OLR RESEARCH REPORT

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OLR BACKGROUNDER: ALTERNATIVE FUEL VEHICLES

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SUMMARY

There has been interest in Connecticut and elsewhere regarding the use of alternative fuels such as electricity and natural gas to power vehicles. According to the U.S. Department of Energy's Alternative Fuel Data Center, there are currently 85 stations that provide alternative fuel in the state. These include 39 electric charging stations (one of which is powered by solar energy), 16 propane stations, and 14 compressed natural gas stations. A map of these facilities is available at www.afdc.energy.gov/afdc/locator/stations/state.

This backgrounder describes initiatives in Connecticut and other states to promote alternative fuel vehicles (AFVs) and discusses some of the policy issues surrounding these vehicles. Connecticut currently has a limited number of initiatives to promote AFVs. It has a grant program for producers of biodiesel (a mixture of vegetable oil and diesel fuel). The program is currently scheduled to end on January 31, 2012. There are also requirements for the use of AFVs in the state's fleet and grants for municipalities for AFVs. Prior law provided a number of tax incentives to promote AFVs. Specifically, the law provided a credit against corporate business taxes equal to 10% of the costs of alternative fuel stations and the added costs of electric and natural gas vehicles. Prior law exempted new electric and gas vehicles, the cost of converting gasoline vehicles to use these fuels, and the equipment used in fueling stations from the sales tax, which expired in 2008.

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Governor Rell's Executive Order No. 34 established the Electric Vehicles Infrastructure Council. The council set a goal of deploying 25,000 electric vehicles (EVs) in the state by 2020. It developed five additional strategic priorities and 30 specific action steps.

Most recently, PA 11-80 allows the state's Clean Energy Fund to:

1. support projects that seek to deploy AFVs and associated infrastructure and related storage, transmission, distribution, and manufacturing technologies or facilities; and

2. provide low-cost financing for these technologies.

ALTERNATIVE FUEL VEHICLE INITIATIVES IN CONNECTICUT

Current Incentives

The Department of Economic and Community Development provides grants to biodiesel producers (biodiesel is a mix of vegetable oil and diesel). A biodiesel producer is eligible for up to 60 monthly payments, up to a total grant per fiscal year equal to: $0.30 per gallon for the first five million gallons of biodiesel produced; $0.20 per gallon for the second five million gallons; and $0.10 per gallon for the third five million. Production above 15 million gallons per fiscal year is not eligible for the grants. This component of the program is scheduled to end on January 31, 2012. Further information about this program is available at http://energy.ccat.us/biodiesel_grant_pogram.

There are also several incentives currently in place for electric vehicles (EVs). They are exempt from the $10 Clean Air Act fee imposed when vehicles are registered and when the registration is renewed. They are also exempt from emissions testing and the associated $20 fee.

Prior Tax Incentives

Prior law provided a number of tax incentives to promote AFVs. With regard to electric and natural gas vehicles, the law provided a credit against corporate business taxes equal to 10% of costs associated with the vehicles. These were expenses for:

1. the added cost of buying a vehicle that is solely powered by electricity or natural gas over the manufacturer's suggested retail price for a comparable conventional vehicle,

2. equipment incorporated or used in a compressed natural gas filling station, and

3. equipment incorporated or used in converting vehicles to electricity or electricity and another fuel.

The law also provided a sales tax exemption for:

1. new vehicles powered exclusively by electricity or natural gas;

2. electric charging equipment and compressed natural gas filling station equipment, and

3. equipment to convert conventional vehicles to electricity or natural gas.

These incentives expired in 2008.

State and Municipal Vehicles

PA 07-242 required that, between January 1, 2008 and December 31, 2009, at least 50% of the purchased state vehicles be alternative-fueled, hybrid electric, or plug-in electric vehicles. This proportion increased to 100% starting January 1, 2010.

PA 07-4, June Special Session modified these requirements. It required, starting January 1, 2008, that:

1. at least half the cars and light-duty trucks the state purchases or leases be alternative-fueled, hybrid electric, or plug-in electric vehicles; and

2. all alternative-fueled vehicles purchased or leased meet the California Air Resources Board Low Emission Vehicle II Ultra Low Emission Vehicle standard.

