Penn State Environmental Law Review

Volume 10 | Number 1 Article 10

9-1-2001

Hybrid Cars: How They Can Reduce American Air Pollution and Oil Consumption, but Why They Are not Replacing Traditional Gas Guzzling Cars and Trucks Just Yet

Debra L. Hart-Munchel

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I. Introduction

The personal automobile is the single greatest polluter in numerous cities across the country.[1] Exhaust from personal vehicles causes hydrocarbons, nitrogen oxides, carbon monoxide, carbon dioxide and ozone to be emitted into the air.[2] These pollutants have negative effects on our health and our environment.[3] Hybrid cars can reduce the amount of pollutants that are emitted from our vehicles because they use much less gasoline ("gas") than gas-only vehicles.[4] The hybrid car uses less gas and emits less pollution because it has a dual engine, which is part gas and part electric.[5] Honda and Toyota have successfully built hybrid cars that are available on the market today.[6] However, the American automakers do not have hybrid cars on the market and this has

1. EPA Website. Automobile Emissions: An Overview, *at* http://www.epa.gov/otaq/05-autos.htm (Aug. 1994).

2. *Id.*

3. *See* EPA Website, *supra* note 1 (explaining hydrocarbons cause cancer, nitrogen oxides contribute to acid rain, carbon monoxide contributes to heart disease and carbon dioxide causes global warming).

4. *See Where Can I Buy an HEV?*, Hybrid Electric Vehicle Program, *at* http://www.ott.doe.gov/hev/where.html (last visited Jan. 15, 2001) (stating Honda Insight gets sixty-one miles per gallon in city and seventy miles per gallon on highway). *See also* Toyota Prius Brochure, *available at* http://www.Toyota.com/prius (last visited Feb. 21, 2002) (stating Prius gets fifty-two miles per gallon in the city and forty-five miles per gallon on the highway).

5. *See* Toyota Prius Brochure, *available at* www.Toyota.com/prius (last visited Feb. 21, 2002 (explaining Prius motor combines gasoline engine with powerful electric motor). *See also* 2001 Insight, Honda Website, Engineering, *at* http://www.honda2001.com/models/insight/engineering.html (last visited Jan. 15, 2001) (explaining Insight motor is a gasoline engine plus ultra-thin electric motor).

6. *See Where Can I Buy an HEV?*, *supra* note 4 (stating Honda Insight was available to public late 1999 and Toyota Insight will be available summer 2000).

postponed and possibly prevented the widespread use of hybrid cars and their possible replacement of gas-only cars.[7] This article will analyze the views of the executive branch, the American automakers, the state of California, and the oil industry to examine who is in favor of hybrid cars and who is in favor of continuing to produce and use gas-only vehicles, which we know are the single greatest polluter in American cities. The last section of this article briefly discusses hydrogen-fueled vehicles, which emit even less pollution than a hybrid car and may thereby become the car of the future, the car that will replace traditional gas-only cars.

II. History and Background

A. Air Pollution

Pollution from cars comes from the exhaust and from evaporation of the fuel itself.[8] Automotive engines emit several types of pollutants in this way.[9] This section lists the pollutants that are emitted from cars and some of the negative effects that they have on our health and environment.

Hydrocarbon emissions result when fuel molecules in the engine do not burn or burn only partially.[10] Hydrocarbons react in the presence of nitrogen oxides and sunlight to form ground-level ozone, which is a major component of smog.[11] Ozone in the upper atmosphere occurs naturally and protects life on earth by filtering out ultraviolet radiation from the sun, but ozone at ground level is a noxious pollutant.[12] Ozone is a severe irritant that is responsible for the choking, coughing, and stinging of the eyes associated with smog.[13] Ozone damages lung tissue, aggravates respiratory disease, and makes people more susceptible to respiratory infections.[14] Elevated ozone levels inhibit plant growth and cause damage to crops and forests.[15]

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7. *See* Lisa Zagori, *Gore Asks Automakers to Step on Gas,* DETROIT NEWS, *at* http://detnews.com/2000/autos/003/31/b01-27828.htm (Mar. 31, 2000) (explaining how automakers are delaying the introduction of more fuel-efficient vehicles).
8. EPA Website, *supra* note 1.
9. *Id.*
10. *Id.*
11. *Id.*
12. EPA Website, *Automobiles and Ozone*, *at* http://www.epa.gov/otaq/04-ozone.htm (Jan. 1993).
13. *Id.*
14. *Id.*
15. *Id.*

Nitrogen oxides form under the high pressure and temperature conditions in an engine when nitrogen and oxygen atoms in the air react to form various nitrogen oxides, collectively known as Nox.[16] Nitrogen oxides are precursors to the formation of ozone, and they also contribute to the formation of acid rain.[17]

Carbon monoxide is a colorless, odorless, poisonous gas.[18] It is emitted directly from the tailpipes of vehicles.[19] In urban areas, motor vehicles can contribute to over ninety percent of carbon monoxide pollution in the air.[20] Combustion is the burning of fuels and carbon monoxide is a product of incomplete combustion.[21] Incomplete combustion is common when the vehicle is started and when cars are not tuned properly.[22] Carbon monoxide enters the bloodstream through the lungs and forms a compound that inhibits the blood's capacity to carry oxygen to organs and tissues.[23] Persons with heart disease may experience chest pain if they breathe the gas while exercising.[24] Infants, elderly persons, and individuals with respiratory diseases are also particularly sensitive, but carbon monoxide can also affect healthy individuals.[25] Carbon monoxide can impair a healthy person's exercise capacity, visual perception, manual dexterity, learning functions, and ability to perform complex tasks.[26]

Carbon dioxide does not directly impair human health, but this gas is a greenhouse gas that traps the earth's heat and contributes to the potential for global warming.[27]

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16. *Id.*
17. EPA Website, *supra* note 12.
18. EPA Website, *Automobiles and Carbon Monoxide, at* http://www.epa.gov/otaq/03-co.htm (Jan. 1993).
19. *Id.*
20. *Id.*
21. *Id.*
22. *Id.*
23. EPA Website, *supra* note 18.
24. *Id.*
25. *Id.*
26. *Id.*
27. *Id. See also* Dina ElBoghdady, *Green cars may offer break, Clinton proposes tax incentive for buyers of efficient vehicles,* DETROIT NEWS, *at* http://detnews.com/2000/autos/0001/31/01290007.htm (Jan. 28, 2000) (explaining how President Clinton stated in his State of the Union speech that dire consequences such as deadly heat waves, droughts, coastal area flooding and disrupted economies may result if United States does not work to stop greenhouse gases that are suspected of trapping heat within earth's atmosphere-including carbon dioxide emitted by automobiles).

