Appropriate Response to Rising Fuel Prices
Citizens Should Demand, “Raise My Prices Now!”

By
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Summary
This paper evaluates public policy options for responding to rising fuel prices. There is popular support for policies to minimize fuel prices by subsidies or reduced taxes. But price-minimization policies are likely to harm consumers and the economy overall by increasing total fuel consumption and vehicle travel, and associated costs such as traffic and parking congestion, infrastructure costs, traffic crashes, import costs and pollution emissions. Fuel price reductions are an inappropriate way to provide more affordable mobility for low-income households, other strategies can help them more while also increasing transport system efficiency. Because many transport decisions are durable, low fuel price policies increase future fuel consumption, harming the future economy. This report identifies responses that maximize total benefits, including gradual and predictable fuel tax increases, mobility management strategies that increase transport system efficiency, incentives to choose fuel efficient vehicles, and development of alternative fuels. With these policies fuel prices could more than double without harming consumers or the economy, and other transportation problems would be reduced.

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Appropriate Response to Rising Fuel Prices

Introduction
Motor vehicle fuel prices have increased significantly in recent years and are likely to rise more in the future. Between 2003 and 2007 average U.S. gasoline retail prices nearly doubled, from $1.77 to $3.15 per gallon, and growing international demand and rising production costs are expected to continue raising prices in the future (Jackson, 2007).

Fuel prices are an emotional issue. Even at lower prices many motorists feel they pay more than is fair. There are frequent demands for investigations into fuel price gouging, and popular campaigns to promote cheaper fuel through public policies and consumer boycotts.¹ As a result, consumers, consumer groups and policy makers are wondering how best to respond to rising fuel prices.

Which policies are considered optimal depends on how the problem is defined. If the only concern is consumer unaffordability (excessive financial burdens, particularly for essential goods and services), then policies that minimize prices may seem sensible. However, if other impacts are considered, such policies may seem undesirable because they impose costs elsewhere in the economy, and they increase total fuel consumption and vehicle travel, which exacerbates other economic, social and environmental problems. When all impacts are considered, other solutions usually turn out to be better.

Advocates of price minimization policies typically argue that high fuel prices harm consumers and cripple the economy, but this focuses on the wrong factor. Consumers and businesses are affected by total fuel costs, the product of fuel prices (cost per gallon or liter) times vehicle fuel economy (miles per gallon or kilometers per liter)² times vehicle mileage (motor vehicle miles or kilometers driven), as summarized below:

\[ \text{Annual Fuel Cost} = \text{Fuel Price} \times \text{Fuel Economy} \times \text{Annual Mileage} \]

Improving vehicle fuel economy and reducing per capita vehicle travel can protect consumers and the economy from rising fuel prices and provide other benefits. Described differently, some policies represent true economy because they increase overall efficiency and help solve multiple problems, providing maximum benefits, while other responses represent false economy because they increase total costs and exacerbate other problems.

This paper investigates these issues. It examines fuel price trends and evaluates potential policy responses in terms of various objectives. This is a timely issue because this is a transition period from declining to increasing fuel costs. It is therefore important to shift policies to reflect future needs.

¹ For example, the GasBuddy.com Internet network designed to help consumers avoid fuel price gouging was established in 2000, when real fuel prices were at their lowest point in history.
² Fuel economy refers to fuel consumption per unit of travel. Fuel efficiency refers to fuel consumption per unit of output power. Increased fuel efficiency can either be used to increase vehicle fuel economy or performance (vehicle weight, carrying capacity and speed).
Fuel Cost Trends

This section discusses current trends that affect transport energy costs.

By most standards, current North American fuel prices are relatively low. The United States and Canada have lower fuel prices than most other high-income countries, as illustrated in Figure 1. Norway and the UK are particularly interesting for comparison because during the last few decades these countries were major petroleum producers, yet they retained high fuel prices as a strategic policy to encourage energy efficiency.

**Figure 1  2004 Transport Fuel Prices (Metschies, 2005)**

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

Figure 2 illustrates inflation-adjusted fuel prices and taxes between 1960 and 2005. Between the mid-1980s and 2003 real prices tended to decline. Recent increases have raised fuel prices to approach historic highs. Prices are likely to increase in the future due to rising international demand, declining supply and increasing production costs, called peak oil (Wikipedia, 2007; Jackson, 2007). Most projections suggest that petroleum prices will stay above $70 per barrel, leading to retail prices exceeding $3.00 per gallon, and perhaps significantly higher.
Fuel costs per vehicle-mile have declined over the last few decades because manufacturers responded to high fuel prices in the 1970s and 80s by developing more efficient vehicles. Overall average fuel economy for all road vehicles (including large trucks) rose from 12.4 miles-per-gallon (mpg) in 1960 to 17.0 mpg in 2004, a 38% increase. Figure 3 shows average fuel prices and taxes per vehicle-mile. Despite fuel price increases, current fuel costs per vehicle-mile are approximately the same as they were in 1960, and 20% lower than in 1980. The decline in real fuel prices and increased vehicle efficiency during the last two decades explains the popularity of trucks and SUVs for personal travel during that period: consumers could afford larger and higher performance vehicles without paying more per vehicle-mile in fuel costs.
Policies that attempt to reduce fuel prices through subsidies and tax reductions can usually only provide modest consumer savings (a few cents per gallon or liter). This is because larger reductions are so costly (the subsidies needed to offset recent oil price increases would bankrupt most governments). In addition, producers often capture a portion of the savings through higher profit margins rather than passing savings on as price reductions.

