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Chapter 5: Develop a Local Action Plan Long Term Initiatives **Transition to Alternative Fuels**

DOCUMENT CONTENTS

This section discusses the opportunities that may exist to use fuels other than the conventional, carbon intensive ones. High levels of uncertainty and risk in the international oil market have caused a tremendous amount of volatility in domestic oil prices over the past few decades. To hedge their bets against high energy prices, many cities have begun to diversify their fuel sources. Making such a switch has advantages to communities beyond reducing carbon. Most towns now spend approximately 20% of their gross income purchasing energy from outside the community. Approximately 80% of these dollars leave the community.[1] In 2004, the United States consumed about 140 billion gallons of gasoline, or about 380 million gallons of gasoline per day in 2004, by far the highest consumption rate of any country in the world. Consumption reached 400 million gallons per day in 2006. The 2005 Energy Policy Act[2] introduced the Renewable Fuel Standard, which will nearly double the use of ethanol and biodiesel in the U.S. by 2012.[3]

Organizations such as the Post Carbon Institute work with communities to help them lay out a strategy for meeting their energy needs without reliance on imported oil.[4]

This section describes some of the strategies that communities can use to do this and lower transportation costs to consumers, achieve independence from imported oil and promote the development of a domestic fuel source industry.

[1] "The Jobs Connection: Energy Use and Local Economic Development", Cities and Counties Project, U.S. Department of Energy, National Renewable Energy Laboratory, 1996., http://www.localenergy.org/pdfs/Document%20Library/The%20Jobs%20Connection.pdf, also archived at, www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/FuelTransition/JobsConnection.pdf, 5 December 2006.
[2] Energy Policy Act of 2005, www.doi.gov/iepa/EnergyPolicyActof2005.pdf, 5 December 2006.
[3] Renewable Fuels Association, Federal Standards, www.ethanolrfa.org/policy/regulations/federal/standard/, 5 December 2006.
[4] The Post Carbon Institute, www.postcarbon.org/, 5 December 2006.

Biofuels

Biofuels are forms of energy derived from recently living substances such as plants and animal by-products. They can include waste to energy, ethanol, bio-diesel and others. There is a potential to replace a significant amount of our current fuel use with biofuels. For example, the U.S. Department of Energy (DOE) hopes to displace 30% of the country's 2004 levels of gasoline demand with biofuels, mostly ethanol, by the year 2030. Other analysts believe that even more petroleum use can be displaced. If combined with much more efficient vehicles, this begins to be a strategy for helping communities escape from dependence on expensive, polluting and insecure oil supplies.

The U.S. produced 3.4 billion gallons of ethanol in 2004 and around 75 million gallons of biodiesel in 2005, representing about 2% of total domestic gasoline consumption.[5] Through federal tax incentive programs and market development initiatives, the U.S. government hopes to stimulate the growth of the alternative fuels market share. Part of this strategy includes mandates that federal vehicle fleets transition from conventional fuel vehicles to any number of alternative fuel vehicles (AFVs). Although not yet required by law, many local governments have also begun to purchase AFVs for the same reasons.

This includes switching their vehicle fleets—maintenance trucks, shuttle buses, delivery vans, and other light-duty vehicles—from conventional internal combustion engine vehicles that consume only gasoline to AFVs that consume ethanol, biodiesel, electricity, gasoline or any combination therein. Since the fuels for AFV fleets can be produced domestically, there is much less volatility in price. Also, as the technology for producing alternative fuels improves, the prices should continue to go down.

Alternative Fuel Vehicles

CASE STUDY: Washington, D.C.

The Washington, D.C. metropolitan area has been classified by the U.S. EPA as an ozone non-attainment area. The primary cause of this air pollution is motor vehicle emissions. To reduce vehicle emissions, the City Administrator's Office began in 2004 requiring 90% of the city government's light-duty vehicle acquisitions to be AFVs.

