

Charging Big Rigs

By John Benson

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1. Introduction

I live in interesting places. My primary residence is in the Livermore Valley, and this is such a place. We have two major National Labs in the valley (Lawrence Livermore National Lab and Sandia National Lab's Livermore Campus), plus many high-technology firms (Oracle has major facilities in the Valley). Thus I get a few leads for my articles from a local weekly newspaper, The Independent. Since this post's primary lead came from The Independent, the reference at the end of this paragraph contains a link to their on-line site, but I prefer to read the paper version. But what does this have to do with "Charging Big Rigs," no matter how you interpret this? Read on for details.¹

I've written incessantly about how California intends move to net-zero greenhouse gasses (GHGs) by 2045. One of the most challenging sources of the GHGs we need to mitigate are class-8 Semis (a.k.a. big rigs). My most recent post on our efforts to stifle these emissions is described and linked below.

New Heavy Truck and Train Rules in California: *The California Air Resources Board (CARB) is almost always the first-mover when it comes to regulations that reduce greenhouse gases and other sources of pollution. CARB recently approved world-leading regulation to phase out the sales of medium and heavy-duty greenhouse gas emitting trucks in California by 2036.*

CARB also approved first-in-the-nation regulation to limit train pollution.

<https://energycentral.com/c/ec/new-heavy-truck-and-train-rules-california>

Also CARB just formed an alliance with major big rig and big rig engine manufacturers: The Clean Truck Partnership. This is covered in section 4 below.

2. Drayage

LIVERMORE — East Bay Community Energy (EBCE), the local energy provider for Alameda County, has announced a new financing program to support the transition to zero-emission heavy-duty trucks.

The EBCE Board has approved \$4.5 million in financing to Forum Mobility, a zero-emission truck solutions provider, to support the development of an innovative electric truck charging depot in Livermore. This site is part of a new network of electric charging depots that Forum Mobility is building for drayage trucking carriers moving freight in and out of the Port of Oakland. "Drayage" refers to a form of trucking service that connects the different modes of shipping products.

Author's comment: In major metropolitan areas, specific Interstate Highways carry a disproportionate amount of drayage traffic. One of these paths is I-580 through the Livermore Valley.

¹ The Independent, "Zero-Emission Truck Charging Depot Slated For Livermore," June 15, 2023, https://www.independentnews.com/news/livermore_news/zero-emission-truck-charging-depot-slated-for-livermore/article_0b97defa-0aca-11ee-b8bf-1fb0d63e6b55.html

Also EBCE is my assigned community choice aggregator, although I have chosen to stay with PG&E.

“The City of Livermore, as a longtime leader in climate action, is proud to help lead the transition to zero-emission goods movement,” said Livermore Councilmember Ben Barrientos, who also serves on EBCE’s board of directors. “As the host of key, cutting-edge clean charging infrastructure, cleaning up the I-580 freight corridor starts with us.”

The EBCE loan will support the development of Forum’s Greenville Community Charging Depot on a 4.4-acre site just off of I-580 in Livermore. The depot will be capable of charging up to 96 trucks simultaneously. According to the U.S. EPA, heavy-duty vehicles are responsible for 23% of the carbon emissions from the transportation sector, as well as 45% of NOx and 57% of PM 2.5 pollution in the US – with disproportionate impacts on communities of color.

