



Inland Empire Regional Mobility Dialogue Series

Results and Summary



**Electrification of
Medium/Heavy
Duty Vehicles**

Apr 23, 2019

Introduction

By 2040, California has mandated the move from petroleum based medium and heavy duty vehicles to Zero Emission bus and trucks. Electric vehicles are one of the new leading technologies in this industry. With the advancement of technology comes questions of reliability, feasibility, financial capability, and safety. The big overriding question is how will public agencies and private companies prepare for this switch? This Regional Mobility Dialogue explored various aspects of this topic; the regulation, new technologies, and application currently in the public and private sectors.

Additional topics that were discussed include infrastructure preparedness, socio-economic impacts, governmental subsidies, and environmental impacts - particularly the reduction of greenhouse gas emissions and material science to improve overall energy efficiency. Given the time horizon of over 20 years before these technologies are implemented, there is the possibility that new technology will be developed that has surpassing benefits in comparison to electric-based vehicles.

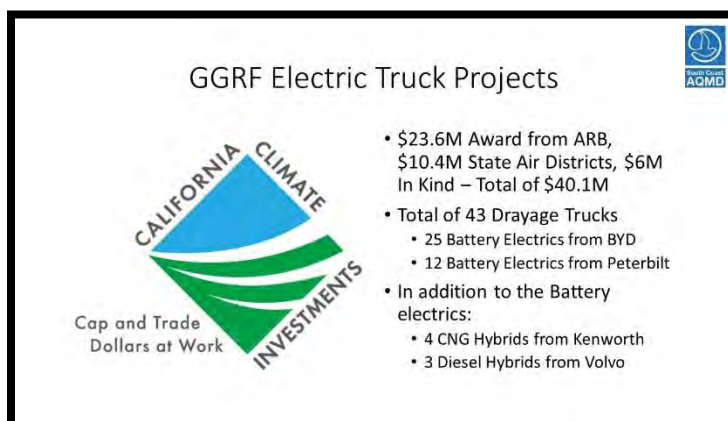
The panel of experts to discuss the electrification of medium/heavy duty vehicles included:

- Joseph Impullitti, Planning and Rules Manager in Science and Technology Advancement, South Coast Air Quality Management District
- Wayne Miller, Adjunct Professor and Associate Director, College of Engineering Center for Environmental Research and Technology, University of California, Riverside
- Doran Barnes, Executive Director, Foothill Transit
- Simon Horton, Senior Project Manager, Transportation Electrification Department of Transmission and Distribution, Southern California Edison

The key elements of this discussion include the advancements in medium and heavy duty electric trucks and how to properly implement them. Although there are many advantages with electrification, there are also challenges such as, implementing charging stations and charging equipment and the issue of electric vehicle range. It is also very important to include the utility providers early on in the plans for infrastructure buildout.

Joseph Impullitti – Planning and Rules Manager in Science and Technology Advancement, South Coast Air Quality Management District

Joseph Impullitti, Planning and Rules Manager from South Coast Air Quality Management District (SCAQMD) led the discussion on renewable energy sources. It is SCAQMD's mission to meet the federal standards in the urban areas of San Bernardino, Los Angeles County, Orange County, parts of Riverside County, and the Coachella Valley. Currently, SCAQMD does not meet the federal regulations and because they are not a regulatory agency, they do not have the option to enforce regulations on vehicles. Nearly



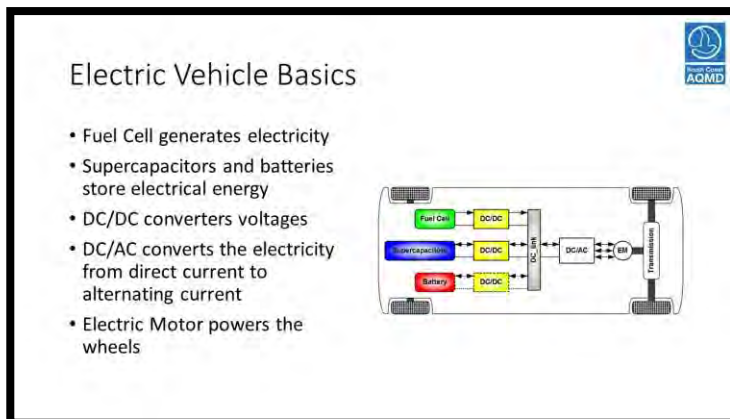
The slide is titled "GGRF Electric Truck Projects" and features the California Climate Investments logo on the left. The logo consists of a green diamond shape with the words "CALIFORNIA CLIMATE" at the top and "INVESTMENTS" at the bottom, with "Cap and Trade Dollars at Work" written below it. On the right side of the slide, there is a list of project details. In the top right corner, there is a small SCAQMD logo.