The act requires all state cars and light duty trucks be alternative-fueled, hybrid electric, or plug in electric vehicles starting July 1, 2012. If the administrative services (DAS) commissioner determines that such vehicles are not available for purchase or lease, he must give his reasons in the annual reports the act requires.

Currently, the Connecticut Clean Fuel Program provides funding to municipalities and public agencies that purchase, operate, and maintain AFVs. These include vehicles that operate on compressed natural gas, propane, electric power, fuel cell, or hybrid electric power.
The program also makes funding available to municipalities and public agencies to buy diesel retrofit technologies, such as diesel particulate filters.

PA 11-80

Among other provisions, this act creates the Clean Energy Finance and Investment Authority to replace the board that develops the plan on how money in the Clean Energy Fund is spent. The act grants the authority a broad range of powers and duties. It also expands how the fund can be used. Among other things, it allows the fund to:

1. support projects that seek to deploy electric, electric hybrid, natural gas, or other AFVs and associated infrastructure and any related storage, transmission, distribution, or manufacturing technologies or facilities; and

2. provide low-cost financing for the above projects and clean energy technologies.

Electric Vehicle Council

Governor Rell's Executive Order No. 34 established the Electric Vehicles Infrastructure Council. The order required the council to:

1. strategize on preparing the state for the rapid and seamless integration of EVs into the market;

2. coordinate interagency decision-making on critical issues;

3. establish performance measures for meeting infrastructure funding, environmental and regulatory goals, and

4. align state goals with what is occurring on the national level for EVs.

The council included representatives of state agencies and other private and public organizations. It held a series of public meetings with agencies and stakeholders starting in December 2009 on the state's readiness to assimilate EVs as a clean-fuel option. In May 2010, the council co-hosted a forum that included six automakers, electric utilities, municipal officials, environmental organizations and other stakeholders.

The council set a goal of deploying 25,000 EVs in the state by 2020. It developed five additional strategic priorities:

1. gaining early access to the first wave of mass-produced EVs;

2. enacting legislation to provide consumers and businesses with tax incentives, grants, or other benefits to make EVs more price competitive with gasoline-powered vehicles;

3. supporting the development of an appropriately sized statewide EV charging infrastructure through partnerships with public and private entities;

4. developing a suitable framework for regulatory and energy policies to address time-of-use rates, pricing, and infrastructure options for consumers; and

5. working with neighboring states to develop a regional corridor of charging stations.

The council also recommended 30 specific action items. The council's final report is available at http://www.ct.gov/dpuc/lib/dpuc/ev/evfinal.pdf.

ALTERNATIVE FUEL VEHICLE INITIATIVES IN OTHER STATES

The Department of Energy's Alternative Fuels and Advanced Vehicles Data Center (AFDC), which maintains a database of state AFV initiatives, broadly categorizes them as either incentives or laws and regulations. Both types of initiatives ultimately aim to promote consumer use of AFVs and the development of the commercial infrastructure necessary to support them.

AFV incentives, such as grants, tax credits, and rebates typically offer some kind of financial discount for purchasing an AFV or investing in AFV infrastructure like refueling stations or equipment. Some states have also encouraged AFV use by loosening legal restrictions (like access to carpooling lanes) and requirements (like emissions inspections) for

AFV owners. Table 1 shows the various AFV incentives other states have implemented. The most common types of measure are tax incentives (137 specific incentives in 41 states), grants (100 measures in 33 states), and regulatory exemptions (100 measures in 43 states. Further details on each state's incentives can be found at the AFDC's website (http://www.afdc.energy.gov/afdc/).

