

**Dollars and Sense:  
The Economic Impacts of Bringing Clean Cars,  
Light-Duty Trucks & SUVs to Minnesota.**

**Environment Minnesota Research & Policy Center  
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## Executive Summary

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Emissions from cars, light-duty trucks and SUVs are a major source of air pollution and global warming gases in Minnesota. During its 2007-2008 Session, the Minnesota legislature considered adopting standards - known as "clean car standards" - that would reduce these emissions. Automakers and their trade associations and others argued that the adoption of these standards would have a negative economic impact on the state and reduce vehicle choice.

This report looks at the economic impacts of bringing clean cars, light-duty trucks and SUVs to Minnesota by adopting these clean vehicle standards, and concludes that these standards will not only significantly reduce the pollution that threatens our special places and our health, but will also provide a net economic benefit to Minnesota.

Global warming is one of the most serious environmental problems our state faces. Leading climate scientists have concluded that the world is warming more quickly than expected, with potentially more damaging long-term consequences. According to Dr. Lee E. Frelich of the University of Minnesota's Center for Hardwood Ecology global warming could cause the ecology of the Boundary Waters to change so significantly that, within 50 years, the wilderness would look completely different. According to the Minnesota Climate Change Advisory Group, Minnesota's transportation sector accounts for approximately one quarter of the state's greenhouse gases.

Air pollution like smog, soot and cancer-causing air toxics from our cars, trucks and SUVs worsen asthma and lung disease and have been linked to an increased risk of stroke, heart attack and cancer. According to the Minnesota Pollution Control Agency,

Minnesota's transportation sector accounts for approximately half of the state's air toxics that can contribute to asthma and other chronic lung diseases.

Transitioning the state's fleet to cleaner, more fuel-efficient, vehicles will help reduce emissions of greenhouse gases and air toxics from the state's cars, light-duty trucks and SUVs.

In May 2008, the Minnesota Climate Change Advisory Group (MCCAG) recommended that the legislature adopt the clean vehicle standards as part of a fleet of climate policies necessary to achieve the global warming emission reduction targets outlined in Minnesota's Next Generation Energy Act of 2007.

As introduced in the 2009 legislature these standards would start with model year 2013, apply only to new vehicles, be phased in over time, and ramp up to a 30 percent reduction in global warming emissions across a manufacturer's fleet. In making their recommendation, the MCCAG estimated that a clean car standard would cut 13 million metric tons of global warming pollution from Minnesota's atmosphere by 2025.

Because of the threats to our special places and the quality of the air we breathe Minnesota is currently considering joining 14 other states in adopting these more protective state-based clean vehicle standards. As discussed in this report, the good news is that adopting these standards will also mean a net economic benefit for Minnesota, a critical consideration in these tough economic times.

**Vehicles that meet these state-based clean vehicle standards are more fuel-efficient, leading to real savings at the pump for consumers. A new Environment Minnesota analysis found that Minnesota consumers would see significantly greater savings under these state-based standards than under existing federal fuel-economy standard.**

- At prices of \$1.74 per gallon, Minnesota drivers would spend \$1.4 billion less on gasoline between now and 2020.
- If gas prices return to \$3.00 per gallon the savings would be even more significant - Minnesota drivers would spend \$2.4 billion less on gasoline between now and 2020.
- Starting in 2020, drivers in 5 Minnesota counties would annually save \$10 million or more at the pump if Minnesota adopts the clean vehicle standards. These counties are Washington County, Anoka County, Dakota County, Ramsey County and Hennepin County<sup>1</sup>.
- Drivers in 49 of Minnesota's 86 counties would save more than \$1 million per year at the gas pump under the clean vehicle standards.

**While these clean vehicles are projected to cost about \$1,000 more in 2016 as a result of incorporated technology, these vehicles are a good deal for Minnesota's drivers<sup>2</sup>.**

- Under the program, a consumer who buys a new car, light-duty truck or SUV in 2016 will see a net savings of between \$210 and \$420 during the

life of a five year loan, assuming \$1.74/gallon gasoline, with lower spending on gasoline outweighing the higher costs of his or her auto loan. After the loan is paid off, a consumer can expect to save between \$285 to \$325 per year, with a payback period of 3.7 to 4.3 years<sup>3</sup>.

**Manufacturers have a history of overestimating the price of producing cleaner vehicles to comply with stronger emission standards.**

- Auto industry costs estimates for the 1970s catalytic converter requirements were 1.6 to 3.2 times higher than the actual cost. In the 1990s, Sierra Research, who provided cost analyses for the auto industry, estimated costs that were 4 to 6 times higher than the actual cost of compliance for the original low emission vehicle program.<sup>4</sup>
- After automakers and car dealerships sued the state of Vermont citing that its clean car global warming standards would cost too much, weren't feasible and would limit production, the Vermont District Court Judge said that automakers have "failed to carry their burden to demonstrate that the regulation is not technologically feasible or economically practicable... given the flawed assumptions and overly conservative selection of technologies" utilized. Instead, the Court found that "compliance is possible in the time period provided at a relatively reasonable cost." The Judge also concluded that the auto industry can make any vehicle reduce its greenhouse gas emissions. The Court did "not find convincing the claims that consumers will be

deprived of their choice of vehicles, or that manufacturers will be forced to restrict or abandon their product lines.”<sup>5</sup>

**Because drivers will be spending less at the pump—money that largely leaves the local economy and is sent out of state or overseas—the state’s economy will benefit as people have more money to spend on other commodities and in their local stores.**

- As of 2006 Minnesotans were spending nearly 5 billion a year on gasoline for motor vehicles. A new Environment Minnesota analysis found that adopting the clean vehicle standards in Minnesota would save 146 million gallons of gas in 2020, the equivalent of taking nearly 245,000 cars off the road for a year in 2020, or more than 1 million cars off the road for a year by 2020 – above and beyond the gas savings Minnesota will experience under the existing federal fuel-economy standards.
- The most detailed analysis of the impact of the clean vehicle standards on an individual state’s economy was conducted for California by that state’s Air Resources Board. The agency projected that the money saved through reduced fuel costs—money that usually flows out of the local economy—will raise personal income levels and help to energize the local economy through increased spending on other goods and services. These expenditures would create jobs and help to create new businesses. The Air Resources Board estimated that for California

in 2020, 83,000 jobs and \$5.3 billion in personal income would be added as a result of the standards.

**Reducing air pollution and global warming pollution would result in additional cost-savings for Minnesota.**

- Because the program would also reduce the air pollution that affects rates of asthma, cancer and heart disease, a reduction in state medical costs could also be expected. Reducing emissions that trigger asthma attacks and increase cancer will inevitably lead to fewer sick days and reduced health care costs for business and government. Asthma alone was estimated to have cost Minnesota approximately \$363.9 million in 2003.
- In addition acting immediately to reduce greenhouse gas emissions—from the transportation sector and economy-wide—would help Minnesota to avoid the costs of inaction. The former chief economist of the World Bank, Sir Nicholas Stern, has put the price of inaction or unmitigated warming at as high as 20 percent of global GDP by 2100.<sup>6</sup>

**Recommendation: Minnesota should require auto manufacturers to produce and sell cleaner vehicles, reducing pollution while providing a net economic benefit to the state.**

## **Introduction**

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The clean vehicle standards have three major components: the Low Emission Vehicle II (LEV II) program, the Zero Emission Vehicle (ZEV) regulations and Global Warming Pollution Standards (GWPS).

The program has its roots in an unusual provision in environmental regulation in the United States, one whose history goes back to the mid-1960s. As a result of this provision, California is able to petition the federal EPA for more stringent, state-based air pollution reduction strategies that can be adopted in other states.

California has long experienced severe air pollution problems, owing partially to its automobile-centered culture and its smog-conducive climate. In the early 1960s, the state began taking action against pollution from automobiles, pioneering new strategies for reducing tailpipe emissions.

At the same time, the federal government was beginning to awaken to the dangers posed by automobile air pollution. In 1970, Congress made its first comprehensive attempt to deal with air pollution by passing the Clean Air Act. One provision of the law barred individual states from regulating automobile emissions – a move intended to protect automakers from having to manufacture 50 separate models for 50 states.

By 1977, with more cities facing smog problems similar to those in California, Congress gave the states – through Section 177 of the Clean Air Act – the opportunity to adopt California’s more protective vehicle emission standards rather than sticking with the weaker national standards. Several states, such as Massachusetts and New York, took advantage of that opportunity by adopting the first Low Emission Vehicle (LEV) program in the early 1990s. Since then, Maine, Vermont, New Jersey, Rhode Island, Connecticut, Oregon, Washington, Maryland, Arizona, New Mexico and Pennsylvania have adopted the current version of the program, known as LEV II. In addition to Minnesota, Florida, New Hampshire, North Carolina and Illinois and others are considering adopting these standards this year.

