

## Electric Vehicles and Energy Policy, 1992-93: Environment and Economy Can Co-exist

by Perry Goldschein

While concern for the environment has gone from special interest to main stream in the 1990s, at least one aspect of the environmental movement seems to remain the same. People place too much emphasis on government action to solve our environmentally related problems and too little emphasis on their own actions. As consumers, we demand and use the various products and services that directly or indirectly pollute the air, land and water, create hazardous waste, cause global warming and destroy the Earth's ozone layer. As Americans, we consume these products and services in disproportionately large quantities when compared not only to the third world countries, but even to our industrialized counterparts. Nowhere is this more apparent than in America's gluttonous consumption of automobiles and oil.

To reduce our consumption of oil, the government is making it easier for American consumers to purchase and use more environmentally benign modes of transportation. The Energy Policy Act of 1992,<sup>1</sup> signed into law last October, provides tax incentives for consumers to buy alternative fuel vehicles. The Act also promotes electric vehicle research, development and demonstration, and an infrastructure to support the sale and use of electric vehicles. In addition to the Federal law, California requires that a certain percentage of motor vehicles sold in state produce zero emissions by 1998.<sup>2</sup> Following this lead, several other northeastern states, required to meet Federal clean air standards, have indicated that they will enact similar measures in the next couple of years.<sup>3</sup> These combined legislative efforts will make electric vehicles, the only vehicles presently

producing zero emissions,<sup>4</sup> much more accessible in the near future.

This Article first compares the environmental impact of gasoline-powered vehicles with that of electric vehicles. Second, the article analyzes and interprets the relevant sections of the Energy Policy Act of 1992 promoting electric vehicle and infrastructure development, commercialization and use. Third, the article examines current events in the emerging electric vehicle industry and what the Energy Policy Act will mean to that

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industry and to consumers. Finally, the article discusses other energy policies that would aid America's shift to electric vehicles and other, more environmentally responsible transportation technologies.

### I. MOTOR VEHICLES AND THE ENVIRONMENT

About half of the world's oil is now consumed by a fleet of over 500 million motor vehicles.<sup>5</sup> With nearly 200 million cars and trucks in the U.S. alone, the National Energy Strategy found that oil use in the transportation sector accounted for nearly 70 percent of the nation's total oil use in 1990.<sup>6</sup> As recently as 1950, when there were only 53 million motor vehicles registered in the world, their emissions were of little concern.<sup>7</sup> However, before the year 2000 the planet will have a billion motor vehicles.<sup>8</sup> Then, largely due to the population growth of developing countries,

this figure will rapidly climb toward two billion. If all these motor vehicles were to be gasoline and diesel fueled vehicles, the sheer volume of emissions would have devastating environmental and health effects, not to mention the ancillary effects from oil exploration and transportation.<sup>9</sup>

#### A. Gasoline-powered Vehicles

Half of all Americans live in areas that do not meet Federal clean-air standards.<sup>10</sup> The contaminated air that they breathe can cause coughing, shortness of breath, chest pains and a myriad of other public health problems including cancer.<sup>11</sup>

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The major culprit is automobile emissions. Driving gasoline and diesel fueled vehicles causes more of the nation's -- and the world's -- air pollution than any other human activity.<sup>12</sup>

Gasoline exhaust can cause eye and respiratory-system irritation, and it contains a number of airborne toxics, including benzene, a known carcinogen.<sup>13</sup> Recent estimates indicate that 182 million Americans face a health threat from ground-level ozone, the key ingredient in automobile-induced smog.<sup>14</sup> In addition, a recent study by the University of California-Davis estimates that 25,000 people die each year from automobile air pollution,<sup>15</sup> and the EPA estimates that toxic fumes from automobiles cause as many as 1,800 cases of cancer every year.<sup>16</sup>

Gasoline-powered automobiles also aggravate global environmental problems. A tank of gasoline produces up to 400 pounds of carbon dioxide, a primary greenhouse gas implicated in global warming.<sup>17</sup> Carbon dioxide induced global warming can increase crop failure, disease,

coastal flooding, severe storm damage, destruction of ecosystems and population dislocation.<sup>18</sup> The world's motor vehicles now produce 14 percent of all the carbon dioxide derived from fossil fuels.<sup>19</sup> The contribution from individual industrialized countries is even higher, reaching a peak of 24 percent in the U.S., where per capita ownership of motor vehicles is the highest in the world.<sup>20</sup> If we expect to reduce this contribution we will have to use alternative fuels to power our motor vehicles.

#### B. Electric Vehicles

Of the various "clean" fuel options under consideration today, electric vehicles (EVs) offer the greatest improvement in our air quality. Methanol, for example, can reduce carbon dioxide emissions and total airborne toxics, but produces considerable amounts of formaldehyde, a carcinogen and ozone-former.<sup>21</sup> Natural gas also reduces total emissions, but not nearly as much as EVs.<sup>22</sup>

Even after factoring in the emissions from the fossil-fuel burning power plants, the most common source of electric motor power, EVs are the cleanest motor vehicles. EVs fueled by traditional coal-powered electrical utilities pollute 90 percent less than typical gasoline powered motor vehicles, and themselves emit zero percent pollution.<sup>23</sup> When powered by alternative energy sources such as solar or wind, or other nonpolluting sources, EVs would produce no air pollution at all.

