

Issue 4

Contemporary Conversation: Sustainable Logistics



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Introduction

About These Series

The Contemporary Conversation (CCs) Series is a compilation of voices from experts in the transportation sector, focusing on specific topics and divided into their relevant subtopics. These pieces are taken from the Regional Mobility Dialogue Series, a series of conversations made from Dialogues organized by the Leonard Transportation Center (LTC). These Dialogues include a diverse panel of experts, from researchers and PhD professors, to key players/stakeholders in the transportation sector.

The purpose of the CCs is to provide the reader with an overview of the transportation issues faced in the Inland Empire and California. It is to do so by including a wide variety of perspectives which bring about a further understanding of the issues faced and their respective solutions proposed. The topics discussed can vary from housing, sustainability, fiscal policy, among others.

About This Issue

This Contemporary Conversation is going to have a little bit of all the important things regarding to sustainability and logistics. It's easy to ignore that logistics right now (2024) produces over a 8% of the global carbon emissions, for this reason in this its important to analyze how to reduce the emissions from the industry, this conversation will cover projects to improve sustainability in logistics.

This Contemporary Conversation is organized into four topics:

- **Volvo Lights:** This section will provide a comprehensive overview of Volvo's LIGHTS Project, a project aimed at an all-electric truck for freight movement use, introducing an all-electric technology to trucking and the issues faced in the project.
- **Trucking, Warehousing & Logistics:** This section will go over how integral warehousing and trucking plays in our lives and will see how new emerging technologies could affect and transform the industry.
- **Enhancing Electrification:** This section will look over how smart cities aim to combat pollution through all-electric technology plans to be implemented and how these up-and-coming technologies face and aim to overcome their issues.
- **Public Projects:** This section will provide an overview of the challenges faced at the border of the United States and Mexico with increased trade delaying deliveries causing the US Governments further collaborating with companies to solve the issue and new operations also begin to develop around the South West to overhaul corridors and ports to make it more efficient, and how new technologies will be implemented to aid truckers on long haul delivers.

Volvo LIGHTS Project

Technology plays a pivotal role in shaping our daily lives and continues to revolutionize the world around us. Within the transportation sector, Volvo's LIGHTS Project stands as a testament to innovative strides in electric vehicle technology. This project explores the feasibility of electric vehicles in logistics, the establishment of public charging infrastructure, enhancing battery lifespan, and fostering collaboration among key agencies, all essential elements driving this groundbreaking initiative.

Infrastructure Development & Logistics

Dr. Arvind Kailas, Advanced Technology Policy Director, Volvo Group North America

Rob Crandall, Senior Project Manager, Greenlots

Dr. Arvind commenced the Dialogue by detailing the development of the Volvo LIGHTS project. He highlighted the significance of its location in the Inland Empire, citing the proximity to major ports and asserting that "innovation is not confined to Silicon Valley; it is flourishing right here in the Inland Empire." Dr. Kailas explained that



the LIGHTS project has been made possible by the convergence of generous funding and involvement of several key agencies that have been able to make the development of electric trucks a reality in logistics. A total of seven electric trucks are still being developed and tested by Volvo LIGHTS which are being used to transport parts between sites in the Inland Empire. It was emphasized that there is so much more to the deployment of this technology than simply building the electric trucks themselves. The development of charging infrastructure is integral to the success of this project and its ability to expand. Dr. Kailas served as both a facilitator and an expert on this panel.

Greenlots has the responsibility for installation of the LIGHTS project, which is made possible by their Sky Communication Network. This network "basically ties in any type of charger manufacturing company that is in the United States and other countries." said Rob Crandall, Greenlots also works on the consumer side and is responsible for building out the project on-site and training its customers.

According to Rob, “location is the first key” but dealing with utilities can “make and break your location.” Rob explained that after designs are developed in the first 2-3 months of project development, they are submitted to customers for review and then for permitting. According to Rob, “permitting is really more of a waiting period, not so much a challenge.” These permits typically take about 30 days to be reviewed and approved. During the waiting time, there is a collaboration with utilities as they develop a “final map” of the necessary utility infrastructure for the project. The utility infrastructure has the potential to be a large project expense so it is important to start with them earlier, so there are no surprises that could derail the project. After a location is identified and all the necessary permitting and utilities are established, installation of the infrastructure can take 4-5 weeks. Overall, Rob estimates that the entire project, from development to installation takes about 3 months but can be faster depending on weather conditions.



