Memorandum

TO: Jeff Weidner

FROM: Chris Porter, Anita Vandervalk, and Michael Williamson, Cambridge Systematics

DATE: October 21, 2002

RE: Analysis of the Impact of Inherently Low-Emission Vehicles (ILEVs) on I-95 High-Occupancy Vehicle (HOV) Lanes

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The Florida legislature has proposed legislation that would allow Inherently Low-Emission Vehicles (ILEVs) to use High-Occupancy Vehicle (HOV) lanes. This memo provides background information on similar provisions implemented in other states and discusses the potential impact of such legislation on traffic flow in HOV lanes in South Florida. The findings in this memorandum are based on a review of legislation passed in other states allowing ILEVs to use HOV lanes; outreach to identify studies of the impacts of this legislation; a review of federal vehicle definitions and certifications related to ILEVs and other low-emission vehicles; a review of current data and market trends on sales of ILEVs in Florida and nationwide; and a review of California emission regulations and how they might affect sales of ILEVs across the nation in the future.

The remainder of this memorandum addresses, in greater detail, the following questions:

- What is the definition of an ILEV?
- What vehicles meet (or may meet) this definition?
- What is the experience of other states allowing ILEVs to use HOV lanes?
- How many ILEVs are currently on the road in Florida?
- What percentage of the Florida vehicle fleet could be ILEVs in the future?
- What are the potential impacts on the HOV lanes?
- What conclusions can be drawn from these findings?
- What policy options are available?

What Is the Definition of an ILEV?

The term "Inherently Low-Emission Vehicle" was defined under the Clean Air Act Amendments of 1990 as a vehicle meeting specific Low-Emission Vehicle (LEV) exhaust emission standards

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and also having *very low levels of evaporative emissions*.[1] (See Attachment A for the specific wording and standards used in the definition.) This definition was intended to limit the definition of ILEVs only to alternative-fuel vehicles (AFVs), including battery-electric vehicles as well as vehicles powered by compressed natural gas (CNG) and liquid propane gas (LPG).[2]

Section 1209 of the 1998 Transportation Equity Act for the 21st Century (TEA-21) outlines the federal regulations for ILEVs to be allowed on HOV lanes. The regulations allow states to permit a vehicle with fewer than two occupants to operate in HOV lanes if the vehicle is certified as an ILEV, and also allow states to revoke this privilege. The "Federal-Aid Highway Program Guidance on High-Occupancy Vehicle (HOV) Lanes[3]" states that the use of HOV lanes by ILEVs is not intended to cause congestion. Guidance on labeling of ILEVs is also specified. The EPA, the only entity with the authority to certify ILEVs, identifies ILEVs in its annual emission certification tests.

Which Vehicles Meet ILEV Standards?

Because of advances in emission control regulations and technology, many light-duty vehicles sold today meet or exceed the EPA exhaust emission standards required to qualify as an ILEV. To date, however, no vehicle powered by gasoline has been able to meet the evaporative standard, and therefore *no gasoline-powered vehicles have qualified as ILEVs*. This includes the new Honda Insight and Toyota Prius hybrids as well as flexible-fuel vehicles (FFVs) that use gasoline/ethanol or gasoline/methanol blends. Therefore, the only ILEVs on the road today are a small number of CNG vehicles and battery-electric zero-emission vehicles (ZEVs).[4] In model year 2002, only four manufacturer-produced vehicle models – all CNG vehicles – were certified by the EPA as ILEVs.[5] Examples of full-function electric vehicles planned for sale in 2003 that would qualify as ILEVs (by virtue of being ZEVs) include the Nissan Altra-EV, the Solectria Citivan, and the Toyota RAV4-EV. Neighborhood electric vehicles, such as the Ford Th!nk, also should qualify as ILEVs but cannot travel at highway speeds.

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[1] 40 CFR88.311-93, Internet: http://www.access.gpo.gov/nara/cfr/waisidx_01/40cfr88_01.html

[2] It should be noted that while the definition of ILEV as established under the Clean Air Act Amendments still stands, EPA rarely uses the term "ILEV" in its programs or regulations. While the standard was meant to encourage alternative-fuel vehicles, the range of alternative fuels that qualify is quite limited. EPA feels that the definition is somewhat outdated and has not been effective at achieving its intended purpose of introducing AFVs on a more widespread basis.

[3] http://www.fhwa.dot.gov/operations/hovguide01.htm

[4] Hydrogen fuel cell vehicles would also meet the ZEV standard. However, these vehicles are unlikely to be ready for mass production until at least 2015 and possibly much later.

[5] See the Certified Vehicle Test Report Data available at http://www.epa.gov/otaq/crttst.htm. In 2002, these vehicles included CNG versions of the Dodge Ram Wagon, the Ford E350, the Ford Crown Victoria, and the Honda Civic GX.

In the future, it may be possible that gasoline-powered vehicles will meet the ILEV standard as defined under the 1990 Clean Air Act Amendments. Starting in 2004, California will require that vehicles increasingly be certified to a "zero-evaporative" emissions standard.[6] The percentage of vehicles meeting this standard will vary depending upon how manufacturers choose to meet the California LEV program requirements. It is likely that by 2010, however, so-called "zero-evaporative" emission vehicles will make up a significant percentage of new vehicle sales (50 percent or more) and an increasing percentage of the on-road light-duty vehicle fleet in California and other states with the California standards. Manufacturers are already developing gasoline-powered vehicles that can meet the zero-evaporative standard as defined by the state of California, and the Nissan Sentra CA is the first such vehicle to be certified to this standard. However, it is not clear whether gasoline-powered vehicles meeting the California zero-evaporative standard will be certified by EPA to the federal ILEV standard (the 1990 Clean Air Act Amendment definition seems ambiguous, and EPA has not made a decision on this issue).