Another environmental advantage to using EVs is the elimination of accidents in the transportation of fuel. For example, any liquid or gaseous fuel used must be piped or transported by tanker, train or truck. Such transportation leads to many containment difficulties -- spills and leaks are far too common, causing extensive environmental damage.<sup>24</sup>

EVs also have practical advantages over gasoline-powered vehicles, including reduced maintenance needs, lower fuel costs

and the ability to recharge at home or anywhere there are standard electric outlets. In fact, combined fuel and maintenance costs for EVs are about eight cents per mile compared with 20 cents per mile for gas-powered vehicles.<sup>25</sup> This is a difference of \$1,200 for every 10,000 miles of vehicle use. Maintenance is cheaper for EVs mainly because the electric motor has only one major moving part compared with the gas motor's 200 plus parts.<sup>26</sup> The California Energy Commission figures show that by the year 2000, EVs will have a 4-1 fuel cost advantage alone.<sup>27</sup>

Though EVs have various disadvantages, these are rapidly being eliminated. Such disadvantages include shorter driving range, lengthy recharging time, poorer performance (slower acceleration and speed) than gas-powered vehicles, little or no infrastructure (very few commercial service or recharging centers) and greater initial expense. Part III of this article, *infra*, discusses substantial improvements to these drawbacks brought about by the emerging EV industry.<sup>28</sup>

Despite the environmental and some practical advantages of present EV technology, manufacturers have not mass produced EVs. In addition to the EV disadvantages mentioned above, this lack of mass production has been largely due to deeply ingrained consumer patterns and to the strong ties between the automobile and oil industries.<sup>29</sup> Now, however, local governments and electric utilities, as well as industry, are responding to the new energy legislation promoting and mandating EV production and use.<sup>30</sup> For these reasons, not only will manufacturers soon mass produce EVs, but improved technology and infrastructure brought on by the new legislation will make EVs a consumer option equally viable to that of conventional motor vehicles.

## II. THE ENERGY POLICY ACT OF 1992

Prior to 1992, fourteen years had elapsed since passage of comprehensive energy legislation designed, among other things, to reduce the nation's reliance on foreign oil imports.<sup>31</sup> Energy policy makers felt restrained, and energy policy observers frustrated, by the American public's lack of concern for energy issues.<sup>32</sup> As long as a gallon of gasoline cost virtually the same as a gallon of bottled water, it seemed the average citizen would not believe that energy was a pressing public issue.<sup>33</sup>

Operation Desert Storm placed energy issues at the top of our nation's policy agenda once again in 1991. The Iraqi

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invasion of its neighboring oil producer, Kuwait, caused oil prices to soar to over \$30 a barrel, which some believe tipped the economy into recession.<sup>34</sup> The war hastened members of Congress to introduce several pieces of comprehensive energy legislation, resulting in the Energy Policy Act of 1992.<sup>35</sup>

### A. Brief Overview

The Energy Policy Act (the Act) approved by Congress and signed into law October 24, 1992, is the most comprehensive energy legislation ever enacted.<sup>36</sup> It addresses nearly every conceivable energy issue from oil, coal, natural gas and nuclear power to energy efficiency and conservation, solar and photovoltaics, hydrogen and fuel cells, wind, biomass and geothermal energies, alternative fuels, transportation, and global warming issues.<sup>37</sup> The Act's goals include

reduced dependence on foreign oil, a cleaner environment, greater energy efficiency and lower energy costs for consumers.<sup>38</sup>

The Act requires increased conservation and energy efficiency to reduce the cumulative national energy demand, while facilitating a 20 percent increase in the use of renewable energy and a 50 percent increase in the use of alternative fuels by 2010.<sup>39</sup> It is expected to reduce oil imports by approximately 4.7 million barrels a day (a one-third cut in petroleum imports), prevent nearly \$400 billion from flowing overseas, and save domestic electricity consumers about \$250 billion in the same 15-year period.<sup>40</sup> Of course, the Act also opens markets for new, alternative automotive technology.

## **B. Provisions Affecting Electric Vehicles**

The Energy Policy Act of 1992 will significantly increase the use of alternative fuels, including electricity, and help to develop a market for alternative fuel vehicles. Along with general funding for alternative fuel vehicle research and development, the act authorizes \$575 million in funding specifically for EV research, development and demonstration.<sup>41</sup> Domestic auto makers competing to meet American transportation, energy and environmental needs are favored and will enjoy a competitive advantage in new automotive technology.<sup>42</sup> The Act will help U.S. companies capture more of the possible \$80 billion in sales of alternative fuel vehicles expected between now and 2010.<sup>43</sup>

### **1. Generally**

The Act requires federal government fleets to purchase a certain percentage of alternative fuel vehicles by the year 2000.<sup>44</sup> It further requires alternative fuel providers, such as electric and natural gas companies, to begin purchasing a specified percentage of alternative fuel vehicles in the next few

years.<sup>45</sup> The Act also provides for state and local incentive programs and loan guarantees to encourage the purchase of such vehicles.<sup>46</sup>

In addition, the Act includes three measures for cost sharing (non-Federal sources must share 50 percent of the costs) of public/private EV research, development and demonstration. The first measure is a \$50 million, 10-year, 10-project effort to demonstrate EVs and collect data on their use.<sup>47</sup> The second provides \$40 million over 5 years for infrastructure and support systems.<sup>48</sup> The third measure is a separate, comprehensive five-year research and development program designed, among other things, to advance battery technology.<sup>49</sup>

Finally, the Act includes tax provisions designed to reduce the cost of purchasing alternative fuel vehicles and to develop the necessary infrastructure.<sup>50</sup> It provides a tax credit to offset the cost of purchasing alternative fueled vehicles, which is the greatest for EVs, and a tax deduction to encourage refueling facility development.<sup>51</sup>

### **2. Provision Specifics**

The following paragraphs highlight and interpret some of the more important details of the provisions mentioned above.

