Fuel Taxes

Increasing Fuel Taxes and Fees

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TDM Encyclopedia
Victoria Transport Policy Institute
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This chapter discusses various reasons to increase fuel taxes, fuel prices impacts on travel and energy consumption, and fuel tax increase implementation strategies.

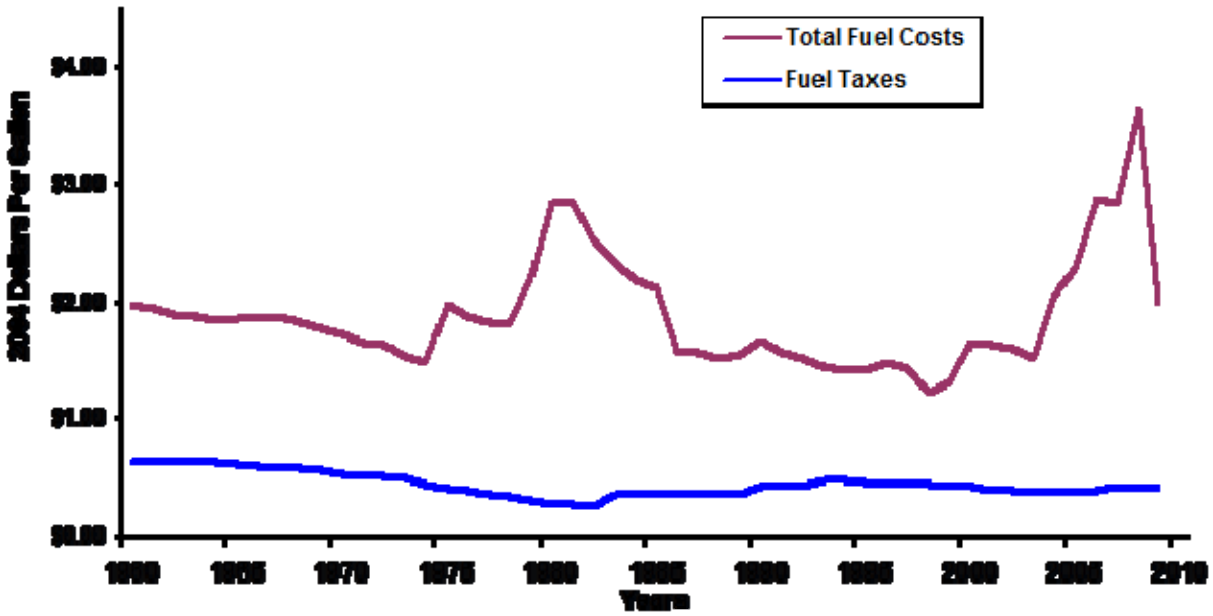
Description

Various reasons to increase motor vehicle fuel taxes are described below.

As a Road User Fee

Vehicle fuel taxes can be considered a roadway user fee (Brown 2001; Metschies, 2005). In many jurisdictions these fees fail to cover total roadway costs, particularly if traffic services such as planning and policing are included (Transportation Costs). Although US fuel taxes cover most state highways and highway patrol costs, local roads and traffic services are funded mostly through general taxes. Fuel taxes have not increased with inflation and vehicle fuel efficiency, resulting in declining revenue per vehicle-mile, as indicated in Figure 1. As a result, vehicle user fees cover a declining portion of total U.S. roadway expenses (Wachs, 2003). Fuel taxes would need to approximately double to cover all roadway costs (Puentes and Prince, 2003).

Figure 1 **U.S. Fuel and Fuel Tax Cost Trends** (FuelTrends)



Inflation-adjusted fuel taxes per vehicle-mile declined by more than half between 1960 and 2004 in the U.S., due to inflation and increased vehicle fuel efficiency. It spiked in 2008 but declined since.

To Finance Transportation Programs

Fuel taxes can be increased to help Finance transportation programs, including alternative modes and TDM programs. Critics argue that Road Pricing is more efficient and equitable (it can more accurately reflect the costs imposed by a particular trip) and reliable (since increased fuel efficiency and shifts to alternative modes may reduce future fuel tax revenues per vehicle-mile), which may be true in the long-term, but compared with commonly-used transportation financing options, such as property and sales taxes, fuel taxes are relatively efficient and reliable (NSTIFC 2008).

To Encourage Energy Conservation

Fuel tax increases are an efficient and effective way to encourage Energy Conservation and Emission Reductions (CBO 2003; Sterner 2006). Fuel prices are predicted to increase and fluctuate significantly in the future due to growing demand and rising production costs (Magoon 2000), so higher fuel taxes are justified now to increased transport system efficiency so the future economy is less burdened by excessive fuel costs. Energy conservation and emission reductions are also justified to minimize climate change emissions. This can be implemented as a Carbon Tax, that is, a tax on the carbon content of fuels, which is effectively a tax on the fossil fuel carbon dioxide emissions (www.carbontax.org).

As a TDM Strategy

Fuel is the largest and most visible motor Vehicle Operating Expense. Increasing vehicle operating costs tends to reduce vehicle travel. For this reason, fuel tax increases are sometimes proposed as a way to reduce driving and increase transport system efficiency.

As A Revenue-Neutral Tax Shift

Some economists recommend increasing fuel taxes as part of a revenue-neutral tax shift, which means increasing taxes on resources such as fuel to fund reductions in more economically harmful taxes, such as those on income and investments (Durning and Bauman, 1998; *Carbon Tax Center*). Such tax shifts can provide overall economic, environmental and social benefits (Norland and Ninassi, 1998; Litman, 2008b).