The LEV II program sets more stringent standards for traditional air pollutants and the ZEV program technically requires the sale of increasing percentages of zero emission vehicles (ZEV).

Continuing its tradition of groundbreaking legislation to reduce pollution from motor vehicles, in 2002 California expanded the clean vehicle standards and adopted the nation’s first law to control carbon dioxide emissions from automobiles. The state’s Air Resources Board, the division of their Environmental Protection Agency that oversees air quality, has adopted rules for implementation of the global warming pollution standards requiring manufacturers to adhere to fleet average emission limits for carbon dioxide equivalent. There is currently no federal standard for regulating greenhouse gas emissions from vehicles.

The clean vehicle standards meet the Air Resources Board’s rigorous analysis of economic impacts, including job creation, business expansion, business competition and state economic implications. The Air Resources Board also had to consider the environmental justice impacts for low-income drivers. Lastly, the standards could not negatively impact performance, consumer

choice, or safety. As a result, the Air Resources Board developed win-win regulations that not only achieve significant gains for clean air, and cut global warming pollution, but also save consumers money and strengthen our economy.

In 2007, Minnesota Governor Tim Pawlenty signed into law the Next Generation Energy Act, in response to growing awareness of the implications that global warming could have not only on Minnesota's rivers, lakes, streams and open spaces, but also on Minnesota's economy. The law required the development of a comprehensive plan to reduce Minnesota's emissions of greenhouse gases through year 2050. In order to comply with this law, the Governor created the Minnesota Climate Change Advisory Group (MCCAG) to prepare a comprehensive plan to reduce Minnesota's global warming pollution. MCCAG worked with the Center for Climate Studies (CCS), the Minnesota Department of Commerce and the Minnesota Pollution Control Agency to create the plan. MCCAG was a 56-member group, representing a range of public and private sector organizations using a stakeholder process to develop their policy recommendations. MCCAG considered the economic impacts and cost-effectiveness of each recommendation. The adoption of a clean car standard was included in the group's list of recommendations for hitting the global warming emission reduction targets outlined in Minnesota's Next Generation Energy Act of 2007.

The clean vehicle standards are an excellent example of how solutions to global warming also provide significant economic opportunity to Minnesota and the country.

This report includes the most up to date estimates on the total consumer fuel savings we can expect to experience in Minnesota under these clean vehicle standards, while summarizing a range of other findings that suggest that bringing clean vehicles to Minnesota by enacting these standards will not only significantly reduce the pollution that threatens our special places and our health, but will also provide a net economic benefit to the state as a whole, and to individual consumers, while maintaining a full range of new vehicle choices for consumers.

Minnesota should act now to reduce global warming and air pollution emissions, while also protecting consumers and the state's economy in these tough economic times.



## **Economic Impact on Consumers**

According to the Energy Information Administration, Minnesotans spent \$6.8 billion in 2006 on gasoline for motor vehicles, ranking 17<sup>th</sup> in the nation for per person expenditures.

Cleaner, more fuel-efficient, cars will help consumers save money, while offering the comforts, amenities and handling drivers are accustomed to.

Incorporating these technologies does come with a small price tag, although any increase in up front vehicle costs is recovered through reduced operating costs.

### **The Cost of Cleaner Vehicles**

#### ***The Air Pollution Standards***

In the early years of the program, any costs associated with the smog and toxics portion of the program have not been passed on to consumers.<sup>7</sup>

For example, as far back as 2003 there was no difference in price between the Toyota Camry model that met these more protective state-based air pollution standards and the model that did not. At the time the price difference between the compliant and non-compliant versions of the Honda Accord was only \$150.<sup>8</sup>

An analysis by the Pennsylvania Department of Environmental Protection in 2006 compared the cost of vehicles meeting the current federal air pollution standards in Ohio and those meeting the stricter state-based air pollution standards in Pennsylvania and New York (see Table 1). In almost every case, the Manufacturer's Suggested Retail Price (MSRP) was identical. There were a few exceptions. Audi charges a \$150 fee for a compliant version of their vehicles. Honda and Volkswagen also suggested there may be a small premium.<sup>9</sup>

There will likely be at least some cost premium for hybrid-electric vehicles for the foreseeable future. However, although the current price spread between hybrids and conventional vehicles is now about \$3,000 to \$4,000, the Air Resources Board projects that the incremental cost of hybrids will decline to about \$700 by the beginning of the next decade.<sup>10</sup> In late 2005, Honda announced it expects the additional cost of a hybrid vehicle to drop by 33 percent within five years, bringing the cost of a Civic hybrid to just \$1,700 more than a non-hybrid version.<sup>11</sup>

**Table 1. Comparison of Automobile Prices in Tier 2 states (Ohio) and LEV II States (New York and Pennsylvania)<sup>12, 13</sup>**

<b>Manufacturer</b>	<b>Model &amp; Style</b>	<b>OH Price</b>	<b>PA Price</b>	<b>NY Price</b>	<b>Difference</b>
Ford	F-150 XLT Super Cab	\$31,175	\$31,175	\$31,175	\$0
Lincoln	Town Car Signature Ltd	\$44,920	\$44,920	\$44,920	\$0
Mercury	Grand Marquis LS 4-dr Sedan 4.6L OHC V8	\$30,065	\$30,065	\$30,065	\$0
Volvo	XC90 2.5T	\$36,770	\$36,770	\$36,770	\$0
Dodge	Ram 1500 SLT Quad Cab 4X4 SWB 5.7L Hemi	\$31,660	\$31,660	\$31,660	\$0
Jeep	Grand Cherokee Laredo 4X4 3.7l	\$29,830	\$29,830	\$29,830	\$0

	V6 Auto				
Chevrolet	Silverado 1500 4WD Reg. Cab 4WD Vortec V6	\$20,145	\$20,145	\$20,145	\$0
Cadillac	DTS Sedan Standard	\$41,990	\$41,990	\$41,990	\$0
Pontiac	Grand Prix Sedan 3.8L Series III V6 4WD Auto	\$21,990	\$21,990	\$21,990	\$0
Buick	Rendezvous CX FWD – 3.5 L SFI V6	\$24,990	\$24,990	\$24,990	\$0
GMC	Sierra 1500HD 4WD Crew Cab, Vortec 6.0L V8	\$33,990	\$33,990	\$33,990	\$0
Chrysler	Town & Country 3.3L V6 OHV 4 spd Auto	\$21,735	\$21,735	\$21,735	\$0
Saturn	Vue AWD V6 3.5L SOHC v6, 5 spd auto	\$23,650	\$23,650	\$23,650	\$0
Ford	Focus ZX4 4 door, 2.0L Automatic	\$13,750	\$13,750	\$13,750	\$0
Chevrolet	Aveo 4-door SVM E-Tecil 1.6L DOCH	\$11,990	\$11,990	\$11,990	\$0
Chevrolet	Impala Sedan LT Automatic 3.5L SFI V6	\$21,490	\$21,490	\$21,490	\$0
Cadillac	STS Sedan Luxury II	\$43,695	\$43,695	\$43,695	\$0
Chevrolet	Malibu Sedan LT 2.2L 4 cyl. Automatic	\$18,990	\$18,990	\$18,990	\$0
Audi	Website states that any purchase in CA or other STATE BASED AIR POLLUTION STANDARDSstandard adopting states will pay \$150 fee				
Mazda	Website states may charge a \$100 fee for STATE BASED AIR POLLUTION STANDARDSemissions standards				
Volkswagen	Website states that "emissions" are not included in MSRP				
Honda	Website no longer allows specific site comparisons. 2005 prices provided. Webpage states that STATE BASED AIR POLLUTION STANDARDSvehicles may cost more.				
Mercedes	Website now says dealers may charge fee for AIR RESOURCES BOARD certification proof.				

Government incentives for the purchase of advanced-technology vehicles can help offset the cost of purchasing hybrid and alternative fuel vehicles.

### ***The Global Warming Pollution Standards***

The technological changes needed to meet the global warming pollution reduction standards—which have not yet been phased in in clean car states—may increase vehicle prices modestly, although those up front costs will easily be recovered by consumers in the form of reduced fuel expenses.

The Air Resources Board projects that cars attaining the 34 percent reduction and trucks attaining the 25 percent reduction in global warming pollution required at full phase-in of the program in 2016 would cost approximately \$1,000 more for consumers to purchase.<sup>14</sup> In 2012, the year the standards would take effect in Minnesota, the average vehicle in the passenger car/light duty truck (PC/LDT1) category would cost approximately \$367 more and the average heavier light duty truck (LDT2) would cost \$277 more.