*Alternative Fuels -- General (Title III).* Section 303 requires federal fleets to obtain at least 5,000 alternative fuel vehicles (AFVs), which include EVs as well as vehicles powered by natural gas, alcohol fuels and hydrogen, in fiscal year 1993; 7,500 AFVs in fiscal year 1994; and 10,000 vehicles in fiscal year 1995. Of the total number of vehicles acquired for federal fleets after 1995, at least 25 percent must be AFVs in 1996, 33 percent in 1997, 50 percent in 1998, and 75 percent in 1999 and thereafter. The term "federal fleet" means 20 or more "light-duty motor vehicles" (cars, vans and/or small trucks under 8,500 pounds) owned by the Federal government

and located in a major metropolitan area (1980 population greater than 250,000).

Section 304 requires Federal agencies, "to the maximum extent possible," to arrange for fueling at commercial facilities that offer alternative fuels for sale to the public. To promote use of AFVs in Federal agencies (including the Postal Service), the Administrator of General Services may charge lower rates to agencies for leasing AFVs than for leasing comparable conventionally-fueled motor vehicles (Sec.306; ends 3 years after enactment).

*Alternative Fuels -- Non-Federal Programs (Title IV).* Section 405 requires the Energy Secretary to establish a public information program on the costs and benefits of AFV use. The program will objectively compare AFV characteristics with gasoline-fueled motor vehicles, including environmental performance, energy efficiency, cost, maintenance, reliability and safety. Section 406 requires similar information on uniform product labeling for alternative fuels and vehicles. A combination of Federal agencies including the Federal Trade Commission will monitor the labeling requirement, which will aid consumers in comparison shopping.

Section 409 requires the Energy Secretary to establish guidelines for comprehensive State AFV incentives and program plans designed to accelerate the introduction and use of AFVs. To be eligible for Federal information and financial assistance, each State's plan must describe in detail a progressive schedule and coordination efforts to "introduce substantial numbers" of AFVs in such State by the year 2000. Details must include, among other things, an examination of exempting AFVs from State sales tax,<sup>52</sup> special parking at public buildings, airport and transportation facilities, and the ability to recharge electric motor vehicles at public locations.

*Availability and Use of . . . [AFVs] (Title V).* Section 501 requires those whose

principal business involves alternative fuels to make a certain percentage of newly obtained motor vehicles AFVs starting in model year 1996. Thus, many electric utilities, as well as others whose principal business is "generating, transmitting, importing or selling electricity," will purchase or lease EVs in the near future. For model year 1996, 30 percent of newly acquired light duty motor vehicles must be AFVs; for 1997, 50 percent; for 1998, 70 percent; and for 1999 and thereafter, 90 percent. Businesses affected are those with 50 or more motor vehicles in the United States and 20 or more in a major metropolitan area.

*Electric Motor Vehicles (Title VI).* Subtitle A of Title VI provides up to \$50 million for an EV commercial demonstration program. The Secretary of Energy must solicit proposals from manufacturers, utilities and/or distributors to demonstrate their EVs and associated equipment (Sec.

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611), and then select from the proposing applicants (Sec. 612). The selected applicants will be reimbursed for a discount they provide to their EV users (e.g., customers or employees; Sec. 613) on the purchase or lease of those EVs. In return, the EV users will provide the selected applicants and the Secretary with information regarding the operation, maintenance, performance and use of the EVs for 5 years (Sec. 612). The discount payments may be up to \$10,000 but cannot exceed the greater of the price differential or the price of a "comparable conventionally fueled motor vehicle." Non-Federal sources must share at least 50 percent of costs directly related to the program, with

exceptions under the Secretary's discretion (Sec. 614).

Subtitle B of Title VI authorizes up to \$40 million for an EV infrastructure and support systems development program. In a process similar to that of Subtitle A, the Secretary of Energy will solicit proposals for research, development, demonstration or commercial application of an infrastructure and support systems program (Sec. 621, 622). The projects may address, among other things, EV servicing, equipment and maintenance; the installation of charging facilities; rates and cost recovery for utility investments in infrastructure; and the development of safety and health procedure guidelines related to battery charging, watering and emissions (Sec. 622). Selected "persons" will receive financial assistance for their projects.

*Revenue Provisions (Title XIX).* These provisions deal with a variety of tax incentives for individual and business taxpayers. Section 1913 provides a tax credit equal to 10 percent of the cost of any qualified EV up to \$4,000. To qualify, the vehicle must be powered primarily by a portable source of electricity (*e.g.* batteries),

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and cannot be acquired for resale purposes. The taxpayer must be the original user. Section 1913 also provides deductions for EV recharging stations for the cost of the property up to \$100,000.

*General Provisions; Reduction of Oil Vulnerability (TITLE XX).* Section 2025, the last EV-related provision of the Act, requires the Secretary of Energy to conduct a cost-shared research and development program on EVs and associated equipment. The Secretary must conduct the program in cooperation with the electric utility industry,

the automobile industry and battery manufacturers, along with others the Secretary considers appropriate. The 5-year comprehensive plan will include a "prioritization of research areas critical to the commercialization" of EVs, including the advancement of battery technology.