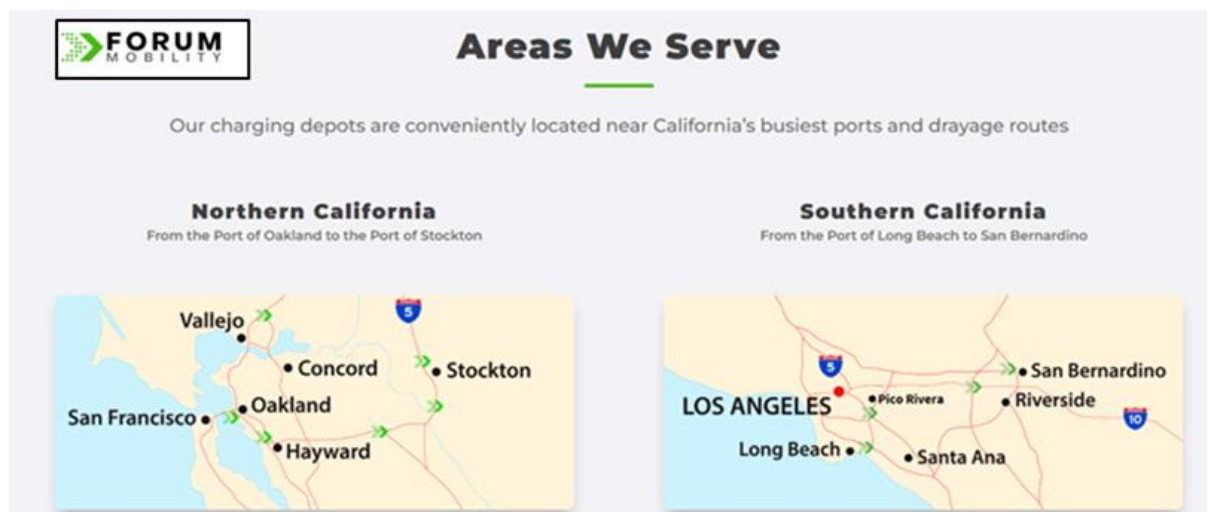
“A transition to zero-emission vehicles will mean cleaner air for our communities, a safer climate, and if done well, lower costs per mile for truckers.”

“East Bay Community Energy provides clean electricity from Oakland to Tracy – and now Forum Mobility will provide clean trucking on the same route,” said Nick Chaset, CEO of East Bay Community Energy. “We’re excited to help Forum Mobility charge electric trucks with 100% renewable energy and further reduce harmful emissions in our community.”

The California Air Resources Board recently approved rules requiring all of California’s in-state drayage fleet – approximately 33,000 trucks – to be zero-emission by 2035. Charging infrastructure is a key ingredient for success. The California Energy Commission estimates that to comply with these and other proposed vehicle regulations, California will need 157,000 medium- and heavy-duty chargers by 2030.

3. Forum Mobility

It appears that the title firm is specializing in servicing drayage corridors in Northern and Southern California – see the image below.²



² <https://forummobility.com/>

In the above Northern California image, the freeway traveling east from Hayward is I-580. I believe the green symbol just west of where I-580 splits will be the location of Forum's Greenville Community Charging Depot on the east end of Livermore Valley.

Forum Mobility's Headquarters are in Oakland. Based on a recent article they seem to be will capitalized.

Startup gets \$15 million in Series-A capital raise to scale the business: *Trucking-as-a-service startup Forum Mobility has formed a \$400 million joint venture with CBRE Investment Management and Homecoming Capital to create charging depots for electric drayage trucks in California.*³

The move aims to bring electric charging availability into better alignment with the growth in battery-powered trucks. Most early sales and leases of the zero-tailpipe-emission Class-8 models are targeted at California's ports. Idling internal combustion engines cause significant air pollution in nearby communities.

"We saw the mandates in California on the policy side. And that's where we got even more enthusiastic about it," Matt LeDucq, Forum Mobility founder and CEO, told FreightWaves. "It's noble because we want to get older and dirtier trucks out of the communities around the ports."

Drayage draws equipment and infrastructure funds from the California Air Resources Board (CARB) and the California Energy Commission (CEC).

For example, the \$120,000 voucher for a Class 8 electric truck under the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project swells to \$168,000 when the truck is used for drayage and is housed in a so-called disadvantaged community.

A CARB proposal would require all of California's drayage fleet — approximately 30,000 trucks — to be zero-emission by 2035. Charging infrastructure is critical to that happening. The CEC estimates California needs 157,000 medium- and heavy-duty chargers — 53 a day — by 2030 to meet all proposed regulations.

3.1. Business Model

Further to the above, I found a much more detailed article that added much additional information.