Tier	Year	Table 2. Average Cost Per Vehicle of Global Warming Controls <sup>15</sup>	
		PC/LDT1 (Passenger cars and light-duty trucks)	LDT2 (Large light-duty trucks/SUVs)
Near-term	2009	\$17	\$36
	2010	\$58	\$85
	2011	\$230	\$176
	2012	\$367	\$277
Mid-term	2013	\$504	\$434
	2014	\$609	\$581
	2015	\$836	\$804
	2016	\$1,064	\$1,029

Although the Air Resources Board’s analysis relied on California-specific numbers, staff have indicated that the broad strokes of the results of their feasibility and cost-effectiveness assessments are transferable to other states.<sup>16</sup>

### **Reduced Operating Costs**

Vehicle cost is just one element of the cost equation for consumers. Equally important are the savings in operating costs over the lifetime of the vehicle.

Using thorough, reliable and industry-accepted tests, models and calculations, Air Resources Board staff identified many technologies that reduced emissions and would save consumers money over the lifetime of the vehicle, including discrete variable valve lift, dual cam phasing, turbocharging with engine downsizing, automated manual transmissions, camless valve actuation and air conditioning improvements such as variable displacement compressors with revised controls, reduced leakage systems and alternative refrigerants.<sup>17</sup>

According to agency staff, “Packages containing these and other technologies provided substantial emission reductions... Nearly all technology combinations modeled provide reductions in lifetime operating costs that exceed the retail price of the technology.”<sup>18</sup>

### ***Savings at the Pump***

By using better pollution control technology clean vehicle fleets are projected to be more fuel efficient than existing fleets, providing substantial fuel savings, and meaning that consumers will start saving money the first time they drive.

Assuming only \$1.74 per gallon of gas, the Air Resources Board found that, for example, large cars incorporating the global warming reduction technologies would produce a lifetime savings of \$1,794 to \$2,067; minivans could achieve a lifetime savings of \$627 to \$1,865 and small trucks could save consumers between \$2,147 and \$2,680 over the life of the vehicle.<sup>19</sup>

A new Environment Minnesota analysis found that Minnesota consumers would see significantly greater savings under these state-based standards than under existing federal fuel-economy standard.

- At prices of \$1.74 per gallon, Minnesota drivers would spend \$1.4 billion less on gasoline between now and 2020.
- If gas prices return to \$3.00 per gallon the savings would be even more significant - Minnesota drivers would spend \$2.4 billion less on gasoline between now and 2020.
- Starting in 2020, drivers in 5 Minnesota counties would annually save \$10 million or more at the pump if Minnesota adopts the clean vehicle standards. These counties are Washington County, Anoka County, Dakota County, Ramsey County and Hennepin County<sup>20</sup>.
- Drivers in 49 of Minnesota's 86 counties would save more than \$1 million per year at the gas pump under the clean vehicle standards.

### **Net Impact on Drivers**

While vehicles would cost about \$1,000 more in 2016 as a result of incorporated technology, under the program, a Minnesota consumer who buys a new car in 2016 will see a net savings of between \$210 and \$420 during the life of a five year loan, assuming \$1.74/gallon gasoline, with lower spending on gasoline outweighing the higher costs of his or her auto loan. After the loan is paid off, consumers can expect to save between \$285 to \$325 per year, with a payback period of 3.7 to 4.3 years<sup>21</sup>.

More realistic assumptions assuming higher fuel costs produces even greater benefits to consumers. At \$2.20 per gallon, the net savings per year during a 5 year loan would be \$115 to \$170, with consumers saving \$360 to \$410 per year after the loan is paid off. The payback period would be 2.9 to 3.4 years. At \$3.00 per gallon, consumers would see a net savings of \$115-\$170 per year during the period of their loan, saving \$360 to \$410 per year after payoff. The payback period under this assumption is only 2.2 to 2.5 years.<sup>22</sup> If gasoline returns to \$3+/gallon price levels, which many expect, savings will be higher yet.

In a statewide poll conducted in the fall of 2008 by the Minnesota Environmental Partnership nearly 80% of Minnesotans said they would be willing to pay more for a clean vehicle, knowing that they will recoup the costs through fuel savings.

### **Net Impact on Low-Income Drivers**

To determine the environmental justice impacts of the program on low-income communities, The Air Resources Board evaluated the effects of the regulation on used vehicle prices. While the standards only impact new models sold in Minnesota in 2012 and beyond, eventually some of those vehicles will become available for sale on used cars lots. Agency staff concluded that the regulations should not negatively impact low-income used vehicle car purchasers. More specifically, they found that the annual cost increase of a used vehicle to a low-income household would be about 0.2 to 0.3 percent, but this slight increased cost would be more than offset by reduced operating costs.<sup>23</sup>

## **Increasing Consumer Choice**

There is substantial evidence that consumers want cleaner cars and trucks that will help keep Minnesota's air clean and reduce their burden at the pump.

In a statewide poll conducted in the fall of 2008 by the Minnesota Environmental Partnership over 80% of Minnesotans said they support putting pressure on automakers to produce cleaner vehicles.

### ***Popularity and Demand for Cleaner Cars***

According to a 2007 poll by Consumer Reports magazine, fuel economy was the top priority of prospective car buyers-a year before gas prices sky-rocketed. Twenty seven percent of those polled identified good mileage as the most important factor. Twenty five percent cited reliability, 14 percent said purchase price and safety and features came in with 12 percent.<sup>24</sup>

“Mileage figures go hand-in-hand with understanding car sales...,” said a Forbes analysis ranking the best selling cars of 2006. Of the 23 models that Toyota, Lexus and Scion marketed that year, 70 percent of vehicles that experienced sales declines were full-sized models, SUVs or trucks.<sup>25</sup>

### ***Expanding the Availability of Cleaner Cars***

To date most American and foreign automakers have chosen to market and distribute compliant vehicles only in states that have adopted a clean car standard. Adopting a clean car standard would mean that Minnesotans get better choices and have more access to cleaner, conventional cars and advanced-technology vehicles.<sup>26</sup>

At the same time that drivers in Minnesota are getting better clean car choices, they will not experience a decline in access to traditional cars, even large SUVs and trucks. Manufacturers are able to comply using existing technologies without altering the current mix of vehicles. Therefore, vehicle size and carrying capacity should remain unaffected, though cars and trucks will perform better and cost less to operate.

In fact, the California legislature directed their Air Resources Board to develop regulations that would insure continued vehicle choice for consumers. The law prohibits the agency from requiring additional fees and taxes on any motor vehicle, fuel, or vehicle miles traveled; banning the sale of any vehicle or vehicle category; or requiring a reduction in vehicle weight.<sup>27</sup>

According to the Alliance of Automobile Manufactures today's cars are already available with the “innovative and affordable technology that reduces fuel use and CO2 emissions,” and automakers are developing more innovative technologies that deliver even lower emissions<sup>28</sup>.

An analysis by the Pennsylvania Department of Environmental Protection in 2006 found that the selection of models available to consumers was not affected in those states with the California

standards (which, at the time of the analysis, some states had been operating under the regulations for three model years), as compared to those with the federal standards.<sup>29</sup>

A New Mexico analysis of the program's air pollution standards, looking at 2007 model cars, found that out of 494 models for which classification information was available from the EPA, 456 were already compliant with the clean vehicle standards. Compliant cars include large models such as the 8-cylinder, 4-wheel-drive Dodge Ram pickup and the Ford Expedition. Only 38 models at the time were non-compliant with the program's air pollution standards.<sup>30</sup>

Regarding the global warming pollution standards, although the Alliance of Automobile Manufacturers claims that because Minnesota has a higher percentage of truck sales, availability will be impacted. In Vermont automakers filed a lawsuit against the state to block its adoption of the global warming pollution standards. After weeks of testimony in the Vermont District Court, Judge Sessions concluded that the auto industry can make any vehicle reduce its greenhouse gas emissions. The Court did "not find convincing the claims that consumers will be deprived of their choice of vehicles, or that manufacturers will be forced to restrict or abandon their product lines." Instead, the Court found that "compliance is possible in the time period provided at a relatively reasonable cost."<sup>31</sup>

Furthermore, the global warming pollution standards are not expected to reduce vehicle availability, as separate standards are set for passenger cars and light weight light duty trucks (up to 3,750 lbs), on the one hand, and heavier light duty trucks on the other (3,751-8,500). Standards for heavier trucks are considerably less stringent. This fleet-averaging ensures the continued availability of trucks and SUVs.

### ***Availability of Diesels***

Moreover, clean vehicle standards in no way prohibit the use of diesels. Despite concerns that farmers and small businesses reliant on diesel pick up trucks and vans will not be able to access such vehicles under the program, pick up trucks or vans currently certified with a diesel engine option with a Gross Vehicle Weight Rating of more than 8,500 pounds are not affected. Some of the most common diesel trucks used for agriculture and business weigh over 8,500 pounds and consumer choice of these will not be limited. As of 2007 these included, the F-250 Super Duty, F-350 Super Duty, E-350 Super Duty (Econoline) Chateau/Wagon, the GMC Sierra 2500HD, GMC Sierra 3500, Chevrolet Silverado 2500HD, Chevrolet Silverado 3500, Dodge Ram 2500, Dodge Ram 3500 and Dodge Sprinter Van (2.7 L I5 Turbo Diesel).<sup>32</sup> Moreover, the standards allow an exemption for diesels classified as "work trucks" and do not apply to heavy-duty vehicles, like semis and buses. Farmers and ranchers in California, the largest agricultural producer in the United States, live in a clean car state and have had no problem buying the cars and trucks they want.