What Is the Experience of Other States Allowing ILEVs to Use HOV Lanes?

Legislation was identified in seven states allowing ILEVs or other low-emission vehicles to use HOV lanes. These states include Arizona, California, Colorado, Georgia, Hawaii, Virginia, and Utah. Attachment B summarizes the findings from this review and identifies the date the legislation was passed, vehicles covered, time period covered, means of enforcement, and number of eligible vehicles (if known). While in some states the legislation specifically refers to the federal definition of ILEV to define eligible vehicles, in other states, only subsets of this definition (such as electric vehicles in Hawaii or AFVs in Arizona and Georgia) are allowed. California's legislation allows some gasoline-powered low-emission vehicles to use HOV lanes. The California legislation applies to ULEVs through 2003, then transitions to SULEVs (Super-Ultra-Low-Emission Vehicles) in 2004 to 2007 (see Attachment A for a definition of ULEV and SULEV). The objective of this approach is to provide a short-term incentive for purchasing the cleanest vehicles, while not overloading the HOV lanes with traffic once these vehicles become common.

Enforcement and Fees

In general, enforcement is through the use of stickers or special license plates issued by the state department of motor vehicles. The fees for these special designators vary from state to state. In

[6] Under the Clean Air Act Amendments, California is allowed to establish emission standards that are more stringent than the Federal standards established by EPA. Other states are allowed to adopt standards identical to the California standards, but cannot set their own alternative standards. California has adopted its own standards since 1994 and three northeast states – Massachusetts, Vermont, and New York – also have adopted the California standards. Other states have considered but not adopted the California program.

some states, legislation includes waiving licensing or registration fees to help promote ILEVs. Often, the legislation also grants free parking at meters or in carpool parking stalls. Some states require the department of transportation (DOT) to post signs indicating the right of these vehicles to use the HOV lanes.

HOV Lanes as an Incentive for AFV Purchase

Allowing single-driver AFVs onto HOV lanes appears to be one of the major incentives for AFV purchase. (The studies reported here focus on AFVs rather than ILEVs, but since all ILEVs to-date have been AFVs, the study results are directly relevant to this discussion.) One study, conducted by the California Energy Commission,[7] surveyed 18 CNG vehicle owners, of which 14 replied that "HOV lane access was the motivating factor in the purchase decision … [and] if HOV lane access were not available, most would not have purchased a CNG vehicle" while "tax incentives did not have much of an impact." In a second case, the U.S. General Services Administration (GSA) found that of the several hundred people interested in purchasing used AFVs from them, 75 percent were "individual consumers encouraged by local alternative fuel incentives and high-occupancy vehicle lane privileges.[8]" The National Renewable Energy Lab reports that "most individuals who purchase AFVs in Los Angeles are motivated by the time savings of HOV access." NREL reported savings of at least 15 minutes a day in Los Angeles, and more than an hour for some commuters in Virginia. HOV lane privileges also have helped maintain resale value for AFVs, along with free parking in downtown Los Angeles and rebates on used vehicle purchase.[9]

HOV incentives have helped induce at least one rental car agency to offer AFVs. Budget EV Rental Cars, a joint effort between EV Rental Cars and Budget Rent a Car, rents hybrid, natural gas, and electric vehicles. Operating in Arizona, California, Washington D.C., and Pennsylvania, the eligible cars in their fleet sport the decals or special license plates required for single passengers to take advantage of these laws.[10]

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[7] Abbanat, Brian, California Energy Commission, *Presentation: Household Ownership of CNG Vehicles in California*, June 12, 2001. http://www.consumerenergycenter.org/vehicles/compare/pdf/cs_briansurvey.pdf

[8] U.S. DOE, *The AFV Resale Market*, Alternative Fuel News, Volume 4, No. 4, February 2001, page 4. http://www.afdc.doe.gov/pdfs/afn4-4_pt1.pdf

[9] Dorfman & O'Neal, Inc. *Successes and Challenges in the Resale of Alternative Fuel Vehicles, July 2001 – March 2002*, National Renewable Energy Laboratory, NREL/SR-540-31990, May 2002. http://www.afdc.doe.gov/pdfs/usedafv.pdf

[10] Telephone conversation with EV Rental Car employee, August 2002.

Number of ILEVs and HOV Lane Usage

Despite the finding that many of those purchasing AFVs did so at least in part because of HOV lane incentives, AFVs still make up a very small proportion of the United States passenger vehicle fleet, 0.21 percent in 2000. (Again, data are only available in terms of AFVs, not ILEVs, but the number of AFVs reported here can be considered to be the same as the number of ILEVs.) Table 1 shows the number of AFVs in various states compared to the total number of total vehicles registered in these states, including both passenger and commercial vehicles. The small market penetration of AFVs is likely due to a combination of factors, including lack of refueling infrastructure, the additional cost of an AFV, performance limitations, and shortage of AFV supply from manufacturers. In California, for example, the demand for AFVs is larger than the number of vehicles the manufacturers are making available.[11] Even in California, the natural gas and electricity refueling infrastructure is still quite limited, although this may change in the future as the industry struggles to meet state requirements to produce more zero-emission vehicles.