*In January, Amazon announced it is supporting Forum Mobility, an Oakland, California zero-emission trucking solutions provider that is building electric truck charging stations for harbor trucking fleets and drivers.*⁴

The venture is supported by a new \$400 million joint venture, led by the commercial real estate company CBRE. In addition, Homecoming Capital provided \$100 million.

³ Alan Adler, FreightWaves, "Forum Mobility in \$400M JV for electric truck infrastructure" Tuesday, Jan 17, 2023, <https://www.freightwaves.com/news/forum-mobility-enters-400m-joint-venture-for-electric-truck-infrastructure>

⁴ Stas Margaronis, American Journal of Transportation, " Apr 04, 2023. <https://www.ajot.com/insights/full/ai-backed-by-amazon-cbre-forum-mobility-is-building-harbor-truck-charging-stations-in-california>

Forum Mobility's investors include Obvious Ventures, Edison International, Overture, Homecoming Capital, CBRE Investment Management, Elemental Excelsior⁵ and Amazon's Climate Pledge Fund, the announcement said.

The endorsement from Amazon signals that a major retail and logistics company is ready to make the investment in electric trucks and charging stations.

Rodrigo Prudencio, principal at Amazon's Climate Pledge Fund said of the commitment: "To address global warming at scale, we need solutions that support the transition to electric vehicles, especially in hard-to-decarbonize sectors like heavy duty trucking. Forum Mobility's solution will help small business owners electrify their transportation fleets, remove air pollution from California's ports, and provide the charging infrastructure needed to support the growing use of electric trucks."



Author's comment: Many of the trucks passing through the I-580 corridor are providing drayage for Amazon. As of 2021 Amazon had seven fulfillment / distribution centers in San Joaquin County, just east of Livermore, and one in Livermore. The big rigs passing up and down I-580 are part of the supply chain for these facilities, and ultimately most of the Amazon customers in the SF Bay Area.

At the January announcement, Matt LeDucq, CEO and Co-founder of Forum Mobility explained: "We are building a comprehensive charging network for heavy-duty trucks to make the transition to electrification. This network will need a lot of infrastructure and real estate, and CBRE IM is the perfect partner to help us build charging where it's needed most. Fleets can bring their trucks to our network, or we can provide electric trucks bundled with charging. Today we can provide a Class 8 electric truck, and all its charging needs, at a monthly price that's competitive with diesel – without the emissions... With new rules coming soon from the California Air Resources Board, we help fleets and drivers looking to make the jump to electric."

Author's comment: I found the following text in CBRE IM's site:⁶

⁵ Author checked for correct spelling, <https://elementalexcelerator.com>

⁶ <https://www.cbreim.com/about-us/our-story-and-values>

Our unique ability to see investment management through the eyes of real estate and infrastructure investors and users means we have the expertise to deliver on all aspects of an investment's lifecycle. Our capability and flexibility to work with leading service providers means we understand everything from designing portfolio strategies, investing capital and operating assets (build, lease, manage, repurpose) to optimizing the occupier experience and ultimately disposing of assets to realize returns. This end-to-end integration allows us to align clients' investment objectives with users' needs and preferences, across portfolios and sector specialties.

Currently, proposed regulations from the California Air Resources Board (CARB) would require all of California's drayage fleet – approximately 30,000 trucks – to be zero-emission by 2035. Charging infrastructure is a key ingredient for success. The California Energy Commission estimates that to comply with these and other proposed vehicle regulations, California will need 157,000 medium and heavy-duty chargers by 2030, the Forum Mobility announcement said.⁴

Forum Mobility has identified nine sites in Northern and Southern California, focusing on the Ports of Long Beach and Oakland. The company plans to install depots capable of simultaneously charging medium and heavy-duty trucks at locations linked to the ports and along routes leading to warehouses.