B. The Clean Air Act

The Clean Air Act of 1970 was not America's first attempt to regulate air pollution.[28] Twenty-three cities with a population of greater than 200,000 had enacted air pollution laws by 1912.[29] Shortly after the killer smog was blamed for 1,600 deaths in London in 1952, Congress passed the Air Pollution Control Act of 1955.[30] The Air Pollution Control Act of 1955 only provided encouragement and assistance to the states, which ultimately had control over enacting legislation to help control air pollution.[31] In 1965 Congress enacted the Motor Vehicle Air Pollution Control Act.[32] This Act expanded the federal government's authority to regulate air pollution caused by automobile exhaust.[33] In 1967, Congress enacted the Air Quality Act.[34] Under this Act, the states had the authority to establish air quality standards in their regions and to develop and implement those standards.[35]

Growing public concern about air pollution and evidence that vehicle emissions were likely to cause serious damage to health prompted Congress to enact the Clean Air Act Amendments in

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28. G. Nelson Smith and Evelia M. Grillo, Book Note, *Let's Clear the Air Once and for All: Municipal Liability for Failing to Comply with Section 110 of the Clean Air Act,* 44 CATH. U. L. REV., 1103, 1106 (1995).

29. *Id.* at 1105.

30. *Id.* at 1106.

31. *Id.*

32. Smith & Grillo, *supra* note 28, at 1108.

33. *Id.*

34. *Id.*

35. *Id. See also* Fredrick R. Anderson, Robbert L. Glicksman, Daniel R. Mandelker & A. Dan Tarlock, *Protecting the Air Resource,* Environmental Protection: Law and Policy, Aspen Law & Business, 1999, 3d ed., Chapter 5, *available at* http://lawstudy.law.ukans.edu/glicks/envprot/5-motorv.htm (last visited Oct. 23, 2000) (explaining how in 1970 Congress stunned automobile industry by ordering them to curtail new vehicle emissions of HC and CO by 90 percent within five years and Nox within six years). Automobile industry claimed that technology did not exist to meet such a deadline, but Congress took the position that strict standards would give industry an incentive to invest in necessary research and development to provide necessary protection of public health and welfare. The EPA initially refused to back off technology forcing standards, but eventually extended the deadline. Statute granted EPA authority to extend deadline, Congress did not intend for the automobile industry to be shut down if it could not produce required technology. However, the Act did apply a sanction of $10,000 for the sale of each noncomplying vehicle. *Id.*

1970.[36] The Clean Air Act has two approaches for achieving the desired national air quality.[37]

The first approach is for the federal government to set the standard itself.[38] Congress decided that the federal government should directly regulate new cars, new stationary sources, and highly toxic substances.[39] The Administrator of the Environmental Protection Agency (EPA) is responsible for prescribing by regulation the emission standards applicable to any class of new motor vehicles.[40] This standard, set by the Administrator of the EPA, shall be applicable to such vehicles for their useful life.[41] The useful life of a vehicle is now set at 10 years or 100,000 miles, whichever occurs first.[42] The states are prohibited from enforcing any standard relating to the control of emissions from new motor vehicles.[43] However, the Administrator of the EPA may waive this prohibition if the state has adopted standards that are at least as protective of public health and welfare as the applicable federal standards.[44]

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36. *See* Fredrick R. Anderson, Robert L. Glicksman, Daniel R. Mandelker & A. Dan Tarlock, *Protecting the Air Resource,* Environmental Protection: Law and Policy, Aspen Law & Business, 1999, 3d ed., Chapter 5, *available at* http://lawstudy.law.ukans.edu/glicks/envprot/5-motorv.htm (last visited Oct. 23, 2000) (stating there have been significant reductions of emissions of VOC's and CO's from mobile sources since 1970). However, between 1970 and 1997, annual vehicle miles traveled increased by more than 250 percent, from just under 1.1 trillion to 2.56 trillion miles. This increase in vehicle miles traveled will negate reduction of emissions unless further regulations are enacted to help offset the amount of emissions because of increased driving and increased vehicles on the road. *Id.*

37. *See* Clean Air Act, 42 U.S.C. § 7407 (1970).

38. *See* Clean Air Act, 42 U.S.C. § 7507 (1970).

39. *Id.*

40. Clean Air Act, 42 U.S.C. § 7521 (1970).

41. *Id. See also* Anderson, Glicksman, Mandelker & Tarlock, *supra* note 36 (explaining 1990 amendments doubled previous useful life requirement for light duty passenger cars and engines). Beginning in 1994, the manufacturers of light duty cars and trucks were required to phase in reductions in tailpipe emissions of HC, CO, Nox and particulates. EPA retains discretion to amend statutory standards in some instances. *Id.*

42. Clean Air Act, 42 U.S.C. § 7521(d) (1970).

43. Clean Air Act, 42 U.S.C. § 7522(a)(3) (1970).

44. Clean Air Act, 42 U.S.C. § 7543(a) (1970).

> State standards
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> (a) Prohibition. No State or any political subdivision thereof shall adopt or attempt to enforce any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines subject to this part. (California is the only exception to this part of the Act. California applied for a waiver subject to this part [42 USCS §§ 7521 et seq.]. No State shall require certification, inspection, or any other approval relating to the control of emissions from any new motor vehicle or new motor

The government's second approach to regulate air quality is to issue National Ambient Air Quality Standards ("NAAQS").[45] Ambient air is the outdoor air that is used by the general public.[46] Under this approach, the federal government sets the NAAQS, and then the states have the duty to develop and implement a plan in order to attain the NAAQS within a specified time.[47] The State Implementation Plan ("SIP") should include emission limitations, schedules, and timetables for compliance with such standards.[48] The EPA is required to approve a SIP that provides for the timely attainment and subsequent maintenance of ambient air quality standards as long as all of the general requirements of that section are met.[49] The federal government may devise a specific plan of its own only if a state fails to submit a SIP that meets the general

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vehicle engine as a condition precedent to the initial retail sale, titling (if any), or registration of such motor vehicle, motor vehicle engine, or equipment.