Table 1. Alternative-Fuel Vehicles Versus Total Vehicle Registrations, 2000[a]

State	Estimated Number of AFVs[b] (2000)	Number of Registered Vehicles[c] (2000)	Percentage of Registered Vehicle Fleet
Arizona	10,364	3,794,538	0.27%
California	67,556	27,697,923	0.24%
Colorado	11,435	3,626,012	0.32%
Florida	**13,351**	**11,781,010**	**0.11%**
Georgia	14,309	7,155,006	0.20%
Hawaii	1,182	737,551	0.16%
Utah	6,012	1,627,606	0.37%
Virginia	6,908	6,046,127	0.11%
Total in United States	**455,906**	**221,475,173**	**0.21%**

[a] The AFV data in this table do not include flexible-fuel vehicles, and therefore represent an estimate of the number of ILEVs registered.

[b] Energy Information Administration, http://www.eia.doe.gov/cneaf/alternate/page/datatables/table3.html.

[c] FHWA Highway Statistics, http://www.fhwa.dot.gov/ohim/hs00/index.htm. Includes all vehicles (automobiles, buses, and trucks).

[11] Personal communication with Jeff Weir of the California Air Resources Board, Air Quality and Transportation Planning department, August 2002.

Most states emphasize that their HOV lanes are currently uncongested and underutilized. For example, in California, the Legislative Analyst's Office determined that approximately 24 percent of the state HOV lane segments fail minimum vehicle throughput criteria with only two-thirds of HOV lanes' total capacity is used. The throughput criteria for HOV lanes in California is 800 vehicles per hour, and the average throughput in HOV lanes is 1,095 vehicles per hour.[12] Even though the average suggests that many segments are being effectively utilized, the fact that average utilization is much less than the capacity of a freeway lane ensures that the incentive to carpool or buy an ILEV remains. It also suggests that allowing ILEVs into HOV lanes could improve overall freeway performance and throughput, as long as the number of ILEVs on the road is not so great that it degrades HOV lane performance.

To date, no studies looking specifically at the traffic impacts of allowing ILEVs in HOV lanes could be identified in any states, probably because of the small number of ILEVs on the road so far.

The sources of legislation for each state can be found at the Internet sites shown in Table 2.

Table 2. Internet Sites Providing State Legislation

State	Legislation Source
Arizona	SB1429 as amended: http://www.azleg.state.az.us/legtext/45leg/1r/adopted/h.1429-trans.doc.htm
California	AB71: http://www.kirschfoundation.org/done/documents/ab_71.pdf
Colorado	Chapter 288, Section 42-4-1012 (HOV lanes): http://www.state.co.us/gov_dir/leg_dir/olls/sl1998/sl.288.htm
Georgia	SB 116 (designated travel lanes for certified vehicles): http://www2.state.ga.us/legis/1997_98/leg/fulltext/sb116.htm
Hawaii	SB1160 (free meter parking, use of HOV lanes, free vehicle registration): http://www.state.hi.us/dbedt/ert/ev-act.html SB3121 (Alternative Fueled Vehicles) DID NOT PASS: http://www.capitol.hawaii.gov/session2000/Bills/SB3121_.htm
Utah	Not Available
Virginia	Section 33.1-46.2 (HOV): http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+33.1-46.2 Section 46.2-749.3 (Special license plates for clean special fuel vehicles): http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+46.2-749.3

[12] California Legislative Analyst Office. *HOV Lanes in California: Are They Achieving Their Goals?* January 7, 2000. http://www.lao.ca.gov/010700_hov/010700_hov_lanes.pdf

How Many ILEVs Are Currently on the Road in Florida?

Once again, data are only available in terms of AFVs, not ILEVs, but the number of AFVs reported below can be considered to be the same as the number of ILEVs. Therefore, the discussion of AFVs below would also apply to ILEVs. According to the U.S. Department of Energy (DOE), there were 11,762 AFVs in use in Florida in 1999, increasing to 13,351 in 2000, an estimated 14,307 in 2001, and a forecast 15,163 in 2002. The breakdown of vehicles by fuel type in 2000 (the most recent year for which this breakdown is available) is shown in Table 3. These include both passenger and commercial vehicles. In 2000, AFVs in Florida made up about 0.11 percent of the total vehicle fleet in the State (Table 1). The year 2002 projected figure would bring this total to roughly 0.13 percent.

Table 3. Alternative-Fuel Vehicles in Florida by Fuel Type, 2000

Fuel Type	Number of Vehicles
Liquid Propane Gas (LPG)	8,501
Natural Gas (CNG & LNG)	3,198
Methanol	11
Ethanol	1,007
Electricity	634
Total	**13,351**

Source: U.S. Department of Energy Alternative Fuels Data Center, http://www.afdc.doe.gov/afvehicles.html.