However, many more diesel models are likely to be available by model year 2013 when the clean vehicle standards would go into effect in Minnesota.

### ***Availability of Flex-Fuel Vehicles***

Credits towards meeting the emissions standards are given for flex fuel vehicles using E85<sup>33</sup>, which will help compliance in Minnesota given the relatively wide availability of this fuel.

A recent analysis of the U.S. EPA's Green Vehicles Guide by the Union of Concerned Scientists found that of the 71 Flex Fuel Vehicles listed in the Guide as on the market only 2 models from Jeep (Commander and Grand Cherokee) and 2 models from Nissan (the Armada and the Titan) are not for sale clean car states<sup>34</sup>.

A recent analysis by the Minnesota Center for Environmental Advocacy found 96 examples of model year 2009 flex fuel vehicles using ethanol (E85) and gasoline, certified for sale in clean car states<sup>35</sup>.

### **Conclusion**

Clean vehicles are a win for Minnesota's consumers. Any increases in vehicle price will be offset by reduced operating costs. Using history and expert estimates as our guides, there is no reason to believe that cleaner vehicles will help consumers. And Minnesotans overwhelmingly support adopting a clean car standard despite the increase in upfront costs.

## **Economic Impact on Manufacturers and Car Dealerships**

Also important is the impact that clean vehicle standards will have on manufacturers, who are responsible for compliance, and local dealerships, who will be stocking these cleaner vehicles. Despite industry concerns, auto manufacturers may actually benefit since vehicles sold under this program can be used by automakers toward compliance with other federal and state regulatory requirements, and spin-offs of advanced technologies can be used on other vehicle lines and in non-vehicle applications. Moreover, the program provides ample flexibility that allows manufacturers to choose a path for compliance that best suits their fleet.

### **Costs to Manufacturers of the Air Pollution Standards**

The primary entry on the cost side of the ledger is the physical cost of upgrading vehicles to meet the tougher standards. As noted above, the program's air pollution standards, in and of themselves, are expected to have a negligible impact on vehicle costs.

Automakers will be required to sell thousands of vehicles with broad consumer appeal—hybrids and clean conventional vehicles—and may choose to supply other advanced-technology cars such as natural gas vehicles. The incremental cost of these technologies is modest when compared to the base cost of the vehicles.<sup>36</sup> In addition, the states that have adopted the program's air pollution standards represent approximately 38 percent of the national car and light truck market. This means that manufacturers already have invested in research and production facilities.<sup>37</sup>

An analysis of the costs to manufacturers of complying with the clean vehicle standards in New Jersey before the state adopted the program found that it would not reduce car sales. Assuming that the ZEV program would require the sale of approximately 18,000 hybrids and 147,000 conventional PZEVs in New Jersey in 2007.<sup>38</sup>

The projected outlay represented about 0.2% of the total sales by New Jersey new car dealers in 2002. Spreading this cost across all new light-duty vehicles sold in New Jersey, the ZEV program would increase costs by an average of about \$64 per car. The study's authors calculated that this would not cause New Jersey to see a significant drop in vehicle purchases—the key potential economic downside of tighter emission standards.<sup>39</sup>

An analysis of the costs to manufacturers of complying with the clean vehicle standards in New Mexico before the state adopted the program found that the estimated cost to automakers in 2010 (model year 2011) represented 0.001 percent of the gross sales of the six major manufacturers in 2006. This figure does not include money made through the sale of the vehicles, as manufacturers should be making a profit on vehicles sold to meet the ZEV mandate, like hybrids and clean, conventional vehicles.

Finally, and perhaps most importantly, consumers have demonstrated a willingness to pay more for clean vehicles. Sales of hybrid-electric vehicles have been strong, despite a cost premium of as much as \$3,000 to \$4,000 for the vehicles. A desire to help the environment, to avoid frequent



trips to the gas station, or to be among the first to use a new technology all appeal to a significant segment of consumers – as does the prospect of substantial savings on the cost of fuel.<sup>40</sup>

In a statewide poll conducted in the fall of 2008 by the Minnesota Environmental Partnership nearly 80% of Minnesotans said they would be willing to pay more for a clean vehicle, knowing that they will recoup the costs through fuel savings.

### **Costs to Manufacturers of Global Warming Pollution Standards**

Because manufacturer’s fleet composition differs based on weight, sales of trucks and other factors, manufacturers will comply in different ways to meet the reduction requirements. The Air Resources Board analyzed the cost of compliance for meeting the global warming pollution standards by manufacturer (see Table 5).<sup>41</sup>

<b>Table 5. Average Cost of Compliance per Vehicle for Each Manufacturer by Vehicle Model Year<sup>42</sup></b>										
<b>MY</b>			<b>Chrysler</b>	<b>Ford</b>	<b>GM</b>	<b>Honda</b>	<b>Nissan</b>	<b>Toyota</b>	<b>All 6 Major</b>	
<b>2009</b>	Near-term Phase In	PC/LDT1	\$77	\$41	\$0	\$0	\$0	\$0	\$17	
		LDT2	\$59	\$19	\$65	\$0	\$20	\$0	\$36	
<b>2010</b>		PC/LDT1	\$153	\$132	\$76	\$0	\$21	\$3	\$58	
		LDT2	\$118	\$85	\$131	\$0	\$67	\$8	\$85	
<b>2011</b>		PC/LDT1	\$268	\$268	\$230	\$94	\$189	\$192	\$230	
		LDT2	\$206	\$183	\$229	\$0	\$138	\$106	\$176	
<b>2012</b>		PC/LDT1	\$383	\$383	\$383	\$311	\$358	\$381	\$367	
		LDT2	\$294	\$306	\$327	\$105	\$210	\$203	\$277	
<b>2013</b>		Mid-Term Phase In	PC/LDT1	\$530	\$530	\$530	\$454	\$396	\$520	\$504
			LDT2	\$312	\$519	\$530	\$139	\$224	\$222	\$434
<b>2014</b>	PC/LDT1		\$676	\$676	\$676	\$386	\$553	\$667	\$609	
	LDT2		\$701	\$713	\$733	\$172	\$238	\$241	\$581	
<b>2015</b>	PC/LDT1		\$895	\$895	\$895	\$637	\$789	\$888	\$836	
	LDT2		\$991	\$1,008	\$1,037	\$222	\$259	\$270	\$804	
<b>2016</b>	PC/LDT1		\$1,115	\$1,115	\$1,115	\$896	\$1,024	\$1,108	\$1,064	
	LDT2		\$1,288	\$1,308	\$1,341	\$272	\$279	\$298	\$1,029	

Overall, the agency estimates that global warming pollution standard compliance costs for large manufacturers would be approximately \$20 per PC/LDT1 vehicle and \$40 per LDT2 truck in 2009. By 2016, manufacturer cost would increase to about \$1,060 per PC/LDT1 vehicle and \$1,030 per LDT2 truck.<sup>43</sup>

California has a long history of estimating technology compliance costs and there is no historical evidence that those estimates have been low. In fact, in almost every case actual compliance costs have actually been lower than state forecasts.<sup>44</sup>

## **Economies of Scale and Remaining Competitive**

The states that have already adopted the clean vehicle standards represent approximately 38 percent of the national car and light truck market. By teaming up with other states, the program creates an economy of scale which reduces the cost of advanced technology vehicles and conventional vehicles that incorporate advanced technologies—and once manufacturers have initially invested in the technology, future production costs should be decreased, overtime making these vehicles more affordable. If both Minnesota and Florida succeed in adopting clean vehicle standards this year 47.9% of all new vehicle registrations would be in clean car states once the program is fully implemented in all adopting states<sup>45</sup>.

In fact, some car companies have told the Air Resources Board staff that they plan to include global warming emission reduction technologies in their world-wide fleet to benefit from greater economies of sale.<sup>46</sup>

Unfortunately, in part because of a reliance on dirtier and less efficient vehicles, American automakers are losing their competitive edge internationally. However, with increasing global scrutiny on fuel efficiency and greenhouse gas emissions, the market potential for clean vehicles is sizeable.<sup>47</sup>

Large car manufacturers—who also produce cars for international markets—already have to meet higher global warming and fuel economy standards in other countries. Tightening of standards in the United States may help companies remain more competitive in the global marketplace.<sup>48</sup>

## **Compliance Options and Flexibility**

The program allows for significant industry flexibility in how they choose to comply. Auto manufacturers have the opportunity to use the most cost-effective reduction strategies and technologies for their fleet. In fact, the most recent addition to the program—the global warming pollution standards—require the regulations to provide flexibility for compliance.<sup>49</sup> Credits for early compliance are also a significant way that manufacturers can meet the standards in a phase-in fashion that best suits their business practice.