(b) Waiver.

(1) The Administrator shall, after notice and opportunity for public hearing, waive application of this section to any State which has adopted standards (other than crankcase emission standards) for the control of emissions from new motor vehicles or new motor vehicle engines prior to March 30, 1966, if the State determines that the State standards will be, in the aggregate, at least as protective of public health and welfare as applicable Federal standards. No such waiver shall be granted if the Administrator finds that—

(A) the determination of the State is arbitrary and capricious,

(B) such State does not need such State standards to meet compelling and extraordinary conditions, or

(C) such State standards and accompanying enforcement procedures are not consistent with section 202(a) of this part [42 USCS § 7521(a)]. *Id.*

See also Motor Vehicle Man. Assoc. of the United States Inc. v. New York State Dept. of Environmental Conservation, 17 F.3d 521 (2d Cir. 1994). (explaining California may only adopt and enforce its own emissions standards after applying to and obtaining the approval of the EPA for a waiver of preemption). The administrator can deny waiver request if she finds protectiveness determination of California is arbitrary and capricious, California does not have a compelling and extraordinary condition or if California's standards and accompanying enforcement procedures are not consistent with § 202(a) of the Act. Congress allowed California this exception only because of its unique Los Angeles smog problem. *Id.*

45. *See* Clean Air Act, 42 U.S.C. § 7409(a)(1)(A) (1970).

46. Train v. Natural Resources Defense Council, 421 U.S. 60 (1975). The agency is in turn required to approve each State's plan within four months of the deadline for submission, if it was adopted after public hearings and if it satisfied eight general conditions set forth in § 110(a)(2). One of these conditions is that the plan provide for attainment of the national primary ambient air quality standards as expeditiously as practicable, but no later than three years from the date of approval of such plan. *Id.*

47. *Id.*

48. *Id.*

49. *Id.*

requirements.[50] Generally, each state shall have the primary responsibility for assuring air quality within its boundaries.[51]

III. The Hybrid Car

As of January 2001, there are only two hybrid electric vehicles ("HEVs") available in the United States for public purchase.[52] The Honda Insight was put on the market in December of 1999.[53] The Toyota Prius is the second of the two HEVs and it went on sale during the summer of 2000.[54]

A. The Honda Insight

The Honda Insight is a two-seat sporty car.[55] The Insight gets sixty-one miles per gallon in the city and seventy miles per gallon on the highway.[56] This has earned the Insight the best EPA mileage ratings in history.[57] The Insight has a specially designed catalytic converter that actually attracts nitrogen oxide molecules during lean-burn conditions.[58] It holds the nitrogen oxide molecules until it can catalyze them later, turning them into emissions of water, carbon dioxide, and nitrogen.[59] The Insight meets California's

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50. *Id.*

51. Clean Air Act, 42 U.S.C. § 7407(a) (1970).

> Air quality control regions
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> (a) Responsibility of each State for air quality; submission of implementation plan. Each State shall have the primary responsibility for assuring air quality within the entire geographic area comprising such State by submitting an implementation plan for such State which will specify the manner in which national primary and secondary ambient air quality standards will be achieved and maintained within each air quality control region in such State.

Id.

52. *See Where Can I Buy an HEV?,* Hybrid Electric Vehicle Program, *at* http://www.ott.doe.gov/hev/where.html (last visited Jan. 15, 2001) (stating Honda Insight was first HEV available to the public, introduced in late 1999, and Toyota Prius will be available in summer 2000).

53. John O'Dell, *Southland Focus, At Showrooms, No Honda Insights In Sight,* L.A. TIMES, *at* http://latimes.qpass.com/cgi-bin/qpass.cgi (Feb. 2, 2000).

54. *See* John O'Dell, *Part of the Thinking Behind Hybrids: People May Actually Buy Them,* L.A. TIMES, *at* http://latimes.qpass.com/cgi-bin/qpass.cgi (Feb. 2, 2000) (explaining how Toyota Prius will enter the market during the summer of 2000).

55. Cat Lazaroff, *Ford Plans 40 Mile Per Gallon SUV,* Environment News Service, Environment, *at* http://ens.lycos.com/ens/apr2000/2000L-04-07-07.html (last visited Jan. 15, 2001).

56. *Supra* note 52.

57. *Id.*

58. 2001 Insight, Honda Website, Engineering, *at* http//:www.honda2001.com/models/insight/engineering.html?show=catalytic (last visited Jan. 17, 2001).

59. *Id.*

stringent Ultra-Low-Emission Vehicle ("ULEV") standard, making it the world's cleanest, most fuel-efficient gasoline powered automobile.[60]

The Insight combines a 1.0-liter, three-cylinder gasoline engine with an ultra-thin electric motor[61] and a five-speed manual transmission.[62] The areas behind the driver and passenger seats house the electronic controls for the Integrated Motor Assist ("IMA") system, the nickel-metal hydride batteries and the gasoline fuel tank.[63] The gasoline engine provides the primary power, but when additional horsepower or torque is needed, such as when accelerating hard or climbing hills, the electric motor provides assistance to the gasoline engine using an electric current supplied by the hydride battery pack.[64] The energy from forward momentum is captured during braking and this energy is then used to recharge the batteries.[65] The Insight never needs to be plugged in to recharge the battery.[66]

B. The Toyota Prius

The Toyota Prius is the second of the two HEVs available in the United States.[67] The Prius also combines a gasoline engine with a powerful electric motor.[68] A sophisticated controller allows the engine and motor to work in concert.[69] When the engine demand is low, like when stopping or starting, the Prius is powered by the electric motor.[70] During normal traveling, the gasoline engine engages and serves a dual purpose.[71] The gasoline engine runs the generator that powers the electric motor that drives the wheels and it supplements the electric motor to also drive the wheels.[72] At full

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60. 2001 Insight, Honda Website, Engineering *at* http://www.honda2001.com/models/insight/engineering.html (last visited Jan. 17, 2001).

61. *Id.*

62. 2001 Insight, Honda Website, *at* http://www.honda2001.com/models/insight/engineering.html?show=powerstrain (last visited Jan. 17, 2001).