It is too early to determine the exact effects these provisions will have on reducing oil use and emissions from motor vehicles. However, the Department of Energy has estimated that the Act will increase alternative fuel use by the equivalent of 660,000 barrels of oil a day by 2010, an increase of over 50 percent from current levels.<sup>53</sup> If the effects of current and pending state legislation were added, the estimate would be much greater. Such combined effects are already noticeable in the recent developments that are bringing popular EV use closer to reality.

### III. CURRENT ELECTRIC VEHICLE DEVELOPMENTS AND THE ACT'S EFFECTS

The Energy Policy Act began to have some impact even before it was passed. Responding to provisions of the Act as debated in Congress over the last year or so, and to recent and pending state legislation, researchers and manufacturers have stepped up their efforts to develop a competitively viable EV. Many breakthroughs in EV technology and new EV-related business ventures have recently been announced, particularly since passage of the Act. In addition, the number of presently available EVs from the smaller manufacturers is growing and their quality is improving.

#### A. Batteries

Battery technology has been one of the main hurdles to commercializing EVs. With current battery technology, the best of the commercially available electric cars claim to get no more than 150 miles per charge -- a relatively limited range.<sup>54</sup> Because recharging generally takes several hours, EV use has been limited to

environmentalists and enthusiasts. Another battery-related problem limiting EV use is poorer acceleration.<sup>55</sup>

The first electric cars to be mass-produced will probably use lead-acid batteries, although other types -- including nickel-cadmium, sodium-sulfur, and nickel metal hydride -- are also being studied.<sup>56</sup> All have disadvantages. For example, some lead-acid batteries weigh too much,<sup>57</sup> and Sodium-sulfur batteries are lighter, but can get dangerously hot.<sup>58</sup>

A recent breakthrough in battery development by Lawrence Berkeley Laboratory researchers could double the range of EVs.<sup>59</sup> LBL scientists have more than doubled the cell life of the nickel-zinc oxide battery, which offers twice as much energy density -- and therefore twice the range -- of conventional lead-acid batteries.<sup>60</sup> This improved battery would allow practical EVs to travel as much as 250 miles between charges, compared with the 100 or so common to lead-acid-propelled batteries.<sup>61</sup>

In another recent development, Argonne and U.S. Advanced Battery Consortium, a partnership of Chrysler, Ford and General Motors, are beginning a three-year, \$7.3 million cooperative research and development (R & D) agreement to produce an advanced lithium metal sulfide battery.<sup>62</sup> The joint venturers believe that EVs powered by such a battery might achieve acceleration and range capabilities comparable to gasoline-powered cars. The battery may provide as much as five times the energy per pound as current battery technology.<sup>63</sup>

The Act will ensure that the EV industry stays busy with battery development for some time. It provides extensive funding for R & D that should aid substantially in the advancement of battery technology. Section 2025, the Federal R & D program, singles out the battery as an item "critical to the commercialization" of EVs.<sup>64</sup> Development of more advanced

batteries, encouraged by the Act, will eliminate range and acceleration problems and will create greater consumer interest in EVs.

### ***B. Charging Systems/Infrastructure***

Recharging EV batteries poses another challenge. The necessary EV infrastructure includes commercial recharging stations, recharging units or electrical outlets in parking lots at malls, restaurants and workplaces, and at-home charging.<sup>65</sup> Until recently, commercial recharging stations were not viable because of the length of time needed to recharge. In the last several months, however, the auto

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manufacturing industry and one aircraft company have reduced recharging time exponentially.

Chrysler Corp., which will build 50 electric minivans in 1993, and Norvik Technologies, Inc., have developed a system that charges EVs in as little as 10 minutes.<sup>66</sup> This extremely quick recharging time discounts the importance of EV range, allowing for the commercial viability of EVs prior to a new generation of batteries. Chrysler hopes to make its charging system an industry standard, either licensing the technology or selling the systems directly to other manufacturers.<sup>67</sup> However, it may be competing with Nissan Motor Co. which has also developed a prototype super quick EV recharging station and has started experimental operations.<sup>68</sup> When operated at its maximum output, Nissan's version can recharge batteries to nearly full capacity in 15 minutes.

Calstart, a public-private consortium, is attempting to interest automakers worldwide in buying EV components

developed and manufactured in California.<sup>69</sup> One of the consortium's goals is to oversee the opening of 160 EV charging stations statewide by 1994.<sup>70</sup> Hughes Aircraft Co., a subsidiary of General Motors, devised the charging system to be used at these stations, but the system will be usable for electric cars produced by any manufacturer.<sup>71</sup> Similar to the charging systems developed independently by Chrysler and Nissan, the Hughes system can provide an adequate charge for most one-way trips in about 15 minutes.

California is also the place where electric utilities and cities are showing that

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they can help develop the necessary EV infrastructure. For instance, the Sacramento Municipal Utility District (SMUD) began offering a discounted off-peak rate for EV owners to charge their cars on November 1, 1992.<sup>72</sup> SMUD has also opened over 50 public EV recharging stations, with plans for up to 250 within the year.<sup>73</sup> In addition, the City of Sacramento, in cooperation with SMUD, has opened some public parking lots equipped with electrical outlets for charging EVs, believed to be the first of their kind in the nation. Southern California utilities and cities are taking similar measures.

