

Review of Varshney/Tootelian Report “Cost Of AB 32 On California Small Businesses – Summary Report Of Findings”

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Draft²: February 16, 2010

In June 2009. Sanjay B. Varshney and Dennis H. Tootelian, operating as Varshney & Associates, submitted a report to the California Small Business Roundtable “Cost Of AB 32 On California Small Businesses – Summary Report Of Findings” (“Varshney/Tootelian report”).

The report concludes that³:

On average, the annual costs resulting from the implementation of AB 32 to small businesses are likely to result in loss of more than \$182.6 billion in gross state output, the equivalent of more than 1.1 million jobs, nearly \$76.8 billion in labor income, and nearly \$5.8 billion in indirect business taxes.

The Varshney/Tootelian report estimate of \$182.6 billion gross state product loss is 10% of the total output of the California economy. The Varshney/Tootelian estimates of impacts are at least an order of magnitude (a factor of 10) higher than typical estimates of California impacts, overall United States impacts, or international impacts of greenhouse gas emissions reductions. Thus the question arises as to how the authors came to these results and whether the estimates have any credibility.

Examination of the Varshney/Tootelian analysis leads to the conclusions⁴ that their estimates are highly biased, are based on poor logic and unsound economic analysis, and are likely to be too large by a factor of at least 10.

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² When this paper is revised, new versions will be posted at <http://peec.stanford.edu/library.php>

³ Varshney/Tootelian report, p. 10.

⁴ Equivalent conclusions have been reached in three prior studies 1) Matthew Kahn, “A Review of Cost of AB 32 on California Small Businesses—Summary Report of Findings”, September 21, 2009; 2) Chris Busch, “Climate Policy and Economic Growth in California: A Comparative Analysis of Different Economic Impact Projections,” December 3, 2009 and 3) Frank Ackerman, “Daydreams of Disaster: An evaluation of the Varshney-Tootelian critiques of AB 32 and other regulations”, Report to the California Attorney General 2009 I have reached my conclusions independently of these three studies. My subsequent review of these studies showed that my work is in full agreement with the fundamental conclusions about the Varshney/Tootelian report reported in these three prior

In developing their analyses Varshney/Tootelian create three "scenarios": "Minimum Impact", "Expected Impact to Consumers", and "Expected Economic Impact to Small Businesses." The first two scenarios use very different analyses to look at impacts. The third scenario follows directly from numerical conclusions of the second analysis. The overall economic analysis follows directly from these three "scenarios."

Scenario One: Minimum Impact

The first Varshney/Tootelian scenario "Minimum Impact" purports to take its analysis directly from the Air Resources Board Scoping Plan. The Varshney/Tootelian report states⁵:

"According to the ARB, the annualized cost of implementing AB 32 is \$24.878 billion."

The footnote cites "ARB, 'Climate Change Scoping Plan Appendices, Volume II,' December 2008, p. G-I-8."

Indeed the \$24.878 billion does come from the ARB report. But the ARB report on the pages cited provides a table of the gross costs and savings associated with the various measures. The cited table shows that the gross costs are estimated to be \$24.878 billion but that the gross savings associated with these costs were even larger: \$40.417 billion. The appropriate interpretation of the Air Resources Board Scoping Plan is that the estimated gross cost is \$24.9 billion and the gross savings is \$40.4 billion, with a net savings to the state of California of \$15.5 billion.

All of the analysis in the "Minimum Impact" scenario is based directly on using the estimated gross cost, entirely ignoring all of the estimated savings. Therefore the Varshney/Tootelian report has taken the Air Resources Board estimation that ARB 32 implementation would save money for the state of California and cites it as an a minimum estimation of a cost to the state of California of \$24.9 billion.

The relevant table from the Air Resources Board is reproduced here⁶.

studies. The Busch and the Ackerman study provide, in addition to critiques of the Varshney/Tootelian report, summaries of impacts of greenhouse gas reductions derived from many other studies.

⁵ Varshney/Tootelian report, p. 5.

⁶ ARB, 'Climate Change Scoping Plan Appendices, Volume II,' December 2008, p. G-I-6 though G-I-8.

