Evaluating the Impact of Replacing Virginia's Gasoline Tax with Incremental Sales Tax

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Summary

Governor Bob McDonnell is proposing to raise Virginia's general sales and use tax while eliminating the portion of the current motor fuel tax that applies to gasoline sales and is used to fund transportation-oriented projects. Chmura Economics & Analytics (Chmura) was asked by the Virginia Department of Transportation to determine the tax implications of the new proposal.

The Governor's transportation package includes: eliminates Virginia's 17.5 cents per gallon tax on gasoline; increases Virginia's sales and use tax, a reliable, predictable and sustainable revenue source, by 0.8 percentage points and dedicates the additional sales tax revenue to transportation; increases Virginia's existing sales tax commitment to transportation from 0.5 percent to 0.75 percent over the next five years; and increases motor vehicle registration fees by $15 and including a $100 alternative fuel vehicle fee, to offset lost federal gas tax revenue and to help fund Virginia's strong and growing demand for passenger rail and transit.

The key conclusions of the Chmura study are:

- Competitive pressure of the gasoline retail market implies that when the gasoline tax is removed, retail prices will come down. Pressure from gas station owners will be tempted to lower their gas prices to increase their sales. Research indicates that when the cost of gasoline is reduced by 10 cents, the retail price would be reduced by 9.5 cents. Based on these findings, it is assumed that if the Virginia gasoline tax is removed, the retail price for gasoline could be reduced by 16.6 cents, or 95% of the 17.5 cents per gallon eliminated gasoline tax.
- The fiscal impact of the Governor's proposal is essentially revenue-neutral for FY2012, considering its impact on the combined General Fund and Transportation Fund. It will increase funding to the Transportation Fund by roughly 20% based on FY2012 data;
- The new proposal will generate more revenue for transportation in the future, as transportation revenue—tied to sales tax—is expected to grow faster than the current motor fuel tax revenue;
- Gasoline taxes are more regressive than sales tax. As a result, removing the gasoline tax makes the governor's proposal slightly less regressive than under the existing law; and
- With the elimination of the gasoline tax, it is estimated that the overall sales of gasoline in Virginia will increase 1.20%, implying that total sales at gasoline stations will be increased by $123.0 million. The increased gasoline sales can potentially increase employment at gasoline stations.

Background

Virginia is grappling with transportation issues—especially with how to generate funding for much-needed transportation projects. Currently, the state funding source for transportation comes from motor

vehicle sales tax, motor fuel tax,[1] and 0.5 cent of the 5 cents per dollar from general sales and use tax.[2] At the beginning of the 2013 General Assembly session, Governor Bob McDonnell announced a proposal that would eliminate the state's gasoline tax. This revenue would be replaced with an increase of 0.8 percentage points in the state's sales tax rate (from 5% to 5.8%), with the entire portion of increase dedicated to transportation. The Governor's proposal also includes other measures to increase transportation funding, such as: dedicating an additional 0.25 cent of the 5 cents per dollar from sales tax to transportation (currently at 0.5 cent), increasing the vehicle registration fee by $15, and imposing $100 in annual alternative fuel vehicle fees.[3] This study only focuses on the impact of replacing the gasoline tax with increased sales tax.

Virginia's state motor fuel tax is assessed at 17.5 cents for each gallon of gasoline, diesel, and blended fuels.[4] This rate has not been changed since 1987. Governor McDonnell's proposal will eliminate the tax on gasoline, while diesel fuel tax will remain unchanged.[5]

Representatives with Virginia's Department of Transportation (VDOT) need to understand the impact of the Governor's proposed funding mechanism on the state budget—especially the effect on consumer behavior of eliminating the gasoline tax, and whether such a switch would be progressive or regressive. Chmura used Fiscal Year (FY) 2012 as the benchmark for the analysis of the state budgetary impact because it's the latest full fiscal year of actual data on sales tax and motor fuel taxes collected. Using FY2012 as the benchmark does not require Chmura to make assumptions on future sales and gasoline taxes, which also depend on economic growth, and could introduce additional uncertainty.[6]