63. *Id.*

64. 2001 Insight, Honda Website, *at* http://www.honda2001.com/models/insight/engineering.html?show=ima (last visited Jan. 17, 2001).

65. *Id.*

66. *See* 2001 Insight, Honda Website, *at* http://www.honda2001.com/models/insight/engineering.html (last visited Jan. 15, 2001) (explaining how the battery recharges from regenerative braking).

67. Toyota Prius Brochure, *available at* http://www.toyota.com/prius.

68. *Id.*

69. *Id.*

70. *Id.*

71. *Id.*

72. Toyota Prius Brochure, *available at* http://www.toyota.com/prius.

acceleration the normal traveling mode is boosted by additional power flowing to the motor from the battery.[73] When decelerating or braking, the wheels drive the electric motor, which acts as a generator and recharges the battery.[74] When the vehicle is stopped, the engine stops automatically.[75] However, when it is necessary to charge the battery or run the air conditioner compressor, the engine will continue to run.[76] The battery charging continues while the vehicle is stopped or when the engine demand is low.[77] The gas engine runs the generator as needed to charge the battery back to full strength.[78]

The information display panel in the Prius gives readouts of fuel consumption, energy transmission and regenerative energy usage, outside temperature, and warning screens.[79] Heat absorption glass is used in the windows to contribute to the energy saving.[80] It is equipped with low rolling-resistance tires to also improve fuel efficiency and save energy.[81] The Prius seats five passengers and gets fifty-two miles per gallon in the city and forty-five miles per gallon on the highway.[82] The Prius has been available in Japan since 1997, and now, over 35,000 are on the road in Japan.[83]

IV. Different Groups and Their Differing Views

The following sections explain some of the latest steps that different groups and the federal government have taken concerning HEVs. These sections also explain why these hybrid vehicles, although technologically available for over three years, have just recently become available in the United States.

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73. *Id.*
74. *Id.*
75. *Id.*
76. *Id.*
77. Toyota Prius Brochure, *available at* http://www.toyota.com/prius.
78. *Id.*
79. *Id.*
80. *Id.* The heat absorption glass is intended to help reduce gas consumption and emissions. The glass is to help keep the sun out on warm days and therefore reduce the amount of time that the air conditioner compressor needs to run. In addition, when the car is stopped, the engine is turned off and the air conditioner compressor stops so the heat absorption glass can keep it cool inside when the air conditioner compressor is not running. *Id.*
81. *Id.* Lightweight aluminum wheels and low rolling-resistance tires improve fuel efficiency and save energy. *Id.*
82. Toyota Prius Brochure, *available at* http://www.toyota.com/prius.
83. *Id.*

A. The Executive Branch

Al Gore was Vice-President from 1993 to 2001.[84] This former Vice-President wanted to reduce American oil consumption so the United States was not so dependent on foreign countries for oil.[85] The United States currently imports fifty percent of its oil and reliance on foreign oil is expected to grow sixty percent by 2010.[86] This former Vice-President believes that efficient cars are a long-term solution to the present oil crisis,[87] as well as a solution to air pollution.[88] The former Vice-President felt strongly enough about these issues that in 1993 he started The Partnership for New Generation Vehicles ("PNGV").[89] The PNGV is a partnership between the Government and the United States Council for Automotive Research.[90] The United States Council for Automotive Research represents DiamlerChrysler, Ford, and General Motors ("The Big Three").[91] Japanese automakers were not allowed to participate in PNGV.[92] The goal of PNGV is to develop technology that can be used to create environmentally friendly vehicles that can achieve up to triple the fuel efficiency of today's vehicles with very low emissions and without sacrificing affordability, performance, or safety.[93] One of the goals of PNGV is to produce, by 2004, a family car that could get eighty miles per gallon.[94] This goal has been called the "Supercar" project.[95] President Clinton allotted PNGV 250 million dollars in 1999 in order to achieve its goal of

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84. *Vice President Albert Gore,* Yahoo! Politics, *at* http://politics.yahoo.com /politics/white_house/profiles/10025/bio.html (last visited Jan. 18, 2001).

85. Bob Davis, Gregory L. White and Jeffrey Ball, *Detroit's Goals on Fuel-Saving Seem to Shift When the Stage is Washington*, WALL ST. J., (Mar. 31, 2000), *at* http://www.ta.doc.gov/pngv/news/articleinwsj2.htm.

86. *Efficient Cars Key to Solving Oil Crisis—Gore*, REUTERS, (Mar. 30, 2000), *at* http://www.ta.doc.gov/pngv/news/articleinreuters.htm.

87. *Id.*

88. Davis, White & Ball, *supra* note 85.

89. *See* Robert Weissman, *Al Gore, Corporate Welfare Envirnomentalist, at* http://lists.essential.org/pipermail/corp-focus/2000/000010.html (Mar. 7, 2000).

90. Partnership for a New Generation of Vehicle, *at* http://www.ta.doc.gov /pngv/cover/pngvcover.htm.

91. *Id. But see* Bob Davis, Gregory L. White and Jeffrey Ball, *Detroit's Goals on Fuel-Saving Seem to Shift When the Stage is Washington*, WALL ST. J., (Mar. 31, 2000), *at* http://www.ta.doc.gov/pngv/news/articleinwsj2.htm.

92. Bob Davis and Jeffrey Ball, *Gore Urges Big 3 to Firmly Commit to the Supercar,* WALL ST. J., (Mar. 30, 2000), *at* http://www.ta.doc.gov/pngv/news /articleinwsj2/htm.

93. Partnership for a New Generation of Vehicle, *supra* note 90.

94. REUTERS, *supra* note 86.

95. Davis & Ball, *supra* note 92.

developing an American-made, family sedan that gets eighty miles per gallon.[96]

On March 30, 2000, former Vice-President Al Gore met with executives of the Big Three in Washington D.C.[97] The purpose of the meeting was to congratulate the Big Three on making their fuel-efficient hybrid cars.[98] The executives of the Big Three introduced the Dodge Precept, Ford Prodigy, and DiamlerChrysler ESX3.[99] These vehicles are only prototypes, and the Big Three are not sure when they will start producing HEVs.[100] The former Vice-President, in encouraging the automakers to begin producing these hybrid cars, pointed out that some Japanese automakers are already selling vehicles that get close to eighty miles per gallon and "[w]e have to recognize the importance of moving quickly."[101] Supercar critics worry that the Big Three are using the project to keep Washington off of their backs and have failed to deliver significant improvements in cars.[102] Meanwhile the Japanese carmakers, which were not allowed to participate in the Supercar project, are putting cutting-edge cars in drivers' hands.[103]

Former Vice-President Al Gore implemented PNGV, the program that helps fund American automakers in order for them to develop hybrid, fuel-efficient cars.[104] President Clinton and the

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96. The Partnership for a New Generation of Vehicles, *at* http://cbs.marketwatch.com/archive/20000330/news/current/car.htx?source=blq/yhoo&dist/yhoo (last visited Jan. 13, 2001).