GGRF Electric Truck Projects

- \$23.6M Award from ARB, \$10.4M State Air Districts, \$6M In Kind – Total of \$40.1M
- Total of 43 Drayage Trucks
 - 25 Battery Electrics from BYD
 - 12 Battery Electrics from Peterbilt
- In addition to the Battery electrics:
 - 4 CNG Hybrids from Kenworth
 - 3 Diesel Hybrids from Volvo

30 years ago, in order to combat vehicle pollutants, SCAQMD started a clean fuels program. “In this program we get about a dollar for every registered vehicle in those areas that I mentioned and it goes towards development demonstration of advanced technologies that are going to result in cleaner air,” said Impullitti.

Zero emission/electric vehicles are primarily made up of the energy source, a fuel cell or a battery, and the electric motor. There are different modules that convert the energy from the batteries. “The batteries are DC (direct current) voltage right? And what comes off the wall, that’s alternating current, that’s AC voltage. So we have AC induction motors, so we have to convert that DC to AC in order to make it usable to move the vehicle,” said Impullitti. SCAQMD’s strategy is to move from small integrators such as the U.S. Hybrid, TransPower and Hydrogenics, to the major original equipment manufacturers (OEM). In order to effectively reduce emissions there needs to be a large quantity of zero emissions vehicles on the road. The only way to do so is through large OEM companies who can manufacture large quantities of vehicles, market them, service them, thus resulting in emission reduction that we need.



Technical Accomplishments and Progress BETs – TransPower

- Maintained three Electric Drayage Demonstration trucks (EDDs) in drayage service
 - ED02 (3Rivers)
 - ED03 (Cal Cartage)
 - ED04 (NRV1)
- Near dock and local operations within 20-mile radius from ports
- Collectively logged 37,841 miles as of 12/31/2017
- Positive feedback on quiet and smooth operations with sufficient power and torque
- Resolved early integration issues and software glitches

One of the projects AQMD received funding for by the California Climate Investments, was to develop 43 drayage trucks. These trucks will be operating throughout Southern California and there are 37 electric truck and seven hybrid trucks with CNG and diesel hybrid trucks. A few of these are currently being operated at the Ports of LA and eventually will be operating in the Port of San Diego. This is what the future of the trucking industry will look like. “We just kicked this project off with Daimler trucks. Daimler is the largest manufacturer of heavy duty trucks in the world and they are going to develop with

us, an electric truck,” said Impullitti. The project will construct 20 electric trucks, both class eight and class six electric trucks, here in California. By 2021-22 when the project ends, they will have electric trucks for sale in California. They also have a Volvo LIGHTS project that just launched. “Now this project is the second largest manufacturer of heavy duty trucks in the world. And this project, we

Project Summary & Overview

- Daimler Trucks North America (DTNA) is the largest truck OEM in North America
- DTNA will develop 20 battery-electric heavy-duty Freightliner trucks
- DTNA will demonstrate the electric trucks in real-world commercial fleet operations in the South Coast Air Basin. The project will include:
 - Ten (10) Class 6 eM2 trucks (GVWR 26,000 lbs)
 - Ten (10) Class 8 eCascadia trucks (GVWR 80,000 lbs)
 - The project will include appropriate charging infrastructure for heavy-duty trucks

were awarded 45 million dollars from CARB (California Air Resource Board) and then our partners and Volvo put in an additional 45 million for 90 million dollar project,” said Impullitti. Similar to the Daimler project, this project will also involve developing class eight electric trucks, in addition to class six and seven trucks. These trucks will be deployed throughout the Inland Empire and there will be quick charging and solar energy stations built into facilities to power the trucks from the ports to the Inland Empire.