To Internalize Fuel Production And Consumption External Costs

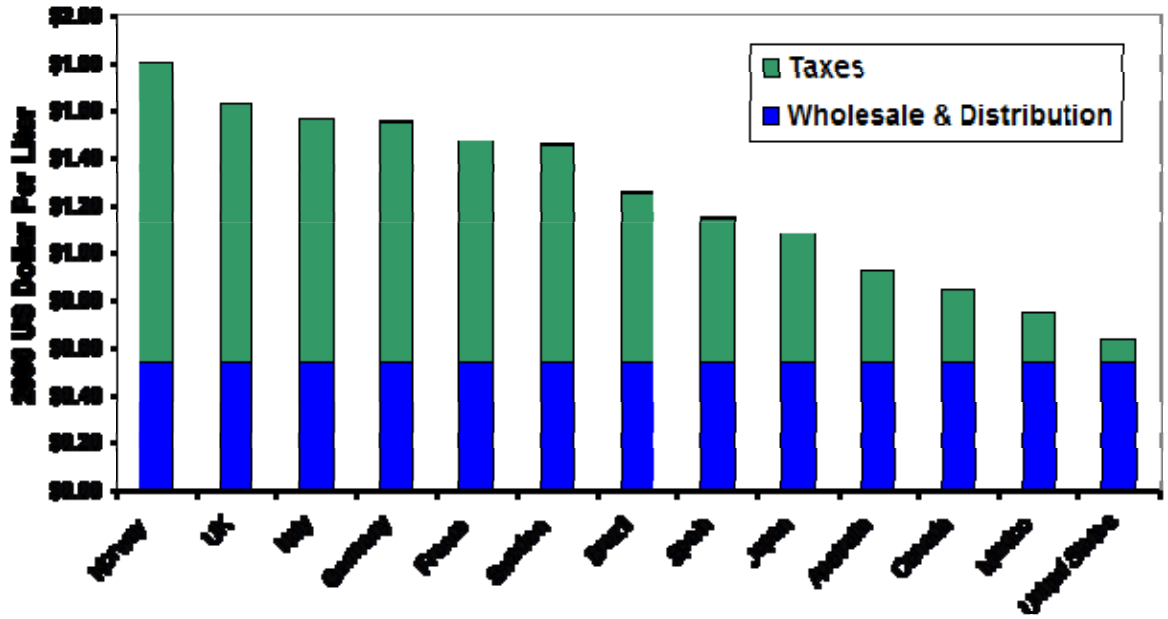
Fuel production and consumption impose various economic, social and environmental costs, including environmental damages, tax subsidies, micro-economic and security costs of petroleum imports. These are estimated to average $0.30-1.00 per gallon (ExternE, 1999; Delucchi and Murphy, 1996; UNEP, 2003; Parry and Small, 2004; Litman, 2006; *Pigou Club* www.pigouclub.com). This is particularly important in jurisdictions where fuel prices are below production costs or international market prices, resulting in economic subsidies of fuel consumption and financial drains on public budgets (Metschies 2005).

To Fund Vehicle Insurance

Some people have proposed a fuel surcharge to fund basic vehicle insurance, called “Pay-At-The-Pump” insurance. This converts a fixed vehicle cost into a variable cost, called Distance-Based Pricing.

North American taxes are lower than those in other developed countries, as illustrated in the figure below. Most fuel taxes are calculated as cents per gallon or liter, rather than as a percentage of sales prices, so their value tends to decline with inflation unless increased regularly. In addition, vehicle fuel economy has improved significantly over the last few decades. As a result, the inflation-adjusted value of fuel taxes per vehicle-mile has declined significantly over the last few decades (FuelTrends Spreadsheet).

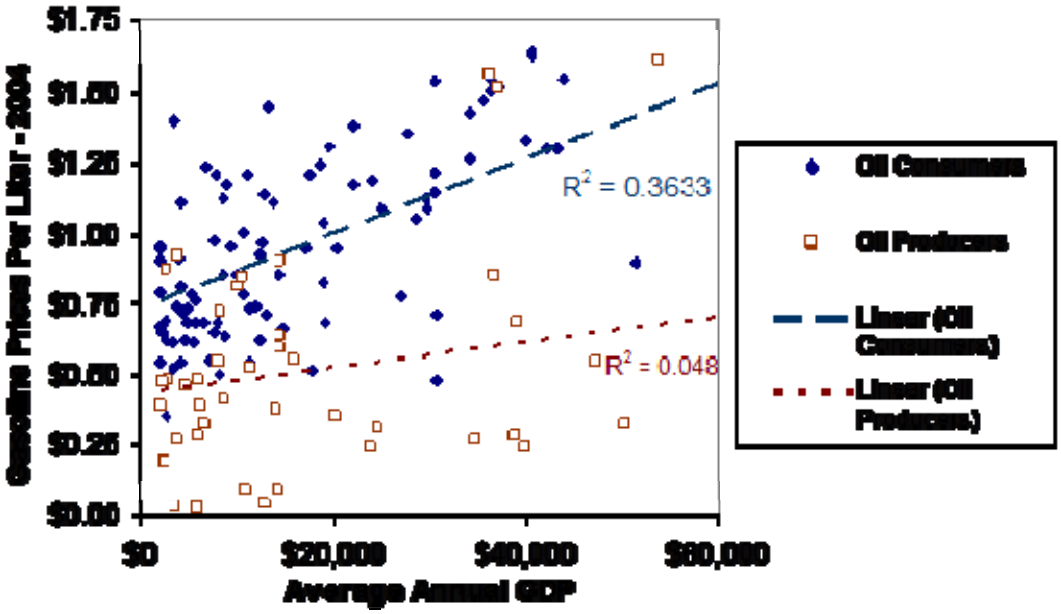
Figure 2 **Vehicle Fuel Retail Prices** (International Fuel Prices 2007)



North American fuel taxes and prices are far lower than those in other developed countries.

Per capita GDP increases with fuel prices, particularly among oil consuming countries (countries that produce no petroleum), as illustrated in Figure 3. Several factors probably contribute to this positive relationship between fuel prices and GDP. Higher fuel prices encourage more efficient transportation and fuel conservation. For oil consuming nations, reduced fuel consumption reduces the economic costs of importing petroleum. For oil producing countries it leaves more product to export, increasing revenues and income. For all countries, reducing VMT reduces costs such as traffic congestion, road and parking facility costs, accident and pollution costs, helps maintain a diverse transportation system (walking, cycling and public transport), and reduces sprawl.

Figure 3 **GDP Versus Fuel Prices, Countries** (Litman 2010)



Economic productivity tends to increase with higher fuel prices, indicating that high vehicle fees do not reduce overall economic productivity.

This suggests that fuel taxes could increase significantly without reducing North American economic competitiveness. Fuel prices vary significantly around the world, from significant subsidization to high taxation. Economic development experts recommend setting fuel taxes to at least cover basic roadway expenditures (a minimum tax of about 10¢ per liter), or higher to fund other transport sector expenditures (including subsidies for rail and public transit services), and to contribute to general government budgets (Metschies 2005; Clarke and Prentice 2009).

Fuel tax increases often face consumer, voter and industry opposition. Motorists will often drive out of their way to save a few cents per gallon in fuel prices (sometimes to the point that the extra driving consumes much of their savings). Fuel-intensive industries are often able to obtain concessions and exemptions that reduce the effects of such taxes. Some jurisdictions use low fuel taxes to compete for businesses. It is sometimes easier to increase general sales or property taxes than fuel taxes, possibly because the percentage increase seems smaller (i.e., a 1¢ per dollar in general sales tax costs consumers about the same amount as a 10¢ per gallon fuel tax, but being a smaller number it appears more acceptable to voters). This political resistance and evasion makes it difficult to increase fuel taxes, particularly in a single, small jurisdiction. To minimize these problems, fuel tax increases should be gradual and predictable, with maximum price increases of 10% at one time (Metschies, 2005).