97. *Gore Asks Automakers to Step on Gas*, DETROIT NEWS, *at* http://detnews.com/2000/autos/003/31/b01-27828.htm (Mar. 31, 2000).

98. *Id.*

99. *Id.*

100. *Id. But see Gore Drives Green Cars*, ENVIRONMENTAL NEWS SERVICE, *at* http://www.wired,com/news/technology/0,1282,35335,00.html (Mar. 31, 2000) (explaining that Ford plans to begin producing and selling a family-sized hybrid electric vehicle by 2003). *But see Statement by Secretary of Commerce William M. Daley on the Unveiling of the Partnership for a New Generation of Vehicles'* Concept Cars, *at* http://www.ta.doc.gov/pngv/news/Daleystatement.htm (Jan. 11, 2000). Secretary of Commerce William M. Daley applauds Ford and General Motors for their tremendous accomplishments and also expresses his gratitude to the government and industry partners who have worked long and hard to turn these truly innovative ideas into a reality. *Id.*

101. The DETROIT NEWS, *supra* note 97. *See also* Dina ElBoghdady, *Honda plans gas-electric hybrid*, DETROIT NEWS, *at* http://detnews.com/2000/autoshow/0001/31/01130100.htm (Jan. 13, 2000) (stating Honda Insight went on sale December 1999, but American automakers believe foreign hybrids will have little impact on the environment because they will be sold in low volumes in the United States).

102. Davis & Ball, *supra* note 91.

103. *Id.*

104. *See US Auto Industry, Labor Join President, Vice President to Give One-Year Progress Report on Historic Partnership for New Generation of Vehicles:*

former Vice-President also ensured that PNGV had enough funds to reach the goals set out by the former Vice-President.[105] In addition to pushing the Big Three to make these cars, President Clinton and the former Vice-President were also thinking about the American people, and thinking of ways to ensure that Americans are able to purchase these cars.[106] President Clinton has proposed to Congress that Americans who buy HEVs should receive a four thousand dollar tax credit.[107] The former Vice-President has asked Congress to approve this proposal.[108]

B. The Big Three

The Big Three agreed to help the PNGV meet its goal of developing the American made sedan that gets eighty miles per gallon.[109] Each of the members of the Big Three developed its own hybrid car, but none of them plan on marketing these vehicles.[110] A

Government, Industry, Labor Craft Plan to Create Super Fuel-Efficient Car, THE WHITE HOUSE, OFFICE OF THE VICE PRESIDENT *at* http://clinton1.nara.gov/White_House/EOP/OVP/html/pngv2.html (Oct. 18, 1994).

105. The Partnership For a New Generation of Vehicles, *at* http://cbs.marketwatch.com/archive/20000330/news/current/car.htx?source=blq/yhoo&dist/yhoo (last visited Jan. 13, 2001).

106. REUTERS, *supra* note 86.

107. *Id.*

108. The DETROIT NEWS, *supra* note 97.

109. *Id. See also* Bob Davis, Gregory L. White and Jeffrey Ball, *Detroit's Goals on Fuel-Saving Seem to Shift When the Stage is Washington*, WALL ST. J., (Mar. 31, 2000), *at* http://www.ta.doc.gov/pngv/news/articleinwsj2.htm (explaining how Japanese car makers are barred from the Vice-President's Super Car project). *But see* DETROIT NEWS, *at* http://detnews.com/2000/autos/0002/23/02230070.htm (explaining how Detroit automakers used electric motors and diesel engines in developing their hybrids because diesel is more efficient than regular unleaded gasoline). Diesel hybrids will not even pass California's current standards, even if they get 80 miles per gallon, because California classifies diesel as a toxic substance. *Id.*

110. Bob Davis, Gregory L. White and Jeffrey Ball, *Detroit's Goals on Fuel-Saving Seem to Shift When the Stage is Washington*, WALL ST. J., (Mar. 31, 2000), *at* http://www.ta.doc.gov/pngv/news/articleinwsj2.htm. *See also* John O'Dell, *Part of the Thinking Behind Hybrids: People May Actually Buy Them,* L.A. TIMES, *at* http://latimes.qpass.com/cgi-bin/qpass.cgi (Feb. 2, 2000) (explaining how General Motors Precept gets eighty miles per gallon while Ford Prodigy gets a mere seventy miles per gallon because it sacrifices spaceship aerodynamics for marketable styling). *But see Statement by Secretary of Commerce William M. Daley on the Unveiling of the Partnership for a New Generation of Vehicles' Concept Cars at* http://www.ta.doc.gov/pngv/news/Daleystatement.htm (Jan. 11, 2000) (extending his congratulations to the Big Three for "harnessing the power of technology to develop a new generation of highly fuel-efficient and environmentally-friendly vehicles"). By harnessing the power of technology, the Secretary says we can "open new markets abroad, create and safeguard high-wage American jobs, improve our balance of trade, reduce our reliance on foreign sources of oil,

Sierra Club representative said that these concept cars were impressive, but hypothetical because consumers cannot purchase them.[111] The Big Three claim that the Americans still want bigger, more powerful vehicles like sport utility vehicles.[112] The Big Three also contend that the American people are not concerned with the rising prices of gasoline.[113] Therefore, General Motors is boosting production of their big trucks and sport utility vehicles over the next couple of years.[114] For General Motors, the big pick-up trucks and the sport utility vehicles are their most profitable models.[115] However, Mr. Gore said that the auto executives pledge to use some of the technologies that they developed by putting the prodigy vehicles into production before 2004.[116] Specifically, General Motors plans on producing as many as 50,000 hybrid vehicles by 2004 and Ford plans to produce between 10,000 and 20,000 hybrid vehicles by 2003.[117] As General Motors' vice president for planning and research and design said, "Clean and efficient vehicles are essential for our society . . . but consumers also want cars that are stylish, functional, fun to drive and affordable. The challenge now is affordability."[118]

The Big Three are not currently producing hybrid vehicles that are better for our environment because they claim the American people will not buy these hybrid vehicles.[119] However, the Honda Insight went on sale in the United States on December 15, 1999 and

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extend the life of the world's oil reserves, and improve the quality of life for every American by keeping our environment healthier and cleaner." *Id.*

111. *Gore Asks Automakers to Step on Gas*, DETROIT NEWS, *at* http://detnews.com/2000/autos/003/31/b01-27828.htm (Mar. 31, 2000).

