TEST REPORT

MESILLA VALLEY TRANSPORTATION SOLUTIONS CERTIFIED
Fuel Economy Experts

MVT SOLUTIONS CERTIFIED™ FUEL ECONOMY TEST

SEPTEMBER 2020

MICHELIN ENERGY GUARD LITE

7.27	0.55	6.12%
gal/1000 miles	MPG	

1.0: INTRODUCTION

Mesilla Valley Transportation Solutions ("MVTS" or "MVT Solutions") certifies the fuel savings described in this report. **Note:** this report was designed for carriers and providing information relevant to their needs. Therefore, the format varies from traditional fuel economy and technical reports. The Report Summary provides the reader a quick synopsis of the fuel savings. Following the Summary is the body of the report and further details on the subjects. This fuel economy test was performed using MVTS proprietary fuel economy test methods. These test methods were developed from race car engineering and advanced vehicle test methods, which the Mesilla Valley Transportation ("fleet" or "MVT") has relied on since 2012 to identify substantial fuel savings. The MVTS methods provide highly accurate and reliable answers on real-world fuel savings in comparison to other test methods, which enables carriers to make the best decisions for their company. Contact MVTS with any questions regarding the product or test. As part of an MVTS Certified™ test, MVTS supports product inquiries, which we encourage carriers to utilize.

Note: blue text indicates a link to the topic. Click to follow. Alt + ← returns the reader to the initial location.

2.0: TEST SUMMARY

The **Michelin Energy Guard (MEG) Lite** system for trailer aerodynamics saved **7.27 gal/1000 miles (6.12%).** The MEG Lite is a smaller version of the MEG full system, consisting of shorter skirts that measure only 132 inches long (11 feet) and 27 inches high, Michelin aerodynamic mud flaps, and the MEG top fairing. Unlike the MEG full system, the MEG Lite does not include the side fairings or Wake Reducer at the back of the trailer. Testing was conducted on a 9-mile test track at 65 miles per hour and a Gross Vehicle Weight (GVW) of 45,000 lbs. Vehicles were modern Class-8 with 53-foot dry van trailers. Test results can be found below in Table 1.

Table 1: Results Summary

Product	Fuel Economy Improvement		
	Gal/1000 miles	MPG	Percent
Michelin Energy Guard Lite	**7.27**	0.55	6.12%

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3.0: TEST PROCEDURE

The two (2) vehicles ran simultaneously, at 65 mph, on the 9-mile circle track near Pecos, Texas. The vehicles were 1-minute apart, avoiding any aerodynamic influence on either vehicle during testing. The vehicles were termed “Compare Vehicle” and “Test Vehicle”. The Compare Vehicle remained unchanged throughout testing; it was used solely for comparison. The Test Vehicle had modifications made during the test (*i.e.* Michelin Energy Guard Lite installed).

The test procedure may appear similar to the SAE J1321 method traditionally used in the trucking industry; however, the MVTS methods are a much more advanced and precise form of on-road and track testing. The vehicles are equipped with sensors and data recording systems that collect data on fuel consumption, aerodynamics, rolling resistance, driver behavior and many other variables that affect fuel consumption. The data is analyzed using MVTS proprietary methods, which provide very accurate answers on fuel savings. Additionally, the test results can be scientifically translated to a carrier’s real-world daily operations and long-term savings, which is a feature unique to these methods. Overall, the MVTS test methods are a much more advanced and reliable tool for predicting fuel savings than the trucking industry has used previously.

3.1: TEST VEHICLES

Test vehicles were 2019 International LT 625’s with Cummins X15 15-Liter engines and Eaton Endurant 12-speed Automated Manual Transmissions (AMT). Trailers were 53-foot Hyundai dry vans. Gross Vehicle Weight (GVW) was 45,000 lbs. Both trucks were equipped with Ex-Guard grill guards, which were previously tested and showed no negative influence on fuel consumption. The Compare vehicle remained unchanged throughout all tests. The Test vehicle configuration was changed between test runs. Trucks and trailers used dual tires. Tire pressures were set at 110 psi in the morning, prior to incurring any effect of daytime heat. Vehicle info can be found in the Appendix.

Vehicles were thoroughly inspected and received regular maintenance prior to testing. It should also be noted, for the reader’s piece of mind, Mesilla Valley Transportation (MVT) and MVT Solutions are 100% confident in the reliable condition of the test vehicles. MVT fleet uses the same vehicle data and test procedures for their own internal purchase decisions.

Figure 1: Test Vehicles (‘Compare’ left, ‘Test’ right)

Test runs were conducted in the order shown in Table 2.

Table 2: Test Runs

Run	Test Name/Description	Start	End
6	Baseline (Trailer Aero Removed)	8:27 PM	9:57 PM
7	MEG Trailer End Solution (Without Skirts)	10:42 PM	12:12 AM
8	MEG Lite	12:27 AM	1:57 AM

3.1a: Run 6: Baseline (Trailer Aerodynamics Removed)

Run 6 consisted of the trailer without aerodynamic components installed. This acted as a Baseline comparison run for the MEG Lite (Run 8).

Figure 2: Trailer without Aero Devices

Figure 3: Rear of Trailer without Aero Devices

3.1b: Run 8: Michelin Energy Guard (MEG) Lite

The MEG Lite was tested in conjunction with other Michelin aerodynamic tests, which affected the run sequence. Run 6 was the Baseline comparison run where trailer aerodynamics were not installed. Run 7 consisted of installing the MEG Trailer End Solution (TES), which was part of a separate MVTS Certified test. That test was reported separately and can be found at www.m-v-t-s.com. Run 8 consisted of installing the MEG Lite 11-ft skirts while removing the TES side fairings and Wake Reducer, thus resulting in the complete MEG Lite package shown below.