How It Is Implemented

Fuel taxes can be raised by:

- Increasing motor vehicle fuel tax rates.

- Imposing a Carbon Tax, that is, a tax that reflects the amount of carbon released when a fuel is burned, as a climate change emission reduction strategy.

- Appling general sales tax to fuel. Many jurisdictions exempt motor vehicle fuel from general sales taxes. If motor vehicle fuel excise taxes are considered a road user fee, as is assumed in highway cost allocation analysis, then general sales taxes should also be applied for the sake of economic neutrality (Jones and Nix, 1995). Exempting fuel from general taxes represents a subsidy of driving, equivalent to collecting the tax and then returning it as a grant just to fuel users.

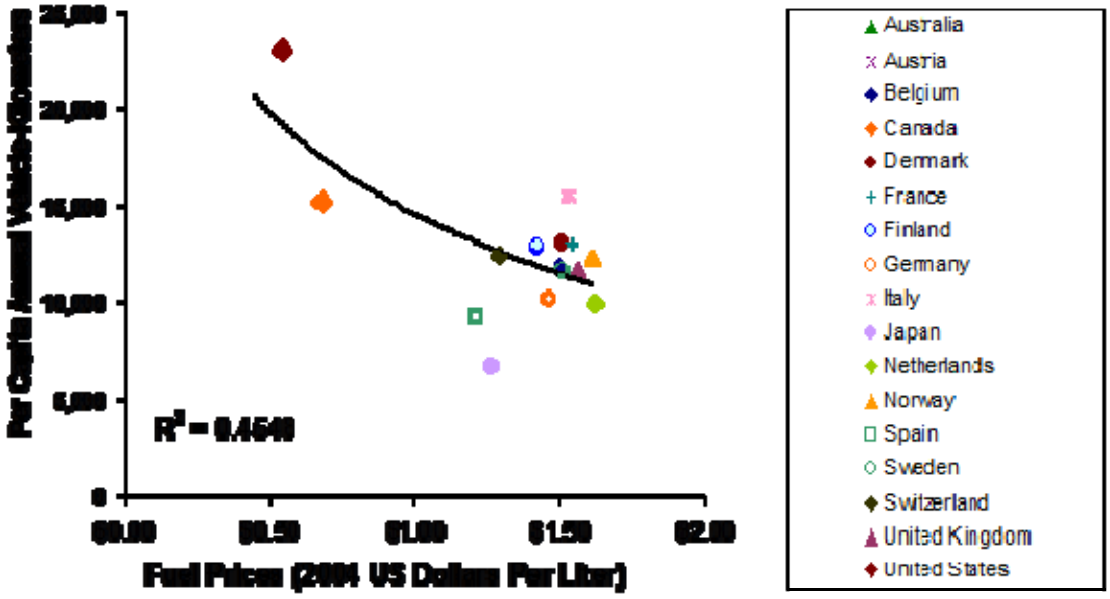
- Index fuel taxes to inflation or roadway costs. Most fuel taxes are a fixed amount per gallon or liter, and so their real value declines over time, and it is often politically difficult to raise them, resulting in less revenue per vehicle-mile and a declining portion of roadway costs paid through user fees (Puentes and Prince, 2003; Litman, 2004). Indexing fuel taxes to inflation or roadway expenditures would help overcome these obstacles.

- Adding a special hazardous material tax to fund cleanup and environmental remediation programs.

Travel Impacts

Higher fuel prices cause a combination of reduced driving and increased vehicle fuel efficiency (Institute for Transport Studies, 2004; CBO, 2008). Short-term fuel savings consist of reduced driving and a shift toward more fuel-efficient vehicles owned in multi-vehicle households. Over the long-term, higher fuel prices encourage consumers to purchase more fuel-efficient vehicles. About two-thirds of long-term fuel savings typically come from increased fuel efficiency and one third from reduced vehicle travel. As a result, increased fuel taxes cause greater fuel savings but less vehicle travel reductions then the same amount of revenue collected through per-mile fees, road tolls or parking charges.

Figure 4 **Fuel Price Versus Per Capita Vehicle Travel** (www.vtpi.org/OECD2006.xls)



Residents of European countries and Japan tend to travel significantly less by automobile than in the U.S. and Canada, in part due to higher fuel taxes.

Fuel Consumption Impacts

The price Elasticity of gasoline is estimated to be -0.27 in the short run and -0.7 in the long run, meaning that a 10% price rise reduces fuel consumption by 2.7% in two or three years, and 7% over a five to ten year period (Goodwin, 1992). DeCicco and Gordon (1993) conclude that the medium-run elasticity of vehicle fuel in the U.S. is -0.3 to -0.5. Hagler Bailly (1999) conclude that the fuel price elasticity for gasoline is -0.15 in the short run and -0.6 in the long run, with separate estimates for air, freight and transit transport.

Table 1 **Fuel Tax Increase Impacts** (Harvey and Deakin, 1997, Table B.8)

Region	Tax Increase	VMT	Trips	Delay	Fuel	ROG	Revenue
Bay Area	$0.50	-3.6%	-3.4%	-8.5%	-8.8%	3.5%	$1,332
	$2.00	-11.7%	-11.3%	-25.5%	-30.6%	11.6%	$4,053
Sacramento	$0.50	-4.1%	-3.9%	-7.0%	-9.3%	4.0%	$414
	$2.00	-13.2%	-12.7%	-22.0%	-31.8%	13.0%	$1,245
San Diego	$0.50	-3.9%	-3.5%	-8.0%	-9.1%	3.8%	$747
	$2.00	-12.5%	-12.0%	-23.0%	-31.1%	12.3%	$2,257
South Coast	$0.50	-4.2%	-3.5%	-9.5%	-9.3%	4.1%	$3,724
	$2.00	-13.0%	-12.5%	-28.5%	-31.6%	12.8%	$11,235

Tax Increase = additional fuel taxes applied in addition to current taxes. VMT = change in total vehicle mileage. Trips = change in total vehicle trips. Delay = change in congestion delay. Fuel = change in fuel consumption. ROG = a criteria air pollutant. Revenue = annual revenue in millions of 1991 U.S. dollars. See report for additional notes and data.