Of the city's fleet of 5,500 vehicles, 329 are AFVs. Two-thirds of the light-duty AFVs are CNG vehicles, and one third are flex-fuel vehicles capable of fueling with gasoline or any mixture of gasoline and ethanol up to E85. One of the city's largest users of AFVs is the parking enforcement division, which has a fleet of light-duty vehicles, of which 90% are AFVs. The AFV fleet refuels at two Department of Public Works fueling stations. A key card system encourages drivers toonly refuel with alternative fuels at the designated stations. The city AFV fleet uses an estimated equivalent of 350,000 gasoline gallons of alternative fuels every year.[6]

The Metropolitan Council of Governments Alternative Fuels Committee has developed a "green policy" to serve as a template to assist members in implementing policies supporting alternative fuels and other environmental initiatives. The committee offers workshops on alternative fuel technology, availability of AFVs and alternative fuel legislation. The city has been successful at emphasizing the benefits of AFVs and creating positive exposure by having the AFVs be a visible part of the community. They have also aggressively pursued grants and other sources of funding to offset the costs of the AFV program. Washington obtained grants from the National Ethanol Vehicle Coalition, the U.S. Department of Energy and the Washington Energy Office to install E85 tanks

[5] U.S. Dept. of Energy Biofuels page, genomicsgtl.energy.gov/biofuels/transportation.shtml, 4 October 2006.
[6] EPAct Fleet Information and Regulations, www.eere.energy.gov/afdc/pdfs/37407.pdf#search=%22ethanol%20city%20policy%22, 4 October 2006. Archived: www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/Fuel Transition/EPAact_fuel.pdf, 5 October 2006.

and equipment, a CNG fuel dispenser, and promotional materials.

Washington is currently seeking ways to expand its AFV use in heavy-duty vehicles like garbage trucks, dump trucks and street sweepers. It is also working to expand the public availability of alternative fuels by contracting with privately owned fueling stations. Increasing the use of AFVs throughout the community will decrease vehicle emissions and improve air quality in the Washington, D.C. area.

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The transition of local government vehicle fleets to AFVs facilitates the expansion of AFV demand throughout the community.[7] People see the vehicles and gain familiarity with them, and there will be increased accessibility to the vehicles in the local market and increased accessibility to publicly available, commercial refueling stations.

Although there are several different varieties of AFVs, the most common types are flex-fuel vehicles that run on a mixture of gasoline and ethanol, biodiesel vehicles, compressed natural gas vehicles and electric/hybrid vehicles. Each of these is discussed below.

Ethanol

Ethanol, or "ethyl alcohol," is 200-proof grain alcohol that can be used as an alternative to gasoline. The majority of ethanol in the U.S. is made from corn, but it can also be made from other crops including wheat, barley, sorghum, potatoes or sugarcane. New technology allows ethanol to be produced from cellulosic feedstocks, including corn stalks, oat husks, paper pulp, municipal solid waste, switchgrass and other sources.[8] Most of the 4 billion gallons of ethanol produced in 2005 came from 13% of the U.S. corn crop, an increase in production of 17% from 2004.[9]

Ethanol that is blended with unleaded gasoline at a ratio of 10% ethanol and 90% gasoline (E10) can be used in almost all vehicles without any special modifications. E85 (85% ethanol and 15% gasoline blend) is available mainly in corn-producing states and can be used as a substitute for gasoline in vehicles that are designated flex-fuel vehicles (FFVs). Because of the corrosive properties of this fuel mixture, the engine and fuel system in a flex-fuel vehicle must be specially adapted for alcohol fuels. Flex-fuel vehicles must also have a special sensor in the fuel line that analyzes the fuel mixture and controls the fuel injection and timing. Flex-fuel vehicles can use any mixture of ethanol-blended fuels up to E85 as well as conventional unleaded gasoline.

Ethanol and gasoline-ethanol blends cannot be transported by pipelines like conventional gasoline, but must be transported by train, barge or truck. Water in the pipelines can cause ethanol-gasoline blends to separate into two phases, making it difficult and expensive to remix the blend at the pumping station.

According to the Department of Energy's Argonne National Laboratory, ethanol-blended fuels reduced CO_2 equivalent greenhouse gas emissions by 7.8 million tons in 2005.[10] The study also cited the following benefits from ethanol use:

Use of E10 achieves:

6% reduction in petroleum use,

1% reduction in greenhouse gas (GHG) emissions, and

3% reduction in fossil energy use.