Below are the planned locations of the first nine charging stations and a number of chargers under-development:

- *City of Long Beach - 48*
- *City of Compton - 52*
- *City of Livermore - 104*
- *City of Oakland - 24*
- *Unincorporated Rancho Dominguez - 120*
- *City of Fontana - 64*
- *City of Vernon - 80*
- *Unincorporated Rancho Dominguez - 112*
- *Unincorporated Rancho Dominguez - 120*

The company says that all but the last two (the Unincorporated Rancho Dominguez sites) are scheduled to be online by the end of 2024 and the last two in 2025 for a total of "724 trucks in this tranche." The company says these stations are "in advanced stages of development" with overnight dwell slips available and fast chargers.

For the next phase of development, Forum Mobility is planning to build charging stations at another 15 sites for 1900 trucks by end of 2027.

In an interview with AJOT, Forum Mobility's Matt LeDucq, discussed the company's focus on harbor trucking beginning with the Ports of Oakland and Long Beach: "We have trucks that are going in and out of the Port of Long Beach today at a facility in Long Beach proper and we are looking to finalize some projects with both the Port of Long Beach and the Port of Oakland ... This is going to create a massive demand. And so, we have built the company around creating an economic and accessible solution for drayage operators to make the transition and to do this on a fixed price per month making it competitive or beating diesel prices by building charging station facilities."

LeDucq says that a new mandate by the California Air Resources Board will require trucking companies to make the investment in electric trucks: “On April 28th, the California Air Resources Board is voting on an Advanced Clean Fleet (ACF) program. ACF will pass in California and will mandate the conversion of fleets to zero-emission.”

Update: The California Air Resources Board (CARB) passed the Advanced Clean Fleets (ACF) regulation on April 28, 2023. The vote was unanimous.

The Advanced Clean Fleet program designed by the California Air Resources Board is “a medium and heavy-duty zero-emission fleet regulation with the goal of achieving a zero-emission truck and bus California fleet by 2045 everywhere feasible and significantly earlier for certain market segments such as last mile delivery and drayage applications. The initial focus would be on high-priority fleets with vehicles that are suitable for early electrification, their subhaulers, and entities that hire them. The goal of this effort is to accelerate the number of medium and heavy-duty zero-emission vehicle purchases to achieve a full transition to zero-emission vehicles in California as soon as possible.”

LeDucq projects that the market in California for truck charging will be substantial: “We need \$10 billion of real estate to house \$10 billion worth of trucks that has near \$10 billion worth of infrastructure on it just for infrastructure and just for California over the next 12 years. It’s that big of an infrastructure opportunity.”

The potential for building truck charging stations is enormous: “You’re going to have to find facilities ... that have the capability of charging 2-3,000 trucks with heavy-duty chargers a day that have to be built in California between now and 2030, which means that between now and 2030 you have to build over 200 chargers a day. By 2030, we’re going to need to build 10,000 chargers in California. The California Energy Commission put out the number of 53 chargers a day for medium and heavy-duty trucks to get constructed for Advanced Clean Fleets (ACF).”

Le Ducq notes that it is not realistic to locate charging stations at the ports because there is limited space for chargers..:

3.2. First Customer

In a December 7, 2022, announcement, Forum Mobility “celebrated with a ribbon-cutting for our first customer, a deal to provide five class 8 battery electric trucks and all the charging they can use, at Hight Logistics in Long Beach.”

The announcement said that attendees included California State Senator Lena Gonzalez, Long Beach Mayor-elect Rex Richardson, California Energy Commissioner Patty Monahan, California Air Resources Board Member Gideon Kracov, Long Beach Harbor Commission President Sharon L. Weissman, Hight Logistics CEO Rudy Diaz as well as Forum Mobility CEO Matt LeDucq.

The announcement cited Hight Logistics: “A family run business that leads with their values.”

The announcement went on to say that Forum Mobility was able to provide Hight with with BYD, Volvo, and Kenworth trucks “all-electric Class-8 trucks, on-site fast-chargers and all the electricity they need for zero-emission drayage.”