Vehicle Travel Impacts

The Elasticity of vehicle travel with respect to fuel price is typically found to be -0.20 to -0.30 (Harvey, 1994; Schimek, 1997; Johansson and Schipper, 1997), with values of about –0.1 in the short run, and up to –0.50 over the very long run. Some U.S. studies of fuel price and consumption patterns during the 1990s, when real fuel prices declined and real incomes increased, found lower price responses (Hughes, Knittel and Sperling, 2006; Small and Van Dender, 2007), but more recent research indicates more normal elasticities (Williams Derry, 2008). A federal study found that fuel price increases cause larger reductions in vehicle traffic on corridors with high quality Rail Transit service, since that gives travelers viable options (CBO, 2008).

Deakin and Harvey (1997) model the effect of a fuel tax increase on transportation impacts in four major urban regions in California. Table 2 summarizes their results for the year 2010. It indicates, for example, that in the South Coast (Los Angeles) region, an additional 50¢ per gallon tax would reduce total vehicle trips by only about 3.5%, but congestion delay would decline by 9.5%, and fuel consumption would decline by 9.3%. Another study finds that a $0.40 increase in fuel prices would reduce regional vehicle trips by 1.2% and vehicle mileage by 1.4%, while a $2.00 increase would reduce trips by 6.7%, and mileage by 7.2% (PSRC, 1994).

INRIX (2008), evaluated the effects of fuel price increases on U.S. vehicle travel and traffic congestion, using the "Smart Dust Network" of GPS-enabled vehicles which report roadway travel conditions. The results indicate that increased gas prices in the first half of 2008 significantly reduced VMT. This study found:

- Two-thirds of consumers indicated that increased gas prices caused them to decrease the amount of driving they do, including 23% reporting a significant decrease.
- 72% of those who reported a decrease of driving said they combined several trips into one to conserve fuel and 69% indicated they took fewer trips as a result of increased gas prices.
- If gasoline prices rise (again) to $4.50/gallon, more than half (54%) of all automobile owners said that they would find it worthwhile to reduce their frequency or distance of vacations by car.
- Females (69%) were significantly more likely than males (63%) to report a decrease in driving as a result of higher gas prices.
- The reduction in discretionary driving significantly reduced traffic congestion.
- Many cities exhibiting high correlation in congestion reduction from the fuel price increase are types of areas that are most impacted by vacation or leisure travel (i.e., driving destination sites) such as Las Vegas, Miami, Daytona Beach, and Orlando.
- The largest decrease in congestion is at those times that are most impacted by vacation driving, specifically Friday PM, not Monday AM.
- National peak hour travel times were down in the first half of 2008 for every hour and for every day of the week.

The price elasticity of gasoline is typically about -0.3 in the short run and -0.7 in the long run, meaning that a 10% price increase reduces fuel consumption 3% in a year or two, and 7% in five to ten years (Lipow, 2008; Litman, 2008a).

Table 2 **Travel Impact Summary**

Objective	Rating	Comments
Reduces total traffic.	2	Has a modest impact on vehicle travel.
Reduces peak period traffic.	1	Peak-period travel tends to be less price sensitive than off-peak travel.
Shifts peak to off-peak periods.	0	
Shifts automobile travel to alternative modes.	1	Provides a modest incentive to shift mode.
Improves access, reduces the need for travel.		
Increased ridesharing.	1	
Increased public transit.	1	
Increased cycling.	1	
Increased walking.	1	
Increased Telework.	1	
Reduced freight traffic.	1	

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Benefits And Costs

Increasing fuel taxes is an effective Energy Conservation and Emission Reduction strategy, results in modest vehicle travel reductions, and provides revenue. Because travel reductions are relatively modest, congestion reduction and roadway cost savings also tend to be modest compared with the same revenue collected through other charges. Safety benefits are mixed, motorists who purchase smaller vehicles in response to higher fuel prices may increase their own

injury risk, but this is offset by reduced risk to other road users and by overall reductions in vehicle mileage (Ross and Wenzel, 2001). Grabowski and Morrisey (2004) estimate that each 10% fuel price increase reduces total automobile deaths by 2.3%, with about twice as large an impact on younger drivers, who tend to be more sensitive to fuel prices. Sivak (2008) found that a 2.7% decline in vehicle travel caused by fuel price increases and a weak economy during 2007-08 resulted in much larger 17.9% to 22.1% month-to-month declines in traffic deaths, probably due to disproportionate reductions in vehicle travel by lower income drivers (who tend to be young and old, and therefore higher than average risk) and speed reductions to save fuel.

Fuel taxes are more accurate at internalizing vehicle costs than some taxes, but they are less accurate than others (Price Evaluation). For example, fuel taxes reflect roadway costs, insurance costs and environmental externalities better than a general tax or a fixed vehicle fee (since they increase with vehicle weight and mileage), but are less accurate than weight-distance fees or GPS-based Pricing (FHWA, 1997; Distance-Based Fees). Although not optimal (congestion and emission fees would be more efficient), Parry and Small (2004) conclude that a fuel taxes can be applied to internalize some transportation costs on second-best grounds, resulting in optimal taxes of $1.01 per gallon in the U.S., and somewhat higher in Britain.

Research by Enerdata (2009) indicates that a 1% reduction in global oil demand reduces oil prices by 1.6 to 1.8% over a 10 year timeframe, and by 1.2 to 1.3% over a 20-year timeframe. As a result, some of the projected energy savings that result from technical strategies that increase vehicle fuel efficiency (such as fuel efficiency standards) will be offset by increased fuel consumption due to reduced energy prices, a Rebound Effect that does not result if Fuel Taxes increase fuel efficiency.

Implementation costs are minimal, since most jurisdictions already collect fuel taxes. The petroleum industry argues that increased fuel taxes harm the economy, but this is probably not true. These costs are primarily economic transfers within the economy, since increased costs to motorists are offset by increased revenues or reductions in other taxes (TDM and Economic Development). Higher energy taxes can reduce wealth transfers from petroleum consuming to petroleum producing nations, and the negative economic development impacts that result by providing consumers with an incentive to reduce energy use. If low fuel taxes were really beneficial, and high fuel prices were really economically harmful, countries like Saudi Arabia and Venezuela would be economic powerhouses, while high fuel price countries like Britain, Germany and Japan would be economic backwaters. This is not the case because higher energy prices motivate businesses to become more efficient, increasing innovation and overall productivity, while low energy prices encourage wasteful use of resources, which is harmful overall to the economy.

Fuel tax increases are justified on economic efficiency grounds (Clarke and Prentice 2009). Although steep, unexpected fuel price increases impose transition costs to the economy (i.e., producer and consumer choices based on low fuel prices are inefficient when fuel prices increase), and transfer of wealth from petroleum consuming regions to petroleum producing regions, a predictable increase in fuel taxes is not necessarily harmful to productivity in a region if revenues are retained within the economy. Raising vehicle fuel taxes in the short term can help

minimize future economic harm from long-term fuel price increases by encouraging consumers to purchase more fuel energy-efficient vehicles now (TDM and Economic Development).