Estimating the Budgetary Impact of Elimination of the Gasoline Tax

In FY2012, the total motor fuel tax for Virginia reached $822.7 million (Figure 1).[7] This figure represents over 4.9 billion gallons of gasoline and diesel fuel consumed in Virginia. Based on Virginia gasoline consumption data from the Virginia Department of Taxation, 20.4% (or $167.8 million) of the motor fuel tax revenue was estimated to be tax monies collected from sales of diesel fuel. Since the motor fuel tax for diesel fuel would not be affected by the removal of the gasoline tax, the state revenue loss resulting

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[1] While motor fuel tax is commonly referred to as gasoline tax (or gas tax), it also includes taxes on diesel, which will not be eliminated under the Governor's proposal. In this report, we use gasoline tax to refer to taxes on gasoline only, while motor fuel tax refers to broader taxes on both gasoline and diesel.

[2] Sales and use tax is simply referred to as sales tax in this report.
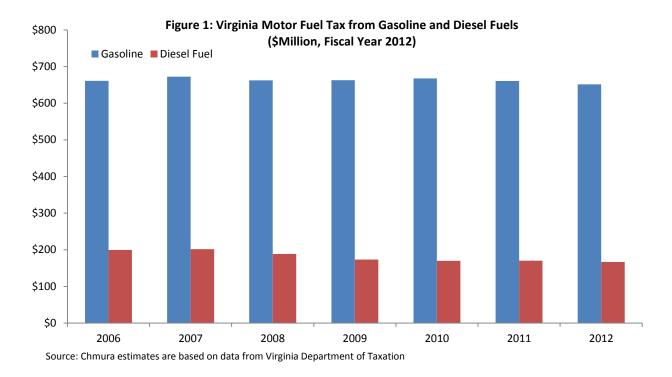
[3] http://www.governor.virginia.gov/News/viewRelease.cfm?id=1588

[4] Motor fuel tax for aviation fuels is 5 cents per gallon in Virginia. Source: VDOT.

[5] In this report, Chmura uses the phrase "gasoline tax" to refer to motor fuel tax on gasoline.

[6] The Governor's office issued a document: "Virginia's Road to the Future: Governor McDonnell's 2013 Transportation Funding and Reform Package," which projected tax revenue from FY2014 to FY2018. However, it did not estimate the budgetary impact of the state's General Fund and did not address issues of progressivity of the new proposal.

[7] Source: The Economic Outlook and Revenue Forecast through Fiscal Year 2016, Governor's Confidential Working Papers, Prepared by the Virginia Department of Taxation for Review by the Governor's Advisory Council on Revenue Estimate. November 2012.

from the new proposal would be only from taxes collected from gasoline, estimated to be $654.9 million in FY2012.

Figure 1: Virginia Motor Fuel Tax from Gasoline and Diesel Fuels ($Million, Fiscal Year 2012)

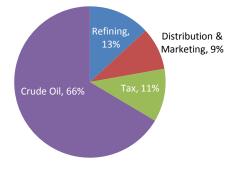Source: Chmura estimates are based on data from Virginia Department of Taxation

After removal of the gasoline tax, there are two essential questions regarding how this action will change gasoline consumption:

1. How will retail gasoline price (commonly referred to as the price at the pump) change, and
2. How will Virginia consumer behavior change in reaction to the change in the retail gasoline price and new sales tax rate?

Based on data from the Energy Information Administration (EIA) of the Department of Energy, the

Figure 2: Composition of Retail Gasoline Price (FY 2012)

Source: EIA, U.S. Dept. of Energy

national retail gasoline price is made up of the following components: crude oil, refining, distribution and marketing, and tax (Figure 2).[8] The tax figure includes both a federal tax (18.4 cents per gallon) and any state taxes. The average state tax on gasoline is 23.4 cents per gallon, higher than Virginia's tax of 17.5 cents per gallon.

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[8] http://www.eia.gov/petroleum/gasdiesel/gaspump_hist.cfm.

When the state gasoline tax is removed, it is unlikely that the cost of either crude oil or petroleum refining will change. The only component that can be affected is distribution and marketing, which includes the cost of distribution, marketing, and the profit of gas station owners. When the gasoline tax is removed, it is possible that gas station owners will not lower their retail price. Or, they may not lower their price as much as the reduction in the gasoline tax; thereby either increasing their profit margins or their spending on distribution and marketing.