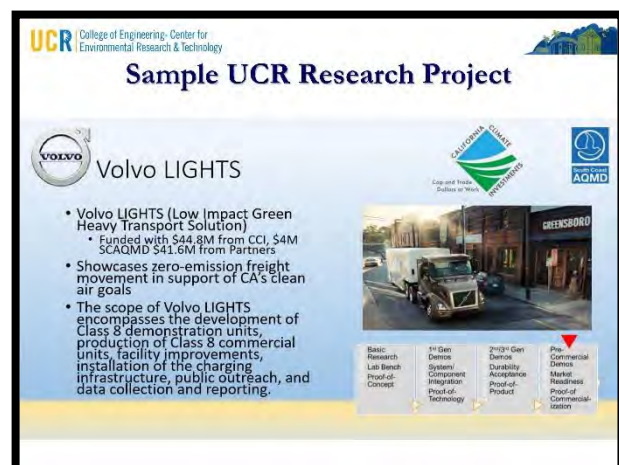
Wayne Miller – Adjunct Professor and Associate Director, College of Engineering Center of Environmental Research and Technology, University of California, Riverside



University of California, Riverside has worked closely with SCAQMD on a number of projects. Wayne Miller, Adjunct Professor and Associate Director for the College of Engineering Center of Environmental Research and Technology at UC Riverside discussed some of their collaborative projects and explained what UC Riverside’s role has been throughout the process. Those of you who are not familiar with AQMD, they are the premiere air agency in the world. “At UC Riverside, we are partnered with them on a lot of these projects, for example you saw that Joe was talking about, we’re going to run these vehicles, but

someone has to keep track of what’s going on. That’s basically one of the roles that we have,” said Miller. The College of Engineering Center of Environmental Research and Technology (CE-CERT) laboratories were founded in 1992. Today, it has become a place that both government and industry can test their vehicles and trust the data that is given to them.

CE-CERT has clean air projects, sustainable transportation projects, renewable fuels projects, and energy and climate impact projects. There is a \$25 million dollars that are distributed across this broad spectrum of projects. In addition, CE-CERT is also working on the Volvo LIGHTS project with AQMD. As explained by Dr. Miller, we can produce near zero emissions engine today that is 90%



UCR College of Engineering - Center for Environmental Research & Technology

Sample UCR Research Project

Volvo LIGHTS

- Demonstrate zero-emission freight movement solutions within communities severely impacted by air quality
- Roll out an entire support system to enable zero-emission operations in at least 3 freight distribution facilities
- Reduce environmental footprint by integrating zero-emission equipment, renewable solar energy, and battery storage technologies into the freight mobility network
- The commercial introduction of class 8 HDBEV trucks



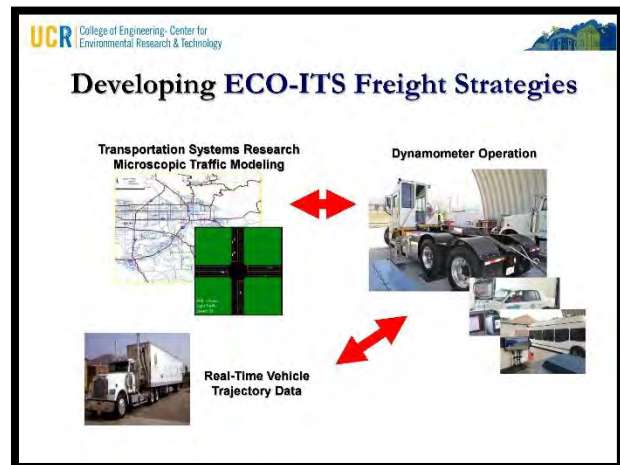
Logos: Volvo, AQMD, and various partner organizations including UCR, Riverside, and others.

cleaner than what is out there or we can opt to go all electric. This is the current investment debate – whether we should decide to go with near zero emission or all electric.

With the Volvo LIGHTS project, the trucks are being tested to find the most efficient routes. “So can you put apps on the trucks that will give you more energy efficient transportation, routing, pathing, those are being created,” Miller stated. UCR’s role is to collect and monitor the data being generated. From there, better decisions can be made based on the data collected.

UCR is also working on other projects such as the eco-ITS (Information Transportation Systems) where real world data is extracted from a heavy duty dynamometer. Miller stated that, “we actually have the only heavy duty dyno in this area that can actually treadmill busses and trucks of all sizes on this dyno here.” Miller’s findings state that the next generation of electric vehicles, electric trucks included, have a better battery to wheel conversion efficiency.

Miller concluded with the note that there is ongoing developments in this space, i.e., near zero engine technology and fully electric such as the BYD Auto unit. “They rated the proportional availability, ecological availability, operational feasibility, and infrastructure. It’s sort of like your consumer reports, where you get the different amount of checks depending on a vehicle,” said Miller. This further aids in better decision making to find the best possible solution.