Many economists recommend eliminating fuel subsidies and imposing taxes which at least cover public costs of production (such as roads provided to access oil fields) and cover roadway costs in order to increase economic efficiency (UNEP, 2003; Metschies, 2005). Others recommend shifting taxes from other activities (such as wages and property) to fuel, as a way to reduce total costs, encourage efficiency and increase productivity. If taxes on petroleum or other fuels are used to reduce less efficient taxes — taxes with greater "deadweight" losses to the economy, such as business and employment income taxes — the result could be increased economic activity and employment (Durning and Bauman, 1998). One study employing a comprehensive model of the U.S. economy found that increasing fuel taxes and using the revenues to replace income taxes could increase GDP by 7.7% and average household wealth by 5.5%, while reducing fossil-fuel use by 38% (Norland and Ninassi, 1998). The Office of Technology Assessment (OTA, 1994) concluded "*...if a gasoline tax were coupled with an equal-revenue increase in investment tax credits, short-run macroeconomic losses resulting from motor fuel tax increases could be more than offset by the short-run macroeconomic gains.*"

This suggests that fuel taxes can be increased significantly from current levels with neutral or positive economic impacts provided that price changes are predictable and gradual, and revenues are used efficiently (Evaluating Pricing Strategies). However, fuel taxes in one area that are significantly higher than nearby jurisdictions may result in cross border purchases. If a significant portion of the population is located within 20 miles of a border, fuel prices should not be set significantly higher (say more than 20% higher) than the prices in neighboring areas (Rietveld, Bruinsma and van Vuuren, 2001).

Table 3 **Benefit Summary**

Objective	Rating	Comments
Congestion Reduction	1	Modest reductions in vehicle travel.
Road & Parking Savings	2	Modest reductions in vehicle size and travel.
Consumer Savings	-1	Increases vehicle operating costs. Overall impacts depend on how revenues are used.
Transport Choice	-1	Mixed. Driving becomes less affordable, but may increase support for alternative modes.
Road Safety	0	Mixed. Increased safety from reduced driving may be offset by use of smaller cars that offer less occupant protection.
Environmental Protection	3	Significant reduction in fuel use and related pollutants.
Efficient Land Use	1	Modest reductions in vehicle travel.
Community Livability	2	Modest reductions in vehicle travel and vehicle size.

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Equity Impacts

The equity impacts of fuel tax changes have been widely debated. Whether taxes are unfairly high or low depends on perspective and assumptions. In North America, the total tax rate on fuel is approximately 100% (that is to say, 50% of retail prices are taxes), and even higher in Europe and Japan, far higher than the sales tax rate on most other goods. As mentioned earlier, the value

of fuel tax revenue per vehicle-mile has declined in North America due to inflation and increased vehicle fuel efficiency, so fuel taxes fund a declining share of total roadway costs.

If fuel taxes are considered a roadway user charge, increases of more than 40% are justified to cover all roadway costs (FHWA, 1997), and more if such taxes are intended to cover the full social costs of automobile transportation (traffic services, unpriced parking facilities, uncompensated crash risk and environmental externalities), rather than just current expenditures on roadway facilities. Fuel is exempt from general sales tax in many states, representing underpricing relative to other consumer expenditures. Fuel tax increases can therefore be justified based on the user-pay principle (horizontal equity).

Fuel taxes are regressive, since they account for a greater share of income for lower-income households than for wealthier households. However, how regressive depends on the perspective used in analysis. Economist James Poterba (1991) demonstrates that fuel taxes are not very regressive when based on lifetime expenditures earnings, which he considers an accurate measure of equity, since it takes into account predicable year-to-year variations in household income. For example, a college student or retiree may have relatively little income, yet be quite wealthy overall. CBPP (2007) identified ways to make fuel tax increases progressive with respect to income by incorporating targeted discounts and exemption. Santos and Cachesides (2005) evaluate the equity impacts of fuel taxes in the U.K. They find that when all households are considered, middle-class households are burdened most by fuel taxes, but when only vehicle owning households are considered, fuel taxes are regressive, particularly in the short-run (over the long run lower-income motorists can adjust additional factors such as the type of vehicle they own and how much they drive, reducing the impacts of fuel taxes on their budgets). The equity impacts of fuel tax increases depend on the how revenues are used (Litman, 1996). Raising fuel taxes to reduce other taxes that are equally or more regressive can make it neutral or progressive with respect to income.

Fuel tax increases are considered particularly burdensome to some groups, such as rural residents and owners of older, fuel-inefficient vehicles, although such claims are often exaggerated, and negative impacts can be minimized if fuel tax increases are predictable and gradual (Glaister and Graham, 2000). Stead (2002) argues that these impacts are minor overall, and that rural residents may benefit overall if higher fuel taxes help support a more efficient land use and more diversified transportation options in rural areas. He recommends a number of Rural Transportation Management strategies to minimize negative impacts of fuel tax increases to rural residents. Ryan and Stinson (2002) evaluate the distributional impacts of a 150% fuel tax increase matched by reductions in general taxes now used to subsidize roads.

Table 4 **Equity Summary**

Impacts	Rating	Comments
Treats everybody equally.	-1	Some groups (i.e., rural residents) bear greater costs than others.
Individuals bear the costs they impose.	2	Increases the portion of vehicle costs recovered through user fees.
Progressive with respect to income.	-1	Fuel taxes are regressive, but overall impacts depend on how revenues are used.
Benefits transportation disadvantaged.	3	Can reduce roadway expenses borne by non-drivers, and encourages development of travel alternatives.

Improves basic mobility.	0	No significant impact.

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Applications

Fuel tax increases can be justified in most geographic conditions. Fuel tax increases are usually implemented by federal or state/provincial governments. Some regional or local governments have modest fuel tax options.

Table 5 **Application Summary**

Geographic	Rating	Organization	Rating
Large urban region.	2	Federal government.	3
High-density, urban.	2	State/provincial government.	3
Medium-density, urban/suburban.	2	Regional government.	1
Town.	2	Municipal/local government.	1
Low-density, rural.	2	Business Associations/TMA.	0
Commercial center.	2	Individual business.	0
Residential neighborhood.	1	Developer.	0
Resort/recreation area.	1	Neighborhood association.	0
		Campus.	0

Ratings range from 0 (not appropriate) to 3 (very appropriate).

Category

Incentive to Reduce Driving

Relationships With Other TDM Strategies

By increasing the variable cost of driving, fuel tax increases support most other TDM strategies. Fuel tax increases can be part of Comprehensive Market Reform and Freight Transport Management. In some situations, fuel taxes may be a substitute for Distance-Based Charges and Road Pricing.