Manufacturers have a number of options for how they choose to comply with the regulations and will be determined based on cost, sales strategy, market conditions and consumer preferences. It is in the car maker's best interest to comply in a way that reduces compliance costs and impacts on sales. Market tools and technology cost decreases in the future are likely to reduce costs even below agency's estimates.<sup>50</sup>

Manufacturers can also choose technologies that reduce global warming emissions from the air conditioning system or that rely on low carbon fuels, like natural gas or ethanol and other biofuels.

Automakers can also receive credits for placing vehicles in programs that are demonstration programs and can earn additional credit for placing vehicles in programs that allow for shared use of vehicles and use “intelligent” transportation technologies or if linked to transit use.

The global warming standards provide flexibility to manufacturers by setting different fleet emission classes and providing lead-in time for compliance. Air Resources Board staff found that “these flexibility provisions will reduce the real world cost impact of the greenhouse gas reduction program and impact on sales.”<sup>51</sup>

### **Impact on Dealerships**

In its analysis on the impacts of the global warming regulations on industry, Air Resources Board staff expected no change in dealership profitability. Total revenue would be unaffected; any possible decrease in sales volume would be offset by averaged increased prices.<sup>52</sup>

At a workshop held during the development of the AB 1493 regulation in 2003, Peter Welch, Director of Government and Legal Affairs for the California Motor Car Dealers Association remarked that if there had been a significant price increase associated with the program’s air pollution standards, the public had not seemed to notice it since sales were not affected.<sup>53</sup>

If cleaner vehicles are seen as desirable, sales may actually increase even if prices also increase.

Furthermore, since many buyers have experienced long waiting lists for advanced-technology vehicles, the requirement that dealers sell more hybrids is unlikely to create an inventory cost that gets passed on to other consumers or a backlog of vehicles that dealers are unable to sell.<sup>54</sup>

### **Lessons Learned**

It is instructive to look to history as a guide, as many of the automakers present concerns about the cost of technology and reduced sales, for example, have also been a concern when other emission regulations were being adopted. Data can help us to assess whether these concerns have played out.

Automakers have said that the regulations will be too costly and that they will have to stop selling some of their largest vehicles, like SUVs, because they will not be able to cost-effectively reduce emissions enough to bring their fleet into compliance.<sup>55</sup> As a result, they allege, consumer choice will be dampened and the industry and its dealers will suffer.

According to a book that traces the history of pollution regulations and the automobile industry, “Time and time again in the 1950, 1960s, 1970s, 1980s and through the 1990s, the automakers said, “we don’t have the technology,” “it’s impossible,” “we don’t have the money,” “we don’t have the engineers,” “we’re at a competitive disadvantage,” “jobs will be lost,” “it will take ten years,” “we can’t change our models that quickly,” “it will be too disruptive,” “It will make cars unsafe.”<sup>56</sup>

The 1970 Clean Air Act required automakers to reduce emissions for nitrogen oxide, carbon monoxide and hydrocarbons by 90 percent between 1975 and 1976. Auto manufacturers attacked the standards. A General Motors executive told the EPA that requiring catalytic converters on its 1975 MY vehicles would pose “unreasonable risk of business catastrophe” and could conceivably lead to “complete stoppage of the entire production.” Ford’s Lee Iacocca said there was “no way” the standards could be met. Chrysler, then DaimlerChrysler, took out a full page ad claiming that emission standards would add \$1,300 to the price of a new car.<sup>57</sup>

In response to the Clean Air Act, Lee Iacocca at Ford, issued a press statement saying, “Some of the changes in this bill could prevent continued production of automobiles after January 1, 1975. Even if they do not stop production, they could lead to huge increases in the price of cars. They could have a tremendous impact on all of American industry and could do irreparable damage to the American economy. And yet, in return for all of this, they would lead to only small improvements in the quality of air.”<sup>58</sup>

Similar dire predictions were made during the LEV II and ZEV rulemakings with automakers suggesting that the standards were not technically feasible, were too expensive and that the staff’s costs analysis were underestimated and did not allow for sufficient lead time, Air Resources Board staff write, “Today, however, the LEV program is clearly successful with vehicles now meeting near zero criteria pollutant emissions ahead of schedule, bargain priced and with full model availability.”<sup>59</sup> Agency staff go on to write that “staff expects that the ultimate climate change emission reductions being proposed can be achieved effectively, on schedule and economically. Staff also expects that industry will once again exceed our expectations when we get there.”<sup>60</sup>

***Historically Overestimated Costs of Compliance***

While it is difficult to precisely pinpoint how the costs of the clean vehicle standards will be passed onto consumers, history certainly suggests that that auto manufacturers have consistently overestimated costs. Auto industry cost estimates for the 1970s catalytic converter requirements were 2 times higher than the actual cost.<sup>61</sup> In 1975, two Wall Street Journal reporters found that industry cost estimates were 25 to 50 percent higher than the estimates provided by the Bureau of Labor Statistics.<sup>62</sup> In the 1990s, Sierra Research, who provided cost analyses for the auto industry, estimated costs that were 10 times higher than the actual cost of compliance for the original LEV program.<sup>63</sup>

For example, in 1994 the automakers claimed the cost of meeting the LEV standard to be nearly \$800. As shown in Table 7, however, the actual costs were significantly lower—only about \$83 in production costs, with consumer costs even lower than that.<sup>64</sup>

<b>Table 7. Predicted Costs and Actual Costs<sup>65</sup></b>			
	<b>1975 Catalytic Converter Standards</b>	<b>1994 Original LEV Program</b>	<b>2005 Global Warming Pollution Standards</b>
CARB/Regulators	\$1,609	\$120	\$1,047
Industry	\$2,770	\$788	\$3,000
Actual Costs	\$1,350	\$83	n/a

The historical discrepancies between automaker and agency compliance are traceable to a variety of different assumptions used in their modeling.<sup>66</sup> First, auto manufacturers may cite near-term costs, rather than full-phased in costs that reflect full technological development and higher volume, which drives costs down.<sup>67</sup> Second, average compliance costs are considerably higher in early years, with the cost declining over time as a result of economies of scale, technological innovation and more experience. For example, the cost of airbag systems decreased 75 percent within the first 15 years of compliance.<sup>68</sup> Third, although not reflect in some cost estimates, manufacturers rarely pass along 100 percent of increased costs in any given model year, choosing instead to break it up over time.<sup>69</sup> Fourth, increased production costs in one product line are not necessarily fully reflected in the prices of that product line. Instead, price increases are spread throughout the fleet, with popular and higher end models subsidizing price increases of “economy” models.<sup>70</sup> Lastly, increased production costs are not necessarily fully made up for by a direct increase in vehicle price. Manufacturers use a wide variety of tools such as modifying “standard” vehicle content and adjusting incentive packages and financing terms.<sup>71</sup>

There is no reason to assume that the Air Resources Board estimates would produce smaller costs than are likely to bear out in reality. Historically, the agency’s estimates have also been higher than actual observed costs, although not as high as predictions made by industry. Moreover, the agency uses widely excepted modeling and technology costs. In fact, a comparison between Air Resources Board assumed costs and the costs assumed in National Highway Traffic Safety Administration’s CAFÉ analysis actually reveal that Air Resources Board cost estimates tend to be higher than those used by the federal government (see Table 8).

Technology	NHTSA		California	
	Low Estimate	High Estimate	Low Estimate	High Estimate
Cylinder Deactivation	\$189	\$480	\$265	\$541
Variable Valve Timing	\$36	\$146	\$49	\$409
Electric Power Steering	\$109	\$156	\$39	\$39
6-Speed Automatic Transmission	\$146	\$291	\$105	\$112
Automated Manual Transmission	\$73	\$291	\$0	\$0
Continuously Variable Transmission	\$146	\$364	\$245	\$245
Variable Valve Lift and Timing	\$73	\$218	\$259	\$829
Gasoline Direct Injection	\$200	\$250	\$259	\$294
Camless Valve Actuation	\$291	\$582	\$637	\$1,078
Dieselization	\$1,000	\$2,000	\$1,260	\$2,521
Hybrid Vehicle	\$3,000	\$5,000	\$1,968	\$5,311

***Overestimation of Cost of the Greenhouse Gas Emission Standards***

Most recently, in the case of the greenhouse gas emission standards, cost estimates provided by Sierra Research and commissioned by the Alliance of Automobile Manufacturers<sup>73</sup>, found that the average vehicle cost, under the global warming pollution standards, would increase by about

\$3,000 and that savings over the lifetime of the vehicle would only be about \$1,000.<sup>74</sup> However, there were several flaws in the study, which led Air Resources Board staff to conclude that the industry's cost estimate numbers were unreliable.<sup>75</sup>