How changes in the cost of different components of gasoline are reflected in the retail price is termed price pass-through in economic literature. Research has found that gas price pass-through is asymmetrical, which means that there are different degrees of changes when the cost of gasoline increases, compared to when it decreases.[9] For example, gasoline retailers tend to increase the price quickly when the cost base of gasoline[10] rises, and lower the price slowly when the cost of gasoline falls, so they can retain more profits. Gas station owners have an incentive not to reduce retail prices, or at least not fully. However, competitive pressure of the gasoline retail market implies that when the gasoline tax is removed, retail prices will eventually come down. This is because there is pressure from some gas station owners who will be tempted to lower their gas prices to increase their sales. In addition, there are incentives for new gas stations to be built in Virginia when profit margins are high. In addition to differences in how quickly prices adjust either upwards or downwards, academic research indicates that when the cost of gasoline increases 10 cents, the retail price would increase by only 9.0 cents. In contrast, when the cost of gasoline is reduced by 10 cents, the retail price would be reduced by 9.5 cents.[11] Based on these findings, it is assumed that if the Virginia gasoline tax is removed, the retail price for gasoline could be reduced by 16.6 cents, or 95% of the 17.5 cents per gallon eliminated gasoline tax.

If the retail price of gasoline declines, how it will affect the quantity of gasoline consumed in Virginia needs to be addressed. Economic theory suggests that gasoline is a commodity of basic need (like food and clothing), thus the demand for gasoline is inelastic. This means that the percentage of demand changes is smaller than the percentage of price changes.[12] Chmura conducted extensive research on academic studies regarding the price elasticity of gasoline.[13] Two notable meta-studies found that the price elasticity for gasoline is quite consistent.[14] One such study, titled "Explaining the Variation in

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[9] Source: Asymmetric Pass-Through in U.S. Gasoline Prices, by Matthew Chesnes, Working Paper No 302, Federal Trade Commission, June 2010. Since gasoline price pass-through with respect to gasoline tax is not available, Chmura assumes that the pass-through study on crude oil price to retail price can be used as a guide.

[10] The cost base of gasoline includes the cost of crude oil, refinery, marketing and distribution, and tax. The difference between cost base and retail price is the profit margin for gas station owners.

[11] Ibid.

[12] Demand elasticity is defined as the percentage change in quantity demanded in response to one percentage change in price.

[13] For an example of discussion of gas elasticity, see:
http://economics.about.com/od/priceelasticityofdemand/a/gasoline_elast.htm.

[14] A meta-study refers to methods focused on contrasting and combining results from different studies, in the hope of identifying patterns among study results, sources of disagreement among those results, or other interesting relationships that may come to light in the context of multiple studies.

Elasticity Estimates of Gasoline Demand in the United States: A Meta-analysis,"[15] examined 101 different studies; and found that in the short run (defined as 1 year or less), the average price elasticity of demand for gasoline is -0.26. In other words, when the price of gasoline is reduced by 1.0%, the demand for gasoline will increase by 0.26% in the short run. In the long run (defined as longer than 1 year), the price elasticity of demand is -0.58. Another meta-analysis, titled "Review of Income and Price Elasticities in the Demand for Road Traffic,"[16] showed that if the price of fuel goes up by 10%, the volume of fuel consumed will go down by about 2.5% within a year, building up to a reduction of over 6.0% in the long run. This study implies a price elasticity of -0.25 in the short run and -0.60 in the long run, consistent with the first meta-study. For Chmura's study, the short run elasticity value of 0.25 was chosen to investigate the budgetary impact in FY2012.[17] Based on the actual gasoline price in Virginia in 2012, removing the state gasoline tax would represent a decrease of 4.8% in the retail gasoline price. Consequently, the total quantity of gasoline consumed is expected to increase by 1.2%. As a result, based on FY2012 gasoline consumption volume, the 1.2% increase means Virginians would purchase 46.5 million more gallons of gasoline.

Estimating Budgetary Impacts of Raising Sales Tax

Using FY2012 data as a baseline, removing the gasoline tax implies that the state will lose $654.9 million in gasoline tax revenue. Despite the increased gasoline purchases, increased sales at gas pumps will not bring in additional revenue for the state government, as the Virginia law (code of Virginia §58.1-609.1) exempts fuel sales from general sales tax, currently set at 5% of sales receipts.

