

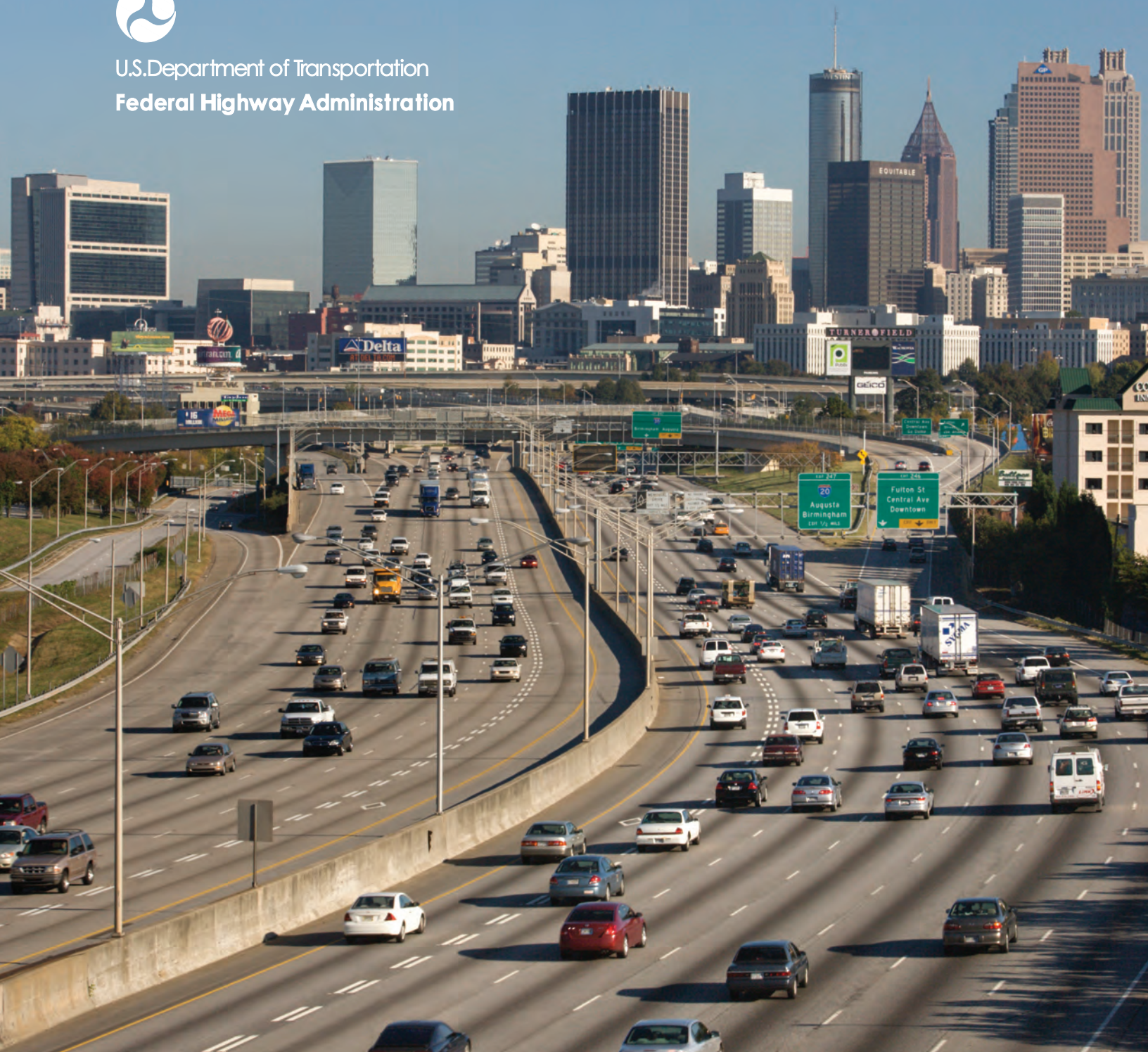
Impact of Exempt Vehicles on Managed Lanes

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16. Abstract <p>In order to better utilize available capacity in high-occupancy vehicle (HOV) lanes, states are permitted to allow certain qualifying non-HOVs to use HOV lanes. In general, states may allow motorcycles, public transportation vehicles, high-occupancy toll (HOT) vehicles, and low-emission and energy-efficient vehicles to use HOV lanes. For any or all of these types of vehicles, the states must establish programs addressing candidacy, enrollment, and management of the lanes. In the case of tolled vehicles, dynamic pricing is the primary control that limits the potential to cause congestion in the lanes. In the case of the energy-efficient vehicles, the programs typically include decals, licenses, license plates, or stickers, that serve to identify and, in some cases, cap the number of allowed to use the lanes vehicles.</p> <p>Concerns may arise that the number of exempted vehicles may overburden the capacity of the HOV lanes to perform their primary function, which is to provide an incentive to form carpools (and thereby reduce the number of cars on the road) and to "reward" such an incentive by guaranteeing a mostly delay-free trip. Use by non-HOVs may overburden the HOV lanes, causing the integrity of the HOV lanes to suffer.</p> <p>The Moving Ahead for Progress in the 21st Century Act (MAP-21) 2012 now mandates that any HOV facility that allows tolled vehicles or any class of qualifying energy-efficient vehicles must annually certify that the subject lanes are "not degraded." By definition, this constitutes that for a 180-day continuous reporting period, the lane(s) operate at greater than 45 mph for 90% of the time. (See Section 166, Title 23 of United States Code for the full language.)</p> <p>This report examines programs in use by states allowing low-emission and energy efficient vehicles to use HOV, HOT, and managed lanes without meeting the vehicle-occupancy requirements. Information is presented on the enabling legislation, the program elements, use of the programs, and impacts of the HOV, HOT, and managed lanes in 13 states.</p>					
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1.0 Introduction

1.1 Purpose

The purpose of this report is to review the legislation and the programs in use by states allowing low-emission and energy efficient vehicles to access high-occupancy vehicle (HOV), high-occupancy toll (HOT), and managed lanes without meeting the vehicle-occupancy requirements. Information is presented on the enabling legislation, the program elements, use of the programs, and impacts on the HOV, HOT, and managed lanes. Information is also presented on the requirements contained in the Moving Ahead for Progress in the 21st Century Act (MAP-21) related to allowing these types of vehicles to use HOV, HOT, and managed lanes. The report should be of benefit to technical staff and policy makers interested in better understanding the use of HOV, HOT, and managed lanes by low-emission and energy efficient vehicles and other types of exempt vehicles.

1.2 Background

Traffic congestion continues to be a significant issue in metropolitan areas throughout the country. Transportation agencies at the federal, state, metropolitan, and local levels are using a variety of techniques and approaches to improve traffic flow, enhance mobility, and provide travel options. Managed lanes, including HOV and HOT lanes, are approaches being used in some areas to ease traffic congestion.

HOV lanes provide travel-time savings and improved trip-time reliability to encourage travelers to change from driving alone to carpooling, vanpooling, or riding the bus. HOT lanes expand the allowed user groups to include solo drivers or lower-occupant vehicles, who can access the lanes by paying a fee. HOV/HOT lanes improve the people-moving capacity of congested freeway corridors and provide mobility options to travelers.

HOV/HOT lane applications have evolved over the past 40 years. Early projects focused primarily on bus-only facilities. Carpools became the dominant user group on most HOV lanes in the 1970s and 1980s. The 1990 Clean Air Act Amendments and the Transportation Equity Act for the 21st Century (TEA-21) expanded potential user groups to include specific types of low-emission and energy-efficient vehicles. These efforts focused on providing incentives for the purchase and use of low-emission and energy-efficient vehicles.

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) allowed increased flexibility for state departments of transportation and other agencies in maximizing the use of HOV/HOT facilities when available capacity exists. SAFETEA-LU provisions expanded the definition of low-emission and energy-efficient vehicles to include some types of hybrid vehicles.

These provisions were continued in MAP-21, which also requires state agencies that allow tolled or low-emission and energy-efficient vehicles to use an HOV facility to submit to the Secretary of the U.S. Department of Transportation (U.S. DOT) a report demonstrating that the facility is not already degraded, and that the presence of the vehicles will not cause the facility to become degraded. Reporting that the number of permits or license plates issued is low is no longer sufficient. Agencies must monitor and certify that the HOV/HOT lanes meet the operating requirements or identify corrective action.

Agencies must also certify that they will establish, manage, and support a performance monitoring, evaluation, and reporting program for the HOV/HOT facilities. The program provides continuous monitoring, assessment, and reporting on possible vehicle impacts on the HOV facility and the adjacent highways. Further, state agencies must submit annual reports to the Secretary on those impacts. The agencies must also establish, manage, and support enforcement programs to ensure the HOV/HOT facility is operated in accordance with the requirements and that agencies limit or discontinue use of the HOV/HOT lanes by these types of vehicles whenever operations are degraded.

This requirement is a key addition – states must now certify that the HOV/HOT lanes are meeting the operating requirements, regardless of the number of low-emission and energy-efficient vehicles using the lanes. In addition, other exempt vehicles typically allowed to use HOV/HOT lanes with only the driver include police, emergency and public transit vehicles.

As of October 2013, 13 states — Arizona, California, Colorado, Florida, Georgia, Hawaii, Maryland, New Jersey, New York, North Carolina, Tennessee, Utah, and

Virginia – had legislation allowing some combination of low-emission and energy-efficient, plug-in electric, or hybrid gasoline-powered vehicles to access HOV and HOT lanes without meeting minimum occupancy requirements. This report summarizes these programs. Based on experiences in the 13 states, issues and considerations with the use of HOV/HOT lanes by these types of vehicles are also highlighted.

1.3 Organization of Report

The remainder of this report is divided into three sections. Section II provides a summary of state programs allowing exempt vehicles use of HOV/HOT lanes. These programs focus on hybrid, plug-in electric, and other low-emission and energy-efficient vehicles. It also highlights use of HOV/HOT lanes by police, emergency, and public transit vehicles with only the driver. Case studies of the states with legislation and programs allowing hybrid, plug-in electric, low-emission and energy-efficient vehicle access are presented in Section III. The report concludes with a discussion of issues and considerations with low-emission and energy-efficient vehicles use of HOV/HOT lanes in Section IV. Appendix A provides a list of references used in the report.



2.0 Summary of State Programs Allowing Exempt Vehicle Use of HOV/HOT Lanes

As of October 2013, 13 states had legislation and programs allowing some combination of hybrid, plug-in electric, low-emission, and energy-efficient vehicles to use HOV/HOT lanes. These states included Arizona, California, Colorado, Florida, Georgia, Hawaii, Maryland, New Jersey, New York, North Carolina, Tennessee, Utah, and Virginia. The program requirements vary, including authorized vehicles, methods to designate vehicles (stickers or license plates), costs, limits on the number of stickers or license plates that can be issued, and restrictions on use of some HOV/HOT lanes.

Tables 1 through 3 highlight general information on HOV/HOT lane user groups and the key elements of the various programs. Table 1 presents the vehicles authorized to use HOT lanes in different states, while Table 2 provides the vehicles authorized to use HOV lanes. Table 3 presents information on the major elements of the exempt vehicle programs in the 13 states; the HOV/HOT lanes covered by the programs, vehicles allowed, the authorization display methods, and any costs. Any limitations on the number of vehicles allowed by the programs, the number of stickers or license plates that can be issued, use as a percent of HOV/HOT lane volume, and the agency or agencies responsible for the programs are also listed. Similarities and differences in the approaches used in the programs are summarized next.

Information on the use of HOV/HOT lanes by law enforcement, emergency medical, and other exempt vehicles is presented at the end of this chapter.