First, Sierra Research ignored promising and cost-effective technologies in the technology packages they modeled. Instead, for example, Sierra Research assumed that vehicle weight would need to be reduced through the use of expensive aluminum body structures, now typically found only in expensive luxury cars, increasing the cost per car by more than \$2,000 alone.<sup>76</sup>

Second, the cost estimates used in the study were higher than would be reasonably expected. For example, Sierra Research estimated a cost for continuously variable valve timing and lift technology at \$808, though a simpler less costly version of the same technology existed at a cost of only \$581. Moreover, in some cases costs were based on in-house design costs, as opposed to cost estimates for components engineered and produced by an outside designer, which artificially increases costs.<sup>77</sup>

Third, costs used in the Sierra Research study for the PC/LDT1 category were based on those for the large category only (which represent only about 10% of the passenger car market), which had the effect of overestimating the costs.<sup>78</sup>

Forth, assumptions used to determine operating costs savings were quite different than those used by the Air Resources Board and included a large rebound effect and fewer lifetime vehicle miles traveled.<sup>79</sup>

The District Court in Vermont that analyzed the numbers and found that the manufacturer's price estimates were "unsupported by the evidence."<sup>80</sup> The court went on to say that the automakers have "failed to carry their burden to demonstrate that the regulation is not technologically feasible or economically practicable... given the flawed assumptions and overly conservative selection of technologies" utilized. Instead, the Court found that "compliance is possible in the time period provided at a relatively reasonable cost."<sup>81</sup>

### **Conclusion**

Manufacturers and dealers are unlikely to be severely impacted by the clean vehicle standards. Moreover, history shows us that regulations are necessary for American automakers to provide cleaner vehicles. Hendry Ford II said, "We wouldn't have the kinds of safety built into automobiles that we have unless there had been a federal law. We wouldn't have had the fuel economy unless there had been a federal law, and there would not have been the emission control unless there had been a federal law."<sup>82</sup>

## **State Economic Impacts**

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Solutions to global warming provide significant economic opportunity to Minnesota and the country. Specifically, more efficient, cleaner vehicles save consumers money, increasing personal income that can be spent in the local economy and promoting job growth.

### **Dependence on Foreign Oil**

The United States has only three percent of the world's oil supplies but is responsible for about a quarter of the world's oil consumption. We currently import 60 percent of our oil from foreign countries, increasingly from regions that are politically unstable or unfriendly to U.S. interests.<sup>83</sup>

The United States hands over more than \$200,000 every minute to other oil-producing countries. Americans spent about \$190 billion on gas in 2000, with projections indicating that that spending is expected to grow by 50 percent in less than a decade.<sup>84</sup>

This unstable supply of oil threatens our national economy, particularly since 97 percent of the U.S. transportation system is completely reliant on oil. Our current oil dependence requires imports that make up 40 percent of the national trade deficit.<sup>85</sup> According to the Union of Concerned Scientists, oil dependence has cost the U.S. economy about seven trillion dollars since 1970.<sup>86</sup>

Oil supply disruptions have at times greatly affected state and national fuel prices and availability. The nation's reliance on petroleum to power our vehicles leaves us vulnerable to rising prices, price spikes and supply disruptions, such as those that occurred during the oil embargoes of the 1970s.

Even without a dramatic event such as an oil embargo, price and supply problems are likely to recur as worldwide demand rises and readily accessible sources of oil are exhausted. Recent increases in oil prices to record highs are caused by economic growth in developing countries, instability in the Middle East and supply limits in many oil-producing countries. These forces are part of the long-term trend influencing oil prices.

Because many of the technologies used to reduce global warming emissions are also expected to reduce gasoline use in new vehicles, reductions in oil consumption may lessen the blow of future supply disruptions and price fluctuations.<sup>87</sup>

### **Reducing Oil Consumption**

A 2007 analysis found that the 12 states that had already adopted the clean car standard were projected to reduce gas consumption by as much as 8.3 billion gallons per year in 2020, as much as is consumed by all vehicles in Florida in a year and one-fifth as much oil as we currently import from the Persian Gulf.

Put another way, those 12 state standards would save as much fuel as if all drivers in America parked their cars for 22 days out of the year or if 14 million of today's cars were taken off the

road completely. At the time this was more gasoline than is currently used by any single state in a year except Florida, Texas and California.<sup>88</sup> If the six more states considering adoption of the clean vehicle standards in 2007 had done so, gasoline consumption was projected to drop by as much 11.2 billion gallons in 2020.<sup>89</sup> Two of the states did, Arizona and New Mexico.

Adopting the clean vehicle standards in Minnesota would save 146 million gallons of gas in 2020, the equivalent of taking 244,583 cars off the road for a year in 2020, or 1,316,985 cars off the road for a year by 2020 – above and beyond the gas savings Minnesota will experience under the new CAFE standards passed in 2007.

### **Boosting the Economy**

Because of reduced oil consumption—allowing drivers to spend more of their money on other commodities—the Air Resources Board projects that the net impact of the standards to the state’s economy will be positive, suggesting that Minnesota could save money while at the same time reducing its overall emissions of global warming pollution.<sup>90</sup>

Agency staff expect that the money saved through reduced operating costs—money that usually flows out of the local economy—will raise people’s personal income and help to energize the local economy through increased spending on other goods and services. These expenditures would create jobs and help to create new businesses.<sup>91</sup>

Agency staff estimate that in California the global warming pollution reduction standards will create 3,000 jobs in 2010; 55,000 jobs in 2020 and 83,000 jobs in 2030, compared to business as usual economic projections. Additionally, they found that personal income would increase by \$160 million in 2010, by \$5.3 billion in 2020 and by \$8.5 billion by 2030.<sup>92</sup> While Minnesota will not experience such large absolute increases in income and employment, the clean vehicle standards are expected nonetheless to have a positive impact on Minnesota’s economy.

Vehicles that meet the clean vehicle standards will be more fuel-efficient. Research by the Union of Concerned Scientists found that increasing the fuel economy of new auto nationwide to 35 miles per gallon (mpg) by 2018, as directed in the Energy Act of 2007, would increase U.S. employment by 241,000 jobs in the year 2020, including 23,900 jobs in the auto industry. According to the analysis, shifting estimated consumer savings from the oil industry to more productive parts of the economy would generate 82,900 new jobs in the service industry; 44,400 jobs in the retail trade industry; 33,100 jobs in the finance, insurance, and real-estate industries; and 17,800 jobs in manufacturing industries outside the auto industry. Thousands of other jobs would be created in agriculture, construction, transportation, utilities, and government. Oil and associated industries would see their job forecasts drop by 21,000, though these jobs would be shifted to other sectors of the economy, yielding a net increase of 241,000 new jobs. The fuel-efficiency of vehicles that meet the clean vehicle standards are projected to be higher than the new CAFE standards, suggesting that we can expect greater economic benefits under these stricter standards<sup>93</sup>.



## **Reduced Medical Costs**

Because the program would also reduce air pollution—that affects rates of asthma, cancer and heart disease—a reduction in state medical costs could also be expected.<sup>94</sup> Health care costs from ozone, smog and air toxics put a burden on the state health care system. Reducing emissions that trigger asthma attacks and increase cancer will inevitably lead to fewer sick days and reduced health care costs for business and government.

The National Institute of Health (NIH) estimated that direct medical costs associated with cancer cost \$78.2 billion in 2006. Cost to the economy from lost productivity from illness and premature death amounted to \$128.1 billion.<sup>95</sup> The American Lung Association estimated that annual health costs from motor vehicle pollution could be as high as \$93 billion.<sup>96</sup>

The cost burden on our economy from asthma is similarly great—and rising. According to the Asthma and Allergy Foundation of America the annual cost of asthma is estimated to be \$18 billion, including \$10 billion in direct costs (primarily hospitalizations) and \$8 billion in indirect costs (lost earnings due to illness or death).

According to a 2008 Minnesota Department of Health report on asthma in Minnesota, an estimated 303,000 adults in Minnesota currently have asthma, and an estimated 85,000 children in Minnesota currently have asthma<sup>97</sup>.

Asthma alone was estimated to have cost Minnesota approximately \$363.9 million in 2003, including \$208.6 million in direct costs and \$155.3 in indirect costs<sup>98</sup>.

## **The Impacts of Unmitigated Global Warming**

The science is clear about the seriousness of global warming and there is a growing consensus around policy solutions that would put a price on Air Resources Boardon. Businesses that are dependent on fossil fuels or are heavy emitters will continue to find themselves in a risky business climate. Taking immediate actions to reduce the emissions from these sectors may help to mitigate serious economic disruption down the road.<sup>99</sup>

According to Dr. Lee E. Frelich of the University of Minnesota's Center for Hardwood Ecology global warming could cause the ecology of the Boundary Waters to change so significantly that, within 50 years, the wilderness would look completely different. Global warming could also cause more frequent and extreme heat-waves, less snow on trails, lower lake levels in the summer time and thinner ice on lakes in the winter time, more intense snowstorms and rainstorms leading to more frequent instances of flooding and longer periods of drought.