[7] Leiby and Ruben, The Alternative Fuel Transition, 2000, http://pzl1.ed.ornl.gov/tafv99report31a_ornltm.pdf, 5 December 2006.
[8] BioCycle, 2005 News Bulletin, www.harvestcleanenergy.org/enews/enews_0505/enews_0505_Cellulosic_Ethanol.htm, 5 December 2006.
[9] U.S. DOE, Ethanol Technologies webpage, www1.eere.energy.gov/biomass/ethanol.html, 5 December 2006.
[10] "Effects of Fuel Ethanol Use on Fuel-Cycle Energy and Greenhouse Gas Emissions", Argonne National Laboratory, www-db.research.anl.gov/db1/ttrdc/document/DDD/58.pdf, also archived at, www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/FuelTransition/FuelEhtanol_1999.pdf, 4 October 2006.

Use of E85 achieves:

73–75% reduction in petroleum use,

14–19% reduction in GHG emissions, and

34–35% reduction in fossil energy use.

There is debate about the net energy balance of ethanol, given current production techniques. This is a comparison of the energy derived from a gallon of ethanol with the total amount of energy needed to produce it. Critics[11] assert that it takes up to 70% more energy to fertilize, plant and harvest corn and to convert and transport the ethanol than the output energy derived from the ethanol. Supporters[12] of ethanol disagree with these claims, pointing out that Exxon funded the proponents. They present data that suggests a positive net energy balance—with only 1.3 British thermal unit (BTU) of petroleum used to produce 1 BTU of ethanol. All such debates depend on the assumptions used about the crop that supplies the feedstock, the fermentation techniques used and the overall efficiency of the process.

Biodiesel

Biodiesel, a substitute for diesel fuel, is created by chemically reacting vegetable oils or animal fats with alcohol in a process known as transesterification. The majority of biodiesel in the U.S. comes from soybean oil or restaurant greases. The big advantage of biodiesel is that can be used in existing diesel engines with little or no modification, and can be blended at any ratio with petroleum diesel. In 2005, U.S. production of biodiesel was nearly 75 million gallons, an increase of 300% from 2004.[13] Production was expected to reach 200 to 250 million gallons in 2006.[14]

Biodiesel

CASE STUDY: Seattle and King County, WA

More than half of King County Metro Transit's public buses use a B20 biodiesel blend as a part of a Seattle City Light greenhouse gas mitigation program.[15] These 640 buses have been added to the fleet of hybrid buses, electric trolleys and clean-burning diesel vehicles. At existing diesel prices as of August 2006, King County pays an average of 34 cents a gallon less for biodiesel as compared to regular diesel fuel, which equates to about $12,000 less a week.[16] Although price fluctuations will not guarantee this differential indefinitely, the expanded use of biodiesel provides a hedge against high fuel costs.

As part of its goal to becoming "greenhouse gas neutral," the city of Seattle has made a commitment to expanding the use of AFVs in its fleet. In addition to the Metro buses, King County's solid waste fleet and its wastewater biosolids trucks also use biodiesel. They are currently working to develop a network of refueling stations across the county to facilitate the transition to a biodiesel fleet. Metro was recently honored as one of the country's top clean bus leaders by the Environmental and Energy Study Institute.

In addition to cleaner air and reductions in GHGs, King County and the Seattle City Light program hope their partnership will increase demand for

[11] "Ethanol Fuels: Energy Balance, Economics and Environmental Impacts are Negative, D. Pimentel, www.ethanol-gec.org/netenergy/neypimentel.pdf, also archived at, www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/FuelTransition/Ehtanol_2002.pdf, 4 October 2006.

[12] "A Rebuttal to "Ethanol Fuels: Energy, Economics and Environmental Impacts" by D. Pimentel", Graboski & McClelland, www.ncga.com/ethanol/pdfs/EthanolFuelsRebuttal.pdf, also archived at, www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/FuelTransition/EthanolFuelsRebuttal.pdf, 4 October 2006.

[13] U.S. Dept. of Energy Biofuels page, genomicsgtl.energy.gov/biofuels/transportation.shtml, 3 October 2006.

[14] National Biodiesel Board, nbb.grassroots.com/07Releases/gov/, 15 November 2006

[15] Seattle City Light GHG Mitigation Program helps pay for the cost of biodiesel in local transportation fleets using trucks, buses, garbage trucks, and ferries. Partnering with large users of petroleum fuels leverages Seattle City Light's greenhouse gas mitigation efforts by helping to build demand for biodiesel. www.seattle.gov/light/conserve/globalwarming/, 30 October 2006.