2.1 Similarities and Differences in Low-Emission and Energy Efficient Vehicle Programs

As highlighted in Table 3, the 13 programs focus on different types of hybrid, plug-in electric, low-emission, and energy-efficient vehicles and have different requirements. Key similarities and differences in the approaches are summarized in this section.

- Exempt vehicle legislation in seven states – Arizona, Hawaii, Maryland, New York, North Carolina, Tennessee, and Virginia – cover HOV lanes. Programs

in California, Colorado, Georgia, Florida, and Utah include HOT lanes. The New Jersey program allows hybrid and other low-emission and energy-efficient vehicles to use the HOV lanes on the New Jersey Turnpike, but these vehicles must still pay the toll.

- Although all states follow the U.S. Environmental Protection Agency (EPA) guidelines related to low-emission and energy-efficient vehicles, there are differences in the models and makes of hybrid and alternative fuel vehicles (AFVs) allowed to use HOV/HOT lanes. In Arizona, only three models – the Honda Insight, the Toyota Prius, and the Honda Civic Hybrid – met the Tier II emissions requirements and achieved not less than 45 percent fuel efficiency in combined city-highway fuel economy when the pilot program was initiated in 2007. Since it is an ongoing pilot, these models continue to be the only ones eligible for the program, although any model year qualifies. In comparison, the Florida program included almost 200 eligible hybrids and other AFVs. Legislation in two states – Hawaii and Maryland – focuses on electric vehicle (EVs) and plug-in electric vehicles (PIVs or PEVs).
- Four states – Arizona, Georgia, Hawaii, and Virginia – use special license plates for qualifying hybrids and other AFVs. Seven states – California, Colorado, Florida, Maryland, New York, Tennessee, and Utah – use stickers, decals, or permits that must be displayed on a vehicle.
- New Jersey does not use any display methods for hybrid vehicles using the New Jersey Turnpike HOV lanes. Single-occupancy Hybrid vehicle drivers must still pay the toll, but have access to the HOV lanes.
- Five states – Arizona, California, Georgia, Utah, and Virginia – charge a fee for the exempt vehicle license plate or sticker. The fees range from a low of \$8 in California, to a high of \$25 in Virginia. No fees are charged with the programs in Colorado, Florida, Maryland, New Jersey, New York, and Tennessee. However, drivers must pay for toll transponders in Colorado and Florida, and New Jersey.

- Three states – Arizona, California, and Colorado – limit the number of license plates or stickers that can be issued to hybrids or other AFVs. Arizona initially allowed 10,000 special license plates to be allocated in the pilot program implemented in February 2007. The limit of 10,000 was reached in May 2008. In 2011, the Arizona Department of Transportation (ADOT) calculated that an additional 2,500 special license plates could be issued based on returned and non-renewed plates. Available in September 2011, these additional 2,500 license plates were quickly taken. The 2004 legislation in California allowing hybrids access to HOV lanes authorized 75,000 yellow clean air vehicle stickers. Subsequent legislation in 2006 allowed an additional 10,000 decals to be issued. There were 85,000 stickers in use when the legislation was allowed to expire on July 1, 2011. The new green clean air vehicle stickers are limited to the first 40,000 vehicles meeting the new California Enhanced Advanced Technology – Partial Zero Emission Vehicle (AT-PZEV) requirements. As of December 31, 2012, 8,859 green clean air vehicle stickers had been issued. There are no limits on the number of white clean air vehicle stickers for California's super ultra-low emissions vehicles (SULEV). As of December 31, 2012, 21,743 white stickers had been issued. In Colorado, the number of orange stickers available for use of the HOV/HOT lanes in the Denver area was limited to the first 2,000 vehicles. This limit was reached in mid-2012.
- The number of decals, stickers, or license plates issued varies by state. California and Virginia have experienced the most demand, probably due to the trip-time savings and trip-time reliability afforded by the HOV lanes in the two states. California reached the legislatively imposed limit of 85,000 for the yellow hybrid stickers in mid-2006. The legislature allowed the yellow hybrid sticker program to expire on July 1, 2011. Both the white stickers and the new green stickers continued to be issued, with 21,743 white stickers and 8,859 green stickers in circulation as of the end of 2012. Approximately 25,696 clean special fuel license plates were issued in Virginia as of October 2013, with use restricted by different HOV facilities. In comparison, approximately 12,500 special license plates have been issued in Arizona, which is the legislatively-imposed limit, and the limit of 2,000 stickers has been reached in Colorado. Approximately 1,300 hybrid decals have been issued in Nashville, 5,555 C Decals have been issued in Utah, and approximately 20,000 hybrid decals have been issued for the Long Island Expressway (LIE) in New York, all of which have no limit.
- California is the only state to allow legislation on hybrid access to HOV lanes to expire. As of July 1, 2011, the 85,000 hybrid vehicles with the yellow clean air vehicle stickers were no longer able to access the HOV lanes in the state without meeting the vehicle-occupancy requirements. The original legislation allowing HOV access to qualifying inherently low-emission vehicles (ILEVs) with white clean air vehicle stickers was extended until January 1, 2015. In addition, the legislation established a new green clean air vehicle sticker for vehicles meeting California's enhanced AT-PZEV requirements. As noted previously, as of December 31, 2012, 8,859 green clean air vehicle stickers had been issued. Legislation passed in 2013 extended the white and the green clean vehicle sticker programs until 2019.
- Virginia is the only state to regulate hybrid vehicle use of the HOV lanes by changing the clean special fuel license plate design and limiting hybrid vehicle access to specific HOV lanes based on the license plate design. There are currently three clean special fuel license plates in use in Virginia. Use of the HOV lanes in northern Virginia, which includes I-394, I-95, and I-66, is limited to certain license plates.
- Information on the use of HOV/HOT lanes by exempt vehicles is somewhat limited. Five states – California, Colorado, Florida, New York, and Virginia – have available data on use of the HOV/HOT lanes by exempt vehicles. Hybrids account for a little over 2 percent of the total vehicles using the I-25 Express Lanes in Denver; 26-to-31 percent of peak hour HOV volumes on the Long Island Expressway in New York; and 10-to-24 percent of total HOV lane volumes on HOV lanes in northern Virginia.

2.2 Other Exempt Vehicles

Other exempt vehicles are allowed to use HOV/HOT lanes in most states. These typically include public transit buses with only the driver and marked (rooftop emergency lights and sirens) law enforcement and emergency vehicles with only the driver.

Public transit buses carrying passengers are important elements of most HOV/HOT lanes. Buses are carrying more people in fewer vehicles, adding to the people-moving capacity of HOV, HOT, and managed lanes. Public transit buses with only the driver, which are typically dead-heading or out of service to begin or end service, are allowed to use most HOV, HOT, and managed lanes. This approach provides operating efficiencies

and cost savings to the transit agencies and improved service for riders. Issues may arise, however, if taxicabs, airport shuttles, and other private transportation vehicles request the same access. No HOV/HOT lanes have been identified allowing these types of vehicles without meeting the occupancy requirement or paying a toll.

Marked law enforcement and emergency vehicles, which typically include police, sheriff, state patrol, emergency medical services (EMS), and other related vehicles, are allowed to use most HOV/HOT lanes without meeting the occupancy requirements. The use of HOV/HOT facilities by marked law enforcement and emergency vehicles appears to be relatively low and does not appear to be monitored. The use of HOV/HOT lanes by unmarked law enforcement and emergency vehicles or by law enforcement and emergency personnel traveling in their own vehicles was an issue on the HOV lanes in northern Virginia in the early 2000s.

The Code of Virginia provides an HOV exemption for law enforcement, but no specific definition of a law enforcement vehicle is provided in the state statute. The Virginia HOV Enforcement Task Force noted issues with the use of HOV lanes in northern Virginia by off-duty law enforcement and emergency personnel, as well as federal employees who consider themselves law enforcement personnel, traveling to and from work in their personal vehicles. Although the Task Force was not able to determine the number of these individuals, it is recommended that the statute be better defined and that education and outreach efforts be undertaken focused on these individuals. Outreach efforts were initiated which appear to have helped address the issue.



Table 1. HOT Lanes and Authorized Vehicles

State/HOT Lanes	Tolled	Carpools	Occupancy Requirement	Carpool Registration	Vanpools	Buses	Motorcycles	Alternative Fuel Vehicles
California ¹ San Diego – I-15 Bay Area – I-680 Los Angeles – I-10, I-110	√	√	2+, except I-10 – 3+ peak period	No	√	√	√	SULEVs AT-PZEVs
Colorado Denver – I-25	√	√	2+	No	√	√	√	Qualifying Hybrids
Florida Miami – I-95	√	√	3+	Yes	√	√	√	Qualifying Hybrids
Georgia ² Atlanta – I-85	√	√	3+	Yes	√	√	√	AFVs
Minnesota Minneapolis – I-394, I-35W	√	√	2+	No	√	√	√	
Texas ³ Houston – I-10W, I-45S, I-45N, US 59S, US 59N, US 290	√	√	2+	No	√	√	√	
Utah Salt Lake City – I-15	√	√	2+	No	√	√	√	Qualifying Hybrids
Virginia I-495	√	√	2+	No	√	√	√	
Washington Seattle – SR 167	√	√	2+	No	√	√	√	

Source: Texas A&M Transportation Institute, 2013.

¹ California currently allows vehicles that meet the state's SULEV standards that qualify for the White Clean Air Vehicle Sticker and enhanced AT-PZEV vehicles that qualify for the Green Clean Air Vehicle Sticker to use HOT lanes without meeting the vehicle-occupancy requirements. These vehicles are not allowed to use the HOT lanes (ExpressLanes) on I-10 and I-110, however, as these facilities are part of the federally-funded Congestion Reduction Demonstration (CRD) program.

² Georgia currently allows AFVs to use the I-85 Express Lanes (HOT lanes), but hybrid vehicles are not included in the AFV definition.

³ The HOV/HOT lanes on I-45S (Gulf Freeway), I-45N (North Freeway), US 59S (Southwest Freeway), and US 290 (Northwest Freeway) are reserved for HOVs-only from 7:00 a.m. to 8:00 a.m. and from 5:00 p.m. to 6:00 p.m. The HOV lanes on I-10W are part of the toll/managed lanes operated by the Harris County Toll Road Authority (HCTRA) in the freeway median. Buses, carpools, and vanpools have toll-free access weekdays from 5:00 a.m. to 11:00 a.m. and 2:00 p.m. to 8:00 p.m.

Table 2. Freeway HOV Lanes and Authorized Vehicles

State/HOV Lanes	Carpools	Occupancy Requirement	Vanpools	Buses	Motorcycles	Alternative Fuel Vehicles
Arizona Phoenix Area – I-10, I-71, SR 51, SR 101, SR 202	✓	2+	✓	✓	✓	Qualifying Hybrids
California¹ Bay Area – SR 4, SR 84, SR 85, SR 87, SR 92, SR 237, I-80, I-280, I-580, I-680, I-880, US 101 Sacramento – SR 51, SR 99, US 50, I-80 Los Angeles/Southern California – I-105, I-605, SR 14, SR 22, SR 55, SR 57, SR 60, SR 71, SR 91, SR 118, SR 210, SR 134, SR 170, I-210, I-215, I-405, I-5, I-405	✓	2+, except Bay Bridge approach – 3+	✓	✓	✓	SULEVs AT-PZEVs
Colorado Denver – US 36, SH 82, US 85	✓	2+	✓	✓	✓	Qualifying Hybrids
Connecticut Hartford – I-84, I-91, I-384	✓	2+	✓	✓	✓	
Georgia² Atlanta – I-75, I-20	✓	2+	✓	✓	✓	AFVs
Hawaii Honolulu – H-201, H-1, H-2, Route 92, Route 72	✓	2+	✓	✓	✓	EVs
Maryland I-270, US 50	✓	2+	✓	✓	✓	PIVs
Massachusetts I-93	✓	2+	✓	✓	✓	
New York Long Island Expressway (LIE) Staten Island Expressway (SIE)	✓	2+ (LIE) 3+ (SIE)	✓	✓	✓	Qualifying Hybrids (LIE)
North Carolina Charlotte – I-77	✓	2+	✓	✓	✓	PIV, natural gas, fuel cell electric
Pennsylvania Pittsburgh – I-279/I-579	✓	2+	✓	✓	✓	
Tennessee Nashville – I-65, I-40, I-24, Memphis – I-40, I-55	✓	2+	✓	✓	✓	Qualifying Hybrids
Texas Dallas – I-30E, I-35E, I-635, US 67	✓	2+	✓	✓	✓	
Virginia Northern Virginia – I-95, I-395 I-66, Dulles Toll Road	✓	3+ 2+	✓	✓	✓	Qualifying Hybrids

Source: Texas A&M Transportation Institute, 2013.