3.3. Port of Oakland

LeDucq said that Forum Mobility is building a charging station at Livermore California, East of the Port of Oakland on the I-580-freeway corridor linking the Port to warehouses and agricultural exporters in the San Joaquin Valley: “At the Livermore facility, we’ll start building this in September and we have just signed the contract with PG&E (Pacific Gas & Electric), and we’ve designed this ... for overnight charging. Adjacent to it, we’re going to find some folks that can do some containers and some storage for those drivers. This is a hundred truck facility. You park your passenger in one place, and you pick up your truck in the morning, it’s fully charged and should get through the day.”

Besides Forum Mobility there has already been moves to build a charging station in the Port of Oakland. In March 2022, it was announced that a Port of Oakland container terminal operator SSA would be building a charging capability for its electric tractor fleet: “Robotic charging specialist Rocsys has signed an order of agreement with marine terminal operator SSA Marine to supply ROC-1 autonomous charging systems. The systems will autonomously charge part of the electric yard tractor fleet of SSA Marine at the International Container Terminal at the Port of Oakland.

The project is partially funded by a \$50 million grant from the California Air Resources Board (CARB) to the Port of Long Beach to fund emissions-free and “near-zero” equipment and vessels at three California ports, including Long Beach, Stockton, and Oakland. According to the organizers, the Sustainable Terminals Accelerating Regional Transformation (START) project will deploy over 100 pieces of zero-emissions terminal equipment and port drayage trucks.”

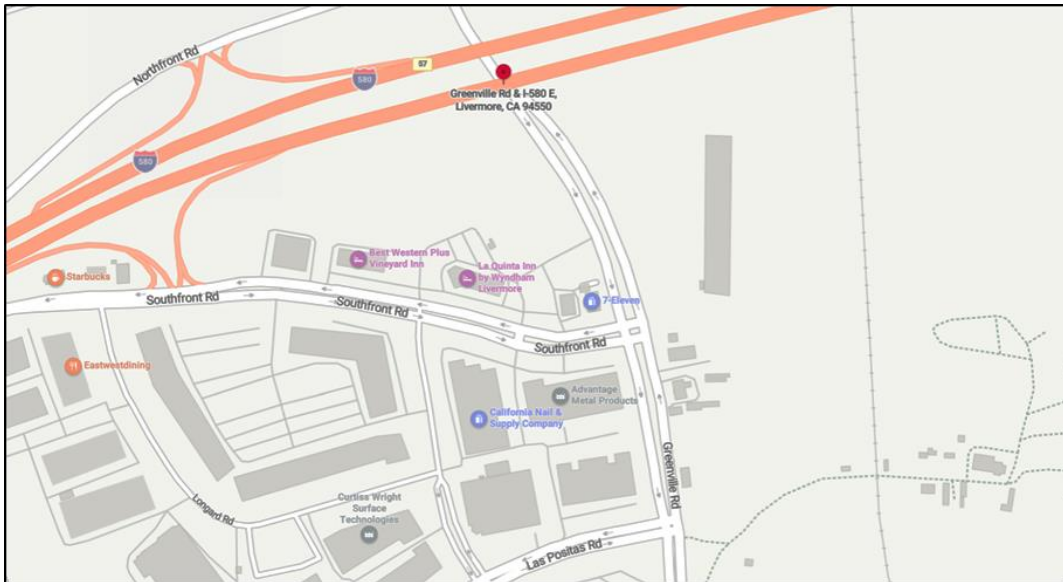
3.4. Back to Livermore

Critically, Forum Mobility was able to execute an interconnection agreement with Pacific Gas & Electric for the initial 6.5 megawatts of power the site will need without expensive and time-consuming grid upgrades, he said. Grid capacity is a must for truck-charging sites, which can draw as much power as small towns.⁷

Final author’s comment: The future Forum Mobility facility in Livermore is described as just off of I-580 near or on Greenville Road. There are two large hotels within a block or two of this location (see map on next page, purple icons), and probably five more hotels and many restaurants just off exits within two or three miles west down I-580. I believe that the above text mentions overnight charging, and this would facilitate this.

Also, this site is on the eastern edge of Livermore, and thus there is much undeveloped land in this area. I was unable to find an address for this future facility.