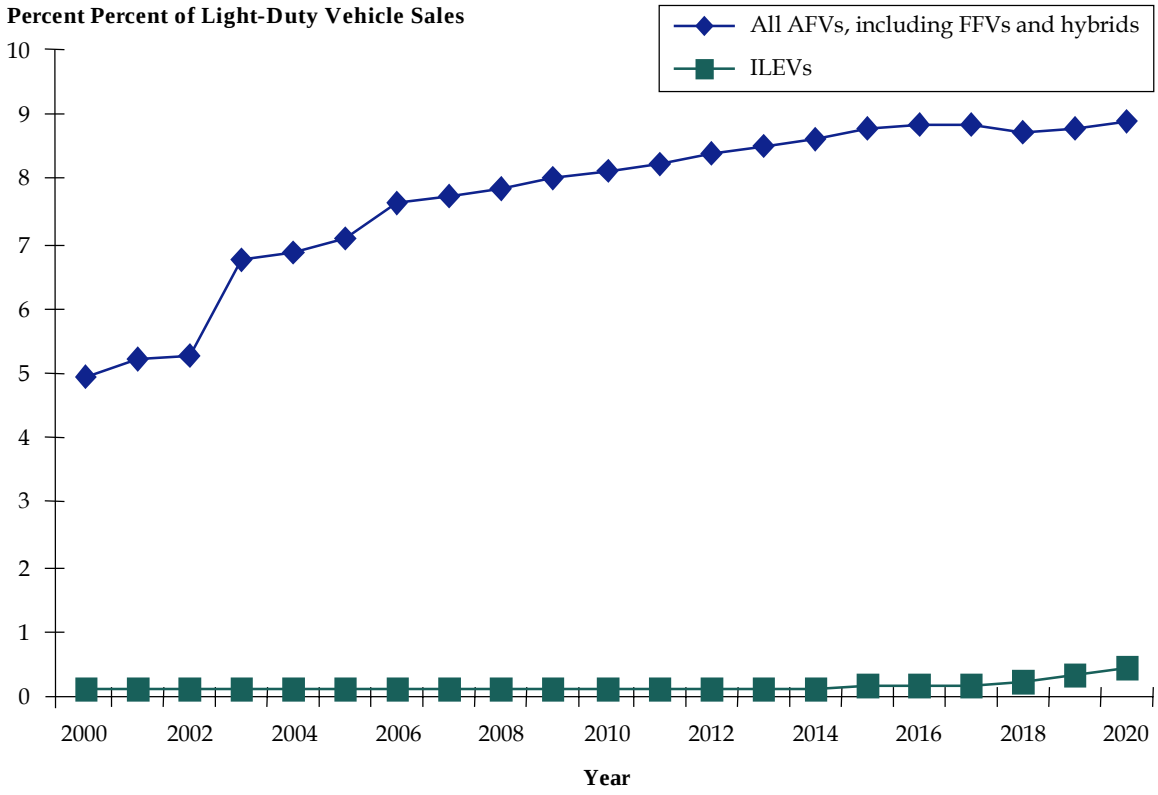
In the United States as a whole, private vehicles make up about 70 percent of the total AFV fleet. The remainder is comprised of federal, state, and local government-purchased vehicles.[13] Similar statistics are not available specifically for Florida. According to the Florida Department of Environmental Protection, however, many of the AFV sales in Florida are through government fleet purchases, especially through the Gold Coast Clean Cities Coalition.

Forecasts of vehicle sales by fuel type could not be identified specifically for Florida. However, the DOE annually publishes these forecasts by region of the country. While there are considerable uncertainties associated with these forecasts, they nevertheless represent the best available information about potential future sales, considering technology and market trends.

[13] Oak Ridge National Laboratory: Transportation Energy Data Book, Edition 21, Table 9.2. Internet: http://www-cta.ornl.gov/data/Chapter9.html

Figure 1 shows sales projections for the South Atlantic region, which includes Delaware, the District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia. In the year 2000, AFVs and FFVs made up 4.9 percent of all light-duty vehicle sales (including cars and light-duty trucks) in this region. However, the vast majority of these vehicles were ethanol and CNG flexible-fuel vehicles, which do not meet ILEV standards. Vehicles meeting ILEV standards made up only 0.11 of light-duty vehicle sales in this year. The DOE projects combined AFV and FFV sales to increase to 8.1 percent of the vehicle fleet by 2010 and 8.9 percent by 2020. This mix includes primarily ethanol flexible-fuel vehicles but also a growing number of gasoline-electric hybrids. These forecasts show the number of true ILEVs remaining at less than 0.5 percent of new vehicle sales, even through the year 2020.

Figure 1. Projected Alternative Fuel Vehicle and ILEV Sales in the South Atlantic States



Source: U.S. Department of Energy, Energy Information Administration. Annual Energy Outlook 2002, Supplemental Table 40 (December 2001).

Internet: http://www.eia.doe.gov/oiaf/aeo/supplement/suptab_40.htm. The ILEV projections include CNG, LPG, ZEV, and other dedicated alternative-fuel vehicles, but not gasoline vehicles certified to "zero-evaporative" California standards.

What Percentage of the Florida Vehicle Fleet Could Be ILEVs in the Future?

Florida has not adopted the California LEV emission regulations, and therefore does not have regulations in place that will require the sales of ZEVs, AFVs, or zero-evaporative-emission vehicles. However, even without such regulations, it is likely that some such vehicles will continue to appear in the Florida vehicle fleet for four reasons:

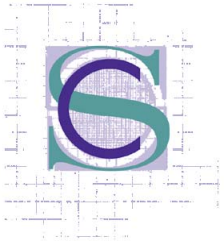
- "**Spillover**" from states with California standards, which currently include California, Massachusetts, New York, and Vermont. Some manufacturers are certifying "50-state" vehicles that meet California standards but are sold in every state (such as the Mitsubishi Eclipse and the Toyota Corolla). They will do this when the incremental cost of meeting California standards is low enough that it makes sense to produce one type of vehicle rather than two. While this is not likely to be the case immediately for zero-evaporative vehicles, after a few years of production costs could be low enough that manufacturers would start selling zero-evaporative vehicles in other states. Furthermore, it is conceivable that the existence of HOV lane privileges in Florida could provide a sufficient incentive for manufacturers to sell California-certified zero-evaporative vehicles in Florida, beginning as early as 2004, even if the cost of producing these vehicles is greater than for vehicles not certified to the standard.