Vehicle selection and location decisions can have larger effect on total fuel costs than fuel prices. For example, at $3.45 per gallon, a motorist who drives 12,000 annual miles in a 15 mile-per-gallon (mpg) vehicle pays $2,760 in total annual fuel costs, compared with $1,380 for a 30 mpg vehicle. Similarly, a two vehicle household that chooses a home in an isolated location that requires 20,000 annual miles per vehicle averaging 20 mpg pays $6,900 for fuel. This is more than twice the $2,588 annual fuel costs if their location that only requires 7,500 annual miles per vehicle. Figure 4 shows the effects of fuel efficiency and annual mileage on total fuel costs, indicating a ten fold increase between the most and least efficient households.

**Figure 4** Total Annual Fuel Costs At $3.45 Per Gallon

This graph shows how fuel efficiency and annual mileage affect total household fuel costs with fuel at $3.45 per gallon. A household with two 15 mpg vehicles each driven 20,000 annual miles pays ten times as much for fuel as a household with a 40 mpg car driven 10,000 annual miles.

Fuel represents only about a quarter of total vehicle costs. Policies that allow households to reduce their vehicle ownership and mileage provide large additional savings (“Costs of Driving” VTPI, 2006). Residents of communities with accessible locations and good transport options (good walking and cycling conditions, and high quality public transit services) tend to spend hundreds of dollars less per capita on transport annually (Bernstein, Makarewicz and McCarty, 2005; CTOD and CNT, 2006).
Fuel Price Impacts On Energy Consumption and Travel

This section discusses how fuel prices affect transport energy consumption and travel activity.

Various studies have investigated the price elasticity of fuel, that is, how prices affect fuel consumption ("Transport Elasticities," VTPI, 2006). These studies indicate that over the long-run a 10% fuel price increase typically causes:

- A 4-6% reduction in total long-term vehicle fuel consumption.
- A 3-4% increase in long-term fuel efficiency.
- A 1-3% reduction in vehicle mileage.

Figure 5 compares fuel prices and per capita transportation energy consumption in various countries. High fuel prices are associated with low energy consumption. The U.S., Canada, Australia and New Zealand have low fuel prices and high transportation energy consumption, while people in other developed countries pay two or three times as much for fuel and consume about half as much transport energy.

Figure 5 Fuel Price Versus Per Capita Transport Energy Consumption (OECD, 2005)

As fuel prices increase, per capita transportation energy consumption declines.

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3 For more additional information see Transportation Elasticities: How Prices and Other Factors Affect Travel Behavior at www.vtpi.org/elasticities.pdf.
4 Some studies indicate smaller price impacts, but they usually reflect shorter-run effects, during the first year or two after a price change. Long-run impacts tend to be two to four times higher.
5 For data see the OECD Country Data Summary Spreadsheet (www.vtpi.org/OECD2006.xls)
Motorists in fuel efficient countries tend to drive more efficient vehicles, drive fewer annual miles, rely more on alternative modes and choose more accessible communities. Transport and land use policies provide better travel options (better walking and cycling conditions, and better quality public transit services) than what exists in more automobile dependent communities. Figure 6 shows a negative relationship between fuel prices and annual motor vehicle mileage. The relationship is weak because other demographic and geographic factors (particularly income, transport options and land use patterns) also affect per capita vehicle travel.

**Figure 6**  Fuel Price Versus Per Capita Vehicle Travel (OECD, 2005)

![Graph showing relationship between fuel prices and per capita vehicle travel](www.vtpi.org/OECD2006.xls)

*Higher fuel prices tend to reduce per capita vehicle travel.*

Policies that increase vehicle fuel efficiency result in **rebound effects**: as vehicle fuel efficiency increases, motorists drive more annual miles (another manifestation of the price elasticity of vehicle travel). So, for example, doubling average fuel efficiency can be expected to cause average annual vehicle mileage to increase about 20% compared with what would otherwise occur (CBO, 2003; Small and Van Dender, 2007). Although there is still an 80% net energy savings, the additional mileage exacerbates problems such as congestion, facility costs, accidents and some environmental impacts (Litman, 2005).

These responses temper the burdens on consumers of rising fuel prices and reduce the total savings to consumers of fuel subsidies and tax reductions. For example, over the long run a 10% fuel price increase only raises total fuel costs by about 4%, after consumers make these adjustments. Conversely, efforts to reduce fuel prices through production subsidies or lower taxes will cause consumers to choose less efficient vehicles and drive more than would otherwise occur.

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6 For data see the [OECD Country Data Summary Spreadsheet](www.vtpi.org/OECD2006.xls)
### Problem Definitions and Potential Solutions

The problems of rising fuel prices can be defined in various ways, as summarized in Table 1.