Table G-I-2: Costs, Savings, and Dollars Per Metric Ton of CO₂E Reduced
Recommended Greenhouse Gas Reduction Measures

	Measures	Reductions (MMTCO ₂ E in 2020)	Costs (\$Millions)	Savings (\$Millions)	Net Cost or Savings Per MTCO ₂ E (\$)
Transportation					
T-1	Pavley I Light-Duty Vehicle GHG Standards	27.7	1,372	11,381	-361
	Pavley II - Light-Duty Vehicle GHG Standards	4.0	594	1,643	-262
T-2	Low Carbon Fuel Standard	15	11,000	11,000	0
T-3	Local Government Actions and Targets (VMT Reduction)	5	500	2054	-311
T-4	Low Friction Oil	2.8	520	1,150	-225
	Tire Pressure Program	0.55	152	224	-131
	Tire Tread Program (Low resistance)	0.3	0.6	123	-408
	Solar Reflective Automotive Paint and Window Glazing	0.89	360	366	-6
T-5	Ship Electrification at Ports	0.20	0 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾
T-6	Goods Movement Efficiency Measures	3.5	TBD	TBD	0
T-7	Heavy-Duty Vehicle GHG Emission Reduction (Aerodynamic Efficiency)	6.4 ⁽²⁾	1,616 ⁽²⁾	2,137 ⁽²⁾	-81 ⁽²⁾
T-8	Medium and Heavy-duty Vehicle Hybridization	0.5	93	177	-169
T-9	High Speed Rail	1	0 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾
	<i>Subtotal</i>	67.8			
Building and Appliance Energy Efficiency and Conservation					
E-1	Electricity Reduction Program 32,000 GWH reduced	15.2	3,402	5,065	-109
	Utility Energy Efficiency Programs				
	Building and Appliance Standards				
	Additional Efficiency and Conservation				
E-2	Increase Combined Heat and Power Use by 30,000 GWh	6.7	362	1,673	-190
CR-1	Natural Gas Reduction Programs (800 Million Therms saved)	4.3	963	1,433	-109
	Utility Energy Efficiency Programs				
	Building and Appliance Standards				
	Additional Efficiency and Conservation				
	<i>Subtotal</i>	26.4			

**Table G-I-2 (cont.): Costs, Savings, and Dollars Per Metric Ton of CO₂E
Reduced
Recommended Greenhouse Gas Reduction Measures**

	Measures	Reductions (MMTCO₂E in 2020)	Costs (\$Millions)	Savings (\$Millions)	Net Cost or Savings Per MTCO₂E (\$)
	Renewable Energy				
E-3	RPS (33%)	21.3	3,672	1,889	133
E-4	California Solar Programs (3000 MW Installation)	2.1	0 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾
CR-2	Solar Water Heaters (AB 1470 goal)	0.14	0 ⁽¹⁾	0 ⁽¹⁾	0 ⁽¹⁾
	High GWP Measures				
H-1	MVACS: Reduction of Refrigerant from Non-Professional Servicing	0.26	3	0	11.5
H-2	SF6 Limits in Non-Utility and Non-Semiconductor Applications	0.30	0.22	0.14	0.3
H-3	High GWP Reduction in Semiconductor Manufacturing	0.15	2.6	0	17
H-4	Limit High GWP Use in Consumer Products	0.25	0.06	0	0.2
H-5	High GWP Reductions from Mobile Sources	3.3	20.86	0	6.32
H-6	Specifications for Commercial and Industrial Refrigeration	4.0	1.24	0.66	0.1
	Foam Recovery and Destruction Program	0.30	9.0	0	30
	SF6 Leak Reduction and Recycling in Electrical Applications	0.10	0.3	0.4	-0.1
	Alternative Suppressants in Fire Protection Systems	0.10	1.96	0.2	18
	Gas Management for Stationary Sources--Tracking/Recovery/Deposit Programs	6.30	1.02	3.6	-0.4
	Residential Refrigeration Early Retirement Program	0.10	18.9	24.79	-58.9
H-7	Mitigation Fee on High GWP Gases	5	100	0	20

**Table G-I-2 (cont.): Costs, Savings, and Dollars Per Metric Ton of CO₂E
Reduced
Recommended Greenhouse Gas Reduction Measures**