[16] King County News Release, www.metrokc.gov/exec/news/2006/0817biodiesel.aspx, 3 October 2006.

biodiesel throughout the local community. The industry has grown rapidly and may reach a point where commercial-scale production is an economically viable option in the State of Washington. King County hopes its increased consumption of biodiesel will help stimulate the production of farm commodities that are used to manufacture biodiesel, creating benefits for local farmers and the local economy.

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The use of B20 (20% biodiesel mixed with 80% diesel) in a conventional diesel engine results in substantial reductions of unburned hydrocarbons, carbon monoxide, sulfur oxides and sulfates, and particulate matter compared to emissions from diesel fuel.[17] Emissions of nitrogen oxides are slightly increased. B20 reduces carbon dioxide emissions by 15%. Neat biodiesel (100% biodiesel) reduces carbon dioxide emissions by more than 75% over petroleum diesel.[18]

Advantages to biodiesel:

Reduces our dependency on fossil fuel imports

Reduction of carbon monoxide emissions of 10% (B20) and 50% (B100).

Biodegradeable

Significantly decreases net greenhouse gas inputs, because the crops soak up carbon dioxide from the atmosphere as they grow. The resulting biodiesel releases some CO_2, but some of the carbon is sequestered in the soil, especially if the feedstock is grown using poly-cultures of perennials.[19]

Only alternative fuel that requires little or no modification to the engine or fuel system

Disadvantages to biodiesel:

Biodiesel tends to gel at lower temperatures. Biodiesel vehicles can therefore have cold start problems relative to petrodiesel, but this is more of an issue for B100 than B20. B20 freezes at 3 to 5 degrees Fahrenheit, while B100 can freeze at 25 degrees Fahrenheit.

Biodiesel fuels will soften and degrade certain types of elastomers and natural rubber compounds over time.[20]

Biodiesel

CASE STUDY: Channel Island National Park

After implementing various renewable technologies at Channel Island National Park[21] throughout the year (CNG vehicles, wind, solar) Kent Bullard was faced with the reality that although the National Park was quite sustainable the coast guard and the diesel ships used to transport fuel were using almost 16,000 lbs of diesel each year. At first, Ken's solution was to bring 300 gallon fuel tanks of B20 onto the island each year to supply the various vehicles and generators. After realizing there was a greater need for biodiesel, Ken worked out a deal with a fuel dock at Ventura Harbor[22] to carry B100.

[17] National Biodiesel Board, www.biodiesel.org/pdf_files/fuelfactsheets/RegulatedFleet_QA.pdf, also archived at www.natcapsolutions.org//ClimateManual/Cities/Chapter5/LongTermInitiatives/FuelTransition/RegulatedFlelet_QA.pdf, 3 October 2006.
[18] DOE Alternative Fuels Data Center, www.eere.energy.gov/afdc/altfuel/bio_benefits.html, 3 October 2006.
[19] Iowa State University's Bio-economy program has shown how to do this, www.iastate.edu/~biorenew/, 5 December 2006.
[20] World Energy, Advantages of Biodiesel Use for Emissions Reductions and Regulatory Compliance, www.epa.gov/air/caaac/mstrs/ciampa.pdf#search=%22advantages%20to%20biodiesel%22, also archived at, www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/FuelTransition/ciampa.pdf, 5 October 2006.
[21] Renewable Energy Applications at Channel Island National Park, www.nps.gov/archive/chis/energy.htm, 29 September 2006.
[22] Ventura Harbor Marine Fuel, www.vhmf.com/, 3 October 2006.

Because Channel Island did not have enough land to establish their own facility, they had to work with a public facility. Once the fuel dock was up and running, Channel Island initially provided 98% of the dock's business. Once biodiesel was available, other businesses and ships began to come to Ventura Harbor just to access the B100 dock. Earth Race stopped by Ventura Harbor on September 5th, 2006 on its world tour to promote renewable energy.[23]

In town, a gas station also adopted B100 fuel. This station was recently shut down, but not for lack of customers. In fact, without the gas station present, vehicles can now be seen backing up to the fuel dock to fill up with B100.