UCR College of Engineering - Center for Environmental Research & Technology

Feasibility Parameter / Criteria	Overall Achievement* of Criteria in 2018 (Commercially Available / Technically Viable Truck Platforms)	
	ZE Battery Electric	NZE NG ICE
Commercial Availability		
Technical Viability	TRL 6 to 7 (moving to 7 or 8)	TRL 8 (moving to 9)
Operational Feasibility		
Infrastructure Availability		
Economic Workability		

Legend: Achievement of Each Noted Parameter / Criteria (2018)

Ultimate Achievement Fully Achieved

*These ratings for overall achievement of each five feasibility parameter are based on the analysis of several criteria within that parameter. Because each criterion is important for the success of a given fuel-technology platform in day-to-day use, the overall achievement ratings are based on the lowest criterion score for each feasibility parameter.

Doran Barnes – Executive Director, Foothill Transit

Starting off, Barnes states that electric buses and electric delivery vehicles have key differences than that of consumer level electric cars – the key difference is in the duty cycles. Barnes makes the comparison by stating that his own plug in hybrid that runs on electric power can be charged/plugged in when it is not being used – since that vehicle spends about 95% being parked. However, with transit

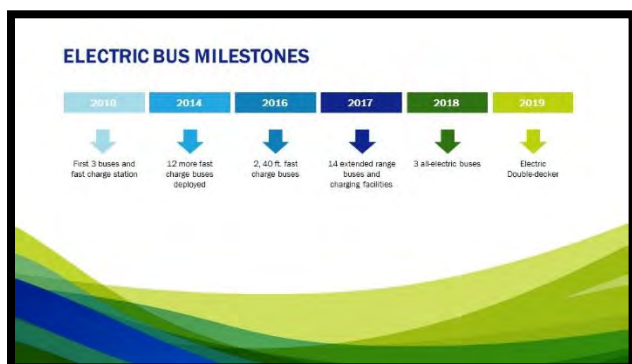


buses, this is a very different scenario. “When that bus leaves the operating facility in the morning it is in operation pretty much nonstop until the end of the service day. It does not have a chance to plug in for multiple hours at a time, [or] in between short spurts of activity,” said Barnes. This poses challenges for similar vehicles as well; other medium and heavy duty vehicles in the delivery services space, such as FedEx, where the duty cycles are similar.

Foothill Transit is a public agency where it is a “joint powers authority.” A joint powers authority (JPA) is an entity is where two or more public authorities may jointly exercise power over that entity. In Foothill Transit’s case, the agency is comprised of 22 cities in the Eastern San Gabriel Valley of Los Angeles County. There is a population area of 1.5 million people and 327 square miles that Foothill Transit serves. That translates to about 12 million customer trips annually with 36 local and express routes. The fleet is primarily powered by compressed natural gas; but Foothill Transit currently has an electric bus fleet of 33 – which is one of the largest electric bus fleets in North America.



Foothill Transit prides itself on innovation and customer focus. “We really lean in on innovation. We also are very focused on the fact that our primary business is not to be a technology innovator, our primary focus is to get people from where they are to where they want to be, and we always want to be mindful of that. We can be the cleanest, slickest, fanciest fleet, but if we don’t take our customers where they want to go, it kind of doesn’t help us achieve our mission,” said Barnes.



Being a not-for-profit-business, Foothill Transit aims to focus on safety and responsiveness to the community in providing a public service – which may make it a bit challenging to move into newer technologies. Barnes added that 85% of the operative program is funded through tax payers in the region and aims to accomplish as much as possible to benefit the community with those funds.

Air quality has been a big challenge over the years. One of the improvements for the community is being able to reduce the pollution that its buses can produce. In 2010, Foothill Transit was “the first transit agency in North America to implement a heavy duty fast charge transit vehicle in daily transit operation,” stated Barnes.

Barnes stated that with the fast charge vehicles, “the batteries could charge, theoretically, from a 10% charge to a 90% charge in less than ten minutes.” But realistically, these buses have much more juice before they are charged intermittently – about once every two hours. So in theory, these busses can run 24 hours a day, seven days a week as long as the charge intervals are done. However, at about 40 miles of

