

Program: California Sustainable Freight Action Plan Pilot Project Ideas

Submission Date: November 30, 2015



1. Name: Mike Saxton - Project Proposal Applicant
Chief Commercial Officer
OrangeEV
500 NW Business Park Lane
Riverside, Missouri 64150
www.orangeev.com
mikes@orangeev.com
866-688-5223
816-210-9669

Jesse N. Marquez – EJ Organization Project Partner
Executive Director
Coalition For A Safe Environment
1601 N. Wilmington Blvd., Ste. B
Wilmington, CA 90744
jnm4ej@yahoo.com
310-590-0177

2. Project Title: Zero Emission Electric Terminal Truck (aka Yard Hostler)
Demonstration Project

3. Project Location:

Wilmington, Long Beach, Carson CA 90744 - Near Alameda Corridor/Port of Los Angeles/Port of Long Beach

4. Executive Summary:

The OrangeEV pilot project proposal consists of two project elements. First, is building a factory new emission-free Electric Terminal Truck (aka Yard Hostler) with Orange EV's all-electric electric power train and control systems technology into a new factory cab and chassis, and second, remanufacturing an older diesel truck to be a emission-free Electric Terminal Truck using Orange EV technology. Some companies may prefer the 2nd option, spending less to purchase a remanufactured truck that provides them a "new truck the already know".

The two Orange EV trucks will undergo the following demonstration performance tests: Each vehicle will demonstrate that it can connect and carry all standard trailers sizes (e.g. from 20' to 53'), fully loaded up to the 81,000 LB GCWR DOT standard, up to 25 MPH working and recharging throughout normal shifts cycles on fast charging (vs. standard). Charging capabilities will be built and installed to support the electric trucks in those normal shift cycles.

The T-Series does the job of the current diesel terminal trucks while eliminating the use of diesel fuel and emissions.

5. Project Description:

This project is being proposed because there is now significant opportunity for the freight transportation industry to transition to sustainable, zero-emission technologies that make financial sense.

OrangeEV Electric Terminal Truck Brief History.

The Orange EV team has a history of success developing and introducing innovative products and services, including multiple types of electric vehicles, leading to Orange EV's flagship offering: the T-Series pure electric terminal truck. Initial customers are obtaining the T-Series remanufactured solution to more quickly, cost effectively acquire and operate "new trucks they already know". For broader deployment they will have new truck options as well.

After years of design and prototype development, in April 2014 Orange EV made the T-Series commercially available. From commercial launch, within:

- 12 months, Orange EV began filling orders.
- 14 months, Orange EV had completed 10 extended onsite customer demonstrations
- 18 months, Orange EV expanded six-fold to larger facilities to accommodate volume.

The demonstrations have been at a broad range of freight / goods movement environments including: rail intermodal, retail distribution, parcel, LTL freight, third party logistics, manufacturing/warehousing and more. All thus far have opted to demonstrate “Standard Charging”. This demonstration would utilize fast charging to complete a full charge in 2 hours or less.

OrangeEV Electric Terminal Truck Sustainability & Energy Efficiency.

An Orange EV T-Series terminal truck is a sustainable freight transportation solution because it is 100% electric, with all systems powered from onboard batteries. There is no fossil fuel engine or tailpipe. The electric power train is ~90% efficient compared to 15-20% found with diesel systems. Orange EV's truck also eliminates the transmission and so further reduces oil based fluids and so requires significantly less maintenance. Using Orange EV's electric Terminal Truck solution operators will save up to 90% on fuel while hauling the same load with zero diesel and zero emission.

OrangeEV Electric Terminal Truck Environmental Benefits.

Electric Terminal Truck Environmental Benefits Include:

- An all-electric technology
- Ability to use the cleanest available sources of renewable energy
- No greenhouse gas emissions
- No fossil fuel requirement
- No fuel, motor oil or transmission fluids.
- Quite - nearly silent
- Smooth - no engine lurching or engine vibration
- Cool - no radiant engine

OrangeEV Electric Terminal Truck Public Safety Benefits.

Electric Terminal Truck Public Safety Benefits Include.

- Does not use flammable or explosive fuels
- No need to transport flammable or explosive fuels over public highways, freeways, street & bridges to get to site
- No need to store flammable fuels on-site
- Healthier for drivers (cooler, smoother, quieter, cleaner) which reduces health care, absenteeism, work comp/liability, etc
- Improved safety due to healthier, more alert truck drivers
- Noise and emission mitigated for healthier surrounding communities.

OrangeEV Electric Terminal Truck Logistics Technology Benefits.