<table>
<thead>
<tr>
<th>Problem Definition</th>
<th>Definition</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel unaffordability</td>
<td>Consumers consider fuel too expensive. Lower income motorists cannot afford essential vehicle travel.</td>
<td>Fuel retail prices</td>
</tr>
<tr>
<td>Transportation unaffordability</td>
<td>Consumers consider transport too expensive. Lower income consumers are unable to afford essential travel.</td>
<td>Total household transport expenditures</td>
</tr>
<tr>
<td>Energy dependence</td>
<td>Economic costs and risks of importing petroleum.</td>
<td>Petroleum import costs</td>
</tr>
<tr>
<td>Vehicle fuel inefficiency</td>
<td>Motor vehicles are fuel inefficient. Per-mile fuel costs and emissions are excessive.</td>
<td>Vehicle fuel economy</td>
</tr>
<tr>
<td>Transport system inefficiency</td>
<td>The transport uses resources inefficiently. Total economic, social and environmental costs are excessive.</td>
<td>Total transport costs relative to benefits</td>
</tr>
</tbody>
</table>

Table 2 lists examples of various types of possible responses.

<table>
<thead>
<tr>
<th>Do Nothing</th>
<th>Minimize Price Increases</th>
<th>Alternative Fuels</th>
<th>Efficient Vehicles</th>
<th>Mobility Management</th>
</tr>
</thead>
</table>

This table lists various potential solutions to rising fuel prices.

These responses affect problems differently. Table 3 indicates whether a solution solves or exacerbates various problems. Efforts to minimize fuel price tend to exacerbate most other problems because of increased vehicle travel and energy consumption.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Minimize price increases</th>
<th>Alternative fuels</th>
<th>Efficient vehicles</th>
<th>Mobility management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel Inaffordability</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport Inaffordability</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Energy Insecurity</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Vehicle Inefficiency</td>
<td>×</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport System Inefficiency</td>
<td>×</td>
<td></td>
<td>×</td>
<td>✓</td>
</tr>
</tbody>
</table>

Different problem definitions justify different types of solutions. (✓ = helps solve; × = exacerbates)
Comprehensive Evaluation

This section identifies various impacts that should be considered when evaluating potential responses to rising fuel prices.

**Consumer Impacts**

*Consumer impacts* refers to direct costs and benefits to consumers, including fuel and vehicle costs, and mobility impacts. These are discussed below.

**Fuel Costs**

Vehicle fuel is a moderate household cost. In 2005 consumers devoted about 5% of total household budgets to fuel (this has probably increased somewhat due to subsequent price increases). This represents about a quarter of total transportation expenditures, as indicated in Figure 7. Considering all households, fuel and transport expenditures are not regressive – the lowest income quintile spends a smaller portion of household budgets on fuel and transport than the second and third quintile. However, for vehicle-owning households as a group, fuel costs are regressive, declining from 7.1% of expenditures for the lowest income quintile down to 3.6% for the highest income quintile.

*Figure 7  Portion of Household Expenditures Devoted to Fuel (BLS, 2005)*

Vehicle fuel expenditures are not regressive overall (yellow bars), but are regressive for vehicle-owning households (red bars and dashed line).

This suggests that fuel prices burden low-income households if they lack transport options. There are therefore two ways to help such consumers: reduce fuel prices or improve affordable transport options so lower-income households can reduce their vehicle expenses. The second approach is particularly beneficial because it reduces total vehicle costs, not just fuel. For example, if improved transport options allow a household to own fewer vehicles, they typically save thousands of dollars annually. This is far more than the savings provided by any feasible fuel price minimization policy.

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7 Fuel is regressive when evaluated relative to household *income* rather than *expenditures*. Most economists consider expenditures a more accurate indicator of equity.
Vehicle Costs

Increasing fuel economy and accommodating alternative fuels (such as biofuels) increases vehicle production costs to develop and implement fuel saving technologies, but these are offset by future fuel savings. These are often cost effective investments (fuel savings repay incremental costs), although consumers typically demand very short paybacks on such investments and fail to anticipate future fuel price increases, and so are likely to choose less efficient vehicles than what they will consider optimal in the future. This suggests that incentives for vehicle purchasers to choose efficient vehicles may be justified to overcome consumer ignorance and bias.

As described above, strategies that improve travel options can provide large total savings by reducing total vehicle costs, which are about four times greater than fuel costs. Residents of more accessible, multi-modal communities tend to spend much less on fuel and transportation than residents of more automobile-dependent communities. According to one study, transportation costs represent only about 10% of household expenditures in multi-modal communities, but about 25% in automobile dependent communities (CTOD and CNT, 2006). Residents of cities with high-quality rail transit systems tend to spend a much smaller portion of household income on transportation and fuel, as illustrated in Figure 8. Residents of such communities save about $450 annually on total transportation expenditures, plus additional savings from reduced residential parking costs, reduced traffic accidents, improved health, and time savings from reduced need to chauffeur non-drivers (Litman, 2004; also see Bernstein, Makarewicz and McCarty, 2005).