Stakeholders

Fuel tax increases are implemented by federal, state or provincial governments. Some regional or local governments have optional fuel taxes, but these tend to be too small to have much impact on travel behavior. Motorist organizations, the petroleum industry, trucking organizations and transport-intensive industries tend to oppose such tax increases, while environmental organizations and government agencies (which require new revenue) often support fuel tax increases.

Barriers To Implementation

The primary barrier to fuel tax increases in North America tends to be political resistance from petroleum, vehicle and transportation industries, and motorists (Watts 2010). Fuel tax increases may depend on making them part of a package that satisfies a variety of objectives and constituencies.

Best Practices

Metschies (2005) recommends:

- Fuel tax increases should be gradual (preferably no more than 10% annual) and predictable to minimize negative economic impacts.
- If vertical equity is a concern, revenues from fuel tax increases should be used in ways that benefit lower-income groups.
- Fuel tax revenues should be used to improve transportation rather than just highways so travelers have more fuel efficient accessibility options.
- General sales taxes should be applied to fuel for the sake of economic neutrality.

Tax Shifting Best Practices

Durning and Bauman's book, *Tax Shift* (www.sightline.org/publications/books/tax-shift/taxshiftexcerpt) recommends the following principles to maximize tax shift benefits.

1. *Revenue neutrality*. Revenues generated by the new tax should be returned to individuals and businesses through reductions in other taxes. That is, taxes should shift from "goods" to "bads."

2. *Phased implementation.* Tax shifts should be gradual and predictable, so consumers and businesses can take higher energy costs into account when making long-term decisions, such as vehicle purchases and building locations.

3. *Protect low-income households.* Tax reductions and rebates should be structured to favor lower-income workers and other disadvantaged groups.

4. *Broad coverage*. Taxes should be applied to the full category of harmful goods, with minimum exemptions. For example, carbon taxes should be applied to all fossil fuels, based on their carbon content: gasoline, diesel, natural gas, coal, heavy fuel oil, propane and kerosene. That will make the tax credible and efficient to administer.

Examples and Case Studies

Economists Don't Agree on Much, But They Do Think That Fuel Taxes Should Increase (www.irs.princeton.edu/pubs/pdfs/389.pdf)

A survey of 40 leading US economist found that there is little agreement among them as to which of thirteen national tax and regulatory reforms are desirable public policies, with the exception that all support a proposed 25¢ per gallon fuel tax increase (Fuchs, Krueger and Poterba, 1998). This indicates that there is strong consensus among a wide range of political and professional perspectives that fuel and vehicle use are underpriced, and that fuel tax increases provide overall economic development benefits.

UK Energy Tax

The United Kingdom had a policy of increasing fuel taxes by 5% per year as an energy conservation and TDM strategy. Research by the European Environment Agency indicates that it has reduced emissions compared with what would have otherwise occurred (EEA, 2000). In November 2000 the government

discontinued that policy in response to popular resistance due to wholesale fuel price increases, but has not reduced taxes, so UK fuel taxes are still among the highest in the world.

British Columbia Carbon Tax (www.bcbudget.gov.bc.ca/2008/backgrounders/backgrounder_carbon_tax.htm)

British Columbia's 2008 budget includes the first revenue neutral carbon tax in North America (Litman, 2008b). It starts 1 July 2008 at $10 per tonne of carbon in 2008, and increases $5 per tonne annually for at least four years. Table 6 illustrates tax rates for various fuels. Revenues are returned to individuals and businesses through various tax cuts and rebates, including a $100 per resident Climate Action Dividend distributed June 2008, and special rebates for low income households.

Table 6 **British Columbia Carbon Tax Rates For Various Fuels**

Fuel	Unit	2008	2009	2010	2011	2012
Carbon	***Tonne of Carbon***	***$10***	***$15***	***$20***	***$25***	***$30***
Regular Gasoline	cents/liter	2.33¢	3.50¢	4.66¢	5.83¢	6.99¢
Diesel	cents/liter	2.69¢	4.04¢	5.38¢	6.73¢	8.07¢
Jet fuel	cents/liter	2.61¢	3.92¢	5.22¢	6.53¢	7.83¢
Propane	cents/liter	1.54¢	2.31¢	3.08¢	3.85¢	4.62¢
Natural gas	dollars/gigajoules	$0.50	$0.74	$0.99	$1.24	$1.49
Coal – low heat	dollars/tonne	$17.77	$26.66	$35.54	$44.43	$53.31
Coal – high heat	dollars/tonne	$20.77	$31.16	$41.54	$51.93	$62.31

This table shows British Columbia's carbon tax rates for various fuels.

Fuel Subsidy Defined (GTZ 2007)

The following was written by the authors of the GTZ "International Fuel Prices" report (www.internationalfuelprices.com) and published in "Subsidy Watch," Vol. 10, March 2007 (www.globalsubsidies.org).

What does "subsidizing" fuel mean in the transport sector? It is not always a simple matter to determine whether fuel prices are actually subsidised in a specific country. We take a simplified approach: fuels are considered subsidised if the actual price is below a (hypothetical) reference price ("benchmark"). Ideally, this benchmark price would be based on the price set by the private sector in competitive markets, excluding tax. However, as competitive benchmark prices are difficult to observe precisely in every market, for practical reasons and to allow worldwide application, we deem prices to be subsidised if they are below the average US prices, less road taxes averaging USD 0.10 per litre (i.e., those charged in the USA). As a rough estimate, it can be assumed that the difference between the actual pump price and the benchmark price approximately represents taxes of some sort.

We believe that transport fuel taxation should be based on three fundamental principles:

1. Fuel taxation should be based on the "users pay" principle, i.e. through the fuel tax road users should be charged the full cost of providing a country's road network.

2. Transport should contribute to state finances. We maintain that fuel is a normal good just as any other good and should be subject to full VAT (Value Added Tax, i.e., normal sales tax). VAT should be charged in addition to the fuel tax, and possibly even additional or sumptuary taxation can be levied. Tax revenue from the transport sector could make a major contribution towards

financing core state functions, such as health services, education and security, particularly since it is a relatively easy tax to administer.

3. Prices in transport always have a guiding function. Taxation should thus be designed to avoid undesired price distortions; for example, between different forms of transport such as private transport, local public transport, rail transport, etc.

In the case of uncongested infrastructure, some transport economists suggest that it is more efficient to pay for maintenance and renewal costs from general tax revenues in order not to suppress the use of the facility. There is, however, a strong trade-off between efficiency and cost coverage (road users directly paying roadway costs). In the absence of an efficient income tax system the most practical way to generate sufficient revenues to build and finance transport infrastructure is to incorporate those charges into user fees. We emphasize the need for cost coverage.