Figure 4: MEG Lite

Figure 5: End Fairings (Top)

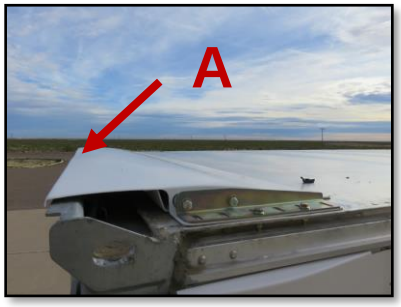


Figure 6: Aerodynamic Mud Flaps

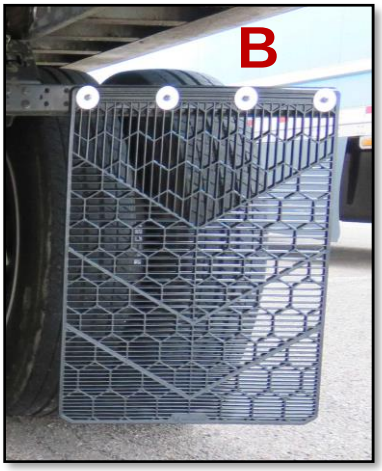
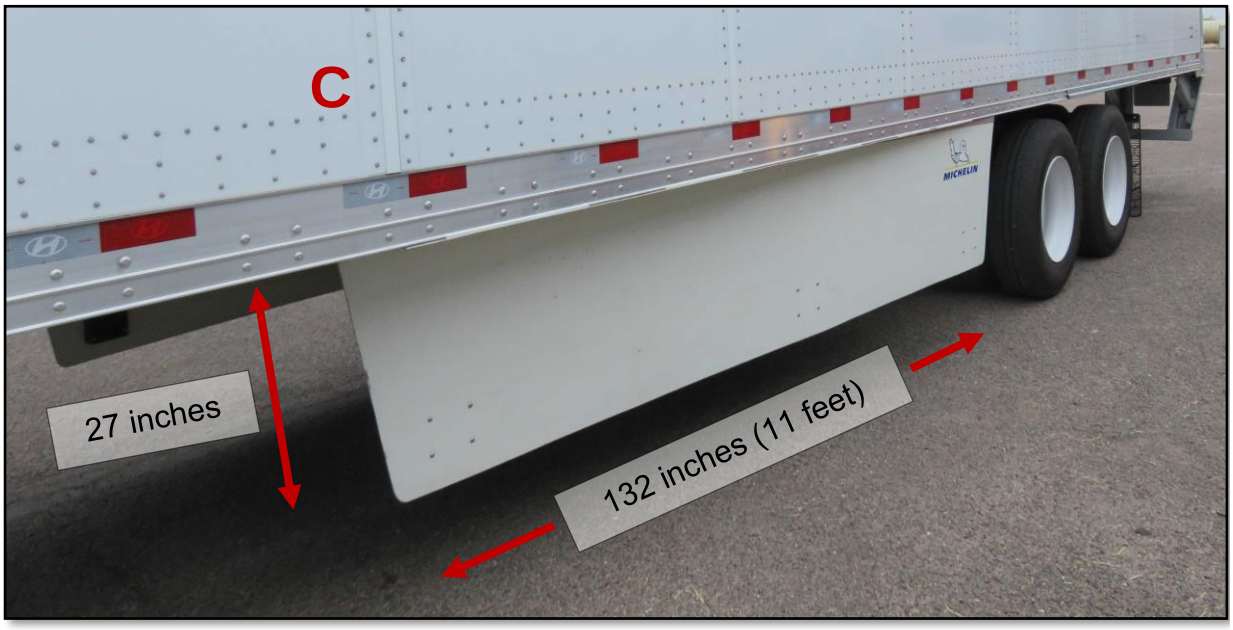


Figure 7: MEG Lite Short Trailer Skirts



4.0: VEHICLE FUEL ECONOMY TEST EQUIPMENT

MVT Solutions fuel economy testing utilizes a data acquisition system and sensors specifically for this testing. This style of testing is derived from race car engineering where reliable sensor data is critical to understanding vehicle modifications.

MVTS test sensors include:

- Data acquisition system (records sensor data)
- Fuel flow meter (accurate to 0.2%)
- Fuel temperature sensor
- Tire temperature sensor (infrared, mounted on left-front drive tire)
- Ground/road temperature sensor (infrared, mounted ahead of left-front drive tire)
- Wind speed air pressure sensor (truck hood)
- Wind direction sensor (truck hood)
- Ambient air temperature sensor (truck hood)
- Ambient air pressure sensor (truck cab)
- High Precision GPS (latitude, longitude, altitude, time)

Click this link to see a video of MVTS sensors and testing: How We Test

Figure 8: Aerodynamic Sensors

Figure 9: Data Acquisition System

Figure 10: Fuel Flow Meter

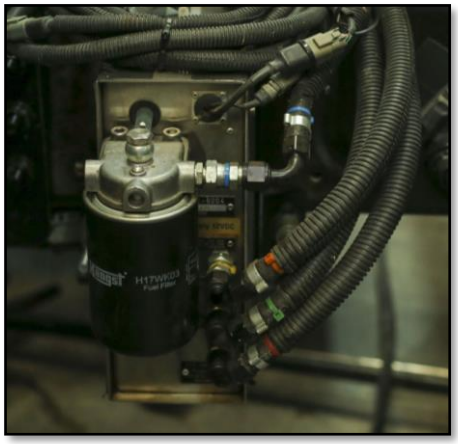
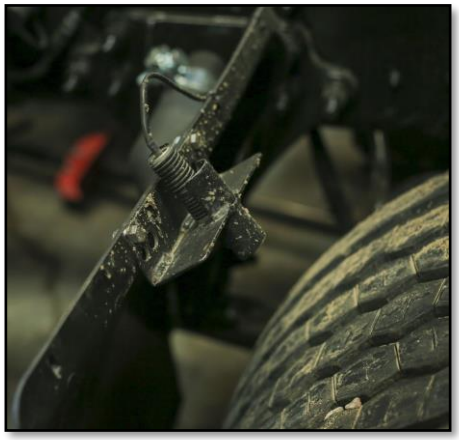


