March 2020.

The Arizona Department of Transportation is not involved in the sale or installation of the Digital License Plates, and statewide adoption of this product is at no cost to the state. Currently, a public network of participating retailers, including Reviver Auto, vehicle dealerships, and professional auto service providers manage Digital License Plate sale, issuance, and installation. Reviver communicates with Arizona Department of Transportation's database through a web service, where they transmit a specific set of information. Based on the information submitted, the system authenticates whether the customer has valid registration, and allows Reviver to mark verified owners as having a Digital License Plate.

Pennsylvania

In June 2019, the Pennsylvania Department of Transportation began conducting a pilot to test the functionality, durability, and readability of Digital License Plates. There was no amendment to existing legislation and no new legislation passed by the Pennsylvania General Assembly that required the Pennsylvania Department of Transportation to establish and conduct this pilot. Instead, the Pennsylvania Department of Transportation reviewed 067 Pennsylvania Vehicle Code § 43.6., which authorizes the department to issue temporary registration plates. Under the authority of this current law, Digital License Plates are considered a temporary registration plate.

Prior to implementation, the Pennsylvania Department of Transportation communicated internally with legislative, policy, and media/ press liaisons to keep them informed on this pilot. State law enforcement was also apprised, and received educational training specific to the pilot. Throughout the duration of the pilot, Pennsylvania Department of Transportation policy staff will receive monthly status updates. Additionally, pilot project management will meet monthly for a workgroup and bi-weekly with Reviver Auto.

Pilot testing is limited to 20 state vehicles, seven of which are commercial trucks and 13 are passenger vehicles. Reviver Auto has facilitated this initial product installation with oversight by the Pennsylvania Department of Transportation Equipment Services Manager. The pilot is scheduled to be completed in June 2020; however, this may be extended upon mutual agreement with Reviver. This timeframe allows the department to conduct Digital License Plate testing through all seasons. The Pennsylvania Department of Transportation will also administer Automated License Plate Reader testing at the Pennsylvania Turnpike Commission (state tolling authority).

Texas

Pursuant to House Bill 1959 (85th Regular Session), the Texas Department of Motor Vehicles was required to conduct a study that identifies and assesses alternative technologies for registering commercial motor vehicles to replace license plates, permits, and other existing documentation and registration methods currently in use in Texas. Additionally, the Texas Department of Motor Vehicles was required to evaluate the safety and suitability for use on roadways of the technologies identified. For this effort, the Texas Department of Motor Vehicles utilized Texas State University to complete the required study and evaluation. The subsequent report was published in 2019. The House Bill 1959 Alternative Registration Technology – Interim Study Report may be accessed at: https://www.txdmv.gov/reports-and-data/cat_view/13-publications/25-reports-data?limit=100&limitstart=0&order=name&dir=DESC

In filing its report, the Texas Department of Motor Vehicles provided recommendations for a pilot program. As part of the program, it will evaluate Digital License Plates via human-eye legibility testing, Automated License Plate Reader legibility, marketability, data connectivity functionality, and user feedback. No timeframe was provided for when the Texas Department of Motor Vehicles will conduct its pilot. The Texas Department of Public Safety is preparing to start the pilot study for Digital License Plates on commercial vehicles. The Texas Department of Public Safety expressed to the California Highway Patrol the need for the Digital License Plate to be detected by the Automated License Plate Reader.

Washington

Pursuant to Section 208(34) of the 2018 Transportation Budget (ESSB 6106), the Washington State Department of Licensing was instructed to conduct a study to evaluate and potential methods for allowing Digital License Plates in the state. In evaluating Digital License Plates, Reviver Auto’s Rplate was used.

The Department of Licensing specifically addressed the Rplate in regard to revenue collection via toll agencies, and brought up concerns that appear equally valid in California. It stated that even if Rplates were equipped with Radio-Frequency Identification chips to interface with Washington’s Good To Go!, that relies on Radio-Frequency Identification chips being in the front of the car, usually in the front windshield. Having Radio-Frequency Identification chips in the rear of a vehicle may require costly modifications to existing systems or the authorization for Digital License Plates (with Radio-Frequency Identification) on the front of vehicles. However, provided the current limited Automated License Plate Reader readability of publicly available Digital License Plates, for which Rplate is the only one, this could create a problem for toll agencies singly reliant on either Radio-Frequency Identification or Automated License Plate Reader for enforcement. The Department of Licensing recommended addressing Automated License Plate Reader readability concerns in implementing a Digital License Plate program. This is based on Automated License Plate Reader’s role in supporting public safety.

Figures 13 and 14 summarize the other states’ activities as related to Digital License Plates.

Figure 13.