¹California currently allows vehicles that meet the state’s SULEV standards that qualify for the White Clean Air Vehicle Sticker and enhanced AT-PZEV vehicles that qualify for the Green Clean Air Vehicle Sticker to use HOV lanes without meeting the vehicle-occupancy requirements.

²Georgia currently allows AFVs to use HOV lanes on I-75 and I-20, but hybrid vehicles are not included in the AFV definition.

Table 3. Hybrid and ILEV Authorization by State

State Legislation/ Initiated	Facilities	Vehicles Allowed	Display Method	Cost	Limit	Number Issued ¹	Percent of HOV/ HOT Lane Volumes ¹	Responsible Agency
Arizona 1997 – AFVs 2001 – Hybrids	Phoenix area HOV lanes – I-10, I-17, SR 51, SR 101, SR 202,	ILEVs, qualifying hybrids	Special license plate	\$10.59				Arizona Department of Transportation
2007 – Pilot Initiated					10,000 additional 2,500 issued	12,500	NI	
California	All HOV lanes in the state							California Air Resources Board, California Department of Motor Vehicles, California Department of Transportation
1999 – SULEVs		SULEVs	White clean air vehicle sticker	\$8.00	No limit	21,743	5%-to- 15% of HOV lane volumes for white and yellow stickers	
2004 – Hybrids (Allowed to Expire July 1, 2011)		Hybrids	Yellow clean air vehicle sticker	\$8.00	75,000 ini- tially, 10,000 added	85,000		
2011 – Enhanced AT-PZEVs		AT-PZEVs	Green clean air vehicle sticker	\$8.00	40,000	8,859		
Colorado 1998 – ILEVs	Denver area – U.S. 36, Santa Fe Drive							Colorado Depart- ment of Transpor- tation, Colorado Department of Revenue
2003 – Hybrids	SH 82 HOV lanes, and I-25 Express Lanes	ILEVs, qualifying hybrids	Orange stickers, toll transponders	No cost for sticker, deposit for transponder	2,000	2,000	4% of HOV volume and 2% of total vehicles on I-25 Express Lanes	
Florida 2003 – ILEVs and Hybrids (based on Federal Ap- proval)	I-95 HOT lanes	ILEVs, qualifying hybrids	Decal	No cost	No limit	3,722	1.5% of monthly trips, 55% of toll-ex- empt trips	Florida Depart- ment of Transpor- tation, Florida Depart- ment of Highway Safety and Motor Vehicles
Georgia 1991 – AFVs 2004 – Hybrids	Atlanta area – I-85, hybrid use not allowed	AFVs	License plates/special tag	\$20 annual regis- tration/ decal fee; \$35 special tag fee	No limit	NI	Use by AFVs not available	Georgia Depart- ment of Transpor- tation, Georgia Department of Revenue

Table 3. Hybrid and ILEV Authorization by State (Continued)

State Legislation/ Initiated	Facilities	Vehicles Allowed	Display Method	Cost	Limit	Number Issued ¹	Percent of HOV/ HOT Lane Volumes ¹	Responsible Agency
Hawaii	Honolulu area – H-1, H-2, H-201, Route 92, Route 72	EVs	License plates	NI	No Limit	NI	NI	Hawaii Department of Transportation
Maryland	I-270 and US 50 HOV lanes	PIVs	Permit	No Cost ²	No Limit	988	NI	Maryland Motor Vehicle Administration, State Highway Administration, Maryland Department of Transportation
New Jersey 2006 – Hybrids 2009 – Reconfirmed	New Jersey Turnpike HOV lanes	ILEVs, qualifying hybrids	No display	Must still pay toll	No limit		NI	New Jersey Turnpike Authority
New York	Long Island Expressway	Hybrids	Decal	No cost	No limit		26%-to-31% of peak hour HOV lane volumes	New York Department of Transportation, New York State Department of Motor Vehicles, New York State Department of Environmental Conservation
North Carolina	Charlotte – I-77	PIVs, natural gas, fuel cell electric	NI	NI	NI		NI	North Carolina Department of Transportation
Tennessee 2009 – Hybrids	Nashville area – I-65, I-40, I-24 HOV lanes; Memphis area – I-40 and I-55-HOV lanes	Hybrids	Decal	No cost	No limit	2,133	NI	Tennessee Department of Revenue, Tennessee Department of Transportation
Utah 2001 – AVLs and Qualifying Hybrids 2011 – Modified to Match EPA Requirements	I-15 HOT Express Lanes in Salt Lake City	Qualifying hybrids	Decal (change from license plate)	\$10 fee for C Decal	No limit	5,555 C Decals	NI	Utah Department of Transportation
Virginia 1993 – AVLs 2000 – Hybrids	Northern Virginia – I-395, I-95, I-66, Dulles Toll Road; Hampton Roads – I-64, SR 44	Qualifying hybrids	License plate	\$25 fee for license plate	Use limited by plate type ³	26,516	10%-to-24% of HOV lane volumes in northern Virginia	Virginia Department of Transportation, Virginia Department of Motor Vehicles

Source: Texas A&M Transportation Institute, 2013.

¹N I – No information available.

²The legislation in Maryland authorizes the Motor Vehicle Administration to charge an annual fee not exceeding \$20 for a PIV permit. No fee is currently charged.

³Virginia has three different designs of clean special fuel license plates. Use of the I-395 and I-95 HOV lanes in northern Virginia is limited to vehicles with clean special fuel license plates issued prior to July 1, 2006. Use of the I-66 HOV lanes is limited to the vehicles with clean special fuel license plated issues prior to July 1, 2006 and the clean special fuel license plates issued prior to July 1, 2011.



3.0 Case Studies of Exempt Vehicle Use by State

This section provides more detailed information on the exempt vehicle programs in the 13 states. Information on the enabling state legislation, program requirements, and permits or license plates issued is presented. Data on actual use by exempt vehicles is provided for those states with available information.

3.1 Arizona



Source: Arizona Department of Transportation.

Legislation allowing AFVs to use HOV lanes in Arizona was first approved in 1997. The definition of eligible AFVs at that time followed the provisions of TEA-21. Legislation approved in 2001 added hybrids to the types of qualifying vehicles based on approval from the federal government.

The initial request from ADOT to the Federal Highway Administration (FHWA) to include hybrid vehicles in the exempt HOV lane user group was not approved since hybrids were not allowed under TEA-21. Based on SAFETEA-LU, FHWA granted conditional approval to ADOT to allow hybrid vehicles use of HOV lanes. The governor authorized a pilot program in January 2007, allowing qualifying hybrid vehicles to use the HOV lanes, reducing travel times and improving trip-time reliability for individuals driving eligible vehicles. The pilot was also intended to promote energy independence, reduce fuel consumption, and support air quality.

The pilot program was initiated by ADOT in February 2007. Vehicles meeting the Tier II emissions levels established under the Clean Air Act Amendments and achieving not less than 45 percent fuel efficiency in combined city-highway fuel economy were eligible for the pilot program. At the time, the Honda Insight, Toyota

Prius, and Honda Civic Hybrid met the criteria. Only those makes and models continue to be eligible for the pilot program, although any model year qualifies.

The pilot program allows up to 10,000 qualifying hybrid vehicles to use the HOV lanes in the Phoenix area. Currently, HOV lanes are in operation on I-10, I-17, SR 51, SR 101, and SR 202 in the Phoenix area. The HOV lanes operate on weekdays from 6:00 a.m. to 9:00 a.m. and from 3:00 p.m. to 7:00 p.m. The lanes are open to general purpose traffic at other times and on weekends.

Owners of eligible hybrid vehicles must obtain a special “blue sky” energy-efficient license plate with a hybrid decal. Initially, individuals were able to obtain an alternative-fuel license plate and decal on-line or through the mail. There is an \$8.00 initial application fee and \$1.50 charge for postage and handling.

The limit of 10,000 was reached in May 2008 and no further decals were issued. By 2011, ADOT calculated that 2,500 license plates could be made available due to those returned or not renewed. The second issuance of alternative-fuel license plates was opened on September 13, 2011. License plates were available only through on-line registration at <http://www.servicearizona.com/>, on a first-come, first-served basis. The cost of the plates was \$10.49, including postage and handling. The 2,500 available plates sold out quickly. The following message is posted on the website. “Arizona’s Energy Efficient Pilot Program has reached the maximum limit of 10,000 special license plates issued. There are no plates available at this time. Thank you for your interest in the program.”

Currently, the overall traffic volumes in the freeway HOV and general purpose lanes in the Phoenix area are monitored. Use of the HOV lanes by vehicles with energy-efficient license plates with hybrid decals is not monitored, however.

3.2 California



Source: Caltrans.

California is the only state that has approved legislation allowing specific low-emissions vehicles to access HOV lanes, adding hybrid vehicles to the authorized group, and then allowing the exemption to expire. The legislation allowing the hybrid exemption to expire created a new program for the next generation of green technology vehicles, however.

Legislation approved in 1999 allowed vehicles meeting California's low-emissions vehicle regulations to access HOV lanes in the state without meeting vehicle-occupancy requirements. Since few vehicles met these requirements, there was little impact on HOV lane use. Owners of vehicles meeting the federal ILEV definition were able to obtain white clean air vehicle stickers. No limit was placed on the number of white stickers that could be issued due to the anticipated low number of ILEVs. This program was continued in the legislation allowing hybrid vehicle use. Further, legislation passed in 2011 extended the white clean air vehicle sticker program through January 1, 2015.

Decaled vehicles have been exempt from tolls on HOT lanes in the state as a matter of practice and business rules. The exception is the I-10 and I-110 HOT lanes in Los Angeles County, which are part of the federal Congestion Reduction Management (CRD) program. Legislation in 2010 requires decaled vehicles using the I-10 and I-110 HOT lanes to pay the toll until the end of the federal demonstration period on March 1, 2014. Legislation passed in 2012 was formally codified providing toll-free passage on HOT lanes to decaled vehicles, with the exception of I-10 and I-110.

Legislation approved in 2004 extended the HOV lane exemption to hybrid vehicles and other vehicles meeting the state's AT-PZEV standard and having a 45 mpg or greater fuel economy highway rating. Implementation of this provision was based on federal action allowing hybrid vehicles.

The legislation directed the California Department of Transportation (Caltrans), the California Department

of Motor Vehicles (DMV), the California Air Resources Board (CARB), and the California Highway Patrol (CHP) to develop and implement procedures for identifying exempt vehicles, administering the program, and monitoring use of HOV lanes. The legislation prohibited the DMV from issuing more than 75,000 yellow clean air vehicle stickers to hybrid vehicles and directed Caltrans to examine specific elements when 50,000 yellow stickers were issued.