Figure 11: Tire Temp. Sensor



5.0: TEST RESULTS

Testing showed the Michelin Energy Guard (MEG) Lite **saved 7.27 gal/1000 miles (6.12%)** as shown in Table 3 with accuracy values. Bar graphs are shown in gal/1000 miles and percent fuel savings in Figure 12 and Figure 13, respectively.

The MEG Lite savings were substantial for a solution that is barely noticeable on the trailer. Typically, fuel savings of this magnitude would require skirts double in length of the MEG Lite skirt and 3 to 5 inches greater in height, while also including a device at the rear of the trailer. As a comparison, the MEG full solution obtained a savings of 10.79 gal/1000 miles (9.09%) on the same day, which was 3.52 gal/1000 miles greater than the MEG Lite. However, the MEG full solution also included full length trailer skirts, side fairings, and a Wake Reducer.

The MEG full solution report can also be found at www.m-v-t-s.com.

Table 3: Test Results with Accuracy

Product	Fuel Economy Improvement		
	Gal/1000 miles	MPG	Percent
Michelin Energy Guard Lite	**7.27**	0.55	6.12%
Accuracy	+/- 0.33	+/- 0.02	+/- 0.28%

Figure 12: Test Results (gal/1000 miles)

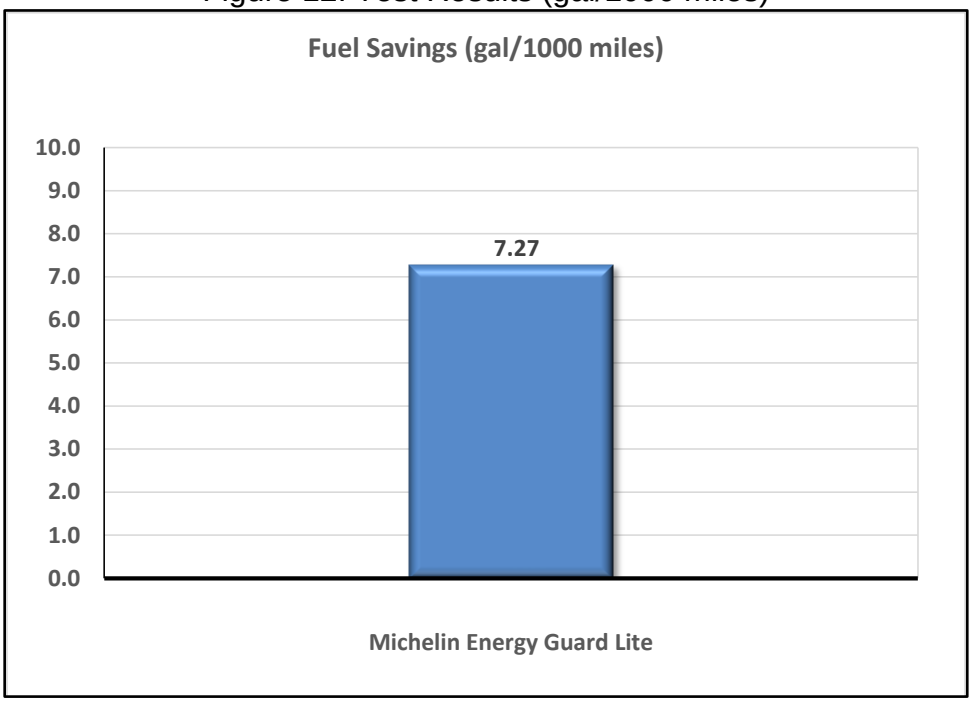
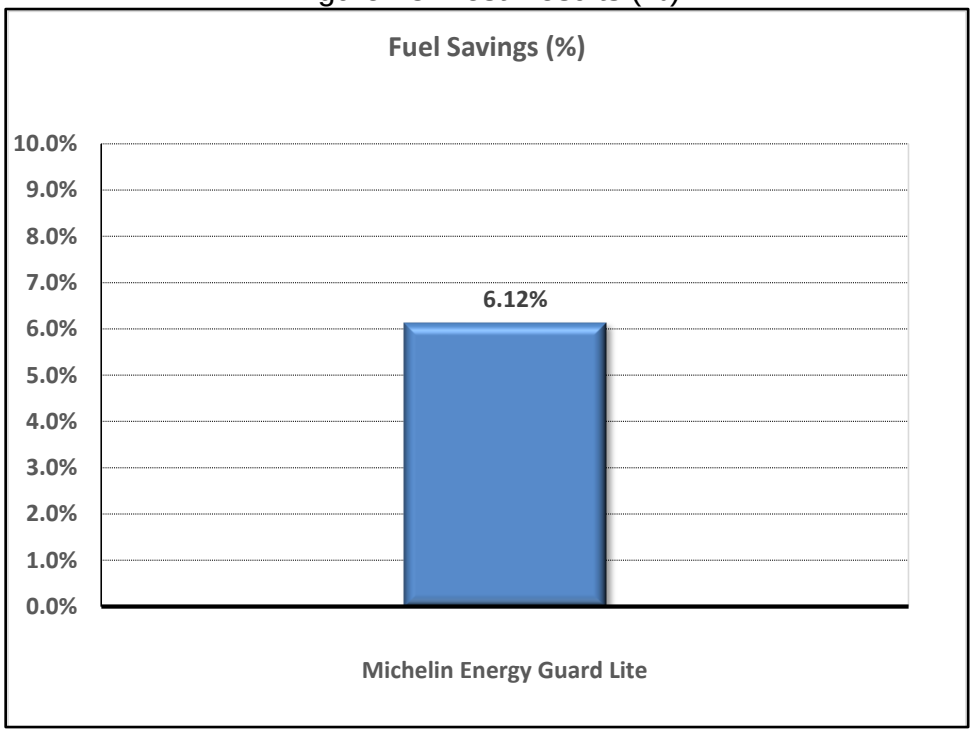