These recent developments in infrastructure are among the most important to EV commercialization. As previously mentioned, lack of an infrastructure, including quick recharging facilities, has been one of the primary obstacles to popular EV use. Also as explored previously, the Act furthers infrastructure development

through tax incentives, R & D and Federal EV fleet patronage, among other things. Section 1913 provides the largest incentive to businesses, with up to a \$100,000 tax deduction per location to install battery recharging stations. Considering this incentive along with those provided to consumers by the Act and state legislation to place EVs on the road, a significant infrastructure could be established very rapidly. With an infrastructure in place, consumer demand would allow large manufacturers to start commercializing EVs.

### *C. Large Auto Manufacturers*

One GM executive summed up the American auto industry's primary concern with EV development when he said that "uncertainty and rapidly changing technology makes major capital investment at this time high risk."<sup>74</sup> However, after the legislative efforts of 1992, the Detroit auto manufacturers know that they have no choice. Thus, General Motors has agreed to study the feasibility of sharing research with Ford and Chrysler to speed development of American electric automobiles.<sup>75</sup>

GM will test its "Impact" EV this year through utilities and the Department of Energy.<sup>76</sup> Ford will deliver 100 of its electric Ecostar trucks to utility companies this year and Chrysler will deliver 50 of its electric TE vans to several utilities groups across the nation.<sup>77</sup> Despite the Detroit automakers' promises, they probably won't mass produce EVs for at least another few years. The companies have also been secretive about their EV prototypes' costs and performance capabilities.

Calstart hopes to attract the large auto manufacturers to California for the parts they will need to purchase in the near future.<sup>78</sup> In its efforts to develop a California EV technology market, the consortium has developed a showcase electric car with components from at least 17 California companies. Calstart believes it can convert some of the resources of



California's declining aerospace and defense industry to the emerging EV industry.<sup>79</sup>

The Act will not do much to expedite the date EVs are mass produced -- that has been taken care of primarily by the California emissions standards<sup>80</sup> -- but it will help to maximize the quality, convenience and economy of the EVs Detroit first introduces to the mass market. The various provisions for R & D, safety and consumer standards, electric utility rates and tax incentives will help to ensure those characteristics. This, in turn, may prompt greater sales than required by California standards. Meanwhile, consumers who are interested in shopping for EVs in the immediate future must turn to the small manufacturers.

#### ***D. Small Manufacturers Have EVs Available Now***

Primarily because large auto manufacturers are hesitant to invest in a volatile EV market, some smaller manufacturers have had success in selling cars converted to electric power. One small company recently even marketed its own originally designed EVs. These small companies are adding valuable technologies to the EV market and are also able to respond to changes in technology much more quickly. The new legislation favors this adaptability because of the continuing EV technology improvements it promotes. For these reasons, if they can maintain some design advantages, these companies may still be around after the Detroit auto makers are forced to mass produce EVs beginning in 1998.<sup>81</sup>

A prime example is Solar Electric Engineering, Inc., a Santa Rosa, California company that refits gasoline cars with electric motors. Solar Electric has joined with a Florida firm, Consulier Automotive, in building an original convertible-top electric sports car said to have a top speed of 100 m.p.h.<sup>82</sup> The car body is made of a strong, light-weight material designed by

Consulier that improves EV performance. Solar Electric now has dealerships in Los Angeles (Green Motor Works), Sacramento and Santa Rosa. Solar Electric's standard EV sales have consisted primarily of converted Ford Escorts and Pontiac Fieros with solar panels, both of which are considerably less expensive to produce than its convertible. The EVs are priced starting at under \$20,000.

Another small EV manufacturer, AC Propulsion Inc. in San Dimas, California converts the frame of a Honda CRX to electric power.<sup>83</sup> This car has a charging system that can be plugged into a standard wall socket to recharge up to 90 percent of a battery's capacity in about an hour.<sup>84</sup> It outperforms most gasoline-powered cars, as well as electric cars, sprinting from zero to 60 m.p.h. in 7.8 seconds. It has a top speed of 85 m.p.h. and a range of up to 130 miles according to California Air Resources Board tests.<sup>85</sup>

Various other small companies will also convert gasoline-powered vehicles to electric power or sell conversion kits. The Act's two biggest immediate contributions to these small manufacturers, as well as consumers, involve its tax provisions in section 1913. The up to \$4,000 federal tax rebate (credit) on initial cost beginning June 30, 1993, will help to stimulate demand. And section 1913's \$100,000 tax deduction for recharging stations is a much needed break for capital-poor smaller companies.

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Finally, for those manufacturers selected by the Energy Secretary under Title VI, Subtitle A, discounts passed on to customers will promote greater EV sales.

#### IV. CURRENT POLICY DEBATE

While the Energy Policy Act creates many beneficial policies regarding the way we use energy in our daily transportation needs, it omits important policies as well.<sup>86</sup> More sweeping energy measures involving transportation should be legislated, such as a carbon-based energy tax and higher automobile mileage standards.<sup>87</sup> These measures would benefit both the environment and the economy. The economy would benefit in two important ways. First, these measures would reduce oil imports and thus the trade deficit. Second, a carbon-based energy tax would favor alternative energy sources, aiding,

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among other things, the new multi-billion dollar business of the future -- the AFV industry.<sup>88</sup> The environment would benefit because these measures would reduce total oil consumption and emissions by improving automobile efficiency. Also, because fossil fuels are taxed under a carbon-based energy tax and renewable energies are not, use of the cleaner renewable energies would increase while use of fossil fuels would decrease.