	Measures	Reductions (MMTCO₂E in 2020)	Costs (\$Millions)	Savings (\$Millions)	Net Cost or Savings Per MTCO₂E (\$)
Industrial					
I-1	Energy Efficiency and Co-Benefits Audits	TBD	TBD	TBD	TBD
I-2	Oil and Gas Extraction GHG Emission Reduction	0.2	0.4	4	-18.5
I-3	GHG Leak Reduction from Oil and Gas Transmission	0.9	0.5	18	-19
I-4	Refinery Flare Recovery Process Improvements	0.33	6.7	46.1	-120
I-5	Removal of Methane Exemption from Existing Refinery Regulations	0.014	3.3	2.7	40.9
Others					
RW-1	Landfill Methane Capture	1.0	52	0	52
A-1	Methane Capture at Large Dairies ⁽³⁾	1.0	156	0	156
F-1	Sustainable Forest Target	5.0	50	0	10
W-1	Water Use Efficiency ⁽⁴⁾	1.4	-	-	
W-2	Water Recycling ⁽⁴⁾	0.3	-	-	
W-3	Pumping and Treatment Efficiency ⁽⁴⁾	2.0	-	-	
W-4	Reuse Urban Runoff ⁽⁴⁾	0.2	-	-	
W-5	Increase Renewable Energy Production ⁷	0.9	-	-	
Recommended Measures Totals		140	\$24,878	\$40,417	

The Varshney/Tootelian report makes it clear to those who read the report carefully that it has taken all of the gross costs and ignored all of the savings associated with those costs. The Varshney/Tootelian report states⁷:

Given the uncertainty of costs and greater uncertainty surrounding the suggested benefits or savings that may never be realized, the \$24.878 billion cost was used for computational purposes as the minimum cost scenario.

....

As previously indicated, the savings identified by ARB are considered too speculative to consider at this time, in part because the outcomes are uncertain and the savings require major investments by businesses and/or consumers that might not be possible.

⁷ Varshney/Tootelian report, p. 6

The Varshney/Tootelian expands its defense of including all estimated costs and no savings associated with any AB 32 implementation⁸:

It is important to recognize that this analysis focuses on the costs of AB 32 and not whatever savings there may be. The reasons why savings are not used as offsets to costs at this time are:

- *There appears to be general agreement that the savings, if any, are unknown. This was recognized in ARB's Scoping Plan, indicated by the LAO's comments, cited by the ARB's peer reviewers, and others.*

- *Some of ARB's expected savings is derived from yet-to-be developed technologies. Whether these will provide the results anticipated by ARB, and whether they will be developed within California are purely speculative.*

As the LAO indicated, the ARB relies heavily on the Pavley regulations, which account for 70% of the benefits to be generated. Accordingly, even relatively small variations downward in this benefit will significantly alter the net effect. If the benefits were more broadly distributed among factors, small changes in some could more readily be offset by others.

- *Some of the savings that are expected to accrue (e.g., solar water heating), require significant investments on the part of businesses and consumers. At this time, there is no indication that such costs could be absorbed by those entities so that the savings would be generated. Additionally, the payback period for the savings is highly speculative.*

This study did not consider all of the costs associated with AB 32., such as the costs or disruptions to prices of crops arising due to changes in land use, costs of reporting, monitoring, and enforcing compliance, future availability of alternative fuels or any major fluctuations or disruptions in the demand supply equation and resulting prices, availability of vehicles utilizing alternative fuels, and costs associated with technology advancements to make the vehicles commercially affordable and reasonably priced, cost of financing of the new production facilities, or of the required investments for both production and distribution, volatility in forecasts of prices of crude, gasoline, and diesel, and research and development costs for lower carbon intensity alternative transportation fuels. Some or all of these additional costs could well offset any savings that might be generated in the future.

- *If there are savings, it is unknown whether they will remain inside the state or migrate to other states or countries.*

⁸ Varshney/Tootelian report, p. 11.

This explanation has little credibility. For example, the largest estimated savings come from the Pavley fuel economy standards. These now are the federal standards for fuel efficiency of vehicles. There can be little doubt that if a vehicle has substantially greater fuel efficiency it will use less gasoline per mile driven and therefore that there is a savings associated with the increased fuel economy of the vehicles. Similarly, programs that lead to energy efficiency improvements in buildings will reduce the cost of using electricity in those buildings. The Varshney/Tootelian report includes an estimate of costs of implementing energy efficiency improvements in buildings but ignores the electricity savings associated with those programs.