- **Migration**, as people who bought ILEV vehicles in other states move to Florida and bring their vehicle with them. This could include temporary (seasonal) migration as well as permanent migration. Whether temporarily migrating ILEVs are allowed to use HOV lanes would depend on how the ILEV decal program is administered.

- **Fleet Sales** – Some alternative fuel vehicles have been purchased for public or private agency fleets. For example, the Florida Gold Coast Clean Cities Coalition (which primarily includes municipalities and utilities in Broward, Palm Beach, Martin, and Miami-Dade Counties) reports the following number of AFVs operated by its members in 2001: 855 CNG, 387 propane, 141 electric, and 1,247 ethanol. Programs to encourage more widespread fleet purchase of alternative-fuel vehicles, however, have not been very successful. Efforts to establish a broad-based refueling infrastructure necessary to support general purchase of alternative fuel vehicles also have not yet taken hold.

- **Niche markets**, for example, for electric vehicles (EVs) purchased by environmentally minded consumers. The primary niche market for EVs to date appears to be for local (neighborhood) use. So-called "neighborhood EVs" have limited speed and range and are unlikely to be used in freeway settings (and therefore to use HOV lanes). The cost and performance characteristics of full-function EVs is likely to remain a barrier to widespread sales of these vehicles, at least in the next 10 to 15 years.

The first and second factors – spillover and migration – could potentially have an impact on the Florida vehicle fleet beginning in 2004, but increasingly in the 2007 to 2010 and later timeframe, as greater penetration of zero-evaporative emission



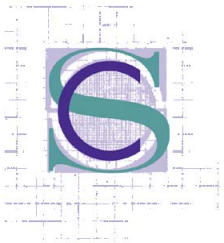
vehicles into the vehicle fleet is achieved. This may especially be true if the cost of producing a vehicle to California-certified zero-evaporative standards becomes small enough that it is attractive for manufacturers to sell these vehicles in Florida. Although the presence of zero-evaporative gasoline-powered vehicles in Florida has potential implications for HOV lane policy and performance, these vehicles will only be able to use HOV lanes if they are certified as ILEVs by the U.S. EPA, which has not yet been determined. In addition, Florida will have the option, as have other states, to limit its definition of allowable ILEVs to AFVs.

An "extreme" (but very unlikely) scenario would be that the percentage of zero-evaporative emission vehicles in Florida is as high as that in California or one of the northeast states that have adopted the California emissions control standards. Table 4 illustrates the percentage of 1) new light-duty vehicle sales and 2) total VMT that could be comprised of ILEVs under two hypothetical scenarios in California, assuming that zero-evaporative emissions gasoline-powered vehicles qualify as ILEVs. These "low" and "high" scenarios represent two different ways in which vehicle manufacturers could meet the California regulations. In these scenarios, ILEVs could make up between 9.3 and 19.5 percent of total statewide VMT in the year 2010. These scenarios are *not* meant to represent projections for Florida – but simply an aggressive forecast for Florida policy-makers to consider. The percentage of ILEVs that are either sold in Florida or migrate to the State will be much less than the percentages shown here without adoption of the California standards in Florida.

Table 4. Potential Market Penetration of ILEVs in a State with California Emissions Standards

	Percent of Light-Duty Vehicle Sales*		Percent of Total VMT (All Vehicle Classes)	
Year	Low	High	Low	High
2004	14%	17%	0.3%	0.4%
2005	20%	27%	1.7%	2.1%
2006	28%	42%	3.5%	4.7%
2007	25%	47%	5.7%	8.2%
2008	16%	50%	7.3%	11.9%
2009	18%	56%	8.3%	15.6%
2010	19%	59%	9.3%	19.5%
2011	20%	62%	10.3%	23.3%
2012	22%	68%	11.2%	27.2%
2013	22%	68%	12.2%	30.9%
2014	22%	68%	13.0%	34.3%
2015	26%	74%	13.8%	37.5%
2016	26%	74%	14.7%	40.6%
2017	26%	74%	15.4%	43.3%
2018	29%	80%	16.1%	45.7%
2019	29%	80%	16.9%	48.1%
2020	29%	80%	17.7%	50.1%

* Includes EPA classes LDV (passenger cars) and LDT1 (trucks with gross vehicle weight rating less than 3,750 pounds).



In our judgment, it is likely that the last two factors (fleet sales and niche markets) will have only a very small impact on the use of ILEVs in HOV lanes. The number of ZEV and alternative fuel vehicles sold in Florida in the near future (through at least 2010) will continue to be small, less than one or two percent of the vehicle fleet. ZEV technology is not close to broad-scale marketability, and is unlikely to be (with either battery-electric or hydrogen fuel cell technology) until at least 2015 or 2020. Alternative fuel vehicles do not appear to be gaining widespread acceptance, due in large part to the difficulty of implementing the necessary refueling infrastructure as well as the lack of an overriding motivation for the typical consumer to purchase an AFV. Furthermore, because of advances in gasoline-engine emissions control technology, there is no longer an incentive to produce CNG, LPG, or even flexible-fuel vehicles to meet emissions standards because the emissions performance of gasoline vehicles can now meet or exceed that of AFVs.

What Are the Potential Impacts on the HOV Lanes?