As required by state legislation, Caltrans conducted an assessment when 50,000 yellow stickers had been issued to determine if significant HOV lane breakdown had occurred due to the addition of hybrid vehicles. The factors identified in the legislation to be examined included reduction in the level-of-service (LOS), sustained stop-and-go conditions, average travel speeds slower than the adjacent general purpose freeway lanes, and consistent increases in travel times in the HOV lanes.

The analysis focused primarily on the LOS measurement, as it is commonly used to assess freeway performance. A LOS C, which represents the threshold between acceptable operating conditions and breakdown conditions, was used in the determination study. Information on the number of permits issued by counties in the state was also examined.

A total of 25 counties accounted for 98 percent of the 50,679 yellow clean air vehicle stickers issued by March 2006. Los Angeles County accounted for 33 percent of the total, followed by Orange County with 10 percent, Santa Clara County with 8 percent, and San Diego and Alameda counties with 7 percent each. HOV lanes are located in all of these counties.

LOS data for a two-week period in April 2005 was compared with data for the same two-week period in 2006. The assessment concluded that there was no significant HOV lane breakdown directly attributable to hybrid vehicle use of the HOV lanes.

The assessment found that approximately 88-to-90 percent of the monitored HOV lanes operated at a LOS C or better during the morning and afternoon peak periods in 2006. Between 10 percent and 12 percent of the HOV lane miles experienced breakdown conditions in 2006. Approximately 7 percent of the HOV lane miles experienced breakdown conditions in 2005, prior to allowing hybrid access. While the operation of some 3-to-5 percent of the HOV lane miles degraded from 2005 to 2006, it was not possible to attribute the LOS decline directly to hybrid vehicles. Finally, the assessment indicated that the operating conditions improved in almost as many HOV lane miles as declined from 2005 and 2006.

In mid-2006, 75,000 yellow stickers had been issued and the DMV stopped issuing stickers. Legislation in 2006 authorized an additional 10,000 yellow stickers to be issued. These extra yellow decals were quickly taken, bringing the total to 85,000 stickers issued.

The use of HOV lanes by hybrid vehicles was monitored as part of Caltrans' ongoing data collection program. Traffic counts from 2006 on HOV lanes in Los Angeles and the San Francisco Bay Area indicate that hybrid vehicles accounted for between 5 percent and 15 percent of total users during the morning peak hour. The highest volumes of 15 percent were recorded on I-405 in Los Angeles. Peak hour hybrid volumes on SR-91, I-10, and I-605 in Los Angeles averaged approximately 6 percent. Hybrid vehicle volumes on HOV lanes in the Bay Area were lower, representing approximately 7 percent on I-80 and 5 percent on US 101.

The legislation providing hybrid access to the HOV lanes in the state was allowed to expire on July 1, 2011. After that date, hybrid vehicles with the yellow clean air stickers were no longer eligible to use the HOV lanes. Vehicles with the white clean air stickers are still eligible to use the HOV lanes.

The California DMV continues to issue white clean air vehicle decals for vehicles that meet California's SULEV standard for exhaust emissions and the federal ILEV evaporative emissions standard, including certain zero-emissions vehicles. Additionally eligible for the white clean air vehicle decals are 2004 model year or older vehicles that meet the California ultra-low emissions vehicle (ULEV) standard for exhaust emissions and the federal ILEV standard and certain AT-PZEVs. As of December 31, 2012, 21,743 white clean air stickers had been issued.

In addition, as of January 1, 2012, the DMV began issuing green clean air vehicle stickers to the first 40,000 applicants who purchase or lease vehicles meeting California Enhanced AT-PZEV requirements. The California Air Resources Board (CARB) identified vehicles meeting the requirements. As of December 31, 2012, 8,859 green decals had been issued.

As required by MAP-21, Caltrans submitted an HOV lane degradation determination report and an HOV lane degradation action plan to the FHWA California Division in July 2013. The degradation determination report includes an analysis of the performance of HOV lanes in the state for 2011. The analysis is based on highway speed and volume data collected from the traffic monitoring system, which includes in-ground loop detectors and microwave vehicle detection systems.

Data were collected and analyzed for two 180-day periods – January 1-to-June 20, 2011 and July 1-to-December 31, 2011. The analysis covers the full 1,425 lane-miles of HOV lanes in the state, although data were not available for all segments.

Overall, 43 percent of the HOV lane miles were identified as degraded in the first half of the year and 49 percent were degraded in the second half. The report notes that these figures partially reflect the general overall increase in congestion on the freeway system in the latter half of the year, especially after school begins in the late summer. Caltrans further examined the level of degradation, using the following three categories:

- Slightly degraded – degradation occurs from 10-to-49 percent of the time, or approximately 2-to-9 weekdays per month;
- Very degraded – degradation occurs from 50-to-74 percent of the time, equivalent to 10-to-15 weekdays per month; and
- Extremely degraded – degradation occurs 75 percent or more of the time, or approximately 16 days per month.

The report notes that on freeways with HOV lanes, approximately 13 percent of VMT in the morning peak hour were in the HOV lanes and approximately 15 percent of the VMT in the afternoon peak hour were in the HOV lanes. The report further notes that given these use levels; it is difficult for Caltrans to meet the federal performance standard requirement. The report further notes that degradation in the HOV lanes increased after the sunseting of the hybrid decal program.

The degradation action plan includes both short-term and long-term strategies to reduce or eliminate degradation. The strategies include increasing enforcement, improving incident response times, improving detection, improving infrastructure, and implementing active traffic management (ATM) strategies. Infrastructure improvements include HOV lane gap closure projects, HOV lane extensions, and adding a second HOV lane. Changing occupancy levels may also be considered, but prohibiting ILEVs is not being considered at this time as it is counter to the Governor's Executive Order to support and incentivize the purchase and use of these vehicles.

The report includes an analysis and action plan for each HOV lane in the state. The 2011 degradation level is provided, along with the potential causes. The planned remediation strategies are presented and the reasons for using the strategies are described.

3.3 Colorado



Source: Colorado Department of Transportation.

The I-25 HOV lanes were opened in the mid-1990s. Initially called the Downtown Express, the HOV lanes are seven miles in length. The barrier-separated facility includes two lanes with shoulders on each side. Access is provided at both ends of the lane. The lanes operate in the inbound direction toward downtown Denver in the morning and in the outbound direction in the afternoon. A 2+ vehicle-occupancy requirement is used.

In June 2006, toll paying solo drivers were allowed to use the re-named I-25 Express Lanes. The project uses electronic toll collection (ETC), with pre-set variable pricing by time-of-day. Solo drivers must obtain an EXpressToll transponder or new sticker tag and maintain an active account to use the Express Lanes. The transponders can also be used on the E-470 and the Northwest Parkway toll facilities.

A License Plate Toll was introduced in January 2009, providing another toll payment option. Cameras photograph the front and rear license plates of vehicles without an EXpressToll transponder or a new sticker tag. A bill is sent one month later to the registered owner of the vehicle for all trips made in the Express Lanes. Unpaid bills become accumulated civil penalties and notices of such are sent to the vehicle owner.

The current EXpressToll rates range from a low of \$0.50 on Saturdays, Sundays, and weekday off-peak periods to a high of \$4.00 during the weekday morning and afternoon peak-periods. The License Plate Toll rate includes a surcharge of 25 percent or more on the EXpressToll rate. The License Plate Toll rates currently range from \$0.75-to-\$5.00. In June 2013, the High Performance Transportation Enterprise (HPTE) Board adjusted the toll rates by extending the morning peak period for another hour to 6:45 a.m. to 8:45 a.m.

Legislation adopted in 1998 allowed ILEVs meeting EPA standards to use HOV lanes in the state without meeting the minimum-occupancy requirements. Qualifying vehicles are required to display a Colorado Department

of Transportation (CDOT)-developed circular bright orange sticker on the front windshield, the front driver's side rear-view mirror, or the front bumper of the vehicle.

The legislation further required CDOT, in consultation with the Denver Regional Transportation District (RTD) and local authorities, to monitor use by ILEVs as part of their periodic LOS evaluations. CDOT or other authorities may restrict or eliminate HOV lane use by ILEVs if it is determined that ILEVs are causing a significant decrease in the LOS for HOVs. The legislation specifies that if the U.S. Secretary of Transportation makes a formal determination that allowing ILEVs to use HOV lanes would disqualify the state from receiving federal funds, the use shall be terminated.

Legislation approved in 2003 allows hybrid vehicles, along with ILEVs, to use HOV lanes without meeting the minimum-occupancy requirements. The legislation states that allowing hybrid vehicles to use HOV lanes shall apply only if such exemption does not affect the receipt of federal funds and does not violate any federal laws or regulations.

The Colorado Department of Revenue, Division of Motor Vehicles, issued "Rules for Establishing and Regulating the Use of HOV/HOT Lanes for Certain Hybrid Vehicles for the Use and Benefit of the Colorado Department of Transportation" in April 2008. The rules cover the statutory authority for allowing hybrid use of HOV/HOT lanes in the state, the identification and permitting of hybrid vehicles, and the duration of the program. The rules also address the vehicle use priority should the HOV/HOT lanes become congested due to access by hybrid vehicles. The rules further cap the number of hybrid permits to the first 2,000 qualifying hybrid vehicles. The hybrid vehicle program was initiated in May 2008.

The program was scheduled to follow the SAFETEA-LU authorization, which initially terminated on September 30, 2009. The program continued following the SAFETEA-LU extensions, and the passage of MAP-21. The rules outline two types of identification for hybrid vehicle use of HOV/HOT lanes. First, hybrid vehicle owners must obtain the orange hybrid sticker. Hybrid vehicles with these stickers may access the HOV lanes on U.S. 36, Santa Fe Drive, and State Highway 82. Secondly, to use the I-25 Express Lanes a hybrid vehicle owner must also obtain an EXpressToll transponder or a new sticker tag. The transponder or tag records the hybrid vehicle as part of the automatic vehicle identification (AVI) system. When a qualifying hybrid vehicle accesses the I-25 Express Lanes, the hybrid identification is read by the toll reader and the account is not charged.

There is no cost to obtain a hybrid permit. Applications can be completed on-line or submitted through the mail. A deposit is required to obtain an EXpressToll transponder and establish an account. Since hybrid vehicles are not exempt from paying tolls on E-470 or the Northwest Parkway, the deposit covers possible use of those toll facilities. Further, charging hybrid vehicles a reduced toll is one option if the Express Lanes become congested. Additionally, the transponders are used as part of the data collection process to monitor congestion and free-flow conditions in the Express Lanes.

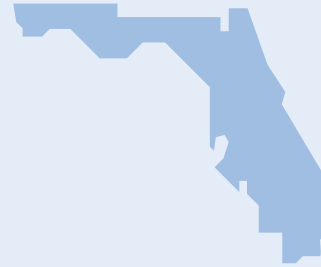
The hybrid permits and transponders are not transferable to another hybrid vehicle or to another owner. The permits and transponders must be returned, although an EXpressToll transponder can be retained by changing the vehicle's status to a non-hybrid account.

By mid-2012, the 2,000 hybrid permit limit was reached. Individuals may still apply for a hybrid permit. Applications are placed on a waiting list and new permits are issued as existing permits are returned. The CDOT I-25 Express Lanes website alerts individuals that the 2,000 permit quota has been reached, but that applications are still being accepted. The website also contains a reminder for individuals to contact CDOT if they no longer own a hybrid vehicle with an authorized permit and transponder or tag.

Use of the I-25 Express lanes is monitored by CDOT. Quarterly reports are published, which include information on vehicle volumes, bus travel times, revenues and expenditures, incidents, enforcement, operational issues, and hybrid utilization. The quarterly reports for July – September 2012, October – December 2012, January – March 2013, and April – June 2013 indicate that the number of daily hybrid users has remained relatively constant over the 12-month period.