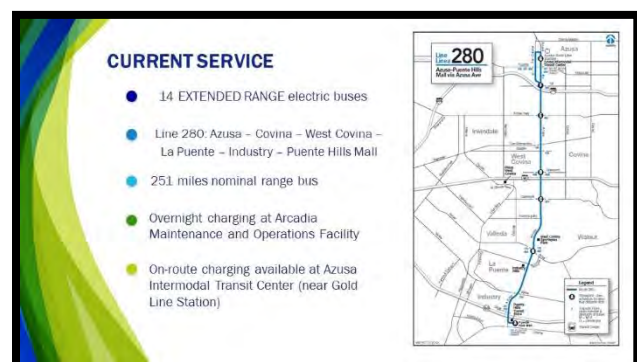
range, the main drawback is the short distances these buses can travel before a charge is needed. If the power grid goes down, there is not as much time to respond and this is a major limitation of this particular technology. Another challenge is to have the planning manager, Josh Landis, to rewrite the



schedules to accommodate charging times. Other than that, the electric busses are very resilient in terms of the electric powertrains. Barnes noted that, “the chargers are expensive. The chargers are running about a million dollars to support a fleet of 10-15 busses. You start adding that up across a fleet of 360 busses, that’s a lot of investment you have to add in to in terms of capital programming.” In addition, there is a need for physical publically owned space to place the

charging equipment. “But if we had to put these street side, you’re then talking about private property issues, you’re talking about right of way issues, again infrastructure, becomes the real key,” said Barnes. There is a number of routes that are being converted to electric buses. With that particular fleet, there is a development for electric buses to have an overnight charge in order to run a full day’s cycle without any additional charge. But this is not always the case. Currently, a CNG powered bus’s range is 350 miles but the electric busses (and the extended range vehicles) only have a range of about 150 to 190 miles. “The key thing that we are struggling with, with these

extended range vehicles, is how do we get the charging infrastructure in place to be able to get the power on board the vehicles even to be able to get that 190 miles. Our friends and colleagues at Edison have been key partners in helping us figure this out,” said Barnes. The most difficult challenge is not the electric buses themselves but the charging infrastructure – how can Foothill Transit implement and



install charging equipment in a constrained environment? How can the electric buses get through an entire day of service? If there is a failure with the charging station or with the power grid, there needs to be a redundancy and an emergency response in place. So those are very challenging to solve. Another challenge is that there is not a common standard for chargers for transit vehicles – BYD buses will have a



BYD charger and a Proterra Bus would have a Proterra charger. This complicates matters in that even if there is a charger within range, it may not be compatible with the bus itself. Barnes used an analogy to elaborate, "it would sort of be like if you bought a Chevrolet and then you could only fill up at a Chevron Station. So if you pull into a Shell Station, sorry you're out of luck."

But there are exciting projects that are in development. One such development is the battery electric double decker bus. As Barnes explained, "we expect, we hope we will be the first transit operator in North America to deploy a battery electric double deck bus." The first two of such buses will be delivered sometime between late 2019 and will be expected to be in service sometime early 2020. By implementing these new buses, it would further enhance the quality of service for those passengers and it allows people to go where they want to go. The environment as well, would also benefit from the electric powertrain as the trend is moving towards a cleaner and more renewable energy sources.



Barnes noted that, "As it stands today, an electric bus costs 30% more and does 30% less." And equally as important is the infrastructure. "Our approach is, we have to figure these things out, we have to

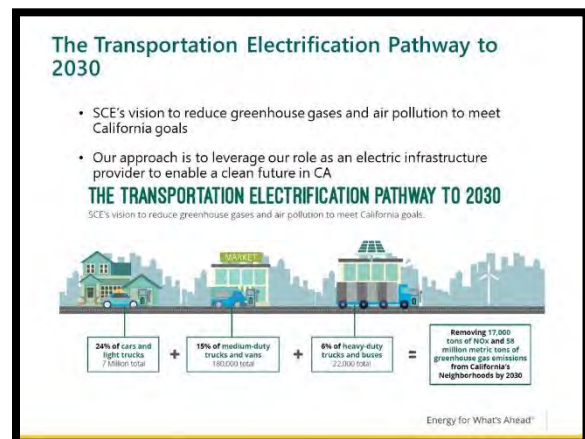


learn, and we have to experiment so that we can get to a point where all of this comes together. What I always tell people, start small, expect the unexpected and infrastructure is the key," added Barnes. Foothill Transit is committed to going all electric by 2030.



Horton stressed the main takeaway from his presentation is, “What I want you to take away from this is engage the utility early, whether it’s Southern California Edison or some other utility. Engage the utility early. We want to be your partner in this, we need to be your partner in this.” Horton strongly advised that keeping the utility engaged in plans is of utmost importance in the planning phase as much as in the implementation and other phases. “We rely on you to give us the information we need, and you rely on us to give you the power. So engage us early that is the most important thing,” added Horton.