As stated in the analysis above, as of year 2000, AFVs make up approximately 0.11 percent of the total vehicle fleet in the State. If we assume that this percentage applies to vehicle composition on I-95 in Fort Lauderdale in the same year, the effect is negligible. For example, the 2000 I-95 HOV Lane monitoring report states that the a.m. peak total volume in the northbound direction south of Broward Boulevard in Broward County is 10,568. If AFVs are assumed to make up 0.11 percent of the entire volume, only 11 vehicles would qualify to travel in the HOV lane during the a.m. peak period. During that same time period, direction, and location, the HOV lane carried 1,194 vehicles.

Although this analysis is based on many assumptions due to market uncertainty and available data, it is a good indicator of the potential impact of ILEV legislation at this time. Florida also has the option of refining the definition of ILEVs within its borders and HOV lane programs.

Technical Findings

The results of this research provide the following technical findings on the impacts of ILEVs on HOV lane performance:

- **ILEVs currently make up a very small proportion of the vehicle fleet in Florida and therefore would not impact HOV lane performance.** Under existing regulations and technology, the only vehicles meeting the ILEV criteria are dedicated alternative-fuel vehicles (AFVs) including natural gas, propane, battery-electric, and other vehicles with "near-zero" emissions from fuel evaporation. The current number of ILEVs is very low (estimated at 0.13 percent of the Florida vehicle fleet). Therefore, allowing these vehicles to use HOV lanes would have a negligible impact on HOV lane operations in South Florida.

- **In other states, legislation allowing ILEVs to use HOV lanes has provided an incentive for AFV purchase, but not enough to affect HOV lane performance.** At least seven other states have passed legislation allowing ILEVs or other low-emission vehicles to use HOV lanes. While studies have shown that the ability to use HOV lanes represents an incentive for AFV purchase, the number of ILEVs sold to-date in these states is quite small, much less than one percent of new-vehicle sales. None of these states reported having conducted a study of the current or projected impacts of their rule on HOV lane performance, but the impact is assumed to be negligible because of the small number of vehicles on the road. In addition, in some of the states that have passed this legislation, HOV lane capacity is still not being effectively used along all segments.

- **If ILEVs continue to be defined only as dedicated AFVs, their numbers are not likely to increase significantly.** AFV sales have been increasing slowly, and DOE forecasts project that AFVs will continue to make up only a small portion of the national vehicle fleet in the foreseeable future (through 2020). Barriers to the widespread adoption of AFVs include lack of refueling infrastructure, added cost, and performance limitations. Also, gasoline engine technology has improved to the point where AFVs provide only small additional emissions benefits.

- **California emissions regulations could have a significant impact on ILEV sales in the future.** So-called "zero-evaporative" emissions regulations to be implemented in California and some of the northeast states starting in 2004 may lead to the development of gasoline-powered vehicles that meet the ILEV standard. Such vehicles may make up a substantial fraction of both vehicle sales and on-road VMT in these states, especially in the 2007-2010 and later timeframe as sales of these vehicles increase. It is likely that some of these vehicles will begin to appear in Florida, as a result of two separate effects: 1) "migration" from other states and 2) manufacturers selling vehicles in all 50 states that meet the California standards. It is currently uncertain whether EPA will certify gasoline-powered vehicles meeting the California zero-evaporative standards as ILEVs, or whether the incremental cost of this technology will be low enough that these vehicles will be sold in Florida. Nevertheless, it is possible that gasoline-powered ILEVs could begin to appear in Florida as early as 2004. **HOV lane incentives could help encourage the sales of these vehicles in the short term, providing air quality benefits to the State, but in the long run may need to be reconsidered to avoid unduly affecting HOV lane performance.** Whether the California emissions regulations impact HOV lane performance in Florida may ultimately depend upon a policy decision by the state of Florida on which vehicles are allowed to use HOV lanes.

- **Electric vehicles – an emerging type of ILEV – are not likely to impact HOV lane performance in the near future.** Most electric vehicles being sold are designed for low-speed, neighborhood use and are not "full-function" vehicles. Because of costs and performance limitations, full-function electric vehicles are not likely to gain broad market acceptance within the next 10 to 15 years.

Policy Options

The following lists some issues associated with policy options from both a lane usage and AFV incentive standpoint. Three options are then proposed to be considered by the Department in terms of the potential for ILEV legislation in the State.

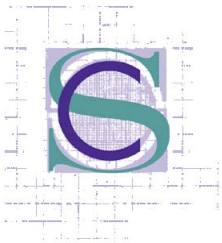
- **Lane Utilization –** Allowing ILEVs to use HOV lanes can help to improve lane utilization. However, the benefit in the short term will be very small because of the small number of ILEVs on the road. Expanding the vehicles covered to include certain types of low-emission vehicles (such as hybrid-electrics and California-certified ULEVs and/or SULEVs) could further improve lane utilization while providing an incentive for improved air quality, as long as the number of vehicles allowed is not too large and time limits are established.

- **Expanding beyond the ILEV Category –** Because of this limited market potential for true AFV ILEVs, the State may wish to consider whether they want to use HOV lane incentives to encourage the purchase of other types of low-emission vehicles, such as gasoline-electric hybrids or California-certified SULEVs. However, if this approach is taken, time limits should be included and sales carefully monitored to ensure that sales of these vehicles do not unduly impact HOV lane performance.