112. Bob Davis, Gregory L. White and Jeffrey Ball, *Detroit's Goals on Fuel-Saving Seem to Shift When the Stage is Washington*, WALL ST. J. (Mar. 31, 2000), *at* http://www.ta.doc.gov/pngv/news/articleinwsj2.htm.

113. *Id.*

114. *Id. But see* Joe Miller, *Ford, GM, DaimlerChrysler extend closings*, DETROIT NEWS (Dec. 15, 2000) (explaining how General Motors and Ford Motor Company will be having holiday shutdowns because there are inventories of unsold mid-sized and large cars). DaimlerChrysler will temporarily close its Windsor plant and six assembly plants. DaimlerChysler will idle nearly 19,000 autoworkers in United States and Canada. They are expecting slower sales in 2001 after sales and demand was at record levels. *Id.*

115. Davis, White & Ball, *supra* note 112. General Motors is boosting production of full-sized pickups and sport utility vehicles to 1.7 million units in 2001, up about 20% from current levels and nearly 70% from 1998. General Motors also plans to produce and sell twenty new big-truck models over the next two and a half years. *Id.*

116. *Id.*

117. *Id.*

118. John O'Dell, *Part of the Thinking Behind Hybrids: People May Actually Buy Them*, L.A. TIMES, *at* http://latimes.qpass.com/cgi-bin/qpass.cgi (Feb. 2, 2000).

119. *See* Davis, White & Ball, *supra* note 112.

every one that has been shipped to the United States from the factory in Japan has been sold on an advance order and was delivered to the buyer without passing through the showroom.[120] Honda officials say they underestimated the United States demand for the Insight and will import an additional 2,500 cars from Japan in order to eliminate the waiting lists.[121] Both Honda and Toyota lose money on their hybrid vehicles, but they still continue to make and market these vehicles.[122] The Big Three's contention that Americans will not buy the hybrid vehicles has been proven false. It appears that the real reason why the Big Three will not market hybrid vehicles until 2004 is because the hybrids will not produce the big profits that the gas guzzling sport utility vehicles are currently producing. By claiming that the American people will not buy them, the automakers are attempting to place the blame elsewhere for the fact that America is falling behind other countries in terms of technological advances that are better for our health and environment. General Motors' vice president for planning and research and design also stated that it is a great technology race to "figure out how to do high-volume, affordable applications so that we can really benefit society" and the way to do that is by increasing the availability of the vehicles.[123]

In addition, not all Americans prefer the larger sport utility vehicles. Some Americans do prefer smaller cars. Many small cars on the market today sell in large quantities.[124] One reason these cars may sell well is because they are relatively inexpensive. On the other hand, there are many small cars on the market in the United States that sell for as much as some sport utilities.[125] The American

120. John O'Dell, *Southland Focus, At Showrooms, No Honda Insights in Sight,* The L.A. TIMES, *at* http://latimes.qpass.com/cgi-bin/qpass.cgi?QIID=lt00+9539&LATID=841316 (Feb. 2, 2000). By February 2, 2000, there were advance orders for 200 Insights.

121. John O'Dell, *Honda to Import 2,500 More Insight Hybrids*, L.A. TIMES, *at* http://www.latimes.com/cgi-bin/archsearc (April 18, 2000).

122. Madeline Chambers, *Auto Show Focuses on Environment, Safety,* Yahoo News, Science News, *at* http://dailynews.yahoo.com/h/nm/20010109/sc/autos_show_dc_2.html (Jan. 9, 2001).

123. O'Dell, *supra* note 118.

124. *See* Yahoo Autos, *at* http://autos.yahoo.com/newcars (last visited Jan. 13, 2001) (BMW, New Beetle, Infiniti, Mazda Miata, Toyota Celica).

125. Yahoo Autos *at* http://autos.yahoo.com/newcars. The 2000 base model of the most inexpensive BMW, the 3 series, is $26,990. The base model of the 2000 New VW Beetle is $15,900. The base model of the 2000 Infiniti G20 is $21,395. The base model of the 2000 Mazda Miata MX-5 is $20,545. The base model of the 2000 Porsche Boxster is $41,430. The Jeep Cherokee SE 2000 sport utility vehicle base price is $16,775. The base model of the 2000 Nissan Xterra sport utility vehicle is $17,559. The base model of the 2000 Kia Sportage sport utility vehicle is

automakers should invest some of their time designing a small hybrid car that is unique in its design. Once American consumers start purchasing these new hybrid vehicles, automakers soon will realize that American-made hybrid cars will be as popular as foreign-made hybrid cars, like the Honda Insight.

General Motors is attempting to develop a sport utility hybrid vehicle.[126] On the surface, this vehicle appears to be the perfect solution to the problem that has arisen between the American automakers and the federal government. One would think that by developing hybrid sport utility vehicles, the government will get the reduced emissions standards they want, the automakers will get increased profits from the sport utility vehicles, and the American people will have the bigger, more powerful vehicles that they desire. However, the technology is not advanced enough at this time to make a fuel-efficient hybrid sport utility that will be economical to mass produce.[127] For example, the Dodge Durango sport utility hybrid is only twenty percent more efficient than its gas engine counterpart and costs much more to produce.[128] Ford plans to produce a hybrid sport utility that gets about forty miles per gallon.[129] Ford plans to begin producing the hybrid sport utility in 2003.[130] However, Ford does not state how much this sport utility vehicle would cost the consumer.[131] Therefore, because the technology is not advanced enough at this time for a sport utility hybrid, the Big Three should mass-produce the smaller hybrid cars for which the technology is available. In a couple of years, after these smaller hybrids have been tested and retested, the automakers will then be able to produce a more fuel-efficient sport utility that will also be economically feasible and will allow the automakers to profit from making them. The Big Three should

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$15,095. The base model of the 2000 Honda CRV sport utility vehicle is $18,650. *Id.*

126. Dina ElBoghdady, *Green cars may offer break, Clinton proposes tax incentive for buyers of efficient vehicles,* DETROIT NEWS, *at* http://detnews.com/2000/autos/0001/31/01290007.htm (Jan. 28, 2000).