Somewhat easier to quantify are the impacts these changes would have on different sectors of our economy. Infrastructure, like flood control and drainage systems, roadways and bridges could be impacted, requiring improvements and replacements. As the planet warms, water shortages and drought could threaten Minnesota's agricultural sector. The global impacts of global warming could cause the massive displacement of people who live in coastal areas, potentially causing an influx of "environmental refugees" in Minnesota.<sup>100</sup> The American Lung

Association found that ground level ozone already costs farmers \$500 million dollars annual in reduced crop yield<sup>101</sup>—and if temperatures continue to rise, this is likely to increase. And, already, as temperatures have risen, Federal wild fire spending has more than tripled in less than 10 years, rising from less than \$800 million in 1996 to \$3 billion.<sup>102</sup>

Stabilizing greenhouse gas concentrations at relatively safe levels will cost less than 3 percent of expected economic growth by 2030 (less than 0.12 percent per year). Costs would be lower if Air Resources Boardon permits are auctioned to polluting industries and the revenue is invested in energy efficiency and the development of new, clean energy technologies. The former chief economist of the World Bank, Sir Nicholas Stern, has put the price of inaction or unmitigated warming at as high as 20 percent of global GDP by 2100.<sup>103</sup>

### **Conclusion**

In addition to reducing the global warming pollution that threatens our rivers, lakes, streams and open spaces, and cutting air pollution emissions, bringing clean cars, light-duty trucks and SUVs to Minnesota may will produce a net economic benefit for the state, through consumer savings, increased consumer spending in state, new jobs generated from that new consumer savings, reduced health car costs and avoiding the cost of inaction on global warming.

## **Methodology**

To arrive at the annualized and cumulative total cost savings to Minnesota consumers we started with the May 2008 California Air Resources Board analysis of greenhouse gas reductions under a Clean Car standard as compared to greenhouse gas reductions under the federal CAFÉ standard in 2020, for the annualized value, and by 2020, for the cumulative value. We converted the greenhouse gas reductions, which are listed in MMTCO<sub>2</sub>e in to equivalent pounds of CO<sub>2</sub>. We then converted the equivalent pounds of CO<sub>2</sub> in to the equivalent gallons of gas saved, and used that figure to calculate the gas savings, at the current price of \$1.74 per gallon and at a high price of \$3.00 per gallon.

The following are caveats regarding the greenhouse gas reduction estimates:

As with all estimates, there's some room for error. There are two primary factors, one that may cause an overstatement of savings and one that likely results in an understatement.

1.) The Air Resources Board (CARB) may not account for the later start date of the clean vehicle standards in some states. This means that the figure here could overstate savings. However, the difference in the early years of the program is fairly small, so the total error in the estimate would likewise be small.

2) CARB assumes a very truck-heavy fleet mix in all states except California. Even before the drastic shift away from light trucks and toward cars in the past six months, CARB's assumption was extremely conservative. The fleet mix in most states is closer to California's car-heavy mix than the federal truck-heavy mix. Because the clean vehicle standards set tighter standards for cars CARB's assumption of fewer cars and more trucks understates the savings.

The following are caveats regarding the gas savings estimates:

1) We calculated gas savings by converting tons of carbon dioxide equivalent into gallons of gas. However, some of the savings made possible by the clean vehicle standards do not result directly from reduced gas use, but rather better controls on air conditioning coolants, thus this conversion somewhat overstates the gas savings of the program.

2) The gas savings estimate is the money that consumers would save at the pump. It does not take into account the higher price they might have to pay for vehicles compliant with the Clean vehicle standards.

To arrive at the projected county-by-county figures we started with the total savings figure as outlined above, and then used 2007 vehicles miles traveled for each county and the Minnesota Department of Transportation and Met Council estimates for per year percentage increase in VMTs for metro Minnesota counties of 0.8%, and non-metro Minnesota counties of 1.1% provided to the MCCAG, to calculate the projected 2020 VMTs for each county. We then used the 2020 VMTs for each county to determine what proportion of the total savings figure would happen in that county in 2020.

The following is a caveat regarding the county-by-county estimates:

- 1) This process does not take in to account a likely variation in fleet-mix by county.
- 2) This process relies on the MN DOT and Met Council estimates for per year % increase in VMTs provided in 2008, but recent months have shown a decrease or stabilization in VMTs in certain counties.

## Endnotes:

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<sup>1</sup> See Appendix A.

<sup>2</sup> Provided by the California Air Resources Board Fact Sheet, December 2004. In developing its global warming pollution standards, the Air Resources Board looked at five different MY 2002 representative vehicles that best fit the average attributes of its class: (1) Chevrolet Cavalier (2.2L I-4) for the “small car” class, which EPA defines as sub-compact and compact sedans; (2) Ford Taurus (3.0 L V6) for the “large car” class, which EPA defines as mid-size and large sedans; (3) DaimlerChrysler Town and Country (3.3L V6) for the “minivan” class; (4) Toyota Tacoma (3.4 L V6) for the “small truck” class, defined by EPA as small SUVs and pick-ups; and (5) GMC Sierra (5.3 I V8) for the “large truck” class, defined by EPA as standard pick-ups and large SUVs. To determine the cost of various technologies on consumers, the Air Resources Board multiplied the initial cost (the incremental additional cost of the technology or package of technologies) by 1.4 (to account for a 40 percent mark-up rate to account for the overhead costs associated with the research, development and manufacturing of the technologies). This retail price multiplier falls within the range of those conventionally utilized in such studies. Volume assumptions—which, in part, determine the cost of the technologies—assumed that vehicles would be produced in volumes to provide vehicles for export to other states and countries, besides California. For a more detailed explanation of the Air Resources Board’s analysis, please review their Initial Statement of Reasons.

<sup>3</sup> Meszler Engineering Services, GHG Emission Standards for Vehicles: An Overview of California’s Pavley Requirements.

<sup>4</sup> Comments by Roland Hwang, Natural Resources Defense Council. State of California Air Resources Board, Air Resources Board Staff Testimony Regarding the Greenhouse Gas Standards for Motor Vehicles. September 2004. <http://www.arb.ca.gov/board/mt/mt092404>

<sup>5</sup> US District Court for the District of Vermont, Case No. 2:05-cv-302, Opinion and Order, September 12, 2007.

<sup>6</sup> Ketcham, Lauren. “World’s Scientists: Solutions to Global Warming Available but Require Government Action,” Environment New Mexico, May 4, 2007. Summary of findings from Intergovernmental Panel on Climate Change Fourth Assessment Report Summary for Policymakers, “Mitigation of Climate Change.”

<sup>7</sup> Environment Maryland Clean Cars fact sheet.

<sup>8</sup> Dutzik, Tony and Dena Mottola. “Clearing the Air: The LEV II Program and its Impacts on New Jersey,” NJPIRG Law and Policy Center, June 2003.

<sup>9</sup> McGinty, Kathleen A. Secretary of the Pennsylvania Department of Environmental Protection. Statement on Pennsylvania’s Clean Vehicles Program before the House Environmental Resources and Energy Committee. February 8, 2006. <http://www.depweb.state.pa.us/dep/cwp/view.asp?a=3&q=487616>.

<sup>10</sup> California Environmental Protection Agency, Air Resources Board, *Staff Report: Initial Statement of Reasons: 2003 Proposed Amendments to the California Zero Emission Vehicle Program Regulations*, 10 January 2003.

<sup>11</sup> Kae Inoue, “Honda Will Cut Excess Price of Civic Hybrids to Bolster Sales,” *Bloomberg*, 22 December 2005.

<sup>12</sup> October 2007 comparison of Ohio (Federal program), New York (LEVII and ZEV), and Pennsylvania (LEVII only). Based on MSRP for automakers most popular 2005 models and randomly selected 2005 and 2006 mid-size and luxury vehicles. MSRP does not include options, tax, title, transfer or destination fees.

<sup>13</sup> Reproduced from McGinty, Kathleen A. Secretary of the Pennsylvania Department of Environmental Protection. Statement on Pennsylvania’s Clean Vehicles Program before the House Environmental Resources and Energy Committee. February 8, 2006. <http://www.depweb.state.pa.us/dep/cwp/view.asp?a=3&q=487616>.

<sup>14</sup> California Environmental Protection Agency, Air Resources Board, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles*, 6 August 2004; California Environmental Protection Agency, Air Resources Board, *Addendum Presenting and Describing Revisions to: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles*, 10 September 2004.