After the infrastructure is up and running, Rob and his company, Greenlots, set up the communication and commissions for the network. Greenlots collaborates with customers to provide training on the use and setup of their systems. Additionally, many customers engage with engineering teams to ensure the trucks being utilized are seamlessly integrated and everything is optimally configured.

The last speaker focused on the permitting challenges encountered, suggestions and considerations for infrastructure, and the crucial nature of customer and company collaborations. The next speakers, Ruth Liddell and Kim Okafor, will discuss the customizability of chargers, ABB’s role in infrastructure, the operational maintenance of the infrastructure, the importance of engaging with stakeholders, and how electric trucking and charging represent the new frontier.

Expanding Electrification

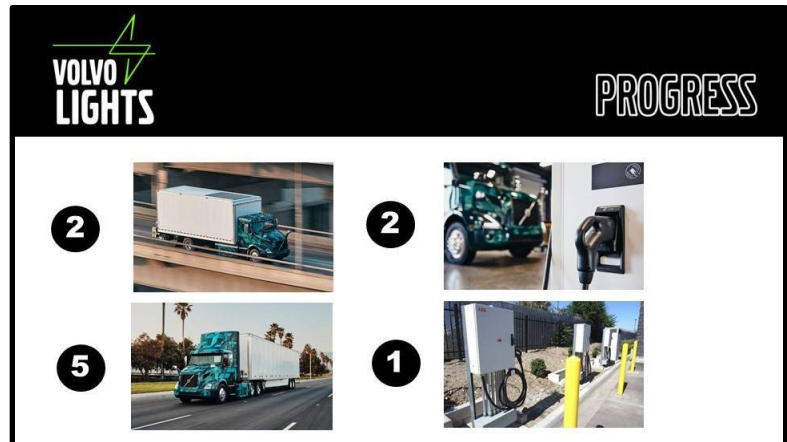
Ruth Liddell, Project Manager, ABB

Kim Okafor, Zero Emissions Solutions Manager, Trillium

After Rob Crandall presented the details of Greenlots involvement in Volvo LIGHTS, Ruth expanded on the hardware component of the project that her company, ABB, is handling. She began by explaining that the novelty and advanced nature of the electric vehicle technology means that, “every charger is made to order.” The chargers are of extremely high voltage, which is simply

not necessary or available for many other projects. Ultimately, development of the chargers takes about 8-10 weeks.

Ruth reported that she is responsible for the implementation of their high-power charging system in the U.S. as well as some of their aftermarket infrastructure upgrade campaign for North America. ABB is providing the hardware for the Volvo LIGHTS project, which is primarily the high voltage charging equipment necessary to fuel a fleet of electric trucks. Additionally, ABB ensures that the hardware works properly and technicians and operators are properly trained on how to utilize such hardware. Ruth went on to explain that an important part of the investment in these chargers is the “operational lifetime” that can be expected from the hardware.



Questions regarding downtime of the chargers, ongoing support, and fixing any issues that arise must be considered early and often. Ruth advised, “you always want to make sure you’ve got a supply of spare parts on your side” to reduce downtime if hardware needs replacing. Ruth emphasized an earlier point made by Rob Crandall, which is how important it is to “engage stakeholders as early as possible and make sure you pull that utility.” Ruth concluded her discussion by calling attention, once again, to the fact that the electric truck and necessary charging industries are new and there is “a lot to learn” even for experts like her and the others at the Dialogue.

Kim explained that, at Trillium, she is responsible for projects centered around electrification at Volvo LIGHTS, but she also works on projects that utilize alternative fuels, such as hydrogen and solar energies. She reported that the Volvo LIGHTS project will be the “first publicly accessible heavy-duty charger” that the company has developed.