Daily use of the Express Lanes by hybrid vehicles averaged between 161 and 179 vehicles a day, with slightly heavier use in the morning operating periods. The maximum daily hybrid use was between 250 and 296 vehicles. The average total daily traffic in the Express Lanes over the same time period was approximately 10,000 vehicles. Approximately 65 percent of the daily traffic is HOVs and hybrid vehicles, and 36 percent are toll-paying vehicles. Hybrid vehicles represent approximately 4 percent of the HOV volume and 2 percent of the total vehicles.

3.4 Florida



Source: Battelle

Legislation approved in 2003 allowed ILEVs that are certified and labeled in accordance with federal regulations to use HOV lanes in the state without meeting the minimum-occupancy levels. The legislation allowed hybrid vehicles to use the HOV lanes without meeting the occupancy requirements based on federal authorization. As a result, hybrid vehicles have been allowed to use HOV lanes in the state since the passage of SAFETEA-LU.

At the time, HOV lanes were in operation on I-95 in Miami-Dade, Broward, and Palm Beach counties. Based on legislative direction, the Florida Department of Transportation (FDOT) and the Florida Department of Highway Safety and Motor Vehicles established a process to issue a decal and a registration certificate on an annual basis to owners of hybrid and other qualifying vehicles for HOV lane access. Hybrid vehicle owners must complete an application for an HOV decal and submit it to a county tax collector office. In addition, as noted in the following, hybrid owners must register to use the 95 Express lanes on I-95.

FDOT sponsored a study in 2002 examining the potential influence of the anticipated ILEV legislation on the I-95 HOV lanes. The study found that ILEVs currently comprise a very small portion of the vehicle fleet in Florida and therefore would not impact HOV lane performance. The study also concluded that, based on limited experience in other states, allowing ILEVs to use HOV lanes provides an incentive for the purchase of these vehicles, but not enough to affect HOV lane performance. The study further noted that the number of ILEVs in the state should not increase significantly based on current definitions, but that the zero-evaporative emissions regulations could have a significant impact on ILEV sales and thus use of HOV lanes in the future. No specific study was conducted examining hybrid use of HOV lanes.

Approximately seven miles of the HOV lanes on I-95 in Miami-Dade County were expanded into HOT lanes with funding through the federal Urban Partnership Agreement (UPA). The project converted the single HOV lanes in both directions to two HOT or express lanes in each direction. Called the 95 Express, the lanes are open to toll-paying customers with an active SunPass account. Variable tolling is used to maintain free-flow conditions in the express lanes. Registered vanpools, registered 3+ carpools, and registered hybrid vehicles can use the 95 Express without paying a toll. Registered transit buses, school buses, and over-the-road coaches may also use the 95 Express toll-free. Additionally, motorcycles can use the 95 Express toll-free and do not need to register.

FDOT monitors use of the 95 Express and publishes monthly operations reports. As of September 2013, 8,978 toll-exempt vehicle registrations had been processed for the 95 Express. Hybrid vehicles accounted for 3,722, or 41 percent, of the registered toll-exempt vehicles. In comparison, the other registered toll-exempt vehicles included 3+ carpools, 27 percent; Miami-Dade school buses, 19 percent; Broward County and Miami-Dade County public transit buses, 11 percent; over-the-road coaches, 1.8 percent; and vanpools, 0.2 percent.

A total of 1,722,467 vehicle trips were recorded using the 95 Express in September 2013. A total of 44,609, or 2.6 percent, of these trips were made by toll-exempt vehicles. Hybrid vehicles accounted for 58 percent of these toll-exempt trips, compared to 24 percent by all types of registered buses, 14 percent by 3+ HOVs, 2 percent by motorcycles, and 2 percent by vanpools. These results indicate that hybrid vehicles represent approximately 25,873, or 1.5 percent, of the total monthly trips on the 95 Express.

3.5 Georgia



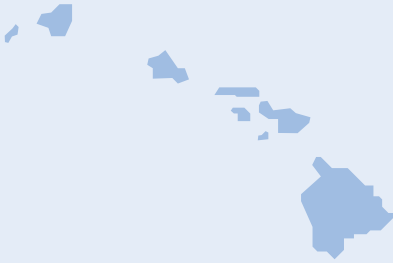
Source: Georgia Department of Transportation.

Legislation approved in 1997 allows AFVs to use HOV lanes in Georgia without meeting vehicle-occupancy requirements. Vehicles must meet requirements designated by the Georgia Department of Natural Resources. Legislation approved in 2004 extended eligibility to electric hybrid vehicles but provided that single-occupant hybrids could not use the HOV lanes unless Congress amended the existing federal legislation or action was taken by the U.S. Department of Transportation. Currently, the Georgia Department of Transportation's (GDOT) web page with AFV and HOV information notes that hybrid vehicles do not qualify for an AFV tag. Thus, single-occupant hybrid vehicles are not allowed to use the HOV lanes in the state, including the I-85 Express HOT lanes.

To use the HOV lanes, owners of AFVs must obtain an AFV license plate and tag from the Georgia Department of Revenue. An owner must complete a vehicle request form, stating the type of fuel used to propel the vehicle. The owner must also indicate the primary location where the alternative fuel will be purchased, and affirm that the vehicle will operate on the alternative fuel not less than 85 percent of the total time the vehicle is in operation. Owners are required to maintain receipts for purchases of alternative fuel for three years and provide them as requested for compliance review. The 2010 special license plate information chart lists the following costs for an AFV license plate – annual registration/decals fee, \$20; manufacturing fee, \$20; special tag fee, \$35; and special tag renewal fee. These fees are similar to those for the other special license plates. No inspection of the vehicle is required.

The I-85 Express Lanes, which expanded the I-85 HOV lanes to HOT lanes in 2011 as part of the federal CRD program, allows vehicles with proper AFV license plates, which do not include hybrids. No data was available on the number of plates issued by the Georgia Department of Revenue or on the use of the I-85 Express Lanes by vehicles with AFV license plates.

3.6 Hawaii



Source: Battelle

Legislation passed in 1997 provided a number of incentives for electric vehicle ownership in Hawaii. These incentives include use of the HOV lanes in the state without meeting the vehicle-occupancy requirements and exemption from parking fees charged by any non-federal governmental authority. Motor vehicle registration fees were also waived on electric vehicles for a five-year period after passage of the act. HOV lanes are in operation in the Honolulu area on H-1, H-2, H-201, Route 92, and Route 72. Motor vehicles are registered by county in Hawaii. Individuals purchasing or importing electric vehicles obtain an electric vehicle license plate when they register their vehicle. Drivers of these vehicles are then able to use the HOV lanes. No data is available on the use of the HOV lanes in Hawaii by electric vehicles.

3.7 Maryland



Source: Battelle

Legislation passed by the Maryland General Assembly in 2010 allows plug-in electric vehicles (PIVs) to use HOV lanes in the state without meeting the vehicle-occupancy requirements. Currently, HOV lanes are in operation on I-270 and US 50. The PIVs must be titled and registered in Maryland, and must display a valid HOV permit. To qualify for use of the HOV lanes, PIVs must also meet the following six criteria:

- The vehicle must be made by a manufacturer and be manufactured primarily for use on public streets, roads and highways;
- The vehicle can be modified from the original manufacturer's specifications to a plug-in electric vehicle. Modified vehicles must be examined by the Maryland State Police prior to the issuance of a HOV permit;
- Is rated at not more than 8,500 pounds unloaded gross vehicle weight;
- Has a maximum speed capability of at least 65 miles per hour;
- Is propelled to a significant extent by an electric motor that draws electricity from a battery that has a capacity of not less than 4 kilowatt hours for four-wheeled vehicles and not less than 2.5 kilowatt hours for two- or three-wheeled motor vehicles; and
- The vehicle is capable of being recharged from an external source of electricity.

HOV lanes currently operate on I-270 and US 50 in Maryland. Operation of the HOV lanes on I-270 was initiated in September 1993 with the opening of the HOV lane on the northbound East Spur. The HOV lanes were completed in December 1996. The southbound HOV lane on I-270 extends from I-370 to Capital Beltway (I-495). The northbound HOV lane extends from the Capital Beltway to MD 121 (Clarksburg Road). The HOV lanes operate in peak periods, peak direction of travel – from 6:00 a.m. to 9:00 a.m. in the southbound direction and from 3:30 p.m. to 6:30 p.m. in the northbound direction. The HOV lanes are open to general purpose traffic at other times. The HOV lanes on US 50 opened in October 2002. The US 50 HOV lanes extend from the Capital Beltway to US 301 (Crain Highway), a distance of 7.5 miles. The HOV designation is in effect 24-hours a day/7 days a week.

The legislation authorized the Maryland Motor Vehicle Administration (MVA) to issue PIV permits. Vehicle owners must complete an application for a PIV permit. Although the legislation authorizes the MVA to charge up to \$20 for a PIV permit, no fee is currently being assessed. The MVA currently provides the HOV permits/stickers to PIV dealerships for them to distribute to PIV buyers. The MVA also provides HOV PIV permits to qualifying PIV owners who did not purchase their vehicle at a dealership. The PIV HOV permits currently expire on September 30, 2017, when the law is scheduled to sunset.

The legislation requires that the MVA and State Highway Administration (SHA) issue a joint report annually to the governor and the General Assembly on the effect of

PIV use of the HOV lanes. The reports document the number of HOV permits issued to PIVs. The December 2013 report notes that 988 permits were issued between October 2010 and September 2013 as highlighted in Table 4. According to the MVA, there are 1,764 PIVs registered in Maryland. Approximately 56 percent of the PIVs in the state have registered for an HOV permit. The highest registration was recorded in September 2013, with 124 PIV HOV permits issued.

Table 4. Number of Annual Plug-In Vehicle HOV Permits Issued in Maryland

Year	Number of PIV Permits Issued
2010 ¹	1
2011	120
2012	460
2013 ²	407
Total	988

¹October-December 2010.
²January-September 2013.

Source: Texas A&M Transportation

The SHA did not conduct a formal study of the impacts of the PIVs on the two HOV lanes based on only 988 permits issued. The SHA concluded that this number of permits has no impact on HOV operations at the current time. The report notes that even if all 988 PIVs used the HOV lanes at the same time, the impact on operation of the lanes would be marginal. The report further notes the growth in the production and sales of PIVs and the need for ongoing monitoring.

3.8 New Jersey



Source: Battelle

The New Jersey Turnpike Authority allows hybrid vehicles to use the HOV lanes on the turnpike without meeting the vehicle-occupancy requirement. The hybrid access was first authorized by the New Jersey Turnpike Authority in 2006 and re-confirmed in 2009. The HOV lanes are located on the turnpike between Interchange 11 in Woodbridge and Interchange 14 in Newark. The HOV lanes operate on weekdays in the northbound direction from 6:00 a.m. to 9:00 a.m. and in the

southbound direction from 4:00 p.m. to 7:00 p.m. Hybrid vehicles must still pay the appropriate tolls, but may use the HOV lanes during the restricted time periods. No special tags, stickers, license plates, or transponders are required.

The list of qualifying hybrids is provided to enforcement personnel who monitor the use of the HOV lanes. Eligible hybrids include the Ford Escape Hybrid, Mazda Tribute Hybrid, Toyota Prius Hybrid, Toyota Highlander Hybrid, Honda Insight Hybrid, Honda Civic Hybrid, Honda Accord Hybrid, and Lexus RX400H. Use of the HOV lanes by hybrid vehicles is not monitored since the owners must still pay the appropriate toll.

3.9 New York



Source: New York State Department of Transportation.