In addition, fuel taxation can be used to spur improvements in fuel efficiency, encourage the use of alternative and cleaner fuels, and promote less polluting forms of transport. Indeed, fuel taxes can be designed to help promote positive side effects. For example, introducing a higher tax rate on high-sulphur fuels can help shift consumption to low-sulphur fuels. Fuel tax revenue can be used to cross-subsidize local public transport.

Based on GTZ's worldwide research, the following minimum guidelines can be regarded as a general guide for tax levels:

Purpose of tax	Minimum fuel tax
Road tax for highways	USD 0.10 per litre
Transport tax for urban roads and local public transport	USD 0.03 - 0.05 per litre
Energy taxes, eco-taxes, taxes to combat fuel smuggling	Variable, often depending on the price level in neighbouring countries
Levy for national fuel stockpile	Variable
Funding measures to improve road safety	Variable; approx. 1.5% of transport spending

The above goals can be summarized in a step-by-step procedure for implementing progressively higher fuel taxes.

Step 1: Cut subsidies that bring pump fuel prices below crude oil prices. This is the challenge currently facing countries such as Egypt and Yemen.

Step 2: Increase prices up to the price for unsubsidised fuel. (The benchmark could be the average US pump price less USD 0.10 per litre), then let the price vary in line with changes in world prices.

Step 3: Add a tax sufficient to cover the costs of maintaining the road infrastructure. In the United States, such taxes average USD 0.10 per litre. Fuel prices should also be subject to the regular value-added tax (VAT), revenues from which go into the general state budget.

Step 4: If, general taxes are not reliable sources for funding road construction and cross-subsidizing public transport, raise fuel taxes to the level that would be sufficient to finance these activities, as well as road maintenance. In Europe, such taxation levels are reflected in the

legislated minimum European fuel prices, which are subject through EU harmonisation to minimum tax rates of EUR 0.287 (USD 0.37) per litre for unleaded petrol and EUR 0.245 (USD 0.31) per litre for diesel.

Step 5: This entails taxing fuel at levels currently seen in European countries such as Germany and the UK, which in addition to covering the full direct costs of the transport sector generate revenue for other sectors, such as education, health and security. Fuel tax rates in Germany, for example, are EUR 0.65 (USD 0.73) per litre of petrol and EUR 0.47 (USD 0.53) per litre of diesel. Increased tax rates apply to high-sulphur fuels and leaded petrol.

Certain countries can serve as important models for a region. In the past year, Morocco, Tunisia and Ghana -- with after-tax prices of, respectively, USD 1.22, USD 0.83 and USD 0.86 per litre for premium gasoline – have reached "reasonable" fuel price levels. Indonesia, with gasoline priced at USD 0.57 per litre, has successfully turned its back on a long history of price subsidies.

If the heavily populated and economically dynamic states of Asia were to raise their fuel prices to the European level, this would provide a major incentive to achieve greater efficiency in the transport sector, since high fuel prices act as an incentive to conserve fuel. This would not only save valuable oil resources (and foreign currency for oil-importing countries) but would also help cut hazardous emissions. And it would be a major contribution to cut CO2 emissions in the transport sector. But for developing countries, the major advantage is that fuel taxation can tap a broad base of revenues, providing a significant source of financing for both their roads and the general budget.

Fuel Prices Affect Vehicle Mix and Mileage (CERA, 2006)

Gasoline price increases after 2004 started to reduce demand. The rate of growth in gasoline demand slowed sharply from its 1.6% per year pace (1990-2004) to 0.3% in 2005, and continued to grow slowly in 2006, at 1.0%. And for the first time in 25 years, motorists' average mileage went down. Overall, improved automotive efficiencies and one of the lowest fuel tax rates among Western countries have kept gasoline and oil's share of average U.S. household budgets at 3.8% in 2006, slightly above the 1960s' 3.4% to 3.6% level despite rising world oil prices.

Misguided Tax Shifting (Sorensen, 2006)

Transportation economist Paul Sorensen evaluates proposed fuel tax reform in California as an example of contradictory policies. Intended to enhance the reliability of highway revenues, the proposal would eliminate a five percent sales tax on gasoline and replace it with a quarter percent increase in the general sales tax that would be specifically earmarked for transportation. Economic analysis shows clearly, however, that eliminating the sales tax on gasoline will stimulate additional miles driven within the state, leading in turn to increased highway congestion and vehicle emissions. At the same time, increasing the general sales tax will shift a greater financial burden onto the shoulders of non-drivers from lower income groups. In short, the recent California proposal, if enacted, would work counter to the sustainability principles of economic efficiency, social equity, and environmental responsibility, and would frustrate local efforts to reduce reliance upon the automobile.

Fuel tax could cut emissions: U.S. should follow lead of German, Japanese policies
Craig Morris, *San Francisco Chronicle*, December 17, 2006

Gov. Schwarzenegger could take a lesson from Germany if he's really serious about attaining his

tough, new air-quality goals. In September, the governor signed into law the Global Warming Solutions Act, AB32, which stipulates that by 2020 the state will cut its emissions of greenhouse gases to 1990 levels, a 25 percent decrease from today's levels. Sounds good, but targets can be missed. The mechanisms to meet the targets are therefore crucial. Germany found that one way to do that was to impose an "ecotax." To improve fuel economy, Germany simply raised the price of gas with this surcharge.

Countries like France, the Netherlands and Germany already charged around $6 per gallon, but Germany raised the price by an additional 10 cents a year from 1999 to 2003. Germans now pay nearly $6.50 per gallon. The increase was not steep (less than 2 percent per year), but it sent a signal to the market that gas would not be getting any cheaper.

No one told carmakers what to build or German consumers what to buy, but the announcement of small, gradual price increases allowed people to plan in a way that sudden shocks -- like the 50 percent increase in U.S. gas prices after hurricanes Katrina and Rita -- do not. Germans had time to react to higher prices by deciding to switch to a more fuel-efficient car, driving less, carpooling, taking public transit, cycling or walking. And those who wanted the thrill of driving a sport utility vehicle on the autobahn could still do so if they had the cash.

By 2004, fuel consumption had dropped by around 7 percent from 1999 levels; 6 percent more Germans were riding public transport; and cars with nearly 80 miles per gallon fuel efficiency hit the market. Yes, 80 mpg. That's not a typo; it's a Volkswagen Lupo. And unlike the two- seater Smart, with 69 mpg, the Lupo (like Audi's classy A2 with 78 mpg) is a four-seater.