Figure 8 Percent Transport Expenditures (Litman, 2006)

The portion of total household expenditures devoted to transportation (automobiles and transit) tends to decline with high quality public transit service with high levels of transit ridership.
Appropriate Response to Rising Fuel Prices

Vehicle Performance
Fuel efficient vehicles often provide less performance (speed, carrying capacity and occupant protection) than less efficient vehicles. Reduced performance can be considered a cost to consumers. However, part of the reason consumers choose larger vehicles is based on their relative attributes, that is, for the sake of prestige or because they feel safer in a vehicle that is large relative to other vehicles on the roadway. To the degree that this is true, it reduces the total costs to consumers from shifts to more fuel efficient vehicles by the overall vehicle fleet, rather than by individual motorists.

Mobility Impacts
Changes in mobility (the amount people travel) have various consumer impacts that should be considered in transport policy analysis (Litman, 2006). Increased fuel prices force people to drive less, which reduces consumer surplus, or as somebody commented on an economics website, “Like it or not, this is a country that relies on the automobile for transportation. A gas tax is a limit on our freedom of movement.”\(^8\) But this is an exaggeration. Although increased mobility can be considered to increase some freedoms, it also imposes costs which reduce other freedoms. This includes increased financial costs that reduces consumers’ freedom to purchase other goods or forces them to work longer hours, reduced mobility options for non-drivers, increased crash injuries and disabilities, and more sprawl that increases the distances that people must travel to access destinations. At the margin, many people would probably prefer to drive less and rely more on alternative modes, provided they are convenient, comfortable and prestigious.

Smart policies can minimize the costs and maximize the benefits of reduced mobility:

- Many of the problems that result when people are forced to reduce mobility reflect transition costs, that is, the costs of adjusting to new conditions. This burden is minimized if we plan for increased energy efficiency, for example, by building more accessible communities and improving the quality of alternative modes.

- Mobility management strategies that apply positive incentives increase consumer benefits overall. For example, if travelers reduce vehicle travel in response to improved transport options (better walking and cycling conditions, improved rideshare and public transit services), they must be better off overall or they would continue driving. Similarly, mileage reductions that result from positive incentives such as Parking Cash Out (commuters can choose cash instead of a subsidized parking space) represent net consumer benefits.

- The cost to consumers of reducing mileage depends on the quality of travel options (walking and cycling conditions, rideharing and public transit service quality, telework and delivery service availability).

- Efficient pricing gives consumers incentives to reduce their least valued trips, while higher value trips continue, and often with less congestion delay.

Thus, reduced mobility can have minimal costs or net benefits to consumers if fuel price increases are predictable and gradual (so consumers can anticipate them when making longer term decisions), and policies improve transport options and land use accessibility.

\(^8\) [http://econlog.econlib.org/archives/2004/03/oil_econ_follow.html](http://econlog.econlib.org/archives/2004/03/oil_econ_follow.html)
**Subsidy Costs**

Many fuel price reduction strategies require subsidies, including production subsidies, tax exemptions, and uncompensated public costs (GSI, 2007). Such subsidies are often indirect, such as tax polices that favor petroleum production and consumption (“Resource Externalities,” Litman, 2007a). These subsidies impose costs elsewhere in the economy. Fuel prices are often considered a road user fee, which should be high enough to at least recover expenditures on roads and traffic services (Metschies, 2005). Since most fuel taxes are per unit (per gallon or liter), they must be increased periodically to account for inflation or they lose their value. Failure to do this is a hidden form of subsidy.

**Transportation System Performance**

Transportation system performance refers to factors such as travel speed, traffic and parking congestion, traffic accidents, and the quality of mobility options. Policies that increase total vehicle traffic tend to reduce transportation system performance by increasing congestion and per capita traffic accident rates, while policies that reduce total vehicle travel and improve mobility options tend to improve transport system performance.

**Environmental Impacts**

Environmental impacts include depletion of non-renewable resources (DNRR) such as petroleum; air, noise and water pollution emissions; and land use impacts (“Resource Costs,” Litman, 2007a). Increased vehicle fuel efficiency reduces resource depletion and pollution emissions but not the amount of land paved for transport facilities or the impacts of sprawl. Shifts to alternative fuels have various types of environmental impacts, depending on fuel type and how it is produced. For example, ethanol produced from corn provides virtually no reduction in climate change emissions, and increases water pollution and farm pollution emissions (GSI, 2007). The environmental impacts of electric and hydrogen fuels depend on their energy source (if produced by coal, environmental benefits are minimal or negative). Producing fuel from coal gasification and oil sands is environmentally harmful. Reductions in total vehicle travel provide the greatest total benefits including energy conservation; air, water and noise pollution reductions; and reduced need to pave land for roads and parking facilities.
Economic Impacts

Economic development refers to a community’s ability to achieve its economic objectives related to employment, productivity, and tax revenues. Transport energy policies affect economic development by affecting productivity, consumer expenditures, and trade.