127. *Id. See also* Bob Davis and Jeffrey Ball, *Gore Urges Big 3 to Firmly Commit to the Supercar,* WALL ST. J. (Mar. 30, 2000), *at* http://www.ta.doc.gov/pngv/news/articleinwsj2/htm (explaining goal of the PNGV was to produce a hybrid vehicle by 2004 that would get eighty miles per gallon, but sell at the price of today's midsize cars).

128. ElBoghdady, *supra* note 126.

129. *Environmental Technologies for the 21st Century*, Ford Motor Company, *at* http://www.ford.com/en/ourCompany/communityAndCulture/c.../environmentalTechnologiesForThe21st Century.htm (last visited Feb. 15, 2002).

130. *Id.*

131. *See id.* (stating Ford Escape will qualify as a Super Low Emission Vehicle, but no price was given or estimated).

invest in their future right now, as well as the future of our health and environment, now by producing hybrid cars that are technologically and economically available today.

C. California's Approach

California has taken a different approach than the federal government, but the automakers are responding to California's emissions regulations in much the same way that they responded to the federal government's regulations.[132] California has required that four percent of the vehicles that the manufacturers offer for sale in California must be zero emission vehicles ("ZEVs") beginning with the 2003 model year.[133] The car companies have been able to meet the mandates set by California, but claim that they will not be able to meet these mandates for the 2003 models.[134] The automobile manufacturers claim that the electric vehicle industry needs at least one billion dollars in state and federal price subsidies to help offset the high cost of manufacturing the cars for California.[135] A General Motors spokesperson stated that General Motors would need to design an entirely new car to meet the mandates that are set for the 2003 model year.[136] Toyota has stated that their new RAV4 ZEV costs them around 200,000 dollars to build because it basically needs to be hand built.[137] Toyota, however, bluntly states that they are not willing to put more than one hundred of the RAV4s on the market because of the cost of manufacturing them.[138] This requirement, that four percent of the vehicles entering California need to be ZEVs, applies only to automobile manufacturers who have annual sales in California of at least 35,000 cars.[139] However,

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132. *See* John O'Dell, *Electric Cars Will Get the Green Light*, L.A. TIMES, *at* http://www.latimes.com (Oct. 18, 2000) (stating that automakers believe that electric vehicles never had range or utility to catch on with the car buying public). *See also* David Phillips and Dina Elboghdady, *DaimlerChrysler Unveils Electric Car,* DETROIT NEWS, *at* http://detnews.com/2000/autos/0002/23/02230070.htm (Feb. 23, 2000) (stating that the Big Three argue that the Toyota Prius and Honda Insight will never appeal to Americans).

133. John O'Dell, *Electric Cars Will Get the Green Light*, L.A. TIMES, *at* http://www.latimes.com (Oct. 18, 2000).

134. *Id.* General Motors would have to produce around 4,100 zero emission vehicles in order to be in compliance with the 2003 mandate. Ford would have to produce around 7,500 zero emission vehicles to be in compliance with the mandate. *Id.*

135. John O'Dell, *Electric Cars Will Get the Green Light*, L.A. TIMES, *at* http://www.latimes.com (Oct. 18, 2000).

136. *Id.*

137. *Id.*

138. *Id.*

139. *Id.* The California Air Resources Board made clear that they are going to

most full-size trucks and sport utility vehicles are excluded from this count.[140] Nissan has been the only manufacturer that appears to be able to meet this mandate.[141] California still plans on sticking to its mandate despite complaints from the automobile industry.[142]

D. The Oil Industry

United States citizens' energy dependence is higher today that it was during the oil shock of the 1970s, and oil imports are still projected to increase.[143] Al Gore has promoted tax incentives to Americans who buy hybrid cars because he wants the United States to be less dependent on foreign oil.[144] The oil industry has claimed that tax incentives would complicate the tax code;[145] however, the tax code is already excessively cumbersome. One additional tax deduction is worth the benefit of reduced air pollution in American cities. The oil industry also contends that tax incentives would skew the free market system and favor some consumers or industries at the expense of others.[146] However, the oil industry should not think that the federal government is favoring one industry over another. With all of the complaints coming from the automobile industry, the federal government does not appear to be favoring any one industry. The federal government is favoring the American people being able to breath clean air and save money on gasoline.

The oil industry has also argued that tax credits would lead to losses in federal revenues.[147] This may be the case, but every project

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uphold the ZEV mandate for the 2003 model year. State lawmakers contributed to the discussions with their direct grant program. The direct grant program was signed into law by Governor Gray Davis and it is supposed to provide consumers up to a $3,000 a year for three years to offset the cost of an electric vehicle lease or purchase. Additional subsidies of up to $5,000 for a three-year lease already are available in the Los Angeles Basin and several other smog-afflicted regions of the state through regional air-quality agencies. The program is capped at 18 million dollars, but automakers say that the electric vehicle industry needs at least 1 billion dollars in state and federal subsidies to help offset the high cost of manufacturing these cars for California. *Id.*

140. O'Dell, *supra* note 135.

141. *Id.*

142. *Id.*

143. *Fuel Cells 2000, Benefits of Fuel Cells, at* http://216.51.18.233/fcbenefi.html (last updated Jan. 9, 2001).

144. Bob Davis, Gregory L. White and Jeffrey Ball, *Detroit's Goals on Fuel-Saving Seem to Shift When the Stage is Washington*, WALL ST. J. (Mar. 31, 2000), *at* www.ta.doc.gov/pngv/news/articleinwsj2.htm.