The Clean Pass pilot program, which began in 2006, allows eligible hybrid vehicles to use the HOV lanes on the Long Island Expressway (LIE). Clean Pass was initiated as part of the then governor's Strategic Energy Action Plan. The LIE Clean Pass is sponsored through a partnership involving the New York State Department of Transportation (NYSDOT), the New York State Department of Motor Vehicles (NYSDMV), and the State Department of Environmental Conservation (DEC).

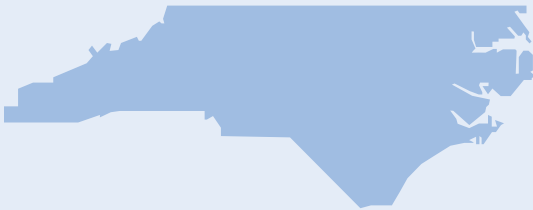
Owners of eligible hybrid vehicles apply to the NYSDMV to register for the program. The NYSDMV issues four stickers to eligible vehicle owners, which must be placed on the front, rear, and each side of the vehicle.

The NYSDMV and the NYSDOT monitor a number of elements of the Clean Pass program. The NYSDMV tracks the total Clean Pass vehicles registered statewide and by county. The number of hybrid vehicles registered in the state by county is also recorded. A comparison can be made of eligible hybrid vehicles by county and registered Clean Pass vehicles by county using these data. Sales of hybrid vehicles in the U.S. are monitored using commercially-available information.

A total of 2,119 Clean Pass stickers were issued by the end of 2006. A total of 19,895 Clean Pass stickers had been issued as of October 1, 2013. Approximately 94 percent of the eligible vehicles in Suffolk County and 64 percent of the eligible vehicles in Nassau County have been registered for the program.

NYS DOT has an ongoing program monitoring use of the LIE. Traffic counts from October, 2006, indicate that hybrid vehicles accounted for between 15-to-90 vehicles or 1 percent and 6 percent of the HOV lane volumes during the morning and the afternoon peak hours. Traffic counts in 2010 and 2011 indicate that the number of Clean Pass vehicles had increased to between 400 and 500 of the 1,500-to-1,600 vehicles using the LIE HOV lanes during the morning peak hour. As of October 2013, there was a maximum of 681 Clean Pass vehicles at exit 50, with an average of 551 Clean Pass vehicles across the length of the HOV lanes. The eastbound peak had a maximum of 520 Clean Pass vehicles at exit 50, with an average of 405 Clean Pass vehicles across the length of the HOV lanes. Thus, Clean Pass vehicles currently account for approximately 26-to-31 percent of all peak hour vehicles using the LIE HOV lanes. The percent of carpools using the LIE has declined over this same time period.

3.10 North Carolina



Source: Battelle

Legislation passed in 2011 by the General Assembly of North Carolina allows PIVs, dedicated natural gas vehicles, and fuel cell electric vehicles to use the HOV lanes in the state without meeting the vehicle-occupancy requirements. The legislation does not include hybrid vehicles. Currently, the only HOV lanes in North Carolina are on I-77 in the Charlotte area. The North Carolina Department of Transportation website notes that gas-electric hybrid vehicles are not allowed to use the HOV lanes.

3.11 Tennessee



Source: Tennessee Department of Revenue.

The HOV Smart Pass program was initiated in 2009, allowing hybrid vehicles to use the HOV lanes in the state without meeting the occupancy requirements. HOV lanes are currently in operation on I-65, I-40, and I-24 in Nashville and on I-40 and I-55 in Memphis. The Tennessee Department of Revenue is responsible for the Smart Pass program; the Tennessee Department of Transportation (TDOT) is responsible for planning, designing, and operating the HOV lanes; and the Tennessee Department of Safety is responsible for enforcing the HOV lanes.

Owners of hybrid and other qualifying vehicles can apply for a Smart Pass decal at no cost by e-mail, fax, or mail. The decal must be displayed to drive in an HOV lane without meeting the vehicle-occupancy requirement. The required placement of the decal is the outside of the rear vehicle window on the lower right or passenger side.

As of November, 2013, 2,133 HOV Smart Pass decals had been issued by the Tennessee Department of Revenue. TDOT does not currently collect data on use of the HOV lanes by vehicles with HOV Smart Pass decals. Plans are underway to begin collecting these data, however.

3.12 Utah



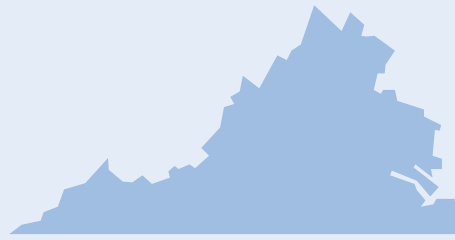
Source: Utah Department of Transportation.

Legislation approved in 2001 allowed vehicles with clean fuel special group license plates to use HOV lanes in the state without meeting minimum-occupancy requirements. The initial exemption was scheduled to expire December 31, 2005, but was continued through legislative extensions. To qualify for a clean fuel license plate, a vehicle must meet EPA standards. An applicant must annually obtain a clean fuel vehicle permit. As of the fall of 2004, there were approximately 659 active vehicle registrations with clean fuel license plates in the state. This figure includes AFVs in agency fleets.

Based on new state legislation, the Utah Department of Transportation (UDOT) began issuing a Clean Fuel Vehicle Decal to new applicants on July 1, 2011. The new C Decal program replaced the clean fuel license plate program for hybrid access to the I-15 Express Lanes with only the driver and without paying a toll. The change was made because the definition of "clean fuel" used in the previous legislation did not match the more stringent federal definition.

Individuals with an existing clean fuel license plate were notified if their vehicle did not qualify for a new C Decal. These individuals did not receive a new permit and C Decal. Individuals with an existing clean fuel license plate whose vehicle did qualify under the new requirements received a new C Decal. Individuals with qualifying vehicles can continue to obtain C Decals, as UDOT determined the I-15 Express Lanes can still accommodate additional C Decal vehicles without impacting carpools and HOT vehicles. As of November 2013, 5,555 C Decals had been issued to hybrid vehicles, as well as compressed natural gas (CNG) and electric vehicles. No data was found on the use of the I-15 Express Lanes by vehicles with the C Decals.

3.13 Virginia



Source: Battelle

Virginia was the first state to allow hybrid vehicles to use HOV lanes without meeting vehicle-occupancy requirements. Hybrid vehicles have been able to access HOV lanes in the state since 2000, before it was allowed by federal legislation. Virginia provides a good example of an extensive ongoing HOV lane monitoring program conducted through the coordinated efforts of the Virginia Department of Transportation (VDOT), the Metropolitan Washington Council of Governments (WASHCOG), and the Virginia State Patrol. This monitoring program documented congestion in the HOV lanes in northern Virginia from hybrid use. Virginia has addressed this congestion by changing the clean special fuel license plate design and limiting hybrid vehicle access to specific HOV lanes based on the license plate design.

HOV lanes are in operation in northern Virginia and in the Hampton Roads, Norfolk, and Newport News area in southeastern Virginia. Three of the HOV lanes in northern Virginia – I-95, I-395, and I-66 – serve traffic in and out of Washington, D.C. The fourth HOV lane in northern Virginia is on the Dulles Toll Road, which feeds into I-66. HOV lanes in the Hampton Roads area include I-64 and I-264.

Legislation approved in Virginia in 1993 established a clean special fuel license plate for AFVs. State legislation approved in 1994 allowed vehicles with clean special fuel license plates to use the HOV lanes in Virginia without meeting the minimum-occupancy requirements. Subsequent legislation has extended the sunset date for the HOV lane access and limited use of some HOV facilities by changing the design of the required clean special fuel license plate. Three different special fuel license plates are currently in use. In 2013, the Virginia General Assembly extended the exemption indefinitely. The 2013 legislation also requires that the exemption must be compliant with federal laws. It further requires that the Commissioner of Highways shall provide annually to the Chairman of the Senate

and House of Delegates Committees on Transportation traffic volumes on the HOV facilities that result in a degradation condition as defined by federal law and as reported to FHWA.

Hybrid vehicles, which became available in the state in 2000, were initially determined not to be eligible for the clean special fuel license plates by the Virginia DMV, in consultation with the Virginia Department of Environmental Quality. After several citizens approached their state legislators about the issue, the decision was reversed.

Only vehicles with clean special fuel license plates are authorized to use the HOV lanes in Virginia without meeting the occupancy requirements. An individual must apply to the Virginia DMV for the special plates. A vehicle owner must submit the application and documentation to the DMV headquarters Special License Plate and Consignment Center. Staff at the Center review the application and documentation and determine if the vehicle qualifies for the clean special fuel license plate. The special plates and an invoice are sent to the owner of qualifying vehicles.

Table 5 presents the number of active clean special fuel license plates for different time periods. During the six years from 1994 through 1999 when only AFVs qualified, there were 78 active clean special fuel license plates. By June 2006, with hybrids qualifying for the HOV exemption, there were 15,485 clean special fuel license plates. By June 2011, there were 26,829 active clean special fuel license plates issued. The number of active clean special fuel license plates declined slightly to 25,646 in October 2013.

Table 5. Number of Active Virginia Clean Special Fuel License Plates

Year	Number of Active Clean Special Fuel License Plates
1994 – 1999 ¹	78
2000 – June 2006 ²	15,485
July 2006 – June 2011 ³	26,829
July 2011 – January 2012 ⁴	26,516
February 2012 – October 2013	25,646

Source: Texas A&M Transportation

¹ Only AFVs eligible for clean special fuel license plates and allowed to use all HOV lanes in the state.
² Hybrid vehicles eligible for clean special fuel license plates and allowed to use all HOV lanes in the state.
³ New clean special fuel license plates design implemented on July 1, 2006. Use of the HOV lanes on I-95 and I-395 limited to vehicles with the old clean special fuel license plates.
⁴ Third clean special fuel license plate design implemented on July 1, 2011. Use of the HOV lanes on I-66 limited to vehicles with the first two clean special fuel license plates.

This increase was directly attributed to hybrid vehicle owners applying for the clean special fuel license plates. Hybrid vehicles account for 99.2 percent of the total active clean special fuel license plates. Further, 84.4 percent of the existing special fuel vehicle plates were issued in counties and cities in northern Virginia, which are served by the I-95, I-395, I-66, and Dulles Toll Road HOV lanes.

WASHCOG, in coordination with VDOT, has an ongoing program for monitoring and reporting on the use of HOV facilities in northern Virginia. In the fall of 2003, clean special fuel vehicles accounted for between 2 percent and 12 percent of the HOV volumes during the peak periods on the different HOV facilities in northern Virginia.

Counts from October 2004 indicated that clean special fuel vehicles accounted for between 11 percent and 17 percent of the vehicles in the I-95 HOV lanes during the 6:00 a.m.-to-9:00 a.m. peak period in the northbound direction. These percentages translate into a range of 844-to-1,422 vehicles with clean special fuel license plates using the HOV lanes during the three-hour period, and the corresponding total vehicle volumes in the HOV lane ranged from 7,994 to 8,450. In 2005 and 2006, hybrid vehicles accounted for approximately 24 percent of the peak-hour vehicles using the I-95 HOV lane.

The Virginia HOV Enforcement Task Force examined hybrid vehicle use of the HOV lanes and other issues. The Task Force was established in 2003 by the Virginia Secretaries of Transportation and Public Safety in response to concerns from numerous groups about the large numbers of non-HOV vehicles in the HOV lanes during the restricted time period. The Task Force included representatives from state, regional, and local transportation and enforcement agencies. Reports issued by the Task Force in 2003 and 2005 included recommendations for addressing these concerns.