People often assume that, since vehicle travel tends to increase with wealth, low fuel prices support economic development, but this is not necessarily true. Reducing fuel prices through subsidies tends to be economically harmful because it imposes costs elsewhere in the economy, and increases energy consumption and transport problems. Many of the most economically successful countries in the world have high fuel taxes (Japan, Germany, all Scandinavian countries), while many countries with low fuel taxes are impoverished as illustrated in Figure 9.9

Figure 9 Annual Income Versus Fuel Price (FinFacts, 2005; Metschies, 2001)

There is no evidence that low fuel prices contribute to economic development. Most high income countries have high fuel prices while many low income countries have low fuel prices.

People often assume that reducing vehicle ownership and use would harm the national economy, but this is not necessarily true. Although the motor vehicle manufacturing industry is the largest U.S. manufacturing industry, it is declining as a portion of the economy and employment, and in profitability, due to increased foreign competition, vehicle quality improvements that extend longevity, and increase costs (Berman, 2005). The industry accounted for 3.5% of real GDP in 2004, which is 15% lower than the 4.1% in the mid-1980s.

9 Development economists find that abundant natural resources and an emphasis on low product prices can actually harm economic development overall by discouraging efficiency and other development efforts. This is sometimes called the resource curse. It explains why many resource rich countries have little economic diversity or development besides resource extraction industries, and are frequently worse off after their resources are depleted.
Policies that increase transport system efficiency, such as cost-based pricing of fuel and vehicle travel, support economic development by increasing productivity and minimizing transportation costs such as congestion, road and parking facility costs, accident and pollution damages. High per capita fuel consumption is economically harmful, particularly to regions that import petroleum, because wealth leaves the community. Fuel expenditures provide less employment and business activity than most other consumer goods (Table 4). Energy conservation leaves more money circulating in the economy.

**Table 4**  
Jobs Created by Transportation Expenditures (B.C. Treasury Board, 1996)

<table>
<thead>
<tr>
<th>$1 Million Expenditure</th>
<th>Full Time Jobs Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum</td>
<td>4.5</td>
</tr>
<tr>
<td>General Automobile Expenses</td>
<td>7.5</td>
</tr>
<tr>
<td>General Bundle Of Consumer Goods</td>
<td>10-15</td>
</tr>
<tr>
<td>Public Transit</td>
<td>21.4</td>
</tr>
</tbody>
</table>

*This table shows employment generated by various types of consumer expenditures in British Columbia. Patterns are similar in other regions (REMI, 2005).*

Policies that stimulate fuel consumption impose large macroeconomic costs. For example, low fuel prices and automobile-oriented transport planning result in high per capita fuel consumption in the U.S., causing the nation to spend about $300 billion on imported petroleum in 2006, representing about a third of the trade deficit, a cost that will increase as international petroleum prices increase (Jackson, 2007). If U.S. motorists consumed petroleum at a similar rate as other wealthy countries, the U.S. economy would save approximately $200 billion dollars at current petroleum prices, and more in the future as domestic production declines and petroleum costs increase.

Retail fuel prices include various components with different economic impacts, as summarized in Table 5. Local taxes and a portion of fuel distribution costs stay in the regional economy. Federal and state taxes, domestic production, and refining and distribution costs, stay in the national economy. Money spent to import petroleum leaves the country. Both regional and national economies tend to benefit from energy conservation. Even petroleum producing regions benefit from increased domestic energy efficiency that frees up more product for export.

**Table 5**  
Economic Impacts of Fuel Price Components (EIA, 2005)

<table>
<thead>
<tr>
<th>Price Component</th>
<th>Portion</th>
<th>Economic Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxes</td>
<td>21%</td>
<td>Stays in jurisdiction (regional/state/provincial/national). Fuel taxes are relatively efficient and less harmful to the economy than most other taxes.</td>
</tr>
<tr>
<td>Distribution &amp; Marketing</td>
<td>6%</td>
<td>A portion stays in the regional economy, providing distribution and retail jobs.</td>
</tr>
<tr>
<td>Refining</td>
<td>19%</td>
<td>Capital intensive. Provides economic activity where refining occurs.</td>
</tr>
<tr>
<td>Domestic Crude Oil</td>
<td>18%</td>
<td>Capital intensive. Provides some royalties and economic activity where production occurs.</td>
</tr>
<tr>
<td>Imported Crude Oil</td>
<td>36%</td>
<td>Leaves the economy. Provides virtually no domestic economic activity.</td>
</tr>
</tbody>
</table>

*This table indicates the size and economic impacts of fuel price components. A portion of taxes and distribution costs stay in the regional economy. Other components provide little employment or economic benefit in the region or country where consumption occurs.*
Figure 10 compares per capita annual vehicle fuel expenditures by these components. With current fuel prices the U.S. spends about $200 annually per capita to import petroleum. If petroleum prices double as projected during the next decade and taxes are reduced to allow current consumption patterns to continue, import costs double to $400. If petroleum prices and taxes double, resulting in a 33% reduction in per capita fuel consumption, import expenditures are reduced to just $260 and far more money is retained in regional and national economies, providing economic benefits.