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[15] Source: Explaining the Variation in Elasticity Estimates of Gasoline Demand in the United States: A Meta-Analysis, Energy Journal 17(3):49-60, by Molly Espey.

[16] Source: Review of Income and Price Elasticities in the Demand for Road Traffic, by Mark Hanly, Joyce Dargay and Phil Goodwin. Report 2002/13 London, ESRC Transport Studies Unit, University College London,

[17] The long-run elasticity suggests that demand for gasoline in the long run will be larger than estimated in this study.

Table 1: Estimated State Budgetary Impact (FY2012, $Million)

	General Fund	Transportation Fund	Total
Existing Law			
Sales Tax[18]	$3,121.5	$503.1	$3,624.6
Motor Fuel Tax-Gasoline		$654.9	$654.9
Motor Fuel Tax-Diesel		$167.8	$167.8
Total-Existing	**$3,121.5**	**$1,325.8**	**$4,447.3**
New Proposal			
Motor Fuel Tax-Diesel		$167.8	$167.8
Sales Tax-Base Line	$3,121.5	$503.1	$3,624.6
Sales Tax 0.8 Percentage Point Increase		$681.8	$681.8
Increase TF Allocation to 0.75 Cents	-$247.7	$247.7	$0.0
Sales[19] Tax Sub-total	**$2,873.8**	**$1,432.6**	**$4,306.4**
Total-New Proposal	**$2,873.8**	**$1,600.4**	**$4,474.2**

Source: Chmura Economics & Analytics

The Governor's proposal calls for increasing the general sales tax rate from 5.0% to 5.8%. This excludes food items to be consumed at home, for which the sales tax rate will remain unchanged at 2.5%. This means that for every $1.00 spent there will be 5.8 cents generated in tax revenue under the new plan. The current sales tax distribution stipulates that about 1 cent of 5 cents per dollar in sales tax will be returned to local governments, and 0.5 cent of the 5 cents per dollar in sales tax will be allocated to Virginia's Transportation Fund,[20] with the rest (about 3.5 cents of 5 cents per dollar in sales tax) going to the General Fund. Under the new proposal, the local portion will remain unchanged. The increased 0.8 cents in sales tax will be devoted to transportation, and the governor also calls for increasing the allocation to transportation from the current 0.5 cent to 0.75 cents.

Table 2: Sales Tax Breakdown per $1.00 in Taxable Consumption

	General Fund	Local Government	Transportation Fund	Total
Existing Law				
Sales tax revenue per $1.00 in spending	3.5 cents	1 cent	0.5 cents	5 cents
New Proposal				
Sales tax revenue per $1.00 in spending	3.25 cents	1 cent	1.55 cents	5.8 cents

Note: These are approximate numbers as sales of certain items, such as food, are taxed at a lower rate.

Source: Chmura Economics & Analytics

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[18] These figures exclude the roughly 1%—approximately one fifth of the current sales tax revenue—of the current 5% sales tax that is allocated to local Virginia governments.

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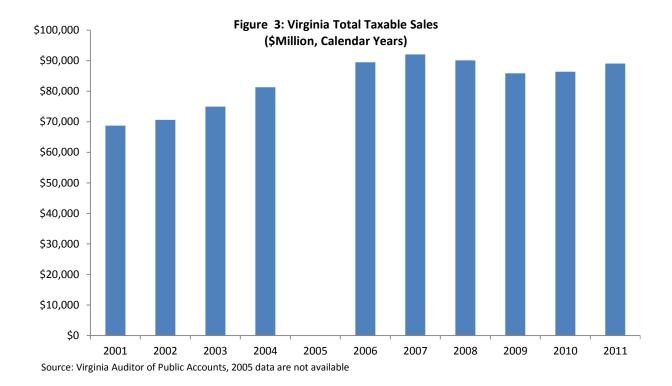
[20] Virginia has two transportation-related funds: the Highway Maintenance and Operation Fund, and the Transportation Trust Fund. In this report, Chmura uses the phrase "Transportation Fund" to refer to both funds.