Many of the arguments above would apply just as well to cost increases as the savings. The magnitude of many of the cost increases are estimated and are not known with certainty. It is true that some of the savings are expected to accrue as a result of significant investments on the part of businesses and consumers. But the increased capital costs also are the result of making those investments. If the investments are not made, neither the costs nor the savings will be relevant, yet the report includes the costs but not the savings. The gasoline cost savings from more fuel-efficient vehicles, driven by both the Pavley regulations and the federal fuel efficiency standards are known with a much higher degree of confidence than is the additional cost of the vehicles.

Finally, there is no evidence that I have seen that would support the contention that “Some or all of these additional costs could well offset any savings that might be generated in the future.”

In short, this methodology is highly biased and has no credibility. A more appropriate methodology for the minimum impact would include the Air Resources Board estimate of the gross costs and the gross savings and would use the net of these two. Using the net of gross savings and gross costs would provide an estimate that the implementation of AB 32 would reduce costs to the state of California would not increase costs⁹.

Scenario Two: Expected Impact to Consumers

The second scenario includes an even larger impact to all consumers. The Varshney/Tootelian report estimates that all consumers in the state of California together will face an increased cost of \$52 billion, a figure more than twice as large as estimated gross cost to the state of California for implementing the AB 32 measures.

The basic idea behind the estimate is the statement that¹⁰:

⁹ This statement is not an endorsement of all of the ARB estimates of costs and savings. Reasonable people can disagree with some of the ARB estimates. However, if the ARB estimates of costs are used in the analysis, the ARB estimates of savings should be used as well.

¹⁰ Varshney/Tootelian report, p. 6.

The expected economic costs of implementing AB 32 are based on the costs that are projected to be incurred by California consumers. This is predicated on the assumption that the costs to businesses will be shifted through the delivery chain to their customers.

But the Varshney/Tootelian report estimates that the overall cost to consumers in California will be over twice as large as the gross costs estimated by the Air Resources Board. Increasing the costs to businesses through the delivery chain to their consumers cannot be expected to double the gross costs and to not pass through any of the gross savings. Thus, on its surface this result is surprising and appears to be unrealistic.

Evaluation of the methods by which the Varshney/Tootelian report arrives at these numbers shows that in fact the estimates are biased and inappropriately large.

The estimates of the Varshney/Tootelian household impact estimates are summarized in a table with the Varshney/Tootelian report¹¹ as follows, where the estimated increases are highlighted:

Number of housing units in California in 2008		13,530,719	
Consumer Expenditure Category	2008	Increase	Total
Housing costs	\$13,761	\$2,048	\$15,809
Transportation (Gas and maintenance only)	\$3,448	\$756	\$4,204
Natural Gas	\$452	\$35	\$487
Electricity	\$1,113	\$124	\$1,236
Food (at home and away)	\$7,645	\$895	\$8,539
Total of above	\$26,418	\$3,857	\$30,276
All Other Consumer Expenditures	\$34,975		\$33,179

According to the Varshney/Tootelian report, households will each face increases of \$2,048 for housing costs, \$756 for gasoline and maintenance costs for transportation, and \$895 for additional food costs.

Here again, the Varshney/Tootelian report has estimates of gross costs to consumer with no offsets to any saving. This is particularly important for energy efficiency in buildings and higher

¹¹ Varshney/Tootelian report, p. 33.

fuel efficiency for vehicles in which the actual cost increases are associated with reductions in fuel use¹². The Varshney/Tootelian report states¹³:

It is realized, of course, that ARB expects that the increased costs will provide benefits at least comparable to the costs that are incurred. However, this is predicated on two very significant assumptions. One is that the new technology that ARB expects to materialize will deliver on the promises that ARB is making. Since this is unproven and undocumented, it is not considered viable now. Second, it assumes that businesses and/or consumers have the capacity to invest in the new technology even if it does arrive. Given economic conditions within the state and nationwide, and the difficulties that both businesses and consumers are experiencing, this assumption is far from certain.

Accordingly, the hoped-for savings that might accrue are too speculative to include as offsets to the costs. Therefore, the cost of \$52.2 billion was used as the expected cost of ARB in this scenario.

Thus here again, the Varshney/Tootelian report includes gross costs but does not include the savings associated with these costs. In addition, the Varshney/Tootelian methods for estimating the gross costs are greatly biased.