Not only has the local community picked up on the new renewable technology, Kent Bullard has worked to extend his enthusiasm for biodiesel to other communities in California. In January 2006, Kent help start a LA Biodiesel Coop.[24] Originally starting with 30 members, the group provided B99 and B100 biodiesel made from California walnut oil to members through a mobile trailer. The goal of the coop was to:

Provide a renewable fuel
Educate others about the benefits of biodiesel
Show a market demand existed for biodiesel

Put themselves out of business when a stationary fueling station decided to distribute biodiesel

Within two months, the group had established a stationary supplier in Calvert City and within the first month the station pumped 4600 lbs of B100.

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Bi-Fuel and Compressed Natural Gas

A bi-fuel vehicle has two separate fuel systems, one for gasoline or diesel and another for either liquefied propane gas (LPG) or compressed natural gas (CNG). CNG and LPG are stored in pressurized tanks and therefore require special systems that increase the cost of bi-fuel vehicles and reduce overall cargo space.

CNG is one of the cleanest alternative fuels. Compared to conventional gasoline, CNG produces 90% less carbon monoxide and 60% less nitrogen oxides. It also produces 30-40% less CO_2.[25]

According to the U.S. Department of Energy, the advantages to CNG vehicles are:[26] Natural gas vehicle can be less expensive to operate than a comparable conventionally fueled vehicle depending on natural gas prices. Natural gas can cost less than gasoline and diesel (per energy equivalent gallon); however, local utility rates can vary.

Purchase prices for natural gas vehicles are somewhat higher than for similar conventional vehicles. The auto manufacturers' typical price premium for a light-duty CNG vehicle can be $1,500 to $6,000, and for heavy-duty trucks and buses it is in the range of $30,000 to $50,000. Federal and other incentives can help defray some of the increase in vehicle acquisition costs. In addition, fleets may need to purchase service and diagnostic equipment if access to commercial CNG/LNG vehicle maintenance facilities is not available. Retrofitting[27] a conventional vehicle so it can run on CNG may cost $2,000 to $4,000 per vehicle. Learn more about NGV tax incentives.[28]

[23] The Earthrace, www.earthrace.net/, 3 October 2006.
[24] Biodiesel Coop, www.biodiesel-coop.org/, 3 October 2006.
[25] DOE Alternative Fuels Data Center, Natural Gas, www.eere.energy.gov/afdc/altfuel/gas_benefits.html, 3 October 2006.
[26] DOE Alternative Fuels Data Center, Natural Gas Vehicles, www.eere.energy.gov/afdc/afv/gas_vehicles.html, 5 October 2006.
[27] DOE Alternative Fuels Data Center, Aftermarket Alternative Fuel Vehicle Conversions www.eere.energy.gov/afdc/afv/conversion.html, 5 October 2006.
[28] DOE Alternative Fuels Data Center, State and Federal Incentives, www.eere.energy.gov/afdc/laws/incen_laws.html, 5 October 2006.

Plug-In Hybrid Vehicles

Hybrid vehicles use both internal combustion engines and electricity from batteries for propulsion. A new variety of hybrid vehicle, the plug-in hybrid or PHEV, uses the battery primarily and the Internal Combustion Engine (ICE) as a supplement only when needed. The first prototypes of the PHEV were released in November 2005. There is considerable promise for the growth of the domestic market. The city of Austin, Texas and the state of California are just two of the governments promoting the use of PHEV.[29]

Plug-in Hybrids

CASE STUDY: Austin, TX

The city of Austin has begun to promote the widespread use of PHEVs as part of its commitment to reducing vehicle emissions. Initiatives currently being undertaken by the city include:

Creating an incentive program to encourage residents to purchase PHEVs

Developing and supporting policies that promote PHEVs

Requesting the help of community organizations to advocate for PHEVs

Initiating Plug-In Partners, a nationwide effort to establish similar incentive programs in the 50 largest cities in the United States

The city of Austin's municipal-owned electric utility, Austin Energy, stands to benefit from the widespread use of PHEVs. Since plug-in hybrids would mainly be plugged in during the night, Austin energy could utilize its off-peak nighttime load to supply the new PHEV market without having to increase its capacity at all. Providing the electricity to the transportation market could provide substantial revenue to Austin Energy.

Replacing conventional vehicles with PHEVs would increase the urban air quality throughout the city. Idling engines produce high levels of CO_2 and other pollutants, while PHEVs running on battery power do not idle at all in the city. The overall benefit of PHEVs could be increased by coupling the use of wind power, which is most prevalent at night, to recharge PHEVs.