![Figure 10: Annual Fuel Expenditures](chart)

This graph compares per capita fuel expenditures under different pricing policies. Reducing taxes increases fuel consumption and future import costs, which is harmful to the economy.

People sometimes claim that fuel price increases are a burden to industrial production, but for most expanding industries (computers, software, entertainment, retail, services), transportation is a relatively small portion of total costs and fuel is a relatively small portion of transport costs. Even shipping companies spend more on labor than fuel. For most industries transport represents 5-15% of total costs and fuel represents 10-20% of transport costs, so fuel only represents 1-3% of total costs. Doubling fuel prices would cause a relatively small increase in total production costs if industries respond by improving logistical efficiency. As a result, fuel price increases have a relatively small impact on overall economic activity, if the increases are gradual and predictable so industries can respond.

Economic efficiency is maximized when prices (what consumers pay) reflect production costs. Reducing fuel prices with subsidies or tax reductions are economic transfers that shift costs to other economic sector and groups. This tends to be unfair and encourages inefficiency. Fuel tax are considered a road user fee, but are inadequate to fund total roadway costs in the U.S. (Puentes and Prince, 2003; Wachs, 2003). Fuel prices would need to increase more than 40% to cover current roadway expenditures, and much more to cover costs for traffic services, fuel production externalities, and other costs imposed by motor vehicle use (“Fuel Taxes,” VTPI, 2006; UNEA, 2003).
Put in a more positive way, cost-based pricing (prices that reflect full production costs) allows consumers to save money by using resources more efficiently. For example, if consumers are shielded from petroleum cost increases by subsidies or tax reductions, they are forced to bear the indirect cost. But if cost increases are passed on as price increases, consumers can avoid some or all of the additional cost by conserving fuel. Similarly, fuel price increases motivate businesses to find ways to increase their fuel efficiency. As a result, efforts to avoid price increases through subsidies and tax reductions are more economically harmful than passing the additional cost on to consumers.

Many studies show that fuel tax increases can help the economy overall by encouraging efficiency, provided that revenues are invested in efficient projects or used to reduce more economically harmful taxes (Metschies, 2001; CBO, 2003). Fuel taxes are less economically harmful and burdensome than most other taxes (CBO, 2003). Therefore, fuel subsidies based on general taxes tend to be economically harmful while tax shifts that increase fuel taxes to reduce other taxes provide overall economic benefits (Durning and Bauman, 1998; Norland and Ninassi, 1998). In the late 1990s, 40 leading US economist representing diverse ideologies were surveyed concerning various tax and regulatory reforms. The only policy they agreed on was the desirability of a 25¢ per gallon fuel tax increase (Fuchs, Krueger, and Poterba, 1998).

Because vehicle and land use decisions are durable, current fuel prices affect future energy efficiency. It therefore makes sense to begin raising fuel taxes now, to increase efficiency as a precaution against future petroleum cost increases. Otherwise, the future economy will lose wealth as international energy prices rise. Gradual and predictable tax increases allow consumers and industries to take higher future prices into account when making vehicle purchase and location decisions.
Equity Impacts

Equity can be evaluated in a variety of ways (“Equity Evaluation,” VTPI, 2006). Horizontal equity refers to whether people with equal needs and abilities are treated equally. Economic transfers tend to violate the principle of horizontal equity. For example, there is no particular reason that automobile travel should be underpriced and subsidized, for example, by financing roads through general taxes rather than user taxes, or by subsidizing fuel production; doing so benefits high energy consuming consumers and industries at the expense of energy efficient consumers and industries.

Vertical equity assumes that physically, economically or socially disadvantaged people should receive extra support. As described earlier, vehicle fuel costs are considered regressive when measured as expenditures by vehicle-owning households, but not when measured as expenditures by all households. This indicates that equity objectives can be achieved either by lowering fuel prices for lower-income households, or by improving affordable transport options. Improving transportation options is more progressive overall than subsidizing fuel since it provides greater total savings (it reduces other vehicle costs besides fuel) and benefits non-drivers in addition to motorists (T&E, 2006; Litman, 2007).

Some policies can provide financial benefits to lower-income households. For example, parking cash out (allowing commuters to choose cash instead of parking subsidies) typically provides $500 to $1,000 annual benefits to people who use alternative modes. Location efficient housing with unbundled parking typically provides $600 to $1,200 annual savings to households that own fewer than average automobiles. Since lower-income households tend to own fewer vehicles, drive fewer annual vehicle-miles and rely more on alternative modes than higher income households, they are likely to capture these savings (VTPI, 2006).

Even if fuel is considered regressive, broad fuel subsidies are an inefficient way to achieve equity objectives, since their primary effect is to allow middle- and high-income motorists to purchase larger vehicles and drive more miles. The lowest-income quintile consumes only 9% of total fuel. The subsidy needed to half the fuel price increases that occurred between 2003 and 2005 would provide $154 to the lowest quintile household and $521 to the highest quintile household. It is far better to provide a targeted subsidy to low-income households that can be used for any travel mode. This provides benefits to low-income people who use alternative modes, lets individual consumers decide what option works best for them, and helps increase overall transport system efficiency.
Summary
The main point of this paper is to illustrate the broad range of impacts that result from different fuel policies, and therefore the need for comprehensive analysis when selecting policies. For example, low fuel prices may increase motorists’ affordability, but they stimulate fuel consumption and vehicle travel, which increases various economic, social and environmental costs. Decision-makers should consider all of these impacts when evaluating potential responses to rising fuel prices.