Housing Costs

The Varshney/Tootelian report explains how it estimates the increase in housing costs¹⁴:

This includes the increased costs of new housing and possible retrofitting of existing homes in an attempt to adjust to higher costs of utilities (see below). It has been estimated by the AB 32 Implementation Group that AB 32 would add approximately \$50,000 to the cost of a new home. Because the median new home price in 2008 was \$335,990, this represents an increase of 14.9% in the cost of housing. Applying this percentage to what consumers spend for their dwellings excluding mortgage/rent results in a cost increase of \$2,048. [Footnote reference deleted]

It is important to note that retrofitting of existing homes can be expected by homeowners only when the savings in reduced energy use would exceed the cost of retrofitting (or when the home is retrofitted in order to gain other benefits for the homeowner, not related to AB 32.) The new home cost increase would be based on increased capital costs of energy-efficient construction or of distributed generation in the homes. These cost increases would lead to reductions in the use

¹² The Varshney/Tootelian report does not include an explicit cap-and-trade policy or any other carbon price.

¹³ Varshney/Tootelian report, p. 33-34.

¹⁴ Varshney/Tootelian report, p. 32.

of energy and/or reductions in the purchases of energy based on the distributed generation. Such reductions could be expected to offset the new capital costs and most likely to more than offset the new capital costs. Therefore, the cost increase for a new home would be a great overestimate of the overall cost of housing associated with a change.

The \$50,000 figure was estimated for new construction of a zero energy home. The Varshney/Tootelian report cites the AB 32 Implementation Group¹⁵, but does not cite a particular document. However, Dorothy Rothrock, co-chair of the AB 32 Implementation Group states that:¹⁶

This information was gathered by our AB32IG members. There are two separate studies; The SMUD study puts the cost at \$20.00/sf or \$50,000 for a 2,500sf home. The ConSol study puts the cost at \$24.20/sf or \$60,500 for a 2,500 sf home.

The SMUC study and the ConSol study are costs for zero net energy homes. These costs are dominated, not by increased energy efficiency, but rather by the costs of photovoltaic electricity generation systems. For example, in the ConSol study for a Sacramento home, the total additional cost for the 2400 square foot home was estimated to be \$58,050; of this, \$53,200 was estimated costs of a 7 KW photovoltaic system and \$4,850 was for all costs for increasing energy efficiency in the home.

AB 32 does not require zero net energy homes. Rather new homes would be required to meet California's new Title 24 building standards. A home meeting California's new Title 24 building standards could not be expected to increase costs of new home construction by as much as \$50,000. Rather the ConSol estimate of less than \$5,000 is very reasonable.

The source of the Varshney/Tootelian \$50,000 estimate underlies the unreasonable nature of their assumption that there would be no reductions in energy cost. By definition, a net zero energy home would save most or all of its energy cost! And a home meeting California's new Title 24 building standards would sharply reduce its use of energy, reducing operating costs substantially, with a new construction cost estimated at less than \$5,000.

New homes meeting California Title 24 building standards would face cost reductions from using less energy that are comparable to or larger than the additional cost of new construction. Therefore, the additional cost of housing is likely to be zero or negative, not the \$2,048 estimated in the Varshney/Tootelian report.

¹⁵ The AB 32 Implementation Group is a coalition representing a group of large and small businesses.

¹⁶ Private communication, February 15, 2010.

Finally, the Varshney/Tootelian report applies the \$50,000 estimate of the cost of constructing a new home to the cost of all housing, even though new housing units are only a small fraction of the total number of housing units.

The cost estimates of the table above suggest that total costs of housing for California households would increase by \$27.7 billion (13.5 million households face average cost increases of \$2,048 dollars). That estimated cost is greater than the estimated gross costs of all AB 32 implementation measures taken together, as estimated by the Air Resources Board. How the net cost of housing to households could exceed the total gross costs of AB 32 implementation is not explained by the Varshney/Tootelian report.

In short, the Varshney/Tootelian report seems to greatly overestimate the cost of AB 32 implementation for housing. More likely, the net costs to housing can be expected to be relatively close to zero or negative once the savings in energy use is balanced against the increased construction costs.