<sup>15</sup> Provided by the California Air Resources Board Fact Sheet, December 2004. In developing its global warming pollution standards, the Air Resources Board looked at five different MY 2002 representative vehicles that best fit the average attributes of its class: (1) Chevrolet Cavalier (2.2L I-4) for the “small car” class, which EPA defines as sub-compact and compact sedans; (2) Ford Taurus (3.0 L V6) for the “large car” class, which EPA defines as mid-size and large sedans; (3) DaimlerChrysler Town and Country (3.3L V6) for the “minivan” class; (4) Toyota Tacoma (3.4 L V6) for the “small truck” class, defined by EPA as small SUVs and pick-ups; and (5) GMC Sierra (5.3 I V8) for the “large truck” class, defined by EPA as standard pick-ups and large SUVs. To determine the cost of various technologies on consumers, the Air Resources Board multiplied the initial cost (the incremental additional

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cost of the technology or package of technologies) by 1.4 (to account for a 40 percent mark-up rate to account for the overhead costs associated with the research, development and manufacturing of the technologies). This retail price multiplier falls within the range of those conventionally utilized in such studies. Volume assumptions—which, in part, determine the cost of the technologies—assumed that vehicles would be produced in volumes to provide vehicles for export to other states and countries, besides California. For a more detailed explanation of the Air Resources Board’s analysis, please review their Initial Statement of Reasons.

<sup>16</sup> California Environmental Protection Agency Air Resources Board, “Regulations to Control Greenhouse Gas Emissions from Motor Vehicles, Final Statement of Reasons,” August 4, 2005.

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

<sup>19</sup> California Environmental Protection Agency Air Resources Board, “Staff Report: Initial Statement of Reasons for Proposed Rulemaking,” Public Hearing to consider adoption of regulations to control greenhouse gas emissions from motor vehicles, August 6, 2004.

<sup>20</sup> See Appendix A.

<sup>21</sup> Meszler Engineering Services, GHG Emission Standards for Vehicles: An Overview of California’s Pavley Requirements.

<sup>22</sup> Ibid.

<sup>23</sup> California Environmental Protection Agency Air Resources Board, “Staff Report: Initial Statement of Reasons for Proposed Rulemaking,” Public Hearing to consider adoption of regulations to control greenhouse gas emissions from motor vehicles, August 6, 2004.

<sup>24</sup> AP/Los Angeles Times, “Autos: Fuel Economy Top Consumer Priority—Survey,” August 23, 2007.

<sup>25</sup> Lienert, Dan. “Best Selling Cars of 2006,” Forbes.com, <http://www.msnbc.com/id/14803544/>.

<sup>26</sup> “Clean Cars and Washington’s Economy: Proposed new clean vehicle standards would help Washington build a healthier, more prosperous economy,” <http://www.climatesolutions.org/pubs/pdfs/economy.pdf> and Personal Communication with Paul Hughes, California Air Resources Board, October 23, 2007.

<sup>27</sup> California Clean Cars Campaign, “California Vehicle Global Warming Law,” [www.calcleancars.org](http://www.calcleancars.org).

<sup>28</sup> Auto Alliance, <http://www.autoalliance.org/index.cfm?objectid=2EA751DB-1D09-317F-BBFF557DC261A83E>.

<sup>29</sup> McGinty, Kathleen A. Secretary of the Pennsylvania Department of Environmental Protection. Statement on Pennsylvania’s Clean Vehicles Program before the House Environmental Resources and Energy Committee. February 8, 2006. <http://www.depweb.state.pa.us/dep/cwp/view.asp?a=3&q=487616>.

<sup>30</sup> 2007 models that do not comply with federal or California standards: Jeep Commander 4WD/8cyl/4.7L/Auto (6cyl complies with CA and Fed), Jeep Grand Cherokee 4WD/8cyl/4.7L/Auto/Flex-fuel (6cyl complies with CA and Fed) and Volkswagen Touareg 10cyl (8cyl is compliant). 2007 models that comply with federal standards but not with California’s: Chevrolet Silverado Classic 1500 4WD/Flex-fuel, Chevrolet Suburban 1500 4WD/4cyl (8cyl is compliant), Chevrolet Tahoe 1500 2WD/8cyl/Flex-fuel, Chevrolet Van 15/25 Conversion 2WD/8cyl/Flex-fuel, Chevrolet Van 1500 Conversion AWD/8cyl/Flex-fuel, Chrysler Aspen 4WD/8cyl/Flex-fuel, Chrysler Sebring 6cyl (4cyl is compliant), Dodge Dakota Pickup 4WD/6cyl/Auto (Manual is compliant), Dodge Durango 4WD/8cyl/4.7L (Flex-fuel), Dodge Durango 2WD/6cyl (8cyl is compliant), Dodge Ram 1500 Pickup 4WD/8cyl/Flex-fuel, Dodge Ram 1500 Pickup 2WD/6cyl/Auto (Manual is compliant), GMC Savanna 15/20 Conversion Cargo 2WD/8cyl/Flex-fuel, GMC Savanna 1500 Passenger AWD, GMC Savanna 1500 Conversion Cargo AWD, GMC Savanna 1500/2500 Cargo 2WD/8cyl/5.3L/Flex-fuel, GMC Savanna 1500/2500 Passenger AWD/8cyl/5.3L/Flex-fuel, Mercedes-Benz S65 AMG, Mercedes-Benz SL55 AMG, Mercedes-Benz SL600, Mercedes-Benz SL65 AMG, Saab 9-7X AWD/8cyl (6cyl is compliant).

<sup>31</sup> US District Court for the District of Vermont, Case No. 2:05-cv-302, Opinion and Order, September 12, 2007.

<sup>32</sup> McGinty, Kathleen A. Secretary of the Pennsylvania Department of Environmental Protection. Statement on Pennsylvania’s Clean Vehicles Program before the House Environmental Resources and Energy Committee. February 8, 2006. <http://www.depweb.state.pa.us/dep/cwp/view.asp?a=3&q=487616>.

<sup>33</sup> Minnesota Clean Car Act, H.F. 690, as introduced, February 2009.

<sup>34</sup> E-mail exchange between author and Spencer Quong, Senior Vehicle Analyst, Union of Concerned Scientists, January 28, 2009.

<sup>35</sup> List provided to author by Jim Erkel, Attorney and Program Director, Minnesota Center for Environmental Advocacy. Available upon request.

<sup>36</sup> Ibid.

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- <sup>38</sup> NJPIRG Law and Policy Center, Tony Dutzik, Dena Mottola, June 2003. "Clearing the Air: The Low-Emission Vehicle II Program and Its Impacts on New Jersey."
- <sup>39</sup> Ibid.
- <sup>40</sup> Ketcham, Lauren and Elizabeth Ridlington. "Ready to Roll: The Benefits of Today's Advanced-Technology Vehicles for New Mexico." Environment New Mexico Research & Policy Center. Spring 2007.
- <sup>41</sup> California Environmental Protection Agency Air Resources Board, "Staff Report: Initial Statement of Reasons for Proposed Rulemaking," Public Hearing to consider adoption of regulations to control greenhouse gas emissions from motor vehicles, August 6, 2004. California Environmental Protection Agency, Air Resources Board, *Addendum Presenting and Describing Revisions to: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles*, 10 September 2004.
- <sup>42</sup> Reproduced from California Environmental Protection Agency Air Resources Board, "Staff Report: Initial Statement of Reasons for Proposed Rulemaking," Public Hearing to consider adoption of regulations to control greenhouse gas emissions from motor vehicles, August 6, 2004. California Environmental Protection Agency, Air Resources Board, *Addendum Presenting and Describing Revisions to: Initial Statement of Reasons for Proposed Rulemaking, Public Hearing to Consider Adoption of Regulations to Control Greenhouse Gas Emissions from Motor Vehicles*, 10 September 2004.
- <sup>43</sup> California Environmental Protection Agency Air Resources Board, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles, Final Statement of Reasons," August 4, 2005.
- <sup>44</sup> Dan Meszler, Meszler Engineering Services, "Testimony in Support of SB 51 and SB 103: Maryland Clean Cars Act of 2007." Meszler is an independent consulting engineer, who has worked on air quality and energy issues for more than 25 years. Analysis included standard EPA-recognized modeling tools for air pollution.
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- <sup>46</sup> California Environmental Protection Agency Air Resources Board, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles, Final Statement of Reasons," August 4, 2005.
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- <sup>48</sup> California Environmental Protection Agency Air Resources Board, "Regulations to Control Greenhouse Gas Emissions from Motor Vehicles, Final Statement of Reasons," August 4, 2005.
- <sup>49</sup> California Clean Cars Campaign, "California Vehicle Global Warming Law," [www.calcleancars.org](http://www.calcleancars.org).
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- <sup>54</sup> Choy, Denise, Elizabeth Ouzts, Elizabeth Self, "Clean Cars, Cleaner Air: A Primer on the Clean Cars Program and its Benefits," Environmental Defense, Environment North Carolina and North Carolina Sierra Club. May 2006.
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- <sup>69</sup> Ibid.
- <sup>70</sup> Ibid.
- <sup>71</sup> Ibid.
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