Another question that arises from the new proposal is how will Virginia consumer behavior change in reaction to an increase in sales tax? If Virginia's sales tax rate increases from 5% to 5.8%, this may reduce the overall sales of commodities and services that are subject to the sales tax. The increase in sales tax and subsequent increase in the total cost born by consumers may cause some consumers to treat it like a simple price increase, thus reducing their demand for products and services. However, unlike the gasoline tax (which is included in the price at the pump), general sales taxes are imposed on top of the retail prices consumers see in the store, and are charged at the cash register. As a result, many consumers may not take sales tax into consideration in their purchase decisions.

Academic studies have found that whether or not sales tax is included in the price tag makes a significant difference in consumer behavior.[21] When the sales tax amount is not included on the price tag, consumers tend to ignore the sales tax. That suggests overall demand for commodities and services in Virginia may not be affected, or may only be affected marginally by an increase in sales tax. For example, when Virginia last increased its sales tax from 4.5% to 5.0% (effective August 1st 2004), there were no observable decreases in total taxable sales for the state in 2004 (Figure 3). The assumption therefore, that the increase in the sales tax rate will not have a material impact on the overall sales tax revenues, is buttressed by these two facts: (1) that the 0.8 percentage point change is similar in magnitude to the 2004 change which resulted in no measurable impact on sales tax revenue, and (2) academic research indicating that because the tax is added at the cash-register and not reflected in the on-the-shelf price, most consumers will not factor in the higher tax rate when making purchasing decisions.

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[21] For an example, please see Salience and Taxation: Theory and Evidence, NBER Working Paper No. 13330, by Raj Chetty, Adam Looney, and Kory Kroft.

Figure 3: Virginia Total Taxable Sales
($Million, Calendar Years)

Source: Virginia Auditor of Public Accounts, 2005 data are not available

When assuming that an increase in the sales tax rate from 5.0% to 5.8% has little effect on overall consumer spending (demand for all goods and services subject to the sales tax), the increased tax rate is estimated to result in an additional $681.8 million in tax revenues for the state based on FY2012 taxable sales (Table 1). According to the Governor's proposal, all revenue from the increased sales tax will be used for transportation-related projects.

In addition, the Governor's proposal calls for increasing the portion of transportation funding from sales tax revenues from the existing 0.5 cent to 0.75 cents. The revenue would be used for various transportation projects as well as for funding the subway in Northern Virginia. In FY2012, the sales tax allocated to the Transportation Fund is estimated to be $503.1 million under the current funding formula. The effect of the proposal is to transfer $247.7 million from the General Fund to the Transportation Fund, based on FY2012 figures.[22]

Overall, the fiscal impact of the Governor's proposal is essentially revenue-neutral for FY2012, considering its impact on the combined General Fund and Transportation Fund. The total state revenue under the new proposal is estimated to be $4.47 billion, close to $4.45 billion under the current law. While the proposal seems to be revenue-neutral now on the overall state budget, it will increase transportation funding by $274.6 million per year—roughly 20%—based on FY2012 figures. More importantly, the new proposal will generate more revenue for transportation in the future, as

[22] The Governor's proposal calls for a 5-year phased-in of such an increase. Chmura estimated the number based on the full impact of such a proposal.

transportation revenue—tied to sales tax—is expected to grow faster than the current motor fuel tax revenue.

Evaluation of Whether the Proposed Tax Switch is Regressive

If high-income households pay a higher percentage of their income on a certain tax, then that tax is considered progressive. A regressive tax is generally a tax that is applied uniformly, and therefore causes lower-income households to share a higher tax burden. To understand whether or not switching from gasoline tax to sales tax is regressive, Chmura calculated the effective tax rates under both the existing law and the Governor's new proposal. In these calculations, Chmura utilized detailed national consumer expenditure data by income bracket from the Bureau of Labor Statistics (BLS)[23] customized to the Virginia spending value with state spending patterns from Claritas.[24]

Table 2 presents the estimated effective tax rates by household income. In Table 3, the effective tax rates under the existing law are calculated as the share of sales and gasoline tax as a percentage of average household income. The effective tax rates under the new proposal are calculated as the share of the increased sales tax (5.8%) as a percentage of average household income, with gasoline tax eliminated.