Terminal trucks serve a critical role helping streamline freight logistics. A terminal truck is a short range truck used in manufacturing, distribution, package centers, rail yards, shipping yards, ports and more to transport (i.e. hostile) cargo containers & trailers around those yards. Terminal trucks are designed for the tighter spaces and slower speeds of the yard environments in which over-the-road long haul trucks are cumbersome and inefficient.

Electric Terminal Truck Logistics Benefits Include:

- Easily replaces traditional diesel fuel trucks
- Longer truck usage life (most sites will replace truck before battery)
- Same size truck frame / handling as standard trucks
- Significant reduction in preventative maintenance requirements and downtime time
- Standard configurations options to suit differing sites requirements (e.g. battery size and charging rate)
- Does not require fuel trucks to fill up storage tanks on-site.

OrangeEV Electric Terminal Truck Technology Nuts & Bolts.

In producing the T-Series Orange EV can completely remanufacture existing diesel trucks, sandblasting and reconditioning cab and chassis while refurbishing other durable components. Onto this frame Orange EV builds its power train (i.e. motor, drive shaft, real axle), battery and battery management systems, control and auxiliary systems thus eliminating waste and delivering to customers a “new truck they already know”.

1. Diesel fuel tanks and fuel management system are replaced by Orange EV’s battery and management system (BMS).
2. Diesel engine and transmission are replaced by Orange EV’s induction motor.
3. The BMS works in coordination with the motor controller to govern truck operations.
4. Electrical cables and the electric “wire harness” that connect systems are installed new.
5. Charging is done by plugging in to existing site’s electricity at either ~220 or 440 VAC.

OrangeEV Electric Terminal Truck Project Economic Benefits.

Pilot Project Short Term Benefits

- 1st Zero Emission commercially available terminal truck
- A major environmental and public health benefit project in California
- Lower purchase cost terminal truck
- Opportunity for local universities, community colleges, trade schools to learn new technologies & develop curriculum and classes

Future Deployment Benefits

- Potential California manufacturing facility with accompanying employment and economic development benefits
- Lower freight transportation costs
- Decrease in petroleum fossil fuel usage
- Decrease in public health care costs

OrangeEV Electric Terminal Truck Pilot Project Demonstration Site Location.

The pilot project demonstration can take place at a range of sites throughout California. Companies have expressed interest in Orange EV technologies from each of the freight / goods movement environments including: rail intermodal, retail distribution, parcel, LTL freight, third party logistics, manufacturing/warehousing and more.

California Cartage Company LLC is one such company. California Cartage Company LLC, Long Beach, CA operates over 1,200 trucks nationwide and is currently a leader in green fleet trucks and service the Customs Examination Station (CES) in Carson, CA.

OrangeEV Electric Terminal Truck Project Future Deployment

Upon completion of the pilot demonstration project and successful demonstration of the technology, further deployments can be introduced in phases. Deployments could be targeted to major international ports, railyards, transloading facilities, container storage yards, chassis storage yards, warehouse distribution centers or any facility near communities most impacted by air pollution, noise, vibration, traffic congestion and health problems.

6. Budget:

Extended Duty T-Series configured for Fast Charging (2) <i>One will be remanufactured and the other all new</i>	\$570,000
Fast Charging Station (1) <i>Option: For the same price to demonstrate the different duty cycles, trucks could be built one each for standard and fast charging (instead of both fast charging).</i>	\$49,950
Orange EV Service Personnel (from local resources)	\$20,000
Orange EV Engineering Personnel, including travel expenses	\$30,000
Communications Management <i>For developing, publishing and presenting demonstration results</i>	\$40,000
Total	\$709,950

Note. Orange EV has invested over \$1M in cash, goods and in kind services to complete R&D, Production and Proof-of-Concept Demonstrations.

Potential Pilot Project Funding Sources

1. Greenhouse Gas Fund - AB32 Global Warming Solutions Act of 2006 - 100% Funding
2. Proposition 1B - The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 – Trade Corridors Improvement Fund - 100% Funding
3. California Energy Commission
 - Alternative and Renewable Fuel and Vehicle Technology Program - 2016-2017 Investment Plan Update
 - EPIC 2015-2017 Investment Plan
 - Regional Energy Innovation Clusters GFO-15-306
 - Sustainable Energy Entrepreneur Development Initiative RFP-15-305
 - Emerging Energy Technologies & Strategies To Market Needs & Opportunities RFP-15-304
4. USDOT Federal Railroad Administration
 - Research & Development Grants
 - Transportation Infrastructure Finance & Innovation Act (TIFA)
 - Build America Bonds-American Recovery & Reinvestment Act
5. Ports of Los Angeles and Long Beach Technology Advancement Program (TAP)
6. Ports of Los Angeles and Long Beach Project Mitigation Funds (Container Tariffs)
7. Harbor Community Benefit Foundation (www.hcbf.org)