Figure 13: Test Results (%)



5.1: UNITS OF MEASUREMENT

The reader may not be familiar with units of gal/1000 miles (gallons per 1000 miles) since it is not traditionally used in the trucking industry. The following paragraphs briefly explain the reasons for these units and how they help carriers better calculate fuel savings.

Units of gal/1000 miles are a more reliable means to calculate fuel savings when compared to other units such as miles-per-gallon (MPG) or percent (%). Those units are prone to error from changing variables such as vehicle baseline fuel economy, load, driver behavior, and duty cycle. For example, a vehicle achieving 9 MPG with a highly aerodynamic configuration will save the same gal/1000 miles as a vehicle achieving 6 MPG. However, the percent fuel savings will be different since percent is based on the baseline fuel economy and the 6 MPG vehicle will use more fuel, which will result in the percent savings value lower.

5.2: WEATHER CONDITIONS SUMMARY

Ambient temperature during testing ranged from 53°F to 54°F with winds ranging from 0-6mph. Weather data was acquired from a local Weather Underground weather station and complete data can be found in the Appendix.

The reader should be aware that MVTS methods include instantaneous and constant weather data acquisition on each vehicle, and this testing has minimal dependency on external weather data collection. MVTS test data accounts for changes in wind, temperature, and other pertinent variables instantaneously.

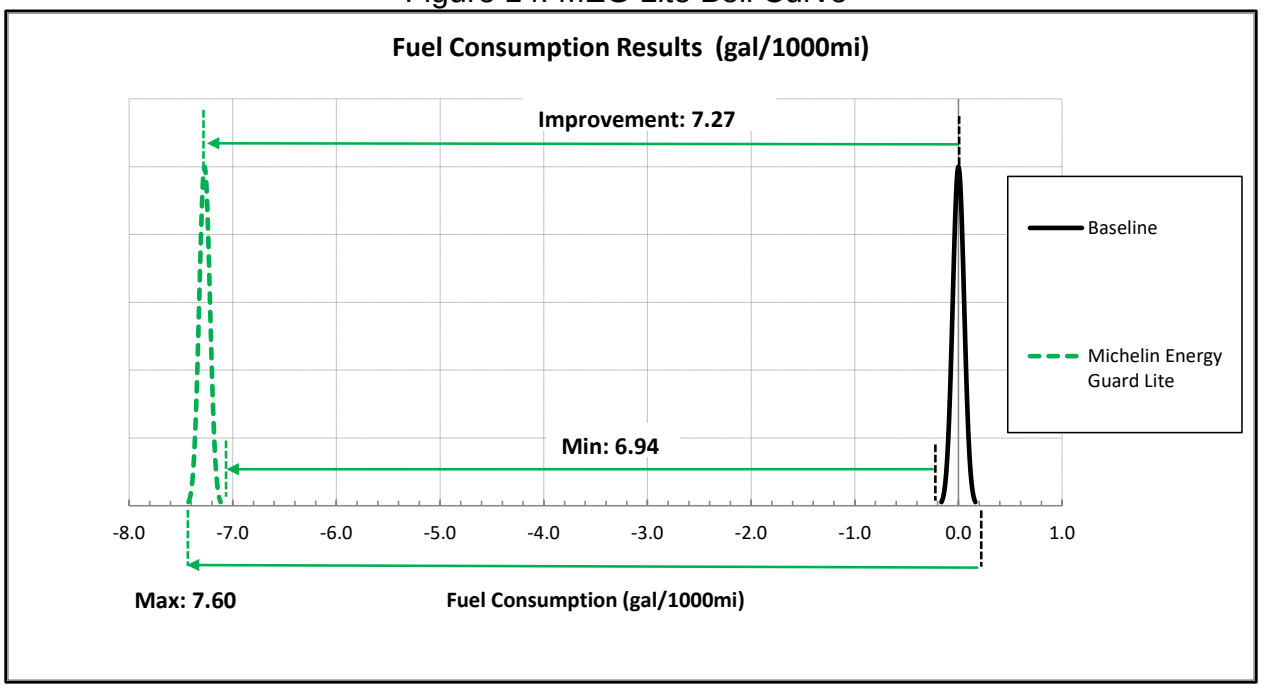
5.3: MEASUREMENT ACCURACY

The accuracy of fuel economy measurements is critical in determining the trustworthiness of test results. Historically, this has been a major difficulty in the trucking industry with fuel economy testing, which has led to confusion and misleading results. The MVTS test methods overcome this issue by achieving better accuracy, which is one of the ways it provides more reliable test results.

Accuracy for all the tests was calculated using a 95% confidence interval, a common standard for testing measurement. 95% confidence interval indicates that if the test were repeated 100 times, values would fall within the range in 95 out of the 100 tests (*i.e.* the reader would be 95% confident the value would be within that range).

Figure 14 below shows the statistical bell curves of the Michelin Energy Guard (MEG) Lite. The graph shows two very distinct curves, indicating a confident difference in fuel savings. The arrow pointing to the left illustrating less fuel used with the MEG Lite installed (*i.e.* fuel savings). The distance between the peaks of the bell curves is the test result average, which was 7.27 gal/1000 miles. Minimum and maximum values were calculated as the test result plus or minus the accuracy values (7.27 +/- 0.33), which were 7.60 and 6.94 gal/1000 miles.

Figure 14: MEG Lite Bell Curve



6.0: SAVINGS CALCULATIONS

Below is a brief outline of how to use the test results to calculate savings. For more detail or assistance contact MVT Solutions.

6.1: FUEL SAVINGS CALCULATIONS

Fuel savings resulting from this test can be calculated as follows:

$$Fuel\ Savings\ (gal/year) = (Test\ result)\ x\ \frac{(Thousands\ of\ miles\ travelled\ per\ year)}{1000}$$

Test result must be in units of gal/1000 miles (*i.e.* not percent or MPG)

Example: Michelin Energy Guard Lite with fuel savings of 7.27 gal/1000 miles and 125,000 miles travelled annually:

$$Fuel\ Savings = (7.27\ gal/1000\ miles)x\ \frac{(125{,}000\ miles/year)}{1000} = 909\ gal/year$$

Therefore, the MEG Lite would save 909 gallons of fuel per year for this vehicle travelling 125,000 miles.

6.2: FINANCIAL SAVINGS CALCULATIONS

Financial calculations can be made by multiplying the fuel saved by the fuel price:

$$Savings\ (\$/year) = (Fuel\ Savings)\ x\ (Price\ of\ fuel)$$

Example: Using the example above and U.S. average retail price of diesel fuel in 2019, $3.056[1] /gal

$Savings\ (\$/year) = \left(909\ \frac{gal}{year}\right)\ x\ \left(\frac{\$3.056}{gal}\right) = \$2{,}778\ /year$ in fuel savings

Therefore, the MEG Lite would save $2,778 per year in fuel for the vehicle travelling 125,000 miles.

[1] Source: https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMD_EPD2DXL0_PTE_NUS_DPG&f=W

6.3: TECHNOLOGY PAYBACK AND RETURN-ON-INVESTMENT

Buyers of fuel economy technologies are highly interested in saving money. For a technology supplier to be successful, their technology must save their potential customers money and many fleets consider the number of months required for the technology to pay for itself as a buying qualification, which is referred to as 'payback' in trucking or sometimes ROI.

$$Payback\ (months) = \frac{(Product\ cost)}{(Savings\ (\$/year)}\ x\ (12\ months/year)$$

Example @$700 Product cost, 2:1 trailer to tractor ratio: **Note**: the Product Cost is fictitious and used only for example purposes. Contact a Michelin sales representative or trailer OEM for pricing.

$$Payback\ (months) = \frac{(Product\ Cost)}{(Savings\ (\$/year)}\ x\ (12\ months/year)$$

$$Payback\ (months) = \frac{2x\ (\$700)}{(\$2{,}778\ /year)}\ x\ \left(12\frac{months}{year}\right) = 6.0\ months$$

Note: '2x' is used in the Product Cost to account for a 2:1 trailer ratio.

Therefore, with a Product Cost of $700 and 2:1 trailer ratio, the MEG Lite would pay for itself (*i.e.* payback or ROI) in 6.0 months.

6.4: TECHNOLOGY PROFIT

Since saving money is the end goal, calculating profit is another important factor. **Note**: these calculations will consider fuel and purchase price only and not maintenance.

$$Profit\ (\$) = (Savings) - (Cost)$$

Example @$700 Product cost, 2:1 trailer ratio: Using annual values from above and a 5 year trailer life.

$Profit\ (\$) = (\$2{,}778) - \frac{2x\ (\$700)}{5\ year}$ = $2,498 saved per year, per vehicle.

If this were translated to a 1000-truck fleet, the profits would be $2.5M annual.

Therefore, the MEG Lite would add $2,498 in profit per vehicle with 125,000 miles in travel. For a fleet of 1000 vehicles, this would equate to $2.5M.

6.5: CO_2 Reduction Calculations

Carbon Dioxide (CO_2) is directly related to diesel fuel consumption in the amount of 10,180[2] grams CO_2 per gallon of diesel consumed (0.01018 metric tons CO_2 per gallon of diesel). Therefore, the same value applies to the amount of fuel saved and correlates to a reduction in CO_2.

$$CO_2\ Reduction\ (metric\ tons) = (Fuel\ Savings)\ x\ (0.01018\ metric\ tons)$$

Where:

- Fuel Savings must be measured in gallons
- 0.01018 metric tons is the amount of CO_2 resulting from one gallon of diesel fuel

Example: Using the values from 6.1: and a fuel savings of 909 gallons per year.

$CO_2\ Reduction\ (metric\ tons) = (909)\ x\ (0.01018\ metric\ tons)$ = 9.25 metric tons CO_2

Therefore, the MEG Lite would save 9.25 metric tons of CO_2 per year for this vehicle travelling 125,000 miles.

[2] https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references

7.0: CONCLUSION

The fuel savings of the Michelin Energy Guard (MEG) Lite solution were **7.27 gal/1000 miles (6.12%)**. These fuel savings are substantial and may surprise fleets when viewing the MEG Lite solution since it is comprised of skirts only 11 feet in length, aerodynamic mud flaps, and a top fairing. Visually, the MEG Lite is hardly noticeable on the trailer when compared to a full length trailer skirt. This presents a good opportunity for fleets that have operational concerns with using full length skirts.

Travelling 125,000 miles annually, the MEG Lite would save 909 gallons of fuel per year. Using the 2019 average retail price of diesel fuel this would equate to $2,778 per year. With a 2 to 1 trailer ratio, the Payback (ROI) would be 6.0 months. In terms of profit, MEG Lite would achieve $2,498 annually with a trailer life of 5 years. For a 1000-truck fleet, this equates to $2.5M saved annually.

All testing was conducted on dry van trailers. Contact MVTS with questions about the test or results.

8.0: APPENDIX

8.1: TEST VEHICLE DETAILS

Figure 15: Vehicle Info, Modified "Test" Vehicle

Date	September 10, 2020					
Company	Mesilla Valley Transportation Solutions					
Location	Pecos, Texas					
Test Route	Pecos 9-mile Test Track					
TRUCK ID:	**Veh. A**					
Brand	International					
Year	2019					
Model	LT 625					
Engine	Cummins X15					
VIN	3HSDZAPR4KN562972					
Mileage (miles):	2,563					
Transmission	Eaton Endurant 12-speed AMT					
Rear Gear	2.79 : 1					
Fuel Load	Full at start of test					
Fuel Type & Batch	No. 2 Diesel					
Axle Weights	11,800		16,860		14,980	
Total weight	43,640					
Photo/Video/Audio folder name:						
TRAILER ID:	**T-1**					
Model	Hyundai					
VIN	3H3C532C6MR248009					
Year	2020					
Size	53' Dry Van					
Trailer Gap (inches)	35" from cab extender to trailer					
Add-ons	Michelin Energy Guard Lite					

Figure 16: Tire Info, Modified “Test” Vehicle

		Truck	Veh. A		
LF:		**Front Axle Tires**			RF: Same
Michelin X Line Energy Z		Type			Michelin X Line Energy Z
275/80R22.5		Size			275/80R22.5
19/32		Tread Depth (32nds)			18/32
110		Pressure (psi)			110
LF-Outer Drive:	LF-Inner Drive:	**Drive Axle Tires**		RF-Inner Drive:	RF-Outer Drive
Michelin X Line Energy D	Michelin X Line Energy D	Type		Michelin X Line Energy D	Michelin X Line Energy D
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
23/32	23/32	Tread Depth (32nds)		23/32	23/32
110	110	Pressure (psi)		110	110
LR-Outer Drive:	LR-Inner Drive:	**Drive Axle Tires**		RR-Inner Drive:	RR-Outer Drive
Michelin X Line Energy D	Michelin X Line Energy D	Type		Michelin X Line Energy D	Michelin X Line Energy D
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
23/32	23/32	Tread Depth (32nds)		23/32	23/32
110	110	Pressure (psi)		110	110
Wide-Based-Singles (WBS)		Trailer	T-1		
LF-Outer Trailer:	LF-Inner Trailer:	**Tandem Front**		RF-Inner Trailer	RF-Outer Trailer
General HT	General HT	Type		General HT	General HT
295/75R22.5	295/75R22.5	Size		295/75R22.5	295/75R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110
LR-Outer Trailer:	LR-Inner Trailer:	**Tandem Rear**		RR-Inner Trailer	RR-Outer Trailer
General HT	General HT	Type		General HT	General HT
295/75R22.5	295/75R22.5	Size		295/75R22.5	295/75R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110

8.2: COMPARE VEHICLE DETAILS

Figure 17: Vehicle Info, 'Compare' Vehicle

Date	September 10, 2020					
Company	Mesilla Valley Transportation Solutions					
Location	Pecos, Texas					
Test Route	Pecos 9-mile Test Track					
TRUCK ID:	**Veh. B**					
Brand	International					
Year	2019					
Model	LT 625					
Engine	Cummins X15					
VIN	3HSDZAPR3KN562087					
Mileage (miles):	1,842					
Transmission	Eaton Endurant 12-speed AMT					
Rear Gear	2.79 : 1					
Fuel Load	Full at start of test					
Fuel Type & Batch	No. 2 Diesel					
Axle Weights	11,040		17,620		14,980	
Total weight	43,640					
Photo/Video/Audio folder name:						
TRAILER ID:	**V511326**					
Model	Stoughton					
VIN	1DW1A5328LSA43051					
Year	2019					
Size	53' Dry Van					
Trailer Gap (inches)	35" from cab extender to trailer					
Add-ons	GreenWing skirts					

Figure 18: Tire Info, 'Compare' Vehicle

		Truck	Veh. B		
LF:		**Front Axle Tires**			RF: Same
Michelin X Line Energy		Type			Michelin X Line Energy
275/80R22.5		Size			275/80R22.5
18/32		Tread Depth (32nds)			18/32
110		Pressure (psi)			110
LF-Outer Drive:	LF-Inner Drive:	**Drive Axle Tires**		RF-Inner Drive:	RF-Outer Drive
Michelin X Line Energy D	Michelin X Line Energy D	Type		Michelin X Line Energy D	Michelin X Line Energy D
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
23/32	23/32	Tread Depth (32nds)		23/32	23/32
110	110	Pressure (psi)		110	110
LR-Outer Drive:	LR-Inner Drive:	**Drive Axle Tires**		RR-Inner Drive:	RR-Outer Drive
Michelin X Line Energy D	Michelin X Line Energy D	Type		Michelin X Line Energy D	Michelin X Line Energy D
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
23/32	23/32	Tread Depth (32nds)		23/32	23/32
110	110	Pressure (psi)		110	110
		Trailer	V511326		
LF-Outer Trailer:	LF-Inner Trailer:	**Tandem Front**		RF-Inner Trailer	RF-Outer Trailer
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110
LR-Outer Trailer:	LR-Inner Trailer:	**Tandem Rear**		RR-Inner Trailer	RR-Outer Trailer
Michelin X Line Energy	Michelin X Line Energy	Type		Michelin X Line Energy	Michelin X Line Energy
275/80R22.5	275/80R22.5	Size		275/80R22.5	275/80R22.5
13/32	13/32	Tread Depth (32nds)		13/32	13/32
110	110	Pressure (psi)		110	110

8.3: TEST ROUTE

Pecos, Texas 9-mile circle track (Figure 19). Counter-clockwise direction, middle lane (of 3).

Figure 19: Pecos Test Track

8.4: WEATHER CONDITIONS

Darkened rows pertain to testing period.

Table 4: Weather Data, September 10, 2020

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
11:53 PM	47 F	44 F	90%	NNE	12 mph	0 mph	27.28 in	0.0 in	Cloudy
12:53 AM	47 F	43 F	86%	N	10 mph	0 mph	27.28 in	0.0 in	Cloudy
1:53 AM	46 F	45 F	96%	N	13 mph	0 mph	27.28 in	0.0 in	Cloudy
2:07 AM	46 F	45 F	96%	N	13 mph	0 mph	27.28 in	0.0 in	Cloudy
2:10 AM	46 F	45 F	96%	N	13 mph	0 mph	27.28 in	0.0 in	Fog
2:22 AM	46 F	45 F	96%	N	13 mph	0 mph	27.28 in	0.0 in	Fog
2:38 AM	45 F	45 F	100%	N	13 mph	0 mph	27.28 in	0.0 in	Cloudy
2:53 AM	46 F	45 F	96%	N	10 mph	0 mph	27.28 in	0.0 in	Cloudy
3:00 AM	46 F	45 F	96%	N	13 mph	0 mph	27.28 in	0.0 in	Cloudy
3:40 AM	46 F	44 F	93%	N	13 mph	0 mph	27.29 in	0.0 in	Cloudy
3:53 AM	45 F	44 F	97%	N	12 mph	0 mph	27.29 in	0.0 in	Cloudy
4:08 AM	46 F	44 F	93%	N	14 mph	0 mph	27.29 in	0.0 in	Cloudy
4:41 AM	46 F	44 F	93%	N	14 mph	0 mph	27.29 in	0.0 in	Cloudy
4:53 AM	45 F	44 F	97%	N	9 mph	0 mph	27.29 in	0.0 in	Light Rain
5:44 AM	46 F	45 F	96%	N	9 mph	0 mph	27.30 in	0.0 in	Cloudy
5:53 AM	46 F	45 F	96%	N	12 mph	0 mph	27.30 in	0.0 in	Cloudy
6:53 AM	46 F	44 F	93%	N	16 mph	0 mph	27.30 in	0.0 in	Cloudy
7:53 AM	46 F	45 F	96%	N	14 mph	0 mph	27.32 in	0.0 in	Cloudy
8:27 AM	47 F	44 F	90%	N	14 mph	0 mph	27.32 in	0.0 in	Cloudy
8:38 AM	47 F	44 F	90%	NNE	15 mph	0 mph	27.32 in	0.0 in	Cloudy
8:53 AM	48 F	45 F	89%	NNE	13 mph	0 mph	27.33 in	0.0 in	Cloudy
9:10 AM	48 F	44 F	86%	NNE	13 mph	0 mph	27.33 in	0.0 in	Cloudy
9:53 AM	48 F	44 F	86%	N	13 mph	0 mph	27.34 in	0.0 in	Cloudy
10:53 AM	50 F	44 F	80%	N	10 mph	0 mph	27.34 in	0.0 in	Cloudy
11:53 AM	51 F	45 F	80%	NE	6 mph	0 mph	27.34 in	0.0 in	Cloudy
12:53 PM	52 F	45 F	77%	N	7 mph	0 mph	27.33 in	0.0 in	Light Rain
1:53 PM	52 F	46 F	80%	N	8 mph	0 mph	27.31 in	0.0 in	Cloudy
2:53 PM	52 F	47 F	83%	N	9 mph	0 mph	27.30 in	0.0 in	Cloudy
3:53 PM	53 F	48 F	83%	N	7 mph	0 mph	27.29 in	0.0 in	Cloudy
4:53 PM	52 F	49 F	89%	N	8 mph	0 mph	27.28 in	0.0 in	Light Rain
5:53 PM	52 F	49 F	89%	N	8 mph	0 mph	27.28 in	0.0 in	Cloudy
6:43 PM	52 F	49 F	89%	N	6 mph	0 mph	27.28 in	0.0 in	Cloudy
6:53 PM	52 F	49 F	89%	NNE	8 mph	0 mph	27.28 in	0.0 in	Mostly Cloudy
7:53 PM	52 F	49 F	89%	N	7 mph	0 mph	27.28 in	0.0 in	Cloudy
8:17 PM	53 F	49 F	86%	NNE	6 mph	0 mph	27.29 in	0.0 in	Cloudy
8:53 PM	53 F	49 F	86%	NNE	5 mph	0 mph	27.30 in	0.0 in	Cloudy
9:53 PM	53 F	49 F	86%	E	5 mph	0 mph	27.30 in	0.0 in	Cloudy
10:25 PM	53 F	49 F	86%	CALM	0 mph	0 mph	27.30 in	0.0 in	Cloudy
10:42 PM	53 F	49 F	86%	CALM	0 mph	0 mph	27.30 in	0.0 in	Cloudy
10:53 PM	54 F	49 F	83%	CALM	0 mph	0 mph	27.30 in	0.0 in	Cloudy

Source: https://www.wunderground.com/history/daily/us/tx/midland/KMAF/date/2020-9-10

Table 5: Weather Data, September 11, 2020

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
11:53 PM	53 F	49 F	86%	NE	6 mph	0 mph	27.29 in	0.0 in	Cloudy
12:53 AM	53 F	49 F	86%	NE	5 mph	0 mph	27.28 in	0.0 in	Cloudy
1:20 AM	53 F	49 F	86%	NNE	5 mph	0 mph	27.28 in	0.0 in	Cloudy
1:53 AM	53 F	50 F	89%	CALM	0 mph	0 mph	27.28 in	0.0 in	Cloudy
2:34 AM	53 F	50 F	89%	N	3 mph	0 mph	27.28 in	0.0 in	Cloudy
2:53 AM	53 F	50 F	89%	N	6 mph	0 mph	27.28 in	0.0 in	Cloudy
3:53 AM	53 F	50 F	89%	N	6 mph	0 mph	27.27 in	0.0 in	Cloudy
4:53 AM	53 F	50 F	89%	N	6 mph	0 mph	27.26 in	0.0 in	Cloudy
5:07 AM	53 F	51 F	93%	N	7 mph	0 mph	27.26 in	0.0 in	Cloudy
5:29 AM	54 F	51 F	90%	N	5 mph	0 mph	27.26 in	0.0 in	Cloudy
5:53 AM	54 F	51 F	90%	N	5 mph	0 mph	27.26 in	0.0 in	Cloudy
6:10 AM	53 F	51 F	93%	N	5 mph	0 mph	27.27 in	0.0 in	Cloudy
6:50 AM	54 F	52 F	94%	N	3 mph	0 mph	27.27 in	0.0 in	Cloudy
6:53 AM	54 F	51 F	90%	N	3 mph	0 mph	27.27 in	0.0 in	Cloudy
7:53 AM	55 F	51 F	86%	N	3 mph	0 mph	27.28 in	0.0 in	Cloudy
8:08 AM	56 F	52 F	87%	NNE	3 mph	0 mph	27.28 in	0.0 in	Cloudy
8:53 AM	57 F	51 F	81%	CALM	0 mph	0 mph	27.28 in	0.0 in	Cloudy
9:25 AM	59 F	51 F	75%	VAR	6 mph	0 mph	27.27 in	0.0 in	Cloudy
9:53 AM	59 F	51 F	75%	CALM	0 mph	0 mph	27.28 in	0.0 in	Cloudy
10:53 AM	61 F	52 F	72%	SE	6 mph	0 mph	27.28 in	0.0 in	Cloudy
11:53 AM	63 F	52 F	67%	SE	3 mph	0 mph	27.26 in	0.0 in	Cloudy
12:53 PM	65 F	53 F	65%	CALM	0 mph	0 mph	27.22 in	0.0 in	Mostly Cloudy
1:53 PM	70 F	54 F	57%	WSW	6 mph	0 mph	27.19 in	0.0 in	Mostly Cloudy
2:11 PM	71 F	55 F	57%		0 mph	0 mph	27.18 in	0.0 in	Partly Cloudy
2:53 PM	70 F	55 F	59%	SSE	5 mph	0 mph	27.15 in	0.0 in	Partly Cloudy
3:53 PM	70 F	56 F	61%	S	7 mph	16 mph	27.12 in	0.0 in	Fair
4:53 PM	71 F	56 F	59%	SSE	10 mph	0 mph	27.10 in	0.0 in	Fair
5:53 PM	71 F	57 F	61%	SE	10 mph	0 mph	27.10 in	0.0 in	Fair
6:53 PM	69 F	58 F	68%	SE	12 mph	0 mph	27.10 in	0.0 in	Fair
7:53 PM	66 F	59 F	78%	SSE	7 mph	0 mph	27.10 in	0.0 in	Fair
8:53 PM	65 F	60 F	84%	SSE	6 mph	0 mph	27.11 in	0.0 in	Fair
9:53 PM	65 F	60 F	84%	S	5 mph	0 mph	27.11 in	0.0 in	Fair
10:53 PM	63 F	60 F	90%	CALM	0 mph	0 mph	27.10 in	0.0 in	Fair

Source: https://www.wunderground.com/history/daily/us/tx/midland/KMAF/date/2020-9-11

8.5: PRODUCT DETAILS

- Michelin Aerodynamic Solutions
  One Parkway South, Greenville, SC 29615 USA
  https://www.michelintruck.com/services-and-programs/aerodynamic-solutions/

8.6: TEST PERSONNEL

8.6a: MVT SOLUTIONS ENGINEERING

- Daryl Bear, Lead Engineer & COO

8.6b: MVT SOLUTIONS DRIVERS & TECHNICIANS

- Allan Dahringer, Director of Maintenance, MVT fleet
- Andrew Burnett, Shop Foreman, MVT fleet Las Cruces
- Carlos Aragon
- Jack Burchell

8.6c: MICHELIN

- Calvin Bradley, Aerodynamic Solutions Technical Lead
- Jason Koches, Business Development Manager, Aerodynamic Solutions

8.7: MVT SOLUTIONS CONTACT INFO

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