Transportation Costs

The Varshney/Tootelian report explains how it estimates the increase in transportation costs¹⁷:

Higher costs of fuel are likely to occur because consumers will have to purchase new cars, which provide better gas mileage, have their cars retrofitted to obtain better gas mileage, or simply pay the higher costs of gasoline/diesel. In its Scoping Plan, ARB indicated that the savings in fuel costs for new car buyers is \$30 per month. Since the average household has 2.1 vehicles, this cost for those who cannot afford to, or will not, purchase new vehicles is \$756. It will, of course, be even higher for those that purchase new cars and the savings over time are still uncertain. [Footnote references deleted]

It its Scoping Plan the ARB fuel savings for new car buyers is estimated to be \$30 per month for those that buy new cars. The pages cited from the Scoping Plan state¹⁸:

Similar savings are projected in the transportation sector. By reducing greenhouse gas pollution from more efficient and alternatively-fueled cars and trucks under California's Clean Car law (the Pavley greenhouse gas standards), consumers save on operating costs through reduced fuel use. Although cars will be marginally more expensive, owners will be paid back with savings over the lifetime of the car, and the average new car buyer will have an extra \$30 each month for other expenditures.

¹⁷ Varshney/Tootelian report, p. 32.

¹⁸ ARB, "Climate Change Scoping Plan," December 2008, p. ES-10.

Contrary to the implications of the Varshney/Tootelian report, the cited ARB study does not estimate increases in the cost of transportation for anybody. It estimates that those who buy new cars will save an average of \$30 each month. The Varshney/Tootelian report takes this savings, multiplies it by the number of vehicles per household, and asserts that this savings will be an increased cost for those who do not purchase new vehicles. From this, the Varshney/Tootelian report concludes that the average household will pay an additional \$756 per year for gasoline and maintenance on costs of automobiles.

The Varshney/Tootelian report has taken a savings for some consumers and reports that savings as a cost for all consumers.

Implementation of a cap and trade system to control the carbon emissions and inclusion of gasoline or crude oil in that system would increase the cost of gasoline and diesel fuel (though not until 2015 under the Scoping Plan, when the scope of cap and trade is extended to cover transport fuels). However, the Varshney/Tootelian report does not include fuel price increases resulting from a cap and trade system nor does it include the reduction in personal income or sales taxes associated with return of cap and trade revenues to taxpayers.

One can estimate however the impact of such changes taken together. If we assume that the average household drives 30,000 miles per year in vehicles that average 20 miles per gallon, then households would use on average 1500 gallons of gasoline. If the carbon price were \$25 per ton of carbon dioxide, then the gasoline price would increase by about \$.25 per gallon. This would increase the cost of transportation per household by about \$375 per year. If 75% of the cap and trade revenue will be return to households in the form of reduced taxes (as recommended by the EAAC committee), then the net cost to households would be about \$94 per year. However, because households can be expected to begin driving more fuel-efficient vehicles, the net cost to households can be expected to be smaller than this amount.

Therefore a more reasonable estimate of the transportation cost increases per household would be an amount smaller than \$94 per year rather than the cost of \$756 per year as estimated by the Varshney/Tootelian report. Thus Varshney/Tootelian report has over-estimated this cost by roughly a factor of eight. The Varshney/Tootelian report greatly overestimates the cost of AB 32 implementation for transportation.

Natural Gas and Electricity

These are estimates by the Varshney/Tootelian report to be small impacts. The report takes these figures from other sources. I have not evaluated these other source documents.

Food Costs

The Varshney/Tootelian report explains how it estimates the increase in food costs¹⁹:

Higher costs of transportation, utilities, etc. undoubtedly will increase the costs of food products, whether it is for in-home use or dining outside the home. Given that the cost of food is highly dependent on transportation, utilities, etc., it was assumed that the rise would be approximately half of the increased costs of gasoline and automobile maintenance (i.e., 11.71% of the current costs).

This calculation is fully dependant on the authors' estimates of the cost of additional transportation. But as shown above the transportation cost increases are vastly overestimated by the Varshney/Tootelian report, probably by a factor of roughly eight.

The Varshney/Tootelian report estimates that the food costs would increase by \$895 per year. If this were adjusted downward based upon the factor of eight overestimation of costs of transportation, this number would be scaled down to about \$110 per year.

In Summary: Expected Cost to Consumers

In short, the Varshney/Tootelian report greatly overestimates the cost of AB 32 implementation for all of the direct consumer impacts. Correcting the errors of this report, but not drawing on other analyses other than cited here, suggests that the impact on consumers would be measured in the order of at most hundreds of dollars per year, not thousands of dollars. The Varshney/Tootelian report seems to have overestimated these costs through fundamental conceptual and methodological errors by a factor of at least 10.