A COMPARISON OF DIGITAL LICENSE PLATE TESTING IN OTHER STATES							
STATE AGENCY	LEGISLATION	PURPOSE OF TESTING	STATUS OF TESTING	COST	NUMBER & TYPE OF VEHICLES	VENDOR	PRODUCT INSTALLER
Arizona Department of Transportation	Not required	Arizona’s license plate statute does not state that the plate must be metal. Therefore, no additional legislation was required for the Arizona Department of Transportation to conduct this pilot, and to authorize the use of Digital License Plates.	In-progress (began early 2017). Scheduled to be completed in March 2020	No cost to state	10 state vehicles	Reviver Auto	Initial installation performed by Reviver Auto and overseen by the Arizona Department of Transportation Equipment Services Administrator. Subsequently performed by Reviver Auto or authorized third-party.
Michigan Department of State	House Bill 4990 became Public Act 656 of 2018	Public Act 656 of 2018 authorized the use of Digital License Plates.	Begins June 2019	N/A	N/A	Reviver Auto	N/A

A COMPARISON OF DIGITAL LICENSE PLATE TESTING IN OTHER STATES							
STATE AGENCY	LEGISLATION	PURPOSE OF TESTING	STATUS OF TESTING	COST	NUMBER & TYPE OF VEHICLES	VENDOR	PRODUCT INSTALLER
Texas Department of Motor Vehicles	House Bill 1959 (2017)	House Bill 1959 authorized the Texas Department of Motor Vehicles to conduct a study on alternative technology methods for registration of commercial motor vehicles. The Texas Department of Motor Vehicles contracted with Texas State University to conduct this study and to develop a pilot plan.	Completed in 1 year	No cost to state	Pilot Plan: commercial motor vehicles will be used.	N/A	N/A
Pennsylvania Department of Transportation	Not required	067 Pennsylvania Vehicle Code § 43.6. authorizes the Pennsylvania Department of Transportation to issue temporary registration plates. The Digital License Plate is considered a type of temporary registration plate; therefore, no additional legislation was required for this effort.	In-progress (began June 2019). Scheduled to be completed in June 2020	No cost to state	20 state vehicles	Reviver Auto	Initial installation performed by Reviver Auto and overseen by the Pennsylvania Department of Transportation Equipment Services Manager.
Washington State Department of Licensing	Engrossed Substitute Senate Bill 6106 (2018)	Engrossed Substitute Senate Bill 6106 authorized the Washington State Department of Licensing to conduct a study on Digital License Plates.	Completed in 1 year	No cost to state	N/A	Reviver Auto	N/A

Figure 14.

A COMPARISON OF DIGITAL LICENSE PLATE TESTING OUTCOMES IN OTHER STATES				
STATE AGENCY	OPERATIONAL	DURABILITY	READABILITY	USABILITY BY OTHER AGENCIES
Arizona Department of Transportation	Operates for an indefinite period when disconnected from power source, and in low / no cellular reception areas.	Functions in a variety of climates in Arizona with extreme temperatures (Grand Canyon North Rim, Phoenix, Tucson, Yuma).	Low-level Automated License Plate Reader readability testing was performed. Readable at night, and from a distance of 100 feet during daylight. No glare on imagery.	All displayed imagery was evaluated and approved by state law enforcement.
Texas Department of Motor Vehicles	The proposed testing will assess and review Digital License Plate technology for potential use by law enforcement and motor carriers.	The on-road testing will be performed on I-45, between Dallas and Houston, at the New Waverly weigh station to evaluate the durability of Digital License Plates in practical applications.	The intended outcomes of the off-road legibility tests will be: to determine if the Digital License Plate meets current American Association of Motor Vehicle Administrators requirements; to evaluate law enforcement's ability to identify change in registration status; and to test legibility using Automated License Plate Readers.	Automated License Plate Reader testing will be conducted to evaluate the compatibility of Digital License Plate with the existing infrastructure used by the Texas toll authority.
Pennsylvania Department of Transportation	This pilot will evaluate the technology components of the Digital License Plate.	This pilot will be in effect for 18 months to test the Digital License Plates' ability to function in all seasons.	This pilot will test Digital License Plate readability at night, and compare it to reflectorized plates currently issued by the department.	Automated License Plate Reader testing will be conducted at the Pennsylvania Turnpike Commission's (state toll authority) test track.

A COMPARISON OF DIGITAL LICENSE PLATE TESTING OUTCOMES IN OTHER STATES				
STATE AGENCY	OPERATIONAL	DURABILITY	READABILITY	USABILITY BY OTHER AGENCIES
<p>Washington State Department of Licensing</p>	<p>Equipped with a radio receiver / transmitter that allows for wireless communication using Long-Term Evolution technology. This allows the plate to receive over the air firmware updates, and communicate with the Rconnect system to facilitate automated registration renewals, update plate options, deliver messages, vehicle tracking, safety alerts, and stolen vehicle information.</p>	<p>Functions in extreme weather (-40 to 185°F) and environmental conditions (dust, moisture), and UV degradation.</p> <p>Provides protection against dust and moisture (IP66 verified), and increased surface pressures.</p> <p>No harmful effects when exposed to powerful water jets at various angles.</p>	<p>Readable in all weather conditions, at night, and instances where the screen were to break (i.e., due to vandalism or collision).</p>	<p>The Digital License Plates are currently unable to be adequately captured by the state tolling authority.</p>

Recommendation

The department recommends permanent authority to use of all three alternative registration products. The products meet the intent of SB 806 and have been well-received in their respective pilots. With the majority of the costs borne by the consumer, the department does not expect a substantial fiscal impact to the state. The department recognizes the need for continued assessment of the products as they evolve to ensure adherence to statutory requirements, industry best practices, consumer safety and protection, and stakeholder needs.