Mayor Will Wynn of Austin has begun a nationwide program called Plug-In Partners, in which he hopes to create similar programs in the 50 biggest cities in the country. The idea of the program is to create a groundswell of demand for PHEVs on a magnitude sufficient enough to entice the automotive industry to begin mass production of PHEVs. As part of the Plug-In Partners campaign, potential consumers can sign a petition pledging to buy a PHEV once they are available in order to demonstrate widespread demand for the new technology.[30]

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c/o Daryl Slusher/ Lisa Braithwaite
721 Barton Springs Rd., Austin, TX 78704
(512) 322-6210 or (512) 322-6511

[29] The California Cars Initiative, www.calcars.org/, 5 December 2006.
[30] For more information on Austin

- Austin Energy Plug-In Hybrid Program www.austinenergy.com/About%20Us/Environmental%20Initiatives/Plug-in%20Hybrid%20Vehicles/index.htm, 3 October 2006.
- State Energy Alternatives, www.eere.energy.gov/states/alternatives/, 3 October 2006.
- CalCars, The California Cars Initiative, www.calcars.org/calcars-news/115.html, 3 October 2006.

PHEVs are most likely to be introduced as fleet vehicles. They can be vehicles of any size, including delivery vans, shuttle buses and maintenance vehicles, among others. With daily routes typically less than 20 miles, most PHEV fleet vehicles used by a local government may almost never need to visit a gas station. If the vehicle exceeds the limits of the battery power, the PHEV will automatically switch to its internal combustion engine/battery combination and operate as a typical hybrid.

A typical PHEV sedan can be charged through a 120-V outlet in 3-4 hours, while larger vehicles can be charged in the same amount of time on a 240-V connection.[31] Assuming a PHEV drives 20 miles a day for five days a week solely on its batteries, it will use around 2000-2500 kWh of electricity to cover 5000 miles. At current prices, total electricity costs amount to about $170-$215 annually, compared to annual fuel costs for the same amount of driving of $750-$825 (at 18 miles a gallon).[32] Assuming national average cost of electricity at 8.5cents per kilowatt hour, a PHEV runs on an equivalent of 75 cents per gallon.[33]

Widespread use of PHEVs could significantly reduce urban emissions. Idling in urban driving situations accounts for about 10-15% of total vehicle carbon emissions[34], and PHEVs under normal conditions (short trips at moderate speeds) do not use their ICE.

PHEVs can be recharged at night when the electricity from utilities is underutilized. This could create a significant new market for off-peak electricity. Roger Duncan, deputy general manager of Austin Energy, asserts that the national power system could charge tens of millions of PHEVs without requiring any new production capacity due to the idle electricity load at night.[35] Also, wind energy that is generated mostly during the night could be coupled to PHEV charging to provide a zero-emissions source of electricity. According to the California Air Resources Board, a vehicle that runs exclusively on battery power generates only a third of the GHGs produced by an equivalent gasoline vehicle.[36]

Federal Biofuel Tax Incentives

Comprehensive Guide to Federal Biofuels Incentives[37]

Tax Incentives	Agency	Benefit	Qualified Applicant	Period
Volumetric Ethanol Excise Tax Credit	IRS	$0.51 per gallon	Blenders of ethanol with gasoline	▪ Expires 2010
Small Ethanol Producer Credit	IRS	$.10 per gallon of ethanol produced of first 15 million gallons of ethanol made by a small producer	Any producer with production capacity below 60 million gallons	▪ Expires end of 2007
Biodiesel Excise Tax Credit	IRS	$1.00 per gallon $0.50 per gallon (recycled grease)	Biodiesel producers and blenders	▪ Expires 2010
Small Producer Biodiesel Credit	IRS	$.10 per gallon of ethanol produced of first 15 million gallons of ethanol made by a small producer	Any producer with production capacity below 60 million gallons	▪ Expires end of 2007
Credit for Installation of Alternative Fueling Stations	IRS	Credit for 30% of the cost to install alternative refueling stations; E85 and B20 fueling stations would qualify	Taxpayer who places the refueling property in service	▪ Effective: Dec. 31, 2005 ▪ Expires: Dec. 31, 2009

Figure: Biofuel Tax Incentives[38]