Scenario Three: Expected Economic Impact to Small Businesses

The Varshney/Tootelian report calculates its expected economic impact to small businesses based directly on the calculation of the expected cost to consumers. Because the Varshney/Tootelian report over estimates the impact on consumers by at least factor of 10, using its analytical methods, this report over-estimates the impact on small businesses by probably the same factor of about 10.

The Varshney/Tootelian report explains how it calculates the impact on small businesses²⁰:

From earlier discussion, there are five major areas of cots increases due to the implementation of AB 32 – transportation, housing, food, fuels, and utilities. While the cost increases for each of the five areas is likely to vary, and given estimates provided by

¹⁹ Varshney/Tootelian report, p. 33.

²⁰ Varshney/Tootelian report, p.27.

several other research studies, it is reasonable to assume that small businesses will likely see at least an average 10% increase in its cost structure that has an exposure to these five costs.

....

It is reasonable to assume that the average cost structure exposure for small businesses to the five areas is approximately 45%. A 45% exposure to increased transportations costs, housing costs, fuel costs, food costs, and utility costs that on average increase 10% due to the implementation of AB 32 results in an actual increase of costs to small businesses by 4.5% of its total costs, or \$63.895 billion in increased costs on sales of \$1.578 trillion.

Therefore, the cost of \$63.895 billion was used as the expected cost of ARB to small businesses in this scenario.

It is clear that the estimated cost on small businesses from the Varshney/Tootelian report is proportional to the estimated impact on consumers. Since the estimated impact on consumers is too large in the Varshney/Tootelian report by a factor of about 10, then using the same method as in the Varshney/Tootelian report, suggests that the impacts on small businesses is exaggerated also by a factor of at least 10.

Overall Economic Impacts

The Varshney/Tootelian report then uses the direct impacts associated with the three scenarios as inputs to some version of the IMPLAN model, an input-output model, to assess overall economic impacts. The IMPLAN model is used to “multiply” the estimates of the impacts on consumers and small businesses into estimates of overall economic impacts. The Varshney/Tootelian report describes its used of the IMPLAN model as follows²¹:

Each industry that produces goods and services has an influence on, and in turn is influenced by, the production of goods and services of other industries. These interrelationships are captured through a multiplier effect as the demand and supply trickle over from industry to industry (direct and derived demand) and thus impact total output, compensation, employment, etc. Multipliers may vary from one region to another depending on the strength of these interrelationships.

Multiplying the greatly biased estimates of the impacts on consumers and small businesses gives a likewise greatly biased estimate of the impacts on the overall economy.

²¹ Varshney/Tootelian report, p.34-35.

The Varshney/Tootelian report states²²:

The direct AB 32 cost of \$24.878 billion results in a total loss of output of \$71.464 billion annually for the State of California (after including indirect and induced costs). The direct cost of \$52.194 billion cost to consumers results in total lost output of \$149.2 billion annually. The direct cost of \$63.895 million to small businesses results in a total loss of output of \$182.649 billion annually.

Thus it is clear that the estimates of direct effects from the three scenarios are scaled up – multiplied – greatly by the use of the input-output model. While I question the amount of scaling upward using the input-output model, even if that multiplication were of roughly the right amount, the overall estimate would be greatly biased. The bias comes about because each of the scenarios is greatly biased upwards. The "Scenario One: Minimum Impact" took estimates from the Air Resources Board of overall net cost reductions, eliminated all the savings, and reported them as estimates of large cost increases, increases equal to the gross cost estimates by the Air Resources Board. The "Scenario Two: Expected Impact to Consumers" made methodological errors that increase the estimated impacts by about a factor of 10. The results of this scenario were brought into "Scenario Three: Expected Economic Impact to Small Businesses", carrying along the factor of 10 biased upwards into these estimates. Therefore, once multiplied, but using the same methods of multiplication, would give overall negative impacts in the first scenario and estimates scaled down by at least a factor of 10 in the second and third scenarios.

In Summary

The Varshney/Tootelian report concluded that²³:

On average, the annual costs resulting from the implementation of AB 32 to small businesses are likely to result in loss of more than \$182.6 billion in gross state output, the equivalent of more than 1.1 million jobs, nearly \$76.8 billion in labor income, and nearly \$5.8 billion in indirect business taxes.

Examination of the methods used by the authors leads to the conclusion that these results are highly biased and have no credibility. They are likely to be too large by a factor of at least 10 and may be biased upward by an even greater amount.

²² Varshney/Tootelian report, p. 37-38.

²³ Varshney/Tootelian report. p. 10.

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