Some energy policy analysts have argued that higher mileage standards for automobiles are necessary and could save nearly 2.5 million barrels of oil consumption a day in the U.S.<sup>89</sup> Along with an energy tax, this is a financially feasible proposal which would significantly reduce oil consumption.<sup>90</sup> The automobile and oil lobbies have worked hard to keep this proposal from being legislated, though, and debate over higher mileage standards almost delayed passage of the Act.<sup>91</sup>

Policy analysts have also argued that a narrower gasoline tax, as opposed to a carbon tax, is warranted as a means of

reducing oil use and emissions.<sup>92</sup> However, President Clinton has proposed an energy tax based on British thermal units, a unit of heat energy.<sup>93</sup> The BTU tax, part of the president's broad economic package, would require initial producers, transporters and storers of natural gas, coal and nuclear power to pay a levy of 25.7 cents per million British thermal units.<sup>94</sup> Oil would be taxed at 59.9 cents per million BTUs, which translates into a tax of about 8 cents per gallon of gasoline.<sup>95</sup> Renewable sources of energy, such as solar and geothermal energy and biomass fuels, would not be taxed.<sup>96</sup> Thus, this tax is also environmentally responsible, promoting energy conservation and renewable energy, and reducing oil use and emissions.<sup>97</sup> At the same time, it should disperse energy tax effects so as not to burden any one industry more than necessary.<sup>98</sup>

All of the industrial nations, each one looking to the other, have debated an energy tax over the last couple of years. When Japan hosted an international meeting on the environment recently, it was expected to agree to a carbon-based tax to reduce carbon emissions.<sup>99</sup> Instead, a report by the Ministry of International Trade and Industry (MITI) suggested that Japan may unjustifiably harm itself by adopting a carbon tax.<sup>100</sup> MITI was worried that if the carbon tax lacked international conformity, "it would invite the international migration of industry."<sup>101</sup> MITI was also concerned that the tax would make Japan less competitive, dragging down economic growth.<sup>102</sup>

Japan's attitude would be different if the Bush administration had not adamantly opposed all forms of energy tax for similar economic reasons. Japan had previously expressed interest in a carbon-based energy tax, and the European Community (EC) has favored a carbon tax but looked for international consensus from the other industrial countries.<sup>103</sup> Thus, both Tokyo and the EC are watching with interest to see

whether the U.S. Congress will support President Clinton's proposed energy tax.<sup>104</sup> A MITI official expressed the way America's industrial counterparts view the situation when he said: "Japan accounts for about 15 per cent of global GNP, but only for 4.8 per cent of [carbon dioxide] emissions; the U.S. accounts for about a quarter of GNP and a quarter of the emissions."<sup>105</sup> The U.S. produces the most carbon dioxide emissions of any country, causing some resentment in the international community because the U.S. has refused to cap those emissions or tax carbon users.<sup>106</sup>

United States	22.3%
USSR	17.4%
China	10.9%
Japan	4.8%
W. Germany	4.4%
India	3.0%
United Kingdom	2.6%
Canada	2.1%
Poland	2.0%
Italy	1.8%
Others	28.7%

Source: US Carbon Dioxide Information Analyzing Center

The EC believes that Canada would follow the United States if Clinton's BTU tax proposal becomes law and that Japan may also.<sup>107</sup> As a precondition to the EC adopting a carbon-related energy tax, the EC Environment and Taxation Commissioners require adoption of comparable energy taxes by the other industrial countries -- the United States, Canada and Japan.<sup>108</sup> EC officials find that Clinton's proposal draws that reality a step closer. Such a consensus

among the industrialized nations would maintain current international trade positions while allowing for substantial progress toward global carbon emission reduction goals.

It is now apparent that U.S. energy policy has greater implications than ever before. Oil imports account for about half our nation's trade deficit; energy conservation and pollution-control costs are weighing heavily on most industrialized nations;<sup>109</sup> and our industrial competitors are looking to the U.S. to set the global energy policy trends for the next decade.<sup>110</sup> For these reasons, the quest to remain globally competitive should not inhibit U.S. energy policy as it has in the past.

## CONCLUSION

Most scientists and energy experts seem to agree that we are in an inevitable transition from a fossil fuel based economy to an alternative energies based economy. Politics, economics, public health and the environment all require this transition. For these same reasons, the transition must be expedited and this may cause short-term economic pain. Policies that risk placing financial burdens on American citizens and American businesses in the short-term are very difficult to legislate, even when they will benefit us in the long run. Indeed, most U.S. environmental and energy laws are directed at certain industries as opposed to all businesses or individuals -- legislation directed at the latter has consistently met substantial opposition.

However, the legislation now in place makes it easier for us to exercise responsibility in our energy use choices. Not just the government, but we as consumers and citizens must also take responsibility. We can demand and effectuate beneficial changes through our consumption habits as well as our active constituency. If we are to avoid hypocrisy in demanding that our government adopt

environmentally, politically and economically responsible policies, we should also choose wisely by considering all the effects our energy choices have on society. The use of electric vehicles is one wise choice having wide-ranging beneficial effects.