In an effort to limit or cap the number of clean fuel vehicles using the I-95/I-395 HOV lanes, legislation approved in 2006 required that a new distinctively different design be used for clean special fuel license plates issued after July 1, 2006. The legislation limits the clean fuel exemption on the HOV lanes in the I-95/I-395 corridor to vehicles registered with and displaying the clean special fuel license plates issued prior to July 1, 2006. Individuals with clean special fuel license plates registered to vehicles before July 1, 2006 are able to renew or transfer their plates to a newly purchased qualifying vehicle after July 1, 2006 and continue to use the I-95/I-395 HOV lanes.

The legislation also increased the fee for the clean special fuel license plates from \$10 to \$25. For each \$25 fee collected after the first 1,000 registrations, \$15 is paid to the State Treasurer and credited to a special, non-revenue HOV Enforcement Fund for use by the Virginia State Police for enhanced HOV enforcement.

In October 2010, hybrid vehicles accounted for between 13.3-to-14.8 percent of peak hour vehicles on I-66 inside the Beltway and 10-to-14.6 percent of peak hour vehicles on I-66 outside the Beltway. On I-395, hybrid vehicles accounted for between 11.8 percent and 14.1 percent and between 13.9 percent and 15.3 percent on I-95.

The hybrid volumes on I-66 resulted in legislation establishing a new clean special fuel license plate and limiting use of I-66 to vehicles with either the special fuel

license plates issued before July 1, 2006 or between July 1, 2006 and July 1, 2011. As noted previously, use of the HOV lanes in the state by vehicles with all of the clean special fuel license plates is currently scheduled to expire on July 2, 2012, although the Virginia General Assembly is considering extending this date.

As presented in Table 5, the number of active clean special fuel license plates in January 2012 and October 2013 recorded a decline from the number in June 2011. As of July 1, 2011, hybrid vehicle owners applying for new clean special fuel license plates can only use the HOV lanes on the Dulles Toll Road and those in the Hampton Road areas, not the HOV lanes on I-95, I-395, and I-66. It appears the restrictions on use of the HOV lanes in the congested travel corridors serving Washington, D.C. have lowered the demand for the clean special fuel license plates.

Figure 1 illustrates the three different clean special fuel license plates currently in use. The restriction on use of the different HOV lanes is also summarized.

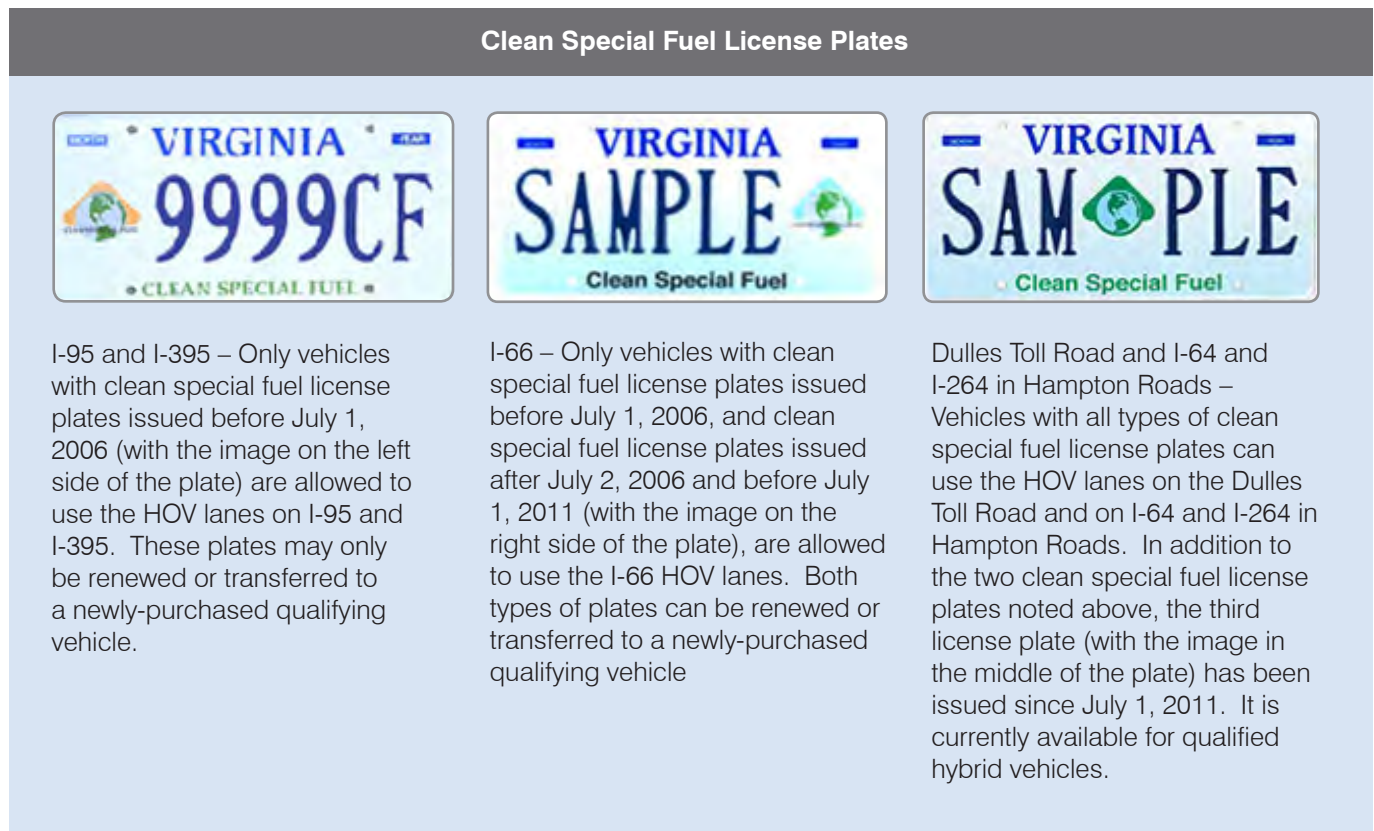


Figure 1. Image. Virginia Clean Special License Plates

Source: Virginia Department of Transportation.

VDOT's June 2013 report on HOV hybrid exemption certification indicates that HOV lanes in the Commonwealth are operating within the requirements of MAP-21, with the exception of I-66 outside the Beltway. The analysis, which examined operation of the HOV lanes from April 1-to-June 30, 2013, found I-66 to be degraded approximately 20 percent of the time in the morning peak period and almost 31 percent in the afternoon peak-period.

The VDOT degradation mitigation plan for I-66 outside the Beltway includes five phases. These phases are increasing HOV enforcement and public awareness, improving available capacity management by implementing ATM and reducing merge activities, adding managed lanes, discontinuing clean fuel (non-HOV) vehicles, and increasing the vehicle-occupancy requirements from 2+ to 3+.



4.0 Issues/Considerations With Hybrid Vehicle Use of HOV/HOT Lanes

The experiences from states allowing hybrids and/or AFVs to access HOV and HOT lanes without meeting vehicle-occupancy requirements provide insight into possible issues that may be encountered with these programs. As highlighted in this section, these issues include creating congestion in the HOV/HOT lanes, reducing carpooling, causing confusion among user groups, addressing hybrid vehicles from other states, determining the eligible hybrid and AFVs, and expanding HOV lanes to HOT lanes. Consideration of these issues and possible approaches to address them prior to allowing hybrid access is important. Communicating this information to hybrid owners, other HOV/HOT users, and policy makers is also important to provide realistic expectations if changes in operations or user groups need to be made.

- **Congestion in the HOV/HOT Lanes.** The addition of hybrid vehicles to HOV/HOT lanes already operating at or near capacity may cause congestion and reduce the travel-time savings and trip-time reliability historically provided to HOVs – buses, vanpools, and carpools. MAP-21 requires that state agencies demonstrate that an HOV facility is not already degraded and that the pressure of low-emission and energy-efficient vehicles will not cause the facility to become degraded. They must also report annually on HOV lane use and develop mitigation plans to address any degradation. In Virginia, this issue occurred and was initially addressed by legislation establishing new clean special fuel license plates, which limited access to individual HOV facilities based on the different license plates. Further, both California and Virginia have developed degrading mitigation plans to address specific concerns with allowing these vehicles to access HOV lanes in both states.
- **Reducing Carpooling.** Current carpoolers who can afford to purchase a hybrid vehicle may do so solely to use an HOV/HOT lane, thus diminishing the intent of supporting carpooling. While no formal surveys have been conducted documenting existing carpoolers, vanpoolers, or bus riders purchasing hybrid vehicles primarily to use HOV/HOT lanes, the trends on the LIE indicates that carpool use of the HOV lanes has decreased while permits for hybrid vehicles have increased. The purchase of hybrid vehicles and applications for clean special fuel license plates are much higher in northern Virginia than in the Hampton Roads area, and use of the HOV lanes in northern Virginia by drivers of hybrid vehicles is much higher than the HOV lanes in Hampton Roads.
- **Causing Confusion among User Groups.** Changing requirements for use of HOV/HOT lanes by hybrid vehicle owners may cause confusion among different user groups. Changing the clean special fuel license plate designs and limiting access to different HOV lanes in northern Virginia adds complexity to the program and may make it more difficult for users to understand. The Dr. Gridlock column in the Washington Post has addressed questions from individuals purchasing or thinking of purchasing a hybrid vehicle, only to find out that they are not able to use the HOV lanes on I-95, I-395, and I-66.
- **Hybrid Vehicles from Other States.** The HOV/HOT lanes in some areas, such as northern Virginia and New York, are very close to adjacent states and may serve multi-state travel patterns. Residents owning qualifying hybrid vehicles in adjacent states have questioned why they are not allowed to use these HOV/HOT lanes. For example, the Maryland State Highway Administration HOV website warns that hybrid vehicles with Maryland license plates are not allowed to use the HOV lanes in Virginia. Non-New York residents have written their congressmen questioning why out-of-state hybrid vehicle owners are not allowed to use the LIE HOV lanes.
- **Establishing Hybrid Vehicle Eligibility.** While the EPA and additional state requirements provide guidelines for establishing hybrid vehicle eligibility, vehicle manufacturers and owners have challenged these guidelines and test procedures when their vehicles were not deemed eligible. For example, there has been disagreement over the Chevy Volt not being classified as eligible for the Clean Pass pilot program on the LIE in New York. GM and Volt owners have argued that the emissions and fuel economy was not tested in the way many people actually drive the Volt. The Volt operates solely on electricity for the first 40 miles. The gasoline engine begins powering the vehicle after 40 miles. Individuals driving the Volt for less than 40 miles and recharging it before their next trip, argue it never uses gasoline, and thus never generates any emissions. As a result, they argue, that

the Volt is effectively an “all electric” vehicle and should be classified as eligible.

- **HOV Lane to HOT Lane Expansion.** The “free pass” given to hybrid vehicles in HOV lanes may be an issue when those HOV lanes are expanded to HOT lanes. Similarly, the development of new HOT lanes in states allowing hybrid access to HOV lanes may present issues. HOT lanes introduce toll collection, and thus, introduce elements of revenue generation. Allowing hybrid vehicles to use HOT lanes without paying the toll reduces revenues, while increasing vehicle volumes. For example, qualifying hybrids are currently able to access the I-95 Express Lanes in Miami, the I-25 Express Lanes in Denver, and the I-15 Express Lanes in Salt Lake City, which are all HOT lanes, without paying a toll or meeting the vehicle-occupancy requirements. Qualifying hybrid vehicles were allowed to use the previous HOV lanes on I-95 and I-15, while the program allowing qualifying hybrids to use the I-15 Express Lanes, as well as HOV lanes in Denver, was initiated after the expansion to HOT lanes. In another example, vehicles with white and green clean air vehicle stickers in California can use the I-25 HOT lanes in San Diego and the I-680 HOT lanes in the Bay Area without paying a toll. Vehicles with AFV license plates and tags are allowed to use the I-85 Express Lanes in Atlanta. In all of these cases, the potential loss of revenues is weighed against the state’s initiatives to encourage the sale and use of environmentally-friendly vehicles.