Although the goals of the state are aggressive, Horton mentioned that Southern California Edison (SCE) supports not just transit, but all market segments. Horton added, “medium/heavy duty segment, as well as a very aggressive light duty set of programs” are all being supported. “We have a program based on the success of our original light duty truck program. We would like to get out there and help kick start the medium/heavy duty market,” stated Horton. SCE received a program budget of 356 million dollars from California Public Utilities Commission (CPUC) to help create electric infrastructure for all medium/heavy duty segments – which includes transit, and cargo handling such as forklifts, ports and warehouses.



Horton also brought to light the air quality issues that are in the area and added that they are continuously getting worse – this is particularly true with the more disadvantaged communities (DACs). A minimum of 40% of SCE’s budget will be spent on DAC’s throughout the Southern California area. This would include “at least 870 different project sites and the program goal is to make sure that we are helping to electrify at least 8,500 vehicles throughout Southern California,” stated Horton.

Business TE Programs

RECENTLY APPROVED

CHARGE READY | TRANSPORT

Decision Summary

- Approved total program budget of **\$356.4M**
- Achieve minimum **870 sites** with **8,490 electric vehicles** procured or converted
- Charging station rebates available for **transit/school buses** and **sites in DACs**
- Launching **first half of 2019**

Budget Allocation

- Minimum **15%** infrastructure budget should serve **transit agencies**
- Maximum **10%** infrastructure budget should serve **forklifts**
- Minimum **25%** of infrastructure budget should serve **ports and warehouses**
- Minimum **40%** infrastructure budget should serve **sites in DACs**

Energy for What's Ahead® 5

There are also rebates that can help offset the initial costs of equipment. These would be made available primarily to the school bus and transit sector along with some DAC sites.

SCE will make the infrastructure ready up to the point of interconnection with the charging equipment. Unlike the issue with standards with BYD and Proterra, Edison is partnering with other utilities around the country to drive standards in all market segments. This way, no one is locked into one OEM with their charging equipment. In addition, there would also be compatibility among various entities. “For example,

port to logistics centers in the Inland Empire, an independent operator can charge at equipment either publicly available or at individual warehousing locations,” stated Horton.

If there is a standard, Edison would like that standard to be implemented and if there is not a standard, then Edison would help support an industry standard for the market segment.

Although Edison installs and maintains the infrastructure, there are some sites that would prefer to install their own facility. Edison has an option where a rebate is available on charging equipment – this would help offset the costs.

With the old traditional utility model, the utility provides everything from the transformer up to the meter panel and the customer picks up everything from there. But with the new model, Edison picks up all the infrastructure. Horton used Barne’s case with the buses as an example, “in a transit yard, not only would we come in and serve to a transformer, we would also serve beyond that all the way to that interface for the charging equipment.”

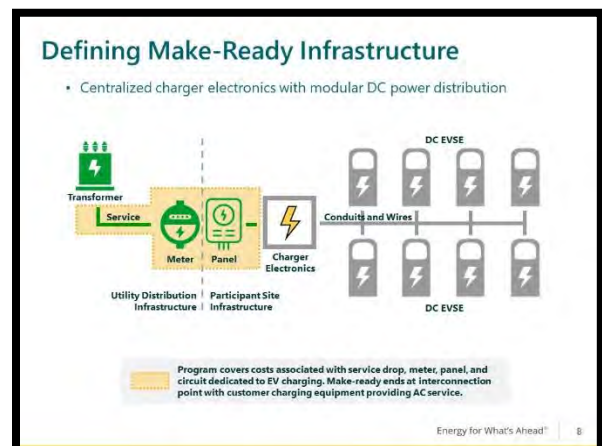
Horton mentions that there are two basic models:

1. Standalone charging equipment that sits in the yard – typically for a level two charger for a passenger car in a standalone infrastructure.
2. A more condensed infrastructure where the overhead solar canopy with the charging equipment that might descend a cord reel or an automated overhead system from there. (In that case our point at interconnection would actually be add a block of power of