- **Impact of California Standards –** The emergence of "zero-evaporative" gasoline-powered vehicles in California should be monitored to determine whether these vehicles qualify as ILEVs. If they do qualify, the way in which other states are addressing this through legislation, as well as the potential for these vehicles to be sold in Florida, should be monitored. The existence of HOV-lane privileges could potentially encourage the sales of these vehicles in Florida, once they begin to be introduced in California and other states starting in 2004. Some states have restricted the types of vehicles allowed in HOV lanes to specific types (including electric vehicles or AFVs only); Florida should consider this option as it works to develop its policy on ILEVs, especially if it looks like gasoline-powered ILEVs will become commonplace.

- **Incentives for AFV Purchase –** Allowing ILEVs in HOV lanes is an important incentive for AFV purchase, but appears to be insufficient by itself to lead to broad market acceptance of AFVs. Other incentives also play an important role, including the development of refueling infrastructure for CNG or electric vehicles as well as financial incentives to bridge the gap between gasoline and electric vehicle costs. Regardless, experience in other states suggests that dedicated AFVs may have very limited potential for market acceptance in the near future, making their impact on HOV lane performance negligible.

Based on the analysis, technical findings, and policy issues, three policy options have been developed for consideration by the Department. These options provide three separate directions for the Department to go in developing its ILEV/HOV lane policies.



1. **Discourage the passage of any legislation which would allow ILEVs (or other categories of AFVs) to operate in the HOV lanes.** There is not sufficient justification to take such a strong position on the proposed legislation. Analysis of current conditions shows negligible impact on the operation of HOV lanes.

2. **Recommend passage of legislation but with caveats**. If ILEV legislation were to pass, the Department should propose that sales of ILEVs and the impact of California standards be carefully monitored and time limits (or sunset clauses) be instituted in the language of the bill to ensure that when vehicle sales or the number of ILEV vehicles operating in the lanes exceed certain limits, ILEVs will no longer be allowed to operate in the HOV lanes. Further analysis would be necessary to determine the limits, as well as an ongoing monitoring program to ensure maximum use of available HOV lane capacity.

3. **Recommend changes to legislation to include other categories beyond ILEV but also with caveats**. Expanding beyond ILEVs will help to encourage the purchase of other types of low-emission vehicles while also encouraging maximum use of HOV lanes. Sunset clauses implemented at appropriate times will ensure that HOV lane performance is not negatively affected.

We believe that the data do not support the restrictive approach defined by option 1. The primary distinction between options 2 and 3 is whether or not this legislation should be used to address air quality issues in the short term by attempting to stimulate immediate investment in low-emission vehicles. Either way, the development of the Department's policy should recognize the need for ongoing monitoring of this market and should provide the ability for ongoing adjustments to the policy to ensure that the initial goal of the HOV lanes (increasing person throughput on fixed highway capacity) is preserved.

Attachment A

Definitions

Definitions

Program Definitions

Federal Tier 1 and Tier 2 Programs – A set of emission reduction regulations, including vehicle emission standards, established by the U.S. EPA under the 1990 Clean Air Act Amendments. "Tier 1" vehicle emission standards were phased in beginning in 1994. Over the 2004-2007 period, more stringent "Tier 2" standards will replace Tier 1 standards.

National LEV Program – A program established by voluntary agreement among EPA, states, and automobile manufacturers to introduce cleaner vehicles in states other than California, in advance of implementing more stringent Tier 2 standards. The National LEV program includes vehicles certified to federal LEV and ULEV standards (see Table A.1).

California Low-Emission Vehicle (LEV) Program – A set of regulations established by the California Air Resources Board (CARB) that sets emissions standards for vehicles sold in California that are different than standards established by the U.S. EPA (and in most cases, more stringent). The original, "LEV I" program is in effect for the period 1994 through 2003. The standards become progressively more stringent over time. The LEV I program includes California-certified LEV, ULEV, and ZEV vehicles (see Table A.1).

California Low-Emission Vehicle-II (LEV-II) Program – A continuation of the original LEV program, the LEV-II program includes more stringent standards that take effect starting in 2004. The standards become progressively more stringent over time. The LEV-II program includes California-certified LEV, ULEV, SULEV, PZEV, and ZEV vehicles (see Table A.1).

California Zero Emission Vehicle (ZEV) Program – One component of the California LEV program. Beginning in 2004, this program requires that a certain percentage of a manufacturer's vehicle sales be zero-emission vehicles or other advanced technology vehicles that can obtain ZEV credits. (A small number of ZEV sales are required prior to 2004 as well.)

Vehicle Type Definitions

Low-Emission Vehicle (LEV) – A specific category of vehicle emission standard, established by the U.S. EPA and also by the state of California (the federal and California LEV standards differ). Also, a generic term for any vehicle that is certified to a standard at least as stringent as the specific LEV standard.

Ultra-Low-Emission Vehicle (ULEV) – A specific category of vehicle emission standard, established by the U.S. EPA and also by the state of California (the federal and California ULEV standards differ), that is more stringent than the LEV standard.

Super-Ultra-Low-Emission Vehicle (SULEV) – A specific category of vehicle emission standard under California's LEV program that is more stringent than the ULEV standard.

Partial Zero Emission Vehicle (PZEV) – A specific category of vehicle emission standard under California's LEV program. A PZEV meets SULEV exhaust (tailpipe) emissions, is certified to the "zero-evaporative" standard, and has extended (150,000-mile versus 120,000-mile) durability requirements compared to SULEVs.

Zero Emission Vehicle (ZEV) – A vehicle that produces zero exhaust emissions of any criteria pollutant or precursor.

"Zero evaporative" emission standard – As defined under the California LEV II program, vehicles demonstrating compliance with this standard shall demonstrate zero (0.0) fuel evaporative emissions during the three-day and two-day diurnal-plus-hot-soak tests. A small amount of non-fuel evaporative emissions are allowed to account for paints, upholstery, tires, and other vehicle sources.