4.1 Other Exempt Vehicles

Other exempt vehicles are allowed to use HOV, HOT, and managed lanes in most states. These typically include public transit buses with only the driver and marked (rooftop emergency lights and sirens) law enforcement and emergency vehicles with only the driver.

Public transit buses carrying passengers are important elements of most HOV, HOT, and managed lanes. Buses are carrying more people in fewer vehicles, adding to the people-moving capacity of HOV, HOT, and managed lanes. Public transit buses with only the driver, which are typically dead-heading or out of service to begin or end service, are allowed to use most HOV, HOT, and managed lanes. This approach provides operating efficiencies and cost savings to the transit agencies and improved service for riders. Issues may arise, however, if taxicabs, airport shuttles, and other private transportation vehicles request the same access. No HOV, HOT, or managed lanes were identified in the literature review allowing these types of vehicles without meeting the occupancy requirement or paying a toll.

Marked law enforcement and emergency vehicles, which typically include police, sheriff, state patrol, EMS, and other related vehicles, are allowed to use most HOV, HOT, and managed lanes without meeting the occupancy requirements. The use of HOV facilities by marked law enforcement and emergency vehicles appears to be relatively low and does not appear to be monitored.

The use of HOV, HOT, and managed lanes by unmarked law enforcement and emergency vehicles or by law enforcement and emergency personnel traveling in their own vehicles was an issue on the HOV lanes in northern Virginia in the early 2000s. The Code of Virginia provides an HOV exemption for law enforcement, but no specific definition of a law enforcement vehicle is provided in the state statute. The Virginia HOV Enforcement Task Force noted issues with the use of HOV lanes in northern Virginia by off-duty law enforcement and emergency personnel, as well as federal employees who consider themselves law enforcement personnel, traveling to and from work in their personal vehicles. Although the Task Force was not able to determine the number of these individuals, it recommended that the statute be better defined and that an education and outreach effort be undertaken focused on these individuals. Outreach efforts were initiated which appear to have helped address the issue.

4.2 Report Summary

The purpose of this report was to review the programs in use by states allowing low-emission and energy efficient vehicles, and other exempt vehicles, access to HOV, HOT, and managed lanes without meeting the vehicle-occupancy requirements. Possible issues to consider with allowing low-emission and energy efficient vehicles to use HOV, HOT, and managed lanes was summarized. MAP-21 regulations require that states must submit a report that the facility is not already degraded, and that the presence of the vehicles will not allow the facility to become degraded are discussed, along with the requirement for ongoing monitoring and certification that the facilities meet the operating requirements.

The report should be of benefit to personnel responsible for planning and operating HOV, HOT, and managed lanes, as well as policy makers. The variety of approaches being used by states, and the differences in impacts, should be of interest to others considering new programs or changes in existing programs. The information highlights that states have the authority to develop programs that best meet their needs within the oversight provided by MAP-21 and the federal government.

Appendix A - Acknowledgements

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Appendix B - References

1. Moving Ahead for Progress in the 21st Century (MAP-21). <http://www.gpo.gov/fdsys/pkg/PLAW-112publ141/pdf/PLAW-112publ141.pdf>.
2. Chandra, A., S. Gulati, and M. Kandliker. *Green Drivers or Free Riders? An Analysis of Tax Rebates for Hybrid Vehicles*. Unpublished, Working Paper, 2009.
3. Gallagher, K., and R. Muehlegger. *Giving Green to Get Green: Incentives and Consumer Adoption of Hybrid Vehicle Technology*. Unpublished, Faculty Research Working Paper Series, Harvard University, 2008.
4. Diamond, D. "The Impact of Government Incentives for Hybrid-Electric Vehicles: Evidence from U.S. States." *Energy Policy*, 37: 972-983, 2009.
5. Diamond, D. "Impact of High Occupancy Vehicle (HOV) Lane Incentives for Hybrids in Virginia." *Journal of Public Transportation*, Vol. 11, No. 4. Center for Urban Transportation Research, University of South Florida, Tampa, Florida, 2008.
6. Shewmake, S., and L. Jarvis. *Hybrid Cars and HOV Lanes*. University of California, Davis, 2009.
7. Breiland, C., C. Lianyu, and H. Benouar. "Operational Effect of Single-Occupant Hybrid Vehicles in High-Occupancy Vehicle Lanes." *Transportation Research Record: Journal of the Transportation Research Board*, No. 1959. Transportation Research Board of the National Academies, Washington, D.C., pp. 151-158, 2006.
8. Brownstone, D., L. Chu, T. Golob, K. Nesamani, and W. Recker. Evaluation of Incorporating Hybrid Vehicle Use of HOV Lanes. California PATH Program Research Report UCB-ITS-PRR-2008-26. Institute of Transportation Studies, University of California, Berkeley, Berkeley, California, 2008.
9. Jang, K., and M. Cassidy. *Dual Influences on Vehicle Speeds in Special-Use Lanes and Policy Implications*. University of California, Berkeley Center for Future Urban Transport. Institute of Transportation Studies, University of California, Berkeley, September 2011.
10. Arizona State Legislation, Senate Bill 1002. <http://www.azleg.state.az.us/FormatDocument.asp?inDoc=/legtext/42leg/7s/bills/sb1002s%2Ehtm&DocType=B> (link no longer available).
11. Arizona State Legislation, Senate Bill 1004. <http://www.azleg.state.az.us/legtext/44leg/7s/bills/sb1004s.pdf>.
12. Arizona State Legislation, Senate Bill 1429. <http://www.azleg.state.az.us/legtext/45leg/1r/bills/sb1429s.pdf>.
13. California State Legislation, Assembly Bill 2628. http://www.calcog.org/2004%20Agendas%20&%20Minutes/040524mtg/ab_2628_bill_20040401_amended_asm.pdf (link no longer available).
14. California State Legislation, Chapter 330.
15. Alan C. Lloyd, chairman, California Air Resources Board, memorandum, May 18, 2000, Low-Emission Vehicles Permitted to Access High-Occupancy Vehicle (HOV) Lanes Under Assembly Bill 71 (AB71).
16. California Department of Motor Vehicles. Vehicle Code – Low-Emission Vehicle Identification for High-Occupancy Vehicle Lane Use: Tolls. http://www.dmv.ca.gov/pubs/vctop/d03/vc5205_5.htm.
17. California Department of Transportation, Division of Traffic Operations. *Determination Report: Hybrids on the High-Occupancy Vehicle Facilities in California*. Sacramento, CA, June 30, 2006.

18. California Department of Transportation. Hybrids in the HOV Lanes Traffic Counts, Los Angeles Freeways, April, 2006.
19. California Department of Transportation. Traffic Counts, I-80 and US 101, April, 2006.
20. California Department of Transportation, 2011. *California High-Occupancy Vehicle Lane Degradation Determination Report*. July 31, 2013.
21. California Department of Transportation, 2011. *California High-Occupancy Vehicle Lane Degradation Action Plan*. July 31, 2013.
22. Colorado State Legislation, Senate Bill 30 (1998). http://www.state.co.us/gov_dir/leg_dir/sess1998/sbills98/sb030.htm.
23. Colorado State Legislation, Senate Bill 91 (2003). http://www.leg.state.co.us/2003a/inetcbill.nsf/fsbillcont/AD9789B9458EF99387256C780069ECEB?Open&file=091_enr.pdf (link no longer available).
24. Colorado Department of Revenue Division of Motor Vehicles. 1CCR 204-28. *Rules for Establishing and Regulating the Use of HOV/HOT Lanes for Certain Hybrid Vehicles for the Use and Benefit of the Colorado Department of Transportation*. April 20, 2008.
25. I-25 Express Lane FY 2013 1st Quarter Performance Report, Quarterly Report July – September, 2012. Colorado High Performance Transportation Enterprise, September 2012.
26. I-25 Express Lane FY 2013 2nd Quarter Performance Report, Quarterly Report October – December 2012. Colorado High Performance Transportation Enterprise, December 2012.
27. I-25 Express Lane FY 2013 3rd Quarter Performance Report, Quarterly Report January – March 2013. Colorado High Performance Transportation Enterprise, December 2012.
28. I-25 Express Lane FY 2013 3rd Quarter Performance Report, Quarterly Report April – June 2013. Colorado High Performance Transportation Enterprise, June 2013.
29. I-25 HOV/Tolled Express Trends – 2006 to Present. Colorado High Performance Transportation Enterprise, June 20, 2012.
30. Florida State Legislation, Senate Bill 88 (2003). <http://www.flsenate.gov/data/session/2003/Senate/bills/billtext/pdf/s0088.pdf> (link no longer available).
31. Chris Porter, Anita Vandervalk, and Michael Williamson, Cambridge Systematics, Inc. to Jeff Weidner, Florida Department of Transportation, memorandum, October 12, 2002, "Analysis of the Impact of Inherently Low-Emission Vehicles on I-95 High-Occupancy Vehicles Lanes."
32. FDOT District Six – *95 Express Monthly Operations Report, September 2013*. Florida Department of Transportation, November 1, 2013.
33. Georgia State Legislation, Senate Bill 116. http://www.legis.state.ga.us/legis/1997_98/leg/fulltext/sb116.htm.
34. Georgia State Legislation, House Bill 719, Section 2. http://www.legis.state.ga.us/legis/2003_04/fulltext/hb719.htm.
35. State of Hawaii. Act 290, Section 4, July 1, 1997.
36. Plug-In America. *Hawaii EV Ready – Guidebook for Commercial Electric Vehicle Charging Station Installations*. May 2012.

37. Maryland General Assembly, HB 674/SB 602 Authorizing Plug-In Vehicles with a State Permit to Use HOV Lanes, 2010 Session.
38. Motor Vehicle Administration and State Highway Administration, Maryland Department of Transportation, 4th Annual Report to the Maryland Governor and General Assembly Regarding the Effects of the Use of Permits Issued to Plug-In Electric Vehicles on the Operation of HOV Lanes, December 2013.
39. New York State Department of Transportation. Long Island Expressway (I-495) HOV Lanes. January, 2007.
40. Utah State Legislation, House Bill 289. <http://www.le.state.ut.us/~2001/bills/hbillint/HB0289S1.pdf> (link no longer available).
41. Kevin Park, Utah Department of Motor Vehicles, E-mail to Author, December 13, 2004.
42. Virginia State Legislation, Section 33.1-462.
43. Virginia State Legislation, House Bill 585/Senate Bill 274. <http://leg1.state.va.us/cgi-bin/legp504.exe?961+ful+HB585>, <http://leg1.state.va.us/cgi-bin/legp504.exe?961+ful+SB274>.
44. Virginia Department of Motor Vehicles Clean Special Fuel License Plate Data. June, 2011.
45. Virginia Department of Transportation, HOV and Hybrid Data Counts. 2004.
46. Virginia Department of Transportation, HOV and Hybrid Data Counts. 2005 and 2006.
47. High-Occupancy Vehicle Enforcement Task Force. *Report of the High-Occupancy Vehicle Enforcement Task Force*. Virginia Department of Transportation, Richmond, Virginia, August 15, 2003.
48. High Occupancy Vehicle Enforcement Task Force. *Report of the High-Occupancy Vehicle Enforcement Task Force*. Virginia Department of Transportation, Richmond, Virginia, January 4, 2005.
49. Virginia Department of Transportation, October 2010 Hybrid Counts, e-mail to author from Valerie Pardo, September 14, 2011.
50. Virginia Department of Transportation. *HOV Hybrid Exemption Certification Report*. June 2013.



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