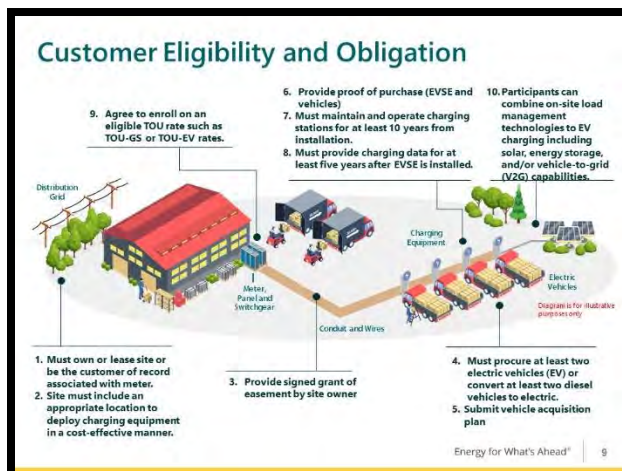
Charge Ready Transport Program Overview

SCE will deploy make-ready infrastructure up to the interconnection point with charging equipment.	Participants can select from a list of approved charging equipment.
Customer ownership option on customer side infrastructure is available.	Charging equipment rebate available to transit agencies, school bus operators, and sites located in disadvantaged communities.

Energy for What's Ahead® 6



electronics off to the side of that overhead infrastructure.)



There is also “load side management.” There are several things to consider, such as, “what are you doing beyond that meter? Are you going to include some battery storage? Are you going to include some solar?” SCE would need to know if there is storage on site or if there are going to be any solar or other generation on site that would reduce the connected load to the grid. This would better facilitate the prediction of fueling costs as well as reducing the amount of infrastructure that needs to be installed to support the fleet. There is also the need for proper management of time and charge scheduling.

In an example explained by Horton, “if you bring in 20 busses on the evening and they all plug in, do they all need to charge at the same time? Or do you have certain routes that need a full charge and they leave the yard first thing in the morning? So the system would charge those vehicles first and then you have other routes that maybe operate comfortably on a 50% charge for that day, it would charge them later. It doesn’t mean they would only charge them to 50%, but it would divert the power to the ones that need the full charge first.” This management would reduce the load on the grid as well as reduce costs more efficiently.

The program will have some requirements. Participants would either own or lease the site. SC would not install for a private entity using a public facility. In addition, the site would need to have an appropriate location to deploy the charging equipment in a cost effective manner. From a cost perspective, each site would need to make logical sense.

Further, another requirement for the program would be that the participant must be procuring at least two electric vehicles or converting at least two existing diesel vehicles to electric. Horton added that, “we do want to see a vehicle acquisition plan, one of the things that we want to encourage is that agencies provide us with a plan of what they are doing, not only for two or ten or whatever that initial deployment is, but what are you doing long term?”

A consideration must be done to plan ahead. “We can put in equipment that allows that growth so that you are not stuck and having to go back and start over again when you add 20 more vehicles down the line,” Horton said. There is a long term commitment to the program where it is not only to support to transition to electrification but also keeping them in service.

SCE is also continually monitoring and gathering data for the first five years and try to better understand usage and different use cases in different market segments. From there, other things such as time of use rates can be implemented.

Business TE Programs

Charge Ready | Transit Bus AVAILABLE NOW

- No-cost infrastructure to serve electric bus charging
- Available to all government transit agency customers
- One-time rebate to offset the costs of charging equipment
- Launched on June 4, 2018

Port of Long Beach Projects IN PROGRESS

- Convert nine out of 24 rubber tire gantry cranes from diesel to electric power
- Deploy infrastructure to serve up to 20 yard tractor charging stations
- Complete by end of 2019


Energy for What's Ahead® 12

There are new rates being rolled out in March of 2019 for EVs. “The reason for that is the utility is providing that peak amount of power. Whether that peak amount of power occurs for 5 minutes or 50 hours, that’s the peak that we need to provide service for on that circuit, so we have to bill for that,” said Horton. But SCE is waiving that in order to help agencies learn how to operate their new electric fleet without having to worry about impacting demand. But this will be gradually phased back in years 6 to 10. There will also be a dedicated EV meter for those facilities that are doing dedicated EV charging.

New Rates to Accelerate EV Adoption¹

New Features

- Available March 2019¹
- No demand charges years 1-5
- Demand charges phased in years 6-10
- Existing EV accounts will have Demand Neutralization grandfathered in perpetuity



Metering:

- EV rates available for separately-metered charging installation

Encouraging off-peak charging:

- Higher energy rates on-peak (4-9 PM)

¹Pending CPUC Approval
Energy for What's Ahead[®]

In the Port of Long Beach, there is currently two large projects in construction. One of the piers, nine of the diesel operated gantry cranes will be converted into direct drive electric motors on the cranes.