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## ENDNOTES

1. Energy Policy Act of 1992, Pub. L. No. 102-486; U.S.C. Advance Legislative Service, 1992.
2. California mandates that 2 percent of all vehicles sold by major automakers produce zero emissions beginning in 1998, which translates to about 40,000 vehicles. See Vlae Kershner, *High Hopes Riding on Electric Car*, S.F. CHRON., Nov. 30, 1992, at A-1. By 2003 it will be 10 percent. Electricity is the only power source that meets the zero-emission requirement.
3. *Id.* New York subsequently adopted similar standards, though these were set back by a Federal court ruling in *Motor Vehicles Manufacturer's Assoc. v. New York State Dept. of Environmental Conservation*, F.Supp. (NDNY, 1993), Slip. Op. Jan. 21, 1993. About 10 other northeastern states are also considering them.
4. *Id.* "Zero emissions" refers to what the vehicle itself produces; most EVs draw their electricity from electric utilities, many of which burn coal for power. However, even using this source of electricity, electric cars pollute 90 percent less than gasoline-powered cars. See *infra* note 23 and accompanying text.
5. See Bleviss and Walzer, *Energy for Motor Vehicles*, SCI. AM., Sept. 1990, at 103.
6. See Richard H. Rosenzweig, *The Energy Bill*, 131 PUB. UTILITIES FORTNIGHTLY 16 (Jan. 1, 1993), at 17.
7. Christopher Lehmann-Haupt, *Books of the Times; Coast to Coast in an Ecologist's Dream With Wheels*, N.Y. TIMES, Dec. 24, 1992, at C13, col. 1 (quoting NOEL PERRIN, SOLO LIFE WITH AN ELECTRIC CAR).
8. *Id.*
9. The United States has steadily increased its use of foreign oil. Today, over 50 percent of the oil used daily in the United States is imported. *Consumer, Environmental, Community Groups Announce Campaign Aimed at 'Gas Guzzlers'*, U.S. Newswire, 11/13/92 (LEXIS On-line Services) [hereinafter *Gas Guzzlers*]. Accompanying this increased dependence is political pressure to drill in environmentally sensitive areas such as the Arctic National Wildlife Refuge and the Outer Continental Shelf. In addition, even now oil spills dump hundreds of millions of gallons of oil and other petroleum-based products into the world's oceans, irreparably damaging hundreds of ecosystems around the globe every year. See also *infra* note 24.
10. *The Fuels of the Future*, CONSUMER REP., Jan. 1990, at 11.
11. *Id.*
12. *Id.*
13. *Id.*
14. *Gas Guzzlers*, *supra* note 9.
15. *Id.*
16. *Fuels of the Future*, *supra* note 10, at 11.
17. See Bleviss and Walzer, *supra* note 5, at 103.
18. *Gas Guzzlers*, *supra* note 9.
19. Bleviss and Walzer, *supra* note 5, at 103.
20. *Id.*
21. *CSAA adds electric ERS truck to its fleet*, MOTORLAND/CSAA, Oct. 1992, at 39.
22. See *The Fuels of the Future*, *supra* note 10, at 13.
23. See Mike Pulley, *The Future Pulls Up Quietly*, THE BUS. J. - Sacramento, Nov. 16, 1992, Sec. 1, p. 1. The only pollution generated by EVs comes from the electric power plant or source from which the vehicles draw their energy. See also *supra* note 4.
24. U.S. waters continue to be vulnerable to spills like the one off the Shetland Islands in the North Sea on January 5, 1993. *Oil Spills: U.S. Risks Accidents Like One In Scotland, Environmental, Federal Officials Say*, Int'l Env't Daily (BNA), Feb. 8, 1993. A Liberian-owned tanker ran aground in high seas, losing virtually all of the 24 million gallons of North Sea light crude oil it was carrying. The spill was twice the amount lost in the Exxon Valdez accident in Alaska.
25. *CSAA*, *supra* note 21, at 39.
26. *Id.*
27. See Steve Rosenthal, *Switch on The Electric*, S.F. EXAMINER, June 21, 1992, (Sunday Magazine) at 5.
28. See *infra*, notes 59-85 and accompanying text.
29. See *Energy, Environmental Groups Pledge Support for BTU Tax, Brace for Industry Opposition*, DAILY REP. FOR EXECUTIVES (BNA), Feb. 19, 1993, at 32.
30. See *infra* notes 53-79 and accompanying text.
31. See Rosenzweig, *supra* note 6, at 16.
32. *Id.*
33. *Id.*
34. *Id.*
35. *Id.*
36. *NEW ENERGY POLICY ACT TO BENEFIT MANY IN MIDWEST*, PR NEWSWIRE, Washington Dateline, Oct. 26, 1992 (paraphrasing former Secretary of Energy James Watkins).