Table 1: AFV Incentives in Other States

Type of Incentive	*Use*
Grants	• Purchasing AFVs • Alternative fuel use (subsidies for additional expenses) • Upgrading state and town vehicle fleets • Replacing or upgrading school bus fleets • Upgrading or converting private business fleets • Converting traditional vehicles to AFVs • Converting and retrofitting traditional vehicles to reduce emissions • Installing idle reduction equipment • Producing alternative fuels • Installing, converting, or upgrading infrastructure (i.e., fueling stations or alternative fuel storage facilities) • AFV research and development • Training on AFV mechanics, safety, maintenance, and infrastructure • Green business development • Business purchases of energy-efficient or pollution prevention equipment
Tax Incentives (credits or exemptions)	• AFV purchases • Converting traditional vehicles to AFVs • Alternative fuel use (credits or exemptions from sales, usage, fuel, excise, or income taxes) • Installing electric vehicle home charging equipment or other electric vehicle supply equipment • Traditional vehicle title taxes and fees • Purchasing emission reduction conversion or upgrade equipment • Using lower emission trucks • Investing in alternative fuel production facilities • Producing alternative fuels • Manufacturing AFVs • Alternative fuel retailing • Alternative fuel research and development expenses • AFV development facilities (property tax exemptions) • Creating jobs in AFV industries (wage and salary tax credits for alternative fuel producers and AFV manufacturers indexed to employees' wages)
Loans and Leases	• AFV purchases • Installing electric vehicle charging equipment at home • Upgrading or converting business fleets with low emission technology • Upgrading or converting school buses • Businesses installing pollution control and prevention technology • Building, converting, or upgrading AFV infrastructure • AFV research and development • Alternative fuel production facilities • Property used for AFV development and commercialization

Table 1: -Continued-

Type of Incentive	*Use*
Rebates	• Purchasing AFVs • Purchasing low emission vehicles • Purchasing or installing electric vehicle equipment for the home • Converting or upgrading school buses • Using alternative fuels in taxis • Purchasing alternative fuels • Supplying power to the grid from an AFV (i.e. two-way charging for electric vehicles) • Installing AFV infrastructure • Producing alternative fuels • Selling alternative fuels
Exemptions from legal restrictions	• HOV lane restrictions • Carpooling parking space restrictions • Commercial vehicle bans • State or municipal parking fees • Emission inspection and maintenance requirements • Pollution control equipment requirements • Weight limits (typically applies to trucks with emission reduction equipment) • Taxi cab use restrictions (typically allow AFV cabs to remain in service longer) • Preparing an environmental impact statement (alternative fuel production facilities)
Other	• State-provided marketing opportunities for businesses using AFV fleets • AFV utility rate reductions or time of use rates • Utility-subsidized AFV home refueling equipment installation • Utility-provided AFV infrastructure feasibility studies and technical assistance • Utility-provided infrastructure financing • AFV insurance discounts

In addition to offering financial incentives to encourage more AFV use, states have also enacted laws to mandate increases in AFV use, make AFV use more convenient, regulate AFV usage and standards, and plan for greater AFV usage in the future. Table 2 shows the various AFV laws and regulations enacted in other states. The most common type of measure is a mandate for fleet acquisition or fuel use (101 measures in 44 states).

Table 2: AFV Laws and Regulations in Other States

Type of Law	*Provisions*
Fleet Acquisition or Fuel Use	• State and municipal green and low emission fleet procurement policies • Green and low emission school bus requirements • State-wide or state agency-wide energy plans, including fleet fuel usage • State fleet fuel requirements (usually biodiesel related) • State fleet anti-idling policies
Driving or Idling	• Idling time limits for traditional vehicles (usually for heavy trucks) • School bus idling time policies and limits • Low emissions requirements • Allowing low speed AFV access to roadways with low speed limits • State approved driver education classes with segments on fuel efficient driving practices
Registration and Licensing Related to AFVs	• Lower licensing fees and taxes for AFVs • AFV registration, decals, license plates (which typically provide benefits like HOV access and sales tax exemptions at fueling stations) • Registration requirements and regulations for vehicles converted for alternative fuels use • Alternative fuel labeling requirements (i.e. ethanol and biodiesel percentages) • Alternative fuel wholesale and retailer distributer licensing requirements • Alternative fuel manufacturer and producer licensing requirements • Alternative fuel quality standards • AFV technician and mechanic licensing and requirements • Alternative fuel storage licensing and requirements
Fuel Taxes	• Alternative fuel taxes (often lower than traditional fuel tax) • Flat alternative fuel taxes paid at time of registering AFV • Alternative fuel tax system (alternative fuels often cannot be taxed in a traditional "per gallon" manner) • Restrictions on municipal taxes on alternative fuels
Alternative Fuel Standards and Mandates	• Ethanol and biodiesel blend requirements • Renewable fuel replacement sales and use goals • Electric vehicle charging standards • Renewable fuel storage standards • Electric vehicle public parking and charging requirements
Air Quality and Emissions	• Vehicle emissions standards • Emission testing and inspection requirements • Greenhouse gas labeling requirements • Emissions reduction conversion credits • School bus emission standards • Required emissions control equipment on heavy duty vehicles on state public works
Climate Change or Energy Initiatives	Statutory requirements for: • Strategic energy plans (typically include goals for alternative fuel vehicle use) • Participation in regional climate change initiatives (typically include goals for alternative fuel vehicle use) • Clean energy education and promotion • Alternative fuel production economic development plans • Alternative fuel infrastructure goals