Table 3: Effective Tax Rates by Household Income

Household Income Brackets	Under Existing Law (% of income spent on sales and gasoline tax)	Effective Rate of Current Gasoline Tax	Under Governor's Proposal (% of income spent on sales tax)
Lowest 20%	3.4%	0.4%	3.3%
Second-lowest 20%	1.8%	0.3%	1.7%
Third-lowest 20%	1.3%	0.2%	1.3%
Fourth-lowest 20%	1.1%	0.2%	1.1%
Highest 20%	0.8%	0.1%	0.8%
Overall	1.1%	0.1%	1.1%

Source: Chmura Economics & Analytics

Under both scenarios, the existing sales and gasoline tax and new sales tax are regressive, meaning lower-income households spend a higher percentage of their income paying these taxes—this is true of most sales tax schemas. The new proposal, however, will make the overall sales and fuel tax structure slightly less regressive, thus benefiting low-income households more than high-income households. Under the existing law, it is estimated that individuals in the lowest 20 percent of the household income bracket spend 3.4% of their income on sales tax and gasoline tax. Under the new proposal, they would

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[23] Source: http://www.bls.gov/cex/#tables. Spending patterns by income brackets are only available at the national level from this survey.

[24] Claritas does not report state-level spending patterns by income segments, only aggregate-level.

spend 3.3% of their income on the increased sales tax. Similarly, households in the second-lowest 20 percent of the income bracket will see their tax burden reduced from 1.8% to 1.7%. For households in other income brackets, the effective tax rates remain either unchanged or slightly higher. This analysis supports the claim that the tax structure becomes slightly less regressive under the new proposal. The reason is that gasoline is a commodity of basic need, which means everyone has demand for it regardless of income. Also there is little variation in quality or price of gasoline. Unlike, for example, fine dining and fast-food restaurants, where there is a difference in both price and quality of food and service, there are no luxury gasoline services catering to high-income households. As a result, there is less variation in spending on gasoline between low- and high-income households, relative to their income difference. For that reason, gasoline taxes are more regressive than sales tax. As Table 2 shows, the effective tax rate for the current gasoline tax is 0.4% for households in the lowest income bracket, but only 0.1% for households in the highest income bracket. The ratio is 4 to 1, calculated as the effective tax rate of the lowest-income household divided by the effective tax rate of the highest-income household. This is more regressive than the sales tax, for which the ratio is 3.3 to 1. As a result, removing the gasoline tax makes the governor's proposal slightly less regressive than under the existing law.

Estimating the Employment Impact

With the elimination of the gasoline tax, under the assumed price elasticity of -0.25, it is estimated that the overall sales of gasoline in Virginia will increase 1.20%, or by 46.5 million gallons based on FY2012 figures. That implies total sales at gasoline stations will be increased by $123.0 million (excluding tax). The increased gasoline sales can potentially increase employment at gasoline stations.

Chmura used the IMPLAN Pro model to estimate direct, indirect, and induced employment resulting from the increase in gasoline sales. Based on the IMPLAN model, average sales per worker was $416,250 in 2010. Assuming this rate remains the same, but adjusting for inflation, the increase in gasoline sales can support 338 new jobs in gas stations around the state in FY2012.[25] The total economic impact also includes the economic ripple effects from the direct impact. Ripple effects, categorized as indirect and induced impacts, measure the secondary benefits generated by gasoline station sales. These effects include benefits to many businesses supplying gasoline stations, such as oil refineries and pipeline and truck transportation businesses. They also include benefits to local businesses that cater to workers in gasoline stations. Including the indirect and induced impact, the total jobs that can be supported from increased gasoline sales is estimated to be 465 in FY2012.

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[25] The average sales per worker can increase, thus supporting fewer jobs than the numbers estimated here. For example, gasoline station owners may simply increase the hours of existing workers, without hiring new workers.

Table 4: Economic Impact of Increased Gasoline Sales in Virginia

	Direct	Indirect	Induced	**Total Impact**
Spending Impact ($Million)	$123.0	$6.8	$10.1	**$139.9**
Employment Impact	338	47	79	**465**

Note: Numbers may not sum due to rounding
Source: IMPLAN Pro 2010 and Chmura