Business TE Programs



Charge Ready Program

- **No-cost infrastructure** to serve level 1 or level 2 EV charging
- Available to all **business customers** and **multi-unit dwelling** site owners
- **One-time rebate** to offset the costs of charging stations
- **CPUC authorized \$22 Million in "Bridge Funding"** accepting new applications in Q2/19



Charge Ready DC Fast Charge

- **No-cost infrastructure** to serve DCFC or level 3 EV charging
- Available to all **business customers**
- **One-time rebate** to offset the costs of DCFC stations
- Launched on **June 29, 2018**

Energy for What's Ahead[®]
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Edison is also providing a transportation electrification advisory service, explained Horton, “where a business customer division has a group of field engineers that will go out and meet with fleet or various market segment operators that are looking to make a transition. They will help them with rate analysis to kind of give them an idea of what rate tier they should be on for their fleet, help them understand what those fueling costs will be, they can also help calculate GHG (greenhouse gas) reductions, and really importantly, what kind of LCFS (Low Carbon Fuel Standard) credits they can take

advantage of to help offset their fueling costs.” Apart from this, there are service groups that review plans for solar and battery storage sites. SCE also provides an online energy management tool, which gives participants usage data, and a one day snapshot usage data, so that they can understand what is affecting their usage.

Moving the Dialogue Forward: Ideas from the Participants

After the presentations, Dialogue attendees discussed the ideas presented and worked together in groups to discuss solutions to move it forward. The top three ideas from each table have been categorized and summarized below.

Make sure we have the infrastructure to support electrification of medium/heavy duty vehicles. There were a number of participants who made note of the fact that we need to make sure our infrastructure needs are in place to support electrification of heavy duty vehicles.

- When thinking about infrastructure upgrading, is there viability in sharing with fueling/gas stations?
- When it comes to funding for infrastructure needs, where are we in the private funding integration?
- We have make sure our infrastructure is designed to scale, we should develop a master plan to acquire investments.

Funding to support build out of infrastructure. In order to provide the infrastructural needs for the electric vehicles, we will need the funding.

- We need financing to make it all happen, have the utility companies working together.
- What are the costs for charging station installation?
- We need an action plan for optimizing investment in order to meet EPA ozone standards.

More charging information. It was discussed among the working groups the intricacies when building out charging stations and how to maintain them.

- We need more charger information in regards to fast charging. How many maintenance companies for charging stations are there?
- More information of charge ready and inter connectivity.
- We should look into creating a universal charging infrastructure.

The Leonard Transportation Center (LTC) at California State University San Bernardino (CSUSB), presented a bi-monthly dialogue series on topics relevant to the future of transportation in the Inland Empire. The series, which was open to the public, was sponsored by HNTB Corporation and was held every other month starting in February 2018.

Dialogue topics ranged from understanding the current mobility dilemma and its causes to potential solutions like congestion pricing, transit; emerging technologies such as autonomous and connected vehicles and new ways of funding transportation infrastructure. Attendees had the opportunity to hear from transportation experts and engage in vigorous discussion about the transportation challenges facing the Inland Empire.

About Leonard Transportation Center

The Leonard Transportation Center (LTC) at California State University, San Bernardino opened in 2006 with a focus on regional transportation needs. The vision of Bill and Barbara Leonard was to create a center that focuses on the unique transportation opportunities and challenges the Inland Empire faces. Today, the LTC is working to expand its research and student engagement programs. Focal points include transportation management and governance issues, development of new technologies, and transnational studies. Their vision is to work collaboratively to seek solutions to assist residents, businesses, government and nonprofit agencies, and international partners to work together on improving sustainability and quality of life in the Inland Empire. For more information, visit www.csusb.edu/ltc.

About HNTB

HNTB Corporation is an employee-owned infrastructure solutions firm serving public and private owners and contractors. HNTB's work in California dates back to its founding in 1914. Today, HNTB continues to grow in size and service offerings to clients in California from seven office locations, currently employing more than 350 full-time professionals. With more than a century of service, HNTB understands the life cycle of infrastructure and addresses clients' most complex technical, financial and operational challenges. Professionals nationwide deliver a full range of infrastructure-related services, including award-winning planning, design, program management and construction management. For more information, visit www.hntb.com

About San Bernardino International Airport

Conveniently located in the heart of the Inland Empire, close to major freeways and just 60 miles from Los Angeles, San Bernardino (SBD) International Airport is strategically positioned to meet growing aviation activity, including cargo, business aviation, general aviation, and commercial airlines by providing competitive rates for aviation companies and local businesses looking to stretch their wings and expand their horizons. With extensive stretches of pristine runway and acres of prime land available for aviation development, SBD International Airport is ready to help our community and region reach new destinations.