Inherently Low-Emission Vehicle (ILEV) – A vehicle meeting specific evaporative and exhaust emissions standards which are intended to limit these vehicles to low-emission alternative-fuel vehicles. As defined under the 1990 Clean Air Act Amendments (40 CFR 88.311-93), an ILEV shall meet the following criteria: 1) fuel vapor emissions which are five or less total grams per test as measured by the current Federal Test Procedure (FTP), with all auxiliary emission control devices related to control of evaporative emissions disabled; and, 2) federal LEV exhaust standards for NMOG, CO, HCHO, and PM and federal ULEV exhaust standards for NOx (for light-duty cars and trucks; other exhaust standards apply for heavy-duty ILEVs). In lieu of criteria (1), a vehicle with a closed or sealed fuel system may be certified at the administrator's option by engineering evaluation in lieu of testing. Such a vehicle will be certified as an ILEV "only if a leak in the fuel system would result in the vehicle becoming inoperative due to loss of fuel supply, or if half the fuel escapes within 24 hours."

Alternative Fuel Vehicle (AFV) – A vehicle that is powered by a fuel that is substantively other than gasoline (e.g., ethanol, methanol, natural gas, propane, electricity). While AFVs sometimes are defined to include "flexible fuel vehicles" (which can run on either gasoline or an alternative fuel), in this memo, only "true" alternative-fuel vehicles are considered as AFVs. Gasoline-electric hybrids also are not true AFVs. True AFVs, however, may include vehicles that run exclusively on fuel blends that are primarily an alternative fuel (e.g., 85 percent ethanol/15 percent gasoline). Currently, the only vehicles meeting ILEV standards are AFVs.

Flexible Fuel Vehicle (FFV) – A vehicle that can run on either gasoline or an alternative fuel such as a methanol or ethanol blend.

Table A.1 Summary of Federal and California Emission Standards for Light-Duty Vehicles

Vehicle Type	Federal Standard	California Standard
Tier 1 (1994-2006 model years)	• 0.250 g/mi NMOG • 0.400 g/mi NOx	• Not defined
Tier 2 (2004+ model years)	• Various levels (generally similar to CA LEV II standards)	• Not defined
LEV	• 0.075 g/mi NMOG • 0.200 g/mi NOx	• 0.075 g/mi NMOG • 0.200 g/mi NOx (LEV I) • 0.050 g/mi NOx (LEV II)
ULEV	• 0.040 g/mi NMOG • 0.200 g/mi NOx	• 0.040 g/mi NMOG • 0.200 g/mi NOx (LEV I) • 0.050 g/mi NOx (LEV II)
SULEV	• Not defined	• 0.010 g/mi NMOG • 0.020 g/mi NOx (LEV II only)
PZEV	• Not defined	• Same exhaust as SULEV • Near-zero evaporative emissions • 150,000-mile durability
ZEV	• Zero exhaust and fuel evaporative emissions under all possible operating modes and conditions	• Zero exhaust and fuel evaporative emissions under all possible operating modes and conditions
ILEV	• LEV exhaust standards for NMOG • ULEV exhaust standards for NOx • Near-zero evaporative emissions, even with emission controls disabled	• Not defined

Note: The standards cited are for light-duty vehicles (passenger cars) at 50,000 miles. Similar numerical standards exist for light-duty trucks. The California program also includes standards that must be met at 120,000 miles.

Attachment B

Summary of State Legislation Allowing ILEVs in HOV Lanes

Table B.1 Summary of State Legislation Allowing ILEVs in HOV Lanes

State	Law	Law Adopted	Law Effective	Law Expires	Vehicles Included	Enforcement	Fee	Number of Eligible Vehicles
California	Chapter 330, Statutes of 1999 (Assembly Bill 71)	7/1999	7/1/2000	2003	ILEVs & CA-ULEVs	Sticker/decal from DMV	$8	Estimated 2000 ILEVs in CA
			2004	12/31/07	ILEVs & CA-SULEVs only			
Georgia	SB 116	5/1/1997	7/1/1997		AFVs substantially (70%) not gasoline	License plate	$25, additional $50 for EV/hybrid owners	Minimum of 500 participating vehicles per year
Virginia	SB 720	1999	< 1996	7/1/2004	"Clean special fuel" vehicles/ hybrid fuel vehicles: propelled by energy source with lower emissions than gasoline	License plate	Free	
	Chapter 191, HB 585/SB 274	3/96		1999	Extends expiration date for vehicles with clean special fuel plates			
Colorado	Chapter 288, SB98-030	6/1/1998	9/1/1998		ILEVs	Sticker	Free	
Arizona	SB 1429	6/1/2001			hybrid electric vehicles which meet ULEV standards	License plate	$50 (EV's exempted from fee)	5,000-10,000 vehicles expected
	SB 1504	4/28/2000			AFVs (ILEVs under 26,000 pounds)			
	Chapter 6, SB 1002	7/1996	4/1/1997		AFVs			
Hawaii	SB 1160	6/21/1997	7/1/1997	6/30/2002	EVs	License plate	Registration fee waived	128 EV's in 1999
	SB 3121	did not pass	(2000)	(2005)	AFVs (does not include EVs)			
Utah	HB 289	3/20/2001	7/1/2001	12/31/2005	"Clean fuels special group"	License plate	License plate fee waived	
Florida	Proposed				ILEVs	Decal	<$5	