37. Energy Policy Act, *supra* note 1.
38. *PRESIDENT BUSH SIGNS NATIONAL ENERGY POLICY ACT*, FOSTER NATURAL GAS REP., Oct. 29, 1992, Rep. No. 1900 at 1.
39. *Id.* See also *NEW ENERGY*, *supra* note 36.
40. *Id.*
41. *NEW ENERGY*, *supra* note 36.
42. *Id.*
43. *Id.*
44. Energy Policy Act, *supra* note 1, Section 303.
45. *Id.*, Section 501.
46. Rosenzweig, *supra* note 6, at 52.
47. *Bush signs energy law; wants smooth transition*, ELECTRIC LIGHT & POWER, PennWell Publishing Company, Dec. 1992, at 1.
48. *Id.*
49. *Id.*
50. See Rosenzweig, *supra* note 6, at 52.
51. *Id.*
52. California already exempts EVs from the state sales tax and gives EV buyers a \$1,000 tax credit. See Kershner, *infra* note 2.
53. See Rosenzweig, *supra* note 6, at 52.
54. See Michael Parrish, *Picking Up Steam; Alternative Cars are Closer to Reality if Auto Show is Right*, L.A. TIMES, Jan. 2, 1993, D1, col. 3.
55. *But see* AC Propulsion's new model, *infra* notes 83-85 and accompanying text.
56. See Parrish, *supra* note 54.
57. *Id.*
58. *Id.*
59. See Davis Kramer, *LBL Researchers Report Breakthrough in Battery for Electric Cars*, INSIDE ENERGY, Oct. 26, 1992, at 4.
60. *Id.*
61. *Id.*
62. *Boost Electric Vehicle Battery Performance*, INSIDE R & D, Nov. 11, 1992, at 7.
63. *Id.*
64. Section 2025 also allows for development of new EV power sources such as fuel cells (hydrogen) and photovoltaics. Though these sources will be supplemental only for quite awhile, they are nonpolluting and could lead to completely pollution free transportation in the future.
65. See Patrice Apodaca, *Battery a Problem in Electric Car*, L.A. TIMES, Nov. 10, 1992, at 5.
66. *Id.*
67. *Id.*
68. *Nissan develops speedy recharging stations for electric cars*, Proprietary to United Press International, Dec. 4, 1992.
69. See Kershner, *supra* note 2, at A-1.
70. *Id.*
71. *Id.*
72. See Pulley, *supra* note 23, at 3.
73. See Terry Jackson, *Greening of the Auto Latest State Car Trend*, SACRAMENTO BEE, Jan. 3, 1993, at A-1.
74. *Big Three May Join in Developing Electric Car*, ALTERNATIVE ENERGY NETWORK ONLINE TODAY, Dec. 16, 1992.
75. *Id.*
76. *Id.*
77. *Id.*
78. See Kershner, *supra* note 2, at A-1.
79. *Id.*
80. *Id.* See also *infra*, note 81. The large manufacturers appear unlikely to mass produce EVs until the mandated 1998 California deadline to sell zero emissions vehicles.
81. California has mandated that at least 2% of motor vehicles sold there in 1998 must produce zero emissions. See Kershner, *supra* note 2. Because EVs are the only vehicle producing zero emissions the big auto manufacturers, unable to ignore the California market, will have to mass produce EVs.
82. See Parrish, *supra* note 54.
83. *Id.*
84. *Id.*
85. *Id.*
86. See Rosenzweig, *supra* note 6, at 52.
87. *Id.*
88. See *supra* note 43 and accompanying text.
89. See Rosenzweig, *supra* note 6, at 55.
90. *Id.*
91. *Id.*
92. *Id.*
93. *Presidential Address to Congress*, (ABC News television broadcast, Feb. 17, 1993). A British thermal unit measures the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit at or near 39.2 F.
94. See Karen Geisler, *U.S. ENERGY CHIEF SEES 350,000 BARREL PER DAY REDUCTION IN OIL*, REUTER ASIA-PACIFIC BUS. REP., Feb. 19, 1993.
95. *Energy, EC ENVIRONMENT CHIEF GIVES CAUTIOUS ENDORSEMENT TO CLINTON BTU PLAN*, DAILY REP. FOR EXECUTIVES (BNA), Feb. 19, 1993, at 32.
96. *Id.*

97. *Presidential Address to Congress, see supra* note 93.

98. *Id.*

99. ROBERT THOMSON, *Business and the Environment: Japan hedges on carbon tax*, FINANCIAL TIMES, Dec. 9, 1992, at 14.

100. *Id.*

101. *Id.*

102. *Id.*

103. *See infra* notes 107-108 and accompanying text.

104. *See Thomson, supra* note 99, at 14.

105. A MITI official has even shrugged off the Whitehouse's BTU tax, saying that it only brings the U.S. energy taxes to prevailing international levels. *Energy Taxes: CLINTON BTU PLAN RE-IGNITES INTERAGENCY BATTLE IN JAPAN*, INT'L ENV'L DAILY (BNA), Feb. 22, 1993. "U.S. energy taxes have been way too low compared to other countries," he said.

106. At a Dec. 7-11, 1992 meeting of nations that signed the U.N. Framework Convention on Climate Change, various countries called for targets and timetables for reducing emissions of carbon dioxide. *Environment, U.N. SUSTAINABLE DEVELOPMENT COMMISSION NOT WORLD 'ECO COP,' INDUSTRY OFFICIAL SAYS*, BNA DAILY REP. FOR EXECUTIVES, Dec. 18, 1992 at 244. A number of European Community member states as well as some developing countries sought to insert into the climate treaty caps on carbon dioxide emissions plus deadlines for cutting releases of the greenhouse gas. The United States successfully blocked their efforts.

107. *Energy, EC ENVIRONMENT CHIEF, supra* note 95.

108. *Id.*

109. *NEWS ANALYSIS; THE SEARCH FOR CLINTON'S ENERGY OMENS*, L.A. TIMES, Dec. 29, 1992, at D-1, col. 2.

110. *Id.* Over the next few years U.S. energy policy is expected to influence and reflect worldwide shifts.