145. Dina ElBoghdady, *Green Cars May Offer Break, Clinton Proposes Tax Incentive for Buyers of Efficient Vehicles,* The DETROIT NEWS, *at* http://detnews.com/2000/autos/0001/31/01290007.htm (Jan. 28, 2000).

146. *Id.*

147. *Id.*

that the federal government funds depletes federal revenues. The federal government's goal to have cleaner air for Americans to breath should be important enough for the federal government to use some of its funds to support the plans that help reach that goal. If the federal government does not help the automakers and the American people by helping reduce the costs of the hybrid cars, then the federal government in the future will probably need to help fund the medical industry to help reduce the costs of treating people with problems associated with breathing unclean air.

V. The Environmentally Friendly Vehicle of the Near Future: The Hydrogen Fueled Vehicle

A fuel cell operates like a battery, but, unlike a battery, a fuel cell does not run down or require recharging.[148] It continues to produce energy in the form of electricity and heat as long as fuel is supplied.[149] A fuel cell system can use hydrogen from natural gas, methanol, and even gasoline.[150] Heat and pure water vapor are the only by-products from the fuel cell's electrochemical reaction.[151] The fuel cell vehicle has the potential of being the cleanest hybrid powered vehicle because of its almost zero emissions.[152] The U. S. Department of Energy projects that if ten percent of automobiles nationwide were powered by fuel cells, regulated air pollutants would be cut by one million tons per year and sixty million tons of carbon dioxide per year would be eliminated.[153] The Department of Energy also predicts that if ten percent of automobiles nationwide were powered by fuel cells that oil imports would be cut by 800,000 barrels a day, around thirteen percent of total imports.[154]

In 1994, the Department of Energy ("DOE") initiated programs with Ford and a Chrysler subsidiary named Pentastar.[155] The goal of the program was to develop direct hydrogen-fueled proton-exchange-membrane ("PEM") fuel cell propulsion systems

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148. *What Is a Fuel Cell?,* Fuel Cells 2000, *at* http://216.51.18.233/whatis.html (last visited Jan. 13, 2001).

149. *Id.*

150. *Id.*

151. *Introduction*, Ballard Power Systems: Products, *at* http://www.ballard.com /pem_intro.asp (last visited Feb. 21, 2002).

152. *Fuel Cells*, Hybrid Electric Vehicle Program, *at* http://www.ott.doe.gov/ hev/fuel_cells.htm (last visited Nov. 15, 2000).

153. *Benefits of Fuel Cells, Fuel Cells 2000, at* http://216.51.18.233/fcbenefi.html (last visited Jan. 13, 2001).

154. *Id.*

155. *Fuel Cell Program*, Office of Transportation, *at* http://www.ott.doe.gov/ oatt/fuelcell.html (last updated on Nov. 6, 2000).

that had low or zero emissions.[156] By the year 2004, the DOE wants to have a fuel celled propulsion system that meets customer expectations in terms of cost and performance.[157] This program by the DOE specifically addresses the PNGV goal of developing a vehicle that will achieve up to three times the fuel efficiency of today's comparable vehicle.[158]

The California Fuel Cell Partnership is a voluntary effort to advance new automobile technology that could move toward environmental solutions.[159] The Partnership will demonstrate fuel cell-powered electric vehicles under real day-to-day driving conditions, and it plans to place more than seventy fuel cell passenger cars and fuel cell buses on the road between 2000 and 2003.[160] DaimlerChrysler AG intends to introduce the first fuel cell buses in 2002 and the first fuel cell cars in 2004.[161]

VI. Conclusion

Air pollution in the past has been a problem in the United States,[162] but it does not have to continue to be a problem in the future. Congress has enacted the Clean Air Act in its attempt to help reduce and control levels of pollution that are emitted into the air.[163] The executive branch has funded the Partnership for a New Generation of Vehicles to help fund research and development of cleaner vehicles.[164] The executive branch has even proposed tax

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156. *Id.*
157. *Id.*
158. *Id.*
159. *Four Companies Join California Fuel Cell Partnership to Help Build Hydrogen Fueling Stations,* California Fuel Cell Partnership, *at* http://www.drivingthefuture.org/releases (Nov. 10, 2000).
160. *Id.*
161. Madeline Chambers, *Auto Show Focuses on Environment, Safety,* REUTERS, *at* http://dailynews.yahoo.com/h/nm/20010109/sc/autos_show_dc_2.html (Jan. 9, 2001).
162. *See* G. Nelson Smith & Evelia M. Grillo, Book Note, *Let's Clear the Air Once and for All: Municipal Liability for Failing to Comply with Section 110 of the Clean Air Act,* 44 CATH. U. L. REV., 1103, 1107 (1995) (explaining that in 1963 scientific data evidenced a connection between air pollution and both aggravated heart conditions and chronic respiratory disease, especially among the elderly). In addition, President Kennedy noted that damages from air pollution were costing United States approximately eleven billion dollars each year. *Id.*
163. Fredrick R. Anderson, Robbert L. Glicksman, Daniel R. Mandelker & A. Dan Tarlock, *Protecting the Air Resource,* Environmental Protection: Law and Policy, ASPEN LAW & BUSINESS, 1999, 3rd Edition, Chapter 5, *available at* http://lawstudy.law.ukans.edu/glicks/envprot/5-motorv.htm (last visited Feb. 21, 2002).
164. Partnership For a New Generation of *Vehicle, at* http://www.ta.doc.gov/pngv/cover/pngvcover.htm (last visited Jan. 13, 2001).

breaks to American people who buy HEVs.[165] There are already over 35,000 Prius HEVs on the road in Japan[166] and there should be that many on the road in the United States too. The Big Three need to look further than their fiscal year incomes when making decisions that relate to the hybrid car. They need to realize that they can make a huge difference in the quality of life in this country now, and in the future, by keeping up with the technological advancements that are better for our health and environment. Unless the fuel cell vehicle is going to be available in the near future, the United States needs to begin replacing gas-guzzling SUVs with cleaner HEVs to help keep our air cleaner for the next generation of drivers.

Debra L. Hart-Munchel

165. *Efficient Cars Key to Solving Oil Crisis—Gore*, REUTERS, *at* http://www.ta .doc.gov/pngv/news/articleinreuters.htm (Mar. 30, 2000).

166. Toyota Prius Brochure, *available at* http://www.toyota.com/prius (last visited Feb. 21, 2002).