Now compare the success of Germany's ecotax to American fuel-efficiency standards. The American standards, designed to raise the average mileage of new cars, basically tell automakers how to build cars. But the standards didn't increase average miles per gallon dramatically in the late 1970s and early 1980s, skyrocketing gas prices after two oil crises did. Once gas prices fell and remained low, the standards had little effect. In fact, the average fuel economy of all vehicles on the road has not moved much since 1987. The 1927 Ford Model A would meet today's fuel-efficiency standards.

Is anyone here watching Europe's success? Yes, Al Gore has been calling for a carbon tax for months. He wants to use the revenue to offset payroll taxes -- exactly what Germany has been doing since 1999. But when MSNBC reported on Gore's idea, it called it a "novel approach" -- no mention of Germany's success.

Of course, many Americans are calling for higher fuel-efficiency standards -- but that's the bad news. These standards are by their very design doomed to failure because efficiency can ironically undercut itself by making consumption cheaper. Think about it: if you could suddenly drive 100 miles longer on one tank of gas, would you drive less or more? When efficiency lowers consumption, demand for energy drops, lowering prices, which in turn undercuts investments in efficiency -- a catch-22 without price mechanisms.

Too bad Americans don't understand that higher prices are the solution.

Targets don't work if they are unrealistic. In 1990, California told automakers and consumers that it wanted 10 percent of the vehicles sold in the state by 2003 to be zero-emission, but the cars didn't sell in great enough numbers, and the project failed. Battery-powered cars leave much to be desired, and fuel-cell cars are still not ready for the market.

The Japanese have a more clever system of targets based on what industry demonstrates to be possible: the average efficiency is determined for a type of car, say four-door sedans, and the least-efficient products must be improved every year. That won't bring sudden, dramatic improvement, but over a few years, it would make a significant difference. Oh, did I mention that gas prices in Japan are nearly twice as high as in the United States?

Unfortunately, we don't look at Japan and Europe enough. Otherwise, we would have seen Japanese hybrids coming while we were still focused on zero-emission cars.

The press release for California's Global Warming Solutions Act calls it a "first-in-the-world comprehensive program." It also later states that the mechanisms to reach the target must be specified by Jan. 1, 2009. So California has set a target without mechanisms. I say: Forget about targets, stop acting like we are the world leaders, and start copying the mechanisms of those who are. America, it's time to play catch-up, not catch-22.

Craig Morris is the author of *Energy Switch: Proven Solutions for a Renewable Future*.

Emission Prices Are More Efficient than Emission Caps

CBO, *Limiting Carbon Dioxide Emissions: Prices Versus Caps*, Congressional Budget Office (www.cbo.gov/showdoc.cfm?index=6148&sequence=0), March 15, 2005.
Analysts generally conclude that uncertainty about the cost of controlling carbon dioxide emissions makes price instruments preferable to quantity instruments because they are much more likely to minimize the adverse consequences (excess costs or forgone benefits) of choosing the wrong level of control. Pricing motivates people to control emissions up to the point where the cost of doing so was equal to the emission price. If actual costs were less than, or greater than, anticipated, people would limit emissions more than, or less than, policymakers projected. However, emissions would be reduced up to the point at which the cost of doing so was equal to the expected benefits, provided that the emission price was set equal to the expected benefits of reducing a ton of carbon dioxide emissions. In contrast, a strict cap on emissions could result in actual costs that were far greater (or less) than expected and that therefore exceeded, or fell below, the expected benefits.

The advantages of a price-based approach stem mainly from the fact that the cost of limiting a ton of emissions is expected to rise as the limit becomes more stringent, while the expected benefit of each ton of carbon reduced is roughly constant across the range of potential emission limitations in a given year. That constancy occurs because climate effects are driven by the total amount of carbon dioxide in the atmosphere, and emissions in any given year are a small portion of that total. Further, reductions in any given year probably would fall considerably short of total baseline emissions for that year.

Transport Funding Proposal Good Example of Bad Policy (Sorenson 2006)

A California transportation finance proposal, which would eliminate a 5% sales tax on gasoline and replace it with a 0.25% increase in the general sales tax specifically earmarked for transportation, is an example of poor public policy. Basic economic analysis shows clearly, however, that eliminating the sales tax on gasoline would stimulate additional miles driven within the state, leading in turn to increased highway congestion and vehicle emissions. At the same time, increasing the general sales tax would shift a greater financial burden onto the shoulders of nondrivers from lower-income groups. In short, the recent California proposal, if enacted, would work counter to the three goals of sustainability—economic

efficiency, social equity, and environmental responsibility—and surely frustrate local efforts to reduce reliance on the automobile.

New Zealand Plans Carbon Tax to Meet Kyoto Targets

www.planetark.org/dailynewsstory.cfm/newsid/18219/story.htm

WELLINGTON, October 18, 2002 - New Zealand announced plans yesterday for a carbon tax that will push up fuel costs but help the country meet targets under the Kyoto climate change agreement. The tax of up to NZ$25 (US$12) a tonne of carbon dioxide equivalent will be levied sometime after 2007, and only if the controversial Kyoto protocol comes into force internationally. It would raise retail petrol prices by up to six percent, diesel by 12 percent, and gas and electricity prices by eight to nine percent, government papers showed. Big losers would be coal users, whose costs would jump 19%. "The policies...will enable New Zealand to meets its greenhouse gas emission targets under the Kyoto protocol while protecting the nation's economic interests," Energy Minister Pete Hodgson said, after the tax proposal was approved by the cabinet. An as-yet-unknown amount of cash raised by the new tax would be offset by cuts to other taxes, he said. New Zealand produces between 70 million to 90 million tonnes of carbon dioxide a year, ranking it the fourth largest per capita producer after the United States, Australia, and Canada.

Economist Magazine Highlights Benefits of Environmental Tax Reform

In cover stories focusing on world dependence on Middle Eastern oil, *The Economist* (December 15, 2001, pp. 9 and 16) cites environmental tax reform as a route to greater energy security. Its *Leaders* editorial argues that U.S. gasoline tax is too low. According to the column, a long-term plan to shift taxes from incomes to carbon emissions is needed. This would spur development of new transport technologies that are vital in curbing the demand for oil. In its story “A Dangerous Addiction,” the magazine says the best way to promote the development of alternative fuels and new technologies is through taxation that reflects the energy security risk (as well as dangers to health and the environment) of burning oil. Europe recognizes this, and over the past decade has started to shift the burden of taxation from income to, for example, carbon emissions.

Wit and Humor

A car is weaving from one side of the road to the other. A policeman pulls it over and says to the driver, “You’re drunk.” And the driver says, “Well thank goodness for that, I thought the steering had gone!”

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