⁷ Jeff St. John, Canary Media, “California is getting its biggest electric truck charging station yet,” June 13, 2023, <https://www.canarymedia.com/articles/ev-charging/california-is-getting-its-biggest-electric-truck-charging-station-yet>



4. Clean Truck Partnership

The California Air Resources Board announced a Clean Truck Partnership today (July 6) with the nation's leading truck manufacturers and the Truck and Engine Manufacturers Association that advances the development of zero-emission vehicles (ZEVs) for the commercial trucking industry, which includes flexibility for manufacturers to meet emissions requirements while still reaching the state's climate and emission reduction goals.⁸

The Clean Truck Partnership, which includes Cummins, Inc., Daimler Truck North America, Ford Motor Company, General Motors Company, Hino Motors Limited, Inc., Isuzu Technical Center of America, Inc., Navistar, Inc., PACCAR Inc., Stellantis N.V., Truck and Engine Manufacturers Association, and Volvo Group North America, marks a commitment from the companies to meet California's vehicle standards that will require the sale and adoption of zero-emissions technology in the state, regardless of whether any other entity challenges California's authority to set more stringent emissions standards under the federal Clean Air Act. In turn, CARB has agreed to work collaboratively with manufacturers to provide reasonable lead time to meet CARB's requirements and before imposing new regulations and to support the development of necessary ZEV infrastructure.

"The unprecedented collaboration between California regulators and truck manufacturers marks a new era in our zero-emission future, where we work together to address the needs of both the trucking industry and the Californians who deserve to breathe clean air," said CARB Chair Liane Randolph. "This agreement makes it clear that we have shared goals to tackle pollution and climate change and to ensure the success of the truck owners and operators who provide critical services to California's economy."

⁸ Lys Mendez, California Air Resources Board (CARB), "CARB and truck and engine manufacturers announce unprecedented partnership to meet clean air goals," July 6, 2023, https://ww2.arb.ca.gov/news/carb-and-truck-and-engine-manufacturers-announce-unprecedented-partnership-meet-clean-air?utm_source=newsletter&utm_medium=email&utm_campaign=currentclimate&cdclid=628673ca6e1a1d1211f1d747§ion=discoveries

EMA President Jed Mandel said, “This agreement reaffirms EMA’s and its members’ longstanding commitment to reducing emissions and to a zero-emissions commercial vehicle future and it demonstrates how EMA and CARB can work together to achieve shared clean air goals. Through this agreement, we have aligned on a single nationwide nitrogen oxide emissions standard, secured needed lead time and stability for manufacturers, and agreed on regulatory changes that will ensure continued availability of commercial vehicles. We look forward to continuing to work constructively with CARB on future regulatory and infrastructure efforts designed to support a successful transition to ZEVs.”

The terms of the Clean Truck Partnership include:

- *CARB will align with EPA’s 2027 regulations for nitrogen oxide emissions. CARB also will modify elements of the 2024 NOx emission regulations for which manufacturers will provide offsets as necessary to maintain California’s emission targets.*
- *CARB commits to providing no less than four years lead time and at least three years of regulatory stability before imposing new requirements.*
- *Truck manufacturers commit to meeting CARB’s zero-emission and criteria pollutant regulations in the state regardless of any attempts by other entities to challenge California’s authority.*

The Clean Truck Partnership comes as California prepares for implementation of its landmark rules that put in place a phased-in transition toward 100% sale and use of zero-emissions technology for medium- and-heavy duty vehicles under CARB’s Advanced Clean Trucks and Advanced Clean Fleets rule by 2045. In March, the Biden administration approved California’s waiver under the federal Clean Air Act that allows the state to become the first in the world to require zero-emissions technology for trucks. By working together, California air quality regulators and truck manufacturers will ensure that the technology, infrastructure and supply will be available to meet the state’s ambitious clean air goals...

Author’s comment: The Clean Truck Partnership agreement can be accessed through the link below.

https://ww2.arb.ca.gov/sites/default/files/2023-07/Final%20Agreement%20between%20CARB%20and%20EMA%202023_06_27.pdf