After Ruth Liddell presented, Kim talked about the differences between public charging stations and private charging sites. She began by stating that a specific challenge of developing public charging sites will impact the design of the site. There are many considerations when on the topic of traffic to the site, this includes the vehicle turn radius, constructing new and necessary lanes, and ensuring that there is not only enough parking but different types of parking as well to accommodate all vehicle types. Kim also explained that the Volvo LIGHTS station is going to be built on the same site where there is existing compressed natural gas (CNG) fueling, thus, adding EV charging will impact existing customers. Kim concluded by reiterating the importance of planning as early as possible as these projects are not much different than that of private sites.

The last speaker talked about the important issues regarding the significance of the Volvo LIGHTS Project and unique challenges presented by public charging stations. The next speaker will talk about Dependable Highway Express (DHE's) involvement in the Volvo LIGHTS Project, the operational cost benefits of switching to electric, challenges and considerations for infrastructure development, and a greater focus on efficiency and innovation.

DHE's Leap Towards Zero-Emission Logistics

Troy Musgrave, Director of Process Improvement, DHE

The DHE is a participant in the Volvo Lights Program. Lights is an acronym for low impact, green, heavy, transport solution. It is part of a California climate investments and statewide initiative that provides billions of cap-and-trade dollars, reducing greenhouse gas emissions, strengthening the economy, and improving public health.

The LIGHTS Program primarily works in disadvantaged communities. There are 14 active members in the coalition. Collaborating with other partners will allow for the success of elite fleet electrification adoption. DHE's goal is to demonstrate battery electric trucks and supporting equipment throughout its supply chain. Goods



can be moved on these vehicles. There are subtypes and mature vehicles. Electric drive forklifts have lower rates of efficiency. DHE's goal is to substitute the petroleum fueled vehicles with lithium ion and zero maintenance batteries.

The latter has been proven to be more efficient. The barriers consist of high price points of the vehicles and infrastructure. The batteries themselves can cost as much as the body of the vehicle. Yard tractors are used to pull trailers in and away from docks and position equipment for drivers. By switching two diesel vehicles with the yard tractors, DHE had an estimated savings of \$140,000 in 22 months. DHE is operating with four electric vehicles at this time. To the left is a box truck. The vehicles are sent on regional routes, but have range limitations. These vehicles run about 100 miles before needing a charge. The capacities are less than the diesel equivalents. The box truck capacity is 8,800 and the diesel box truck (in the background) can carry around 15,000 pounds.

Mr. Musgrave hopes that in the future the range will be increased to 200 miles and carry 12,500 pounds.

There are applications for current technology for electrification of these units. Infrastructure is a complicated matter. Stakeholders, design, end-user usability, is only the beginning. Permits and applications must be filed with utility companies as well. Construction, operation, maintenance, and storage are all necessary components. Musgrave explains the program started March 2019 and the chargers were not powered until January 2021. It takes time for critical infrastructure to become operational. Mr. Musgrave believes that distributive energy resources play a huge role in electric fleet innovation. DHE installed a solar system, which you can see on the right, with its project partners. There is great opportunity to collaborate with utilities agencies to allow fleet operators a good chance of success. Fleets should focus on operations of fleets and not energy management resources.



The project also introduces an energy storage system, which was designed to mitigate demand charges on EV meters. Subsequently, DHE was allowed an EV pass for demand charges, which allowed for the substitution to energy arbitrage. It collects energy when there is abundance of solar, which charges the battery with 100% renewable energy. The battery system discharges energy to mitigate grid pull. Large battery systems are used for microgrids. Mr. Musgrave believes they offer the best for utility distributive resources, which allows for resiliency in times of power outages. These microgrids are useful to continue the goods movement when electricity is not readily available from utilities. To the left is an example of what data DHE's system aggregates.



The green area represents solar production, the blue symbolizes the solar going to the grid. In the center, the orange represents the battery being charged during solar generation. The battery then discharges after solar production is diminished. This simplistic system is a great example of distributive energy resources. Determining the best renewable energy sources for a specific region

is critical. Energy sources such as wind, solar, and geothermal may be used in one region. Mr. Musgrave's goal is to one day have a 100% zero emissions freight facility. DHE has taken the steps to learn about fleet electrification to achieve this goal. This goal will take a considerable amount of time; however, it is incredibly important to the innovation of goods movement. Mr.