For purposes of analysis various impacts are defined as planning objectives, which indicate the desired direction of each impact. Table 6 indicates how potential responses to rising fuel prices affect these objectives. For example, all strategies help increase consumer affordability, but minimizing fuel prices through subsidies and reduced fuel taxes tends to contradict other planning objectives. Increased vehicle fuel efficiency tends to increase consumer affordability, energy security and pollution reductions, but because it increases total vehicle travel, it contradicts other objectives. Mobility management tends to provide the greatest total benefits by increasing transportation system efficiency.

Table 6 Comparing Benefits (Litman, 2007)

<table>
<thead>
<tr>
<th>Planning Objectives</th>
<th>Minimize Fuel Prices</th>
<th>Alternative Fuels</th>
<th>Efficient Vehicles</th>
<th>Mobility Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer affordability</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Minimize tax subsidies</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td></td>
</tr>
<tr>
<td>Energy security</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pollution reduction</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Congestion reduction</td>
<td>×</td>
<td>×</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Road and parking cost savings</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Traffic safety</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Improved mobility options for nondrivers</td>
<td>×</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Physical fitness &amp; health (exercise)</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Land use objectives (reduces sprawl)</td>
<td>✓</td>
<td>✓</td>
<td>×</td>
<td>✓</td>
</tr>
</tbody>
</table>

Subsidizing fuel reduces consumer fuel costs but imposes indirect costs on consumers through higher taxes and by stimulating additional driving tend to exacerbate problems such as congestion, accidents and sprawl. Increasing vehicle fuel efficiency provides consumer savings but also tends to increase total vehicle travel and mileage-related costs. Mobility management strategies provide the greatest benefits. (✓ = supports objective; × = contradicts objective)
Appropriate Responses To Rising Fuel Prices
This section describes the most overall beneficial responses to rising fuel prices.

Although there are many possible responses to rising fuel prices, some are much better overall than others. The key to an effective response is to decide that the overall goal will be to reduce total costs by increasing vehicle fuel economy and transport system efficiency, rather than attempt to shield consumers from price increases. As much as possible, individual, short-term policy decisions should be consistent with this strategic goal. This requires that potential responses be evaluated using a comprehensive framework that takes into account all significant impacts.

Among specific potential policy responses, the most beneficial are Win-Win Transportation Solutions, which are market reforms based on economic principles that increase overall transport system efficiency (Litman, 2007b). One of the most appropriate of these is to gradually and predictably increase fuel taxes. At a minimum, fuel taxes should increase to reflect all public expenditures on roadways and traffic services (Metschies, 2005). In the U.S., this would require an increase of approximately 50% over current fuel taxes. Additional taxes may be justified to internalize petroleum production externalities, pollution emission costs, and as an energy conservation strategy (“Fuel Tax Increases,” VTPI, 2006). This can be considered a revenue-neutral tax shift, with higher fuel prices offset by reductions in other taxes. These increases should be gradual, typically about 10% annual real (inflation adjusted) growth in tax rates.

Several other Win-Win Solutions help increase transportation system efficiency by improving consumer transport options and correcting existing market distortions that encourage economically excessive motor vehicle travel. These include (Litman, 2007b):

- **Pay-As-You-Drive Pricing** - Convert fixed vehicle charges into mileage-based fees.
- **Parking Cash-Out** - Offer commuters financial incentives for using alternative modes.
- **Parking Pricing** - Charge users directly for parking facility use, often with variable rates.
- **Road Pricing** - Charge users directly for road use, with rates that reflect costs imposed.
- **Transportation Demand Management Programs** - Local and regional programs that support and encourage use of alternative modes.
- **Transit and Rideshare Improvements** - Improve transit and rideshare services.
- **Walking and Cycling Improvements** - Create more walkable and bikeable communities.
- **Smart Growth Policies** - More accessible, multi-modal land use development patterns.
- **Freight Transport Management** - Encourage businesses to use more efficient transportation options.
- **Carsharing** - Vehicle rental services that substitute for private automobile ownership.
- **Planning Reforms** - More comprehensive and neutral planning and investment practices.
Policies that encourage fuel efficient vehicle purchases are justified now to prepare for higher future fuel prices, and to reduce the relative disadvantage of driving efficient vehicles (if the entire fleet becomes more efficient there is less stigma and risk to smaller vehicle users). These include vehicle fuel efficiency standards (or carbon emission limits), feebates (surcharges on less efficient vehicles with revenues used to rebate efficient vehicle purchases), and efficiency-based vehicle taxes and fees. To minimize rebound effects and maximize total benefits it will be important to implement fuel tax increases and mobility management strategies in conjunction with efficient vehicle policies.