Potential Future Long Term Project Expansion Funding

1. Greenhouse Gas Fund - AB32 Global Warming Solutions Act of 2006 - 100% Funding
2. Proposition 1B - The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 – Trade Corridors Improvement Fund - 100% Funding
3. Federal Highway Administration-Federal Transportation Bills 100% Funding , MAP - 21), Highway & Transportation Funding Act of 2014, as Amended. Currently expires in 2015 and currently under discussion. USDOT Federal Railroad Administration
 - Transportation Infrastructure Finance & Innovation Act (TIFA)
 - Build America Bonds-American Recovery & Reinvestment Act
 - Private Debt Financing Bonds (PABS)
 - Section 129 Loans
5. Maritime Goods Movement Act for the 21st Century
6. The National Freight Network Trust Fund Act of 2014 (HR 935, HR5101)
7. Multimodal Freight Funding Formula Program & National Freight Infrastructure Competitive Grant Program (HR 1308)
8. Carl Moyer Fund
9. Los Angeles County Measure R2 (2016)

7. Timeline:

The entire project described from project initiation through delivery, demonstration and final reporting may be completed in as little as 12 months. Initial production requires approximately 3 months.

8. Progress Analytics:

Following are example of performance metrics that can be tested. Others may be defined.

- Demonstrate can connect to a standard 20' and 40' chassis.
- Demonstrate can carry a fully loaded container on a chassis to 81,000 LB GCWR
- Demonstrate can travel a distance of up to 5 miles.
- Demonstrate can complete 50 round trips fully loaded in a standard shift of 10 hrs.
- Demonstrate can fully charge within 2 hrs.
- Demonstrate can travel up an incline of 3%
- Demonstrate capability to build a battery charging station to support the electric trucks.
- Demonstrate zero emissions
- Noise - Can be measured using standard off-the-shelf test equipment following approved test protocols.
- Vibration - Can be measured using standard off-the-shelf test equipment following approved test protocols.
- Energy Generation & Efficiency - Can be measured using onboard and wayside equipment to verify power requirements
- Logistics Destination Travel Speed - Can be measured using onboard and wayside equipment to verify speeds
- Logistic Loading/Unloading Time - Can be measured using wayside equipment to verify time to load container, travel to destination and unload container.

9. Interagency Partner Roles:

Governor's Office of Business & Economic Development (BED)

BED can participate in the technology, business and labor economic cost assessments and benefits.

California EPA/Air Resources Board (ARB):

ARB can verify the technology incorporated is a zero emissions technology and releases no greenhouse gases. ARB can verify near noiseless operation and near vibrationless operation. ARB can quantify potential public health care and cost benefits.

California Energy Commission (CEC):

CEC can validate the amount of renewable energy being generated, energy being used, compare energy efficiency to a traditional locomotive train.

California Department Transportation (Caltrans) Office of Freight Planning:

Caltrans can verify test operations, logistics data, assess potential integration into existing transportation infrastructure and land-use-right-a-ways.

Department of Toxic Substances Control (DTSC):

DTSC can verify zero waste and waste disposal.

Attachment - A

Project Team Summary

Orange EV (www.orangeev.com) is Kansas City based small business. Orange EV manufactures and delivers pure-electric, industrial-strength vehicles that are better for the earth, people and bottom line with solutions that meet the harsh demands of industrial environments, while lowering total cost of ownership.

EJ Organization Partner: Coalition For A Safe Environment (CFASE) is an Environmental Justice Organization with its office located in the Port of Los Angeles community of Wilmington, California. CFASE founded in 2001 has been a leading community science based organization researching alternative, innovative and emerging 21st century technologies that can modernize port operations and mitigate the negative environmental, socio-economic and public health impacts of major international trade ports, freight transportation, energy and petroleum industries. CFASE believes that we must plan and invest in a future sustainable environment and balance the need for economic growth and the public's best interests. CFASE will provide project Community Relations, Public Presentations, Information Distribution, Participate In Media Events, Community Events, and Industry Conferences, Trade Shows and Seminars. CFASE will additionally provide professional photography and HD Videography of the project. CFASE will also participate in the project testing witnessing, technology assessment and final evaluation report.