[31] Lucy Sanna, *Driving the Solution: the Plug-In Hybrid Vehicle*, EPRI Journal, Fall 2005, p. 5, www.calcars.org/epri-driving-solution-1012885_PHEV.pdf, also archived at, www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/Fuel Transition/CalCars_plugin.pdf, 3 October 2006.
[32] Ibid.
[33] Ibid.
[34] Ibid.
[35] Ibid.
[36] Ibid.
[37] Federal Biofuel Incentives cantwell.senate.gov/services/Biofuels/Comprehensive_Guide_to_Federal%20Biofuel_Incentives.pdf#search=%22biofuels%20federal%22, also archived at, www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/Fuel Transition/FederalBiofuel_Incentives.pdf, 3 October 2006.
[38] Ibid.

Biofuel Tax Incentives

CASE STUDY: Sarasota, FL

Sarasota County is the first community in the country to join the National Renewable Energy Laboratory's "Renewable Community" program. This demonstration project integrates the use of rooftop photovoltaic (PV) systems on super high-efficiency homes with plug-in hybrid vehicles. Zero-Energy Homes (ZEHs) must be efficient enough to consume no more power annually than a small photovoltaic system can supply. Energy from the PV system is also used to charge the batteries of plug-in hybrid vehicles.

The objective of the Renewable Community program is to showcase the potential integration of efficient buildings, renewable energy and the latest technology in clean vehicles.

Several state and federal financial incentives have contributed to the implementation of this program.

This type of integration on a community level could significantly reduce our dependence on imported oil and reduce the country's overall contribution of GHGs.[39]

The Florida Energy Act provides rebates to consumers for solar installations.

The Florida legislature appropriated $2.5 million in funding for both commercial and consumer solar incentives for 2006-2007.

The Federal Energy Bill offers a 30% tax credit to individuals for the purchase of residential solar energy systems and a $2000 tax credit to homebuilders of houses that are 50% more efficient than the national code

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[39] For more information on Sarasota

- NREL Presentation on Renewable Communities www.solar2006.org/presentations/forums/f15-penney.pdf#search=%22renewable%20community%22, also archived at, www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/FuelTransition/NREL_plugin.pdf, 3 October 2006.
- Sarasota County Press Release scg.co.sarasota.fl.us/Media/media_documents/scgovFACTS.pdf#search=%22renewable%20community%22, also archived at, www.natcapsolutions.org/ClimateManual/Cities/Chapter5/LongTermInitiatives/FuelTransition/Sarasota_plugin.pdf, 3 October 2006.
- www.floridagreenbuilding.org/news/news2006/jun2006.htm, 3 October 2006.
- National Renewable Energy Laboratory on PHEVs www.nrel.gov/vehiclesandfuels/hev/plugins.html, 3 October 2006.

Additional Resources

Alternative Fuel Vehicles
www.fueleconomy.gov/feg/current.shtml

Clean Cities
www.eere.energy.gov/cleancities/

Alternative Fuel Station Locator
afdcmap2.nrel.gov/locator/

***Driving the Solution: the Plug-In Hybrid Vehicle* by Lucy Sanna**
EPRI Journal, Fall 2005
www.calcars.org/epri-driving-solution-1012885_PHEV.pdf

Oak Ridge National Laboratory Report: The Alternative Fuel Transition: Results from the TAFV Model of Alternative Fuel Use in Light-Duty Vehicles 1996-2010
www1.eere.energy.gov/vehiclesandfuels/epact/pdfs/plf_docket/tafv99report31a_ornltm.pdf

Comprehensive Guide to Federal Biofuels Incentives
cantwell.senate.gov/services/Biofuels/Comprehensive_Guide_to_Federal%20Biofuel_Incentives.pdf#search=%22biofuels%20federal%22

Biodiesel Fact Sheet
www.biodiesel.org/resources/fuelfactsheets/

Set America Free
www.setamericafree.org/

Natural Resources Defense Council—Growing Energy: How Biofuels Can Help End America's Oil Dependence
www.nrdc.org/air/energy/biofuels/contents.asp

Powerpoint from NREL about the plug-in hybrid system.
sustainablecommunities.scgov.net/ssDocuments/1270/powerpoint/transportation.ppt

Seattle's Clean and Green Fleet Action Plan
www.seattle.gov/environment/Documents/CleanGreenFleetAP.pdf

NATURAL CAPITALISM SOLUTIONS

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