The main incentive for alternative fuels should be higher gasoline and diesel prices. Some alternative fuels may deserve public support, particularly for their basic development, but these should be evaluated critically to insure they are justified, taking into account all economic, social and environmental costs. Fuels based on waste products, such as used vegetable oils and cellulitic ethanol, probably deserve support, provided they are environmentally benign and economically efficient. Corn-based ethanol is costly and overall environmentally harmful (air pollution reduction benefits are offset by increased agricultural pollution), and so should receive no public subsidy (Bourne, 2007).

Electric vehicle development should be encouraged, but their production and use should not be subsidized since their overall benefits are modest; they reduce tailpipe emissions but increase electric generation emissions, and already receive about 2.5¢ per vehicle-mile subsidy because they pay no road use taxes. Electric vehicle benefits are insufficient to justify other incentives such as free parking or use of High Occupancy Vehicle lanes. Propane and LPG also provide only modest benefits and so deserve only modest support. Synthetic fuels from tar sands, oil shales and coal are too environmentally harmful to be justified and so should receive no public support. Alternative fuel vehicles should no longer be considered fuel efficient for CAFE standards.10

Any subsidy or tax reduction to increase fuel affordability should be targeted at economically disadvantaged people and suitable for any transport mode. For example, low income people could receive an annual subsidy that may be used for fuel, public transit, taxi fares or to help pay for location-efficient affordable housing.

Economic development policies should encourage resource efficient industries, particularly those that increase transport system efficiency. Support for vehicle and petroleum industries should be evaluated critically to determine whether they are cost effective compared with other industrial development investments, and whether they are consistent with strategic objectives and future consumer demands. Businesses that depend on energy intensive transport (manufacturing of fuel inefficient automobiles, recreational vehicles and motorized sports equipment) should be encouraged to diversify and develop alternative products that will be profitable if fuel prices increase.

10 Fuel economy calculation for alternative fuel vehicles multiplies the actual fuel used by a Fuel Content Factor of 0.15 as an incentive to develop alternative fuel vehicles. Thus a 15 mpg dual-fuel E85 capable vehicle would be rated as 40 mpg for CAFE purposes although only a tiny portion of fuel used in such vehicles is actually E85.
Conclusions: Raise My Fuel Prices, Please!

Fuel prices are likely to increase significantly in the future. Motorists are accustomed to low fuel prices and often demand price minimization policies. But such policies impose significant economic, social and environmental costs, by requiring subsidies and by increasing fuel consumption and vehicle travel. This increases the economic costs of importing petroleum, pollution emissions, congestion, road and parking facility costs, accidents and sprawl. Rather than trying to minimize fuel price increases it would be better to allow prices to rise and help consumers, businesses and communities reduce total costs through more fuel efficient vehicles and more efficient transport systems. These solutions provide far larger total benefits.

The real problem of higher fuel prices occurs if we fail to change. Vehicle purchase and housing location decisions last years or decades, and consumers tend to apply a high discount rate when evaluating energy savings. As a result, they purchase less efficient vehicles and choose more automobile-dependent locations than what will be optimal during much of these products’ operating life. The key to avoiding a future crisis is to begin increasing efficiency now. If we treat current high energy prices as a temporary anomaly and try to shield consumers from price increases we encourage inefficiency and exacerbate future problems. If we begin raising prices now with increased fuel taxes, and work to make our transport system more efficient, we can avert future problems.

The current transport system is inefficient. Large efficiency gains can be achieved in cost effective ways that provide multiple benefits. Harm to consumers and the economy can be minimized by making fuel price increases gradual and predictable, and matching them with policies that improve vehicle efficiency and transport options. There is no equity justification to subsidize fuel since their primary effect would be to allow middle- and upper-income motorists to purchase less efficient vehicles and drive more. Targeted subsidies and policies that improve affordable transport options can do far more to help disadvantaged people while also helping to solve other transport problems.

With these recommended policy changes, petroleum prices could double and consumers would spend less on transport than they do now. Consumers would still be able to access work, school and services, they would still take holidays, businesses would still produce and distribute products, and economic activity could still increase, but these activities would consume less energy. These policies would change lifestyles and industries, more children would walk and bicycle to school rather than be driven, communities would be more compact, and industrial production would be more resource efficient. These changes can provide significant additional benefits besides just energy cost savings.

A well-developed vocabulary exists for describing prices considered too high. People say that they are gouged, cheated, or fleeced. There is no comparable vocabulary to describe prices that are too low, although underpricing is equally harmful to the economy and ultimately to consumers. It is difficult to imagine consumers demonstrating with signs that say, “Raise My Fuel Prices!”, but it actually makes sense. The best response to rising fuel prices is to let them increase and create a more efficient transport system.
References


Appropriate Response to Rising Fuel Prices


International Fuel Prices Website ([www.international-fuel-prices.com](http://www.international-fuel-prices.com)) provides information for the study of retail fuel prices.


Appropriate Response to Rising Fuel Prices


Natural Resources Canada (*www.nrcan.gc.ca*) provides Canadian energy data, including a *Fuel Focus* website *http://fuelfocus.nrcan.gc.ca*.


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