Table 2: -Continued-

Type of Law	*Provisions*
Other	• Alternative fuel working groups, centers, institutes, and agencies to study, promote, and educate on alternative fuel issues • Infrastructure feasibility studies and planning • Maintenance of alternative fuel infrastructure resources (i.e., database of alternative fueling stations) • Required joint use of government owned alternative fuel infrastructure (open to vehicles from all levels of government) • AFV dealer requirements to publicize AFV purchasing and leasing programs and availability • AFV training programs in schools • Deregulation of natural gas for vehicle use • Exceptions for franchise owners to obtain alternative fuels from sources other than the franchise distributor • Allowing utility companies to operate fueling stations • Allowing public access to government alternative fueling facilities

POTENTIAL ISSUES

Impact on the Electric Utility System and Air Quality

By law, the electric companies must develop an integrated resources plan that identifies demand and supply options to meet future electric needs (e.g., conservation programs and distributed generation, respectively). The 2010 plan addressed the potential impact of EVs on the state's electric system, exploring several scenarios for their deployment in New England. The plan found that the most aggressive deployment of EVs would increase peak demand by 3.5% by 2020 if all EVs were recharged at the same time (an unlikely scenario). Other scenarios would increase peak demand by less than 0.5%. The plan concluded that even an optimistic view of growth of EVs in New England would be unlikely to pose unmanageable problems with maintaining reliable electric service.

The plan also found that increased deployment of EVs would, on balance, have positive environmental effects. Converting 5% of the vehicles in the region to EVs would reduce CO_2 emissions by 1.5 million tons per year and nitrogen oxide emissions by 250 tons per year. On the other hand, this growth in EVs would increase sulfur dioxide emissions by 170 tons per year.

One issue for legislators is what role the electric companies should play in facilitating the deployment of EVs. Among the specific issues is whether the companies should be treated as utilities in this market or allowed to compete with non-utility parties on a market basis.

Impact on Transportation Funding

In Connecticut, the Special Transportation Fund (STF) supports both highway and public transit funding. It is funded by a variety of sources, notably the motor fuels tax. As discussed in OLR report 2010-R-0446, tightened federal fuel economy standards will likely reduce motor fuels tax revenues going into the STF. In the longer term, another threat to gasoline tax revenues is the introduction of AFVs, notably electric vehicles. A 2010 analysis by the firm Pike Research forecasts that the market for plug-in hybrid and battery electric passenger cars and light duty trucks will grow at a compound annual growth rate of 106% between 2010 and 2015, resulting in sales of more than 3.24 million vehicles during that period. However, a 2010 study by Deloitte Consulting projects that the high cost of batteries and limited driving range will limit the market penetration of electric vehicles to 2% to 5% by the end of the decade, suggesting a proportionate drop in motor fuels tax revenues. While the impact of AFVs on STF revenues is likely to be minor in the near and mid-term future, such vehicles may pose a greater risk in the long term.

Other Issues

While most of the attention on developing an infrastructure for AFVs has focused on commercial fueling stations, in the foreseeable future many purchasers of EVs will primarily recharge their vehicles at home. While home charging equipment typically operate at 240 volts (the voltage of several home appliances), the introduction of charging equipment in homes raises several questions regarding the state building code, some of which were addressed by the Electric Vehicle Infrastructure Council.

In addition, some individuals and groups believe that rather than relying on commercial charging stations, it may make sense to develop facilities where EV owners can quickly swap out batteries that have run out of power. Initiatives to do this are being developed in Israel, Denmark, and California. The companies Better Place, Tesla Motors, Mitsubishi Heavy Industries, and others are currently working on integrating battery switch technology in their EVs to extend their driving range. While this approach and promoting commercial charging facilities are not mutually exclusive, legislators may wish to consider how to balance them.

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