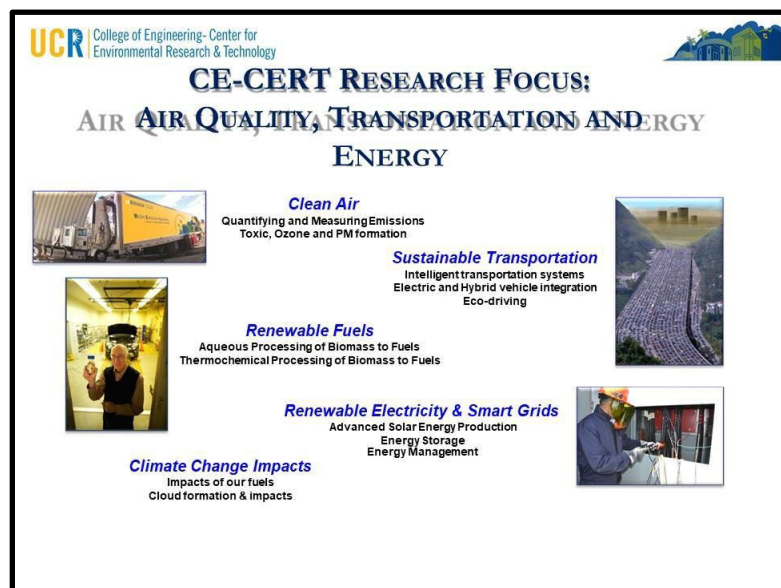
Musgraves proceeds to illustrate how using renewable energy resources such as solar and stored energy, over diesel, increases efficiency.

The last speaker talked about DHE's involvement in the Volvo LIGHTS Project, cost benefits of switching to electric, the challenges and considerations for new infrastructure, and a greater focus on efficiency and innovation to achieve 100% zero emissions. The next speaker will talk about the collaboration between South Coast Air Quality Management District (SCAQMD) and the University of California Riverside (UCR) on various project, UCR involvement in the Volvo LIGHTS Project, the investment debate regarding zero emission, UCR collecting data to better understand performance and efficiency, and highlight developments in the transportation sector.

UCR's Zero-Emission Research Project

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. Miller continued "At UC Riverside, we are partnered with them



on a lot of these projects, for example Joe talked 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". The College of Engineering Center of Environmental Research and Technology (CE-CERT) laboratories were founded in 1992. Today, it has become a place where both the 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 are 25 million dollars 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 a near zero emissions engine today that is 90% 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. 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 dynamometer in this area that can actually treadmill busses and trucks of all sizes." 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 are 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 like your consumer reports, where you get the different number of checks depending on a vehicle," said Miller. This further aids in better decision making to find the best possible solution.

From VOLVO LIGHTS to other private companies' support to sustainable logistics. In the following theme we will talk about what logistics and warehousing companies are doing to help logistics, in specific last mile delivery, more sustainable.

Productive Warehousing & Logistics

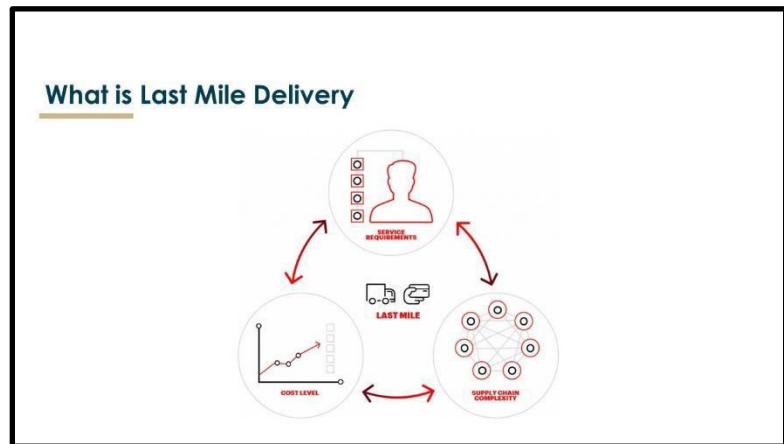
The future of commerce is reliant on the logistical network and infrastructure that we operate today, however the future of tomorrow is just around the corner. With new technologies and more innovative ways to aid logistics. Some things we will look at are the benefits and operational cost of quantum computers, supply chain shortcