



# TITAN Freight Systems

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Freightliner  
eCascadia & eM2

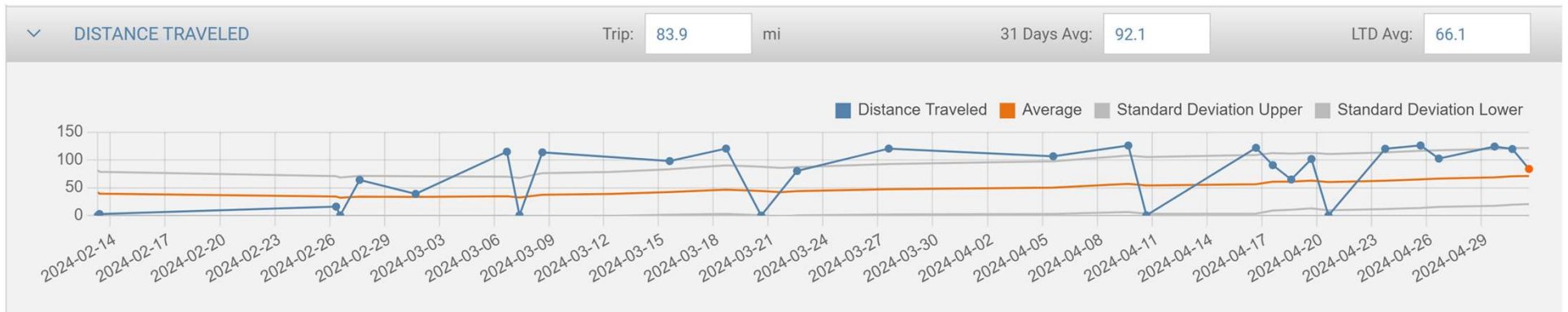


August 6<sup>th</sup>, 2023 –  
First Battery Electric Freightliner in Oregon



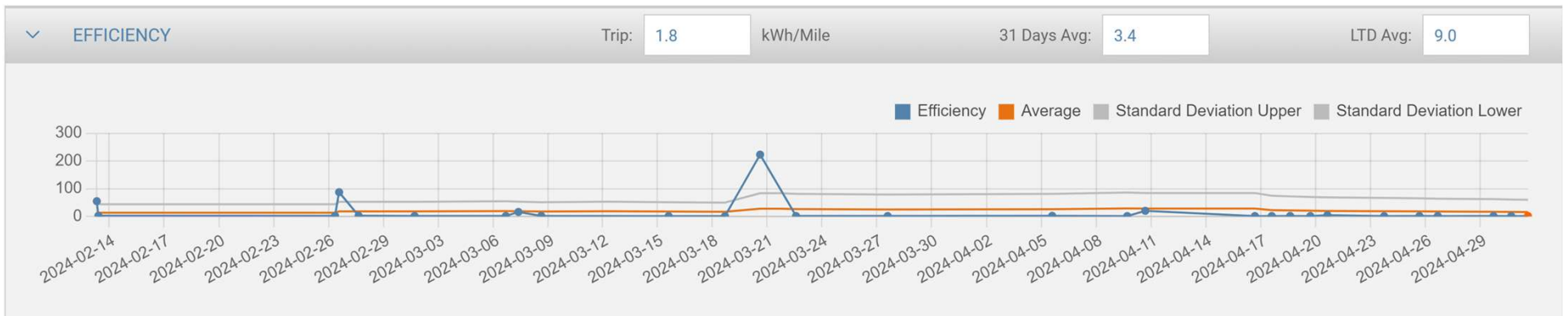
# Batteries - Today

- 291kWh Usable Capacity is good for local routes, P&D, Drayage, & Vocational
  - Routes are between 50-150 miles
  - Avg Tractor route 90 miles
  - 210kWh capacity for box trucks is good
  - Avg Box truck route 75 miles



# Vehicle - Today

- Energy efficiency is generally advertised at 1.9 kWh per mile
  - Average is 1.9 kWh/mi for trips over 20 miles long
  - As low as 1.465 kWh/mi over 120 mile trip
  - As high as 2.96 kWh/mi over 64 mile trip



## **HEAVY DUTY - CLASS 8 VEHICLE - ELECTRIC VS DIESEL - TOTAL COST OF OWNERSHIP (TCO)**

### **EQUIPMENT COST PER MILE (CPM) ANALYSIS**

<b>Equipment Cost</b>		<b>eCascadia Electric</b>	<b>Cascadia Diesel</b>
<b>Unit Type</b>			
Max Energy Capacity		291 kWh	100 Gallons
MSRP		\$402,047	\$140,000
Grants, incentives, % MSRP		-\$120,000	
Federal Tax Credit (IRA)		-\$40,000	
<b>Total Unit Cost</b>		<b>\$242,047</b>	<b>\$140,000</b>
<b>Charging Unit Cost</b>			
<b>Number of Charging Units Added</b>		6	
Unit Cost - Infrastructure		\$0	
Unit Cost - Charging Dispensers		\$90,624	
Federal Tax Credit		-\$16,667	
<b>Total</b>		<b>\$73,957</b>	
<b>TOTAL UNIT &amp; CHARGING COST</b>		<b>\$316,004</b>	<b>\$140,000</b>

<b>EQUIPMENT COST PER MILE (CPM) ANALYSIS</b>				
<b>Financing</b>			<b>Electric</b>	<b>Diesel</b>
	Term Months		84	84
	Discount Rate, Interest Cost		5%	5%
	Factor - Principal & interest payment		1.19	1.19
	Payment Per Month		\$4,477	\$1,983
<b>Operating Miles</b>				
	Miles Per Day		120	120
	Operating Days Per Month		21	21
	Miles Per Month		2520	2520
<b>TOTAL EQUIPMENT CPM</b>			<b>\$1.776</b>	<b>\$0.787</b>

<b>VARIABLE COST PER MILE (CPM) ANALYSIS</b>				
<b>Energy</b>			<b>Electric</b>	<b>Diesel</b>
	<b>Unit of Measure</b>		<b>kWh</b>	<b>Gallon</b>
	Cost Per Unit		\$0.110	\$4.228
	Miles Per Gallon			6.7
	kW Per Mile		1.9	
	Charging Efficiency		90%	
	kW Per Mile		2.11	
	Cost Per Mile		\$0.232	\$0.631
	Credit Per Mile - Oregon Clean Fuels Program		-\$0.360	
	<b>Energy Total CPM</b>		<b>-\$0.128</b>	<b>\$0.631</b>
<b>Maintenance</b>				
	Additional Insurance Cost Per Mile		\$0.021	\$0.000
	Maintenance Cost Per Mile			\$0.085
	EV Lower CPM		50%	
	<b>Maintenance Total CPM</b>		<b>\$0.064</b>	<b>\$0.085</b>
	<b>TOTAL VARIABLE CPM</b>		<b>-\$0.064</b>	<b>\$0.716</b>



<b>HEAVY DUTY - DUTY CYCLE - TCO - 10 YEARS</b>		<b>Electric</b>	<b>Diesel</b>
Financing Period Months		84	84
TCO		\$362,438.64	\$318,172.36
Remaining Useful Life Months		36	36
TCO		-\$5,831.28	\$64,959.58
<b>Duty Cycle TCO</b>		<b>\$356,607.36</b>	<b>\$383,131.94</b>
			-7%
<b>Reduction in Operating Costs</b>			
<b>EV DELTA</b>			
<b>10 Year</b>		<b>-\$26,524.58</b>	
<b>Per Year</b>		<b>-\$2,652.46</b>	

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# Questions



**MEDIUM DUTY - CLASS 8 VEHICLE - ELECTRIC VS DIESEL - TOTAL COST OF OWNERSHIP (TCO) ANALYSIS**

<b>EQUIPMENT COST PER MILE (CPM) ANALYSIS</b>				
<b>Equipment Cost</b>		<b>eM2</b>	<b>M2</b>	
<b>Unit Type</b>		<b>Electric</b>	<b>Diesel</b>	
Max Energy Capacity		210 kWh	50 gallons	
MSRP		\$280,201	\$120,000	
Grants, incentives, % MSRP		-\$85,000		
Federal Tax Credit (IRA)		-\$40,000		
<b>Total Unit Cost</b>		<b>\$155,201</b>	<b>\$120,000</b>	
<b>Charging Unit Cost</b>				
<b>Number of Charging Units Added</b>		6		
Unit Cost - Infrastructure		\$0		
Unit Cost - Charging Dispensers		\$90,624		
Federal Tax Credit (IRA)		-\$16,667		
<b>Total</b>		<b>\$73,957</b>		
<b>TOTAL UNIT &amp; CHARGING COST</b>		<b>\$229,159</b>	<b>\$120,000</b>	



<b>VARIABLE COST PER MILE (CPM) ANALYSIS</b>			
<b>Energy</b>		<b>Electric kWh</b>	<b>Diesel Gallon</b>
Cost Per Unit		\$0.110	\$4.228
Miles Per Gallon			8.8
kW Per Mile		1.5	
Charging Efficiency		90%	
kW Per Mile		1.7	
Cost Per Mile		\$0.183	\$0.480
Credit Per Mile - Oregon Clean Fuels Program		-\$0.313	
<b>Energy Total CPM</b>		<b>-\$0.129</b>	<b>\$0.480</b>
<b>Maintenance</b>			
Additional Insurance Cost Per Mile		\$0.021	\$0.000
Maintenance Cost Per Mile			\$0.085
EV Lower CPM		50%	
<b>Maintenance Total CPM</b>		<b>\$0.064</b>	<b>\$0.085</b>
<b>TOTAL VARIABLE CPM</b>		<b>-\$0.066</b>	<b>\$0.565</b>

**MEDIUM DUTY - DUTY CYCLE - TCO - 10 YEARS**

		<b>Electric</b>	<b>Diesel</b>
Financing Period Months		84	84
TCO		\$261,115.19	\$242,546.18
Remaining Useful Life Months		36	36
TCO		-\$4,964.40	\$42,748.36
<b>Duty Cycle TCO</b>		<b>\$256,150.79</b>	<b>\$285,294.55</b>
<b>Reduction in Operating Costs</b>			<b>-10%</b>
<b>EV DELTA</b>			
<b>10 Year</b>		<b>-\$29,143.76</b>	
<b>Per Year</b>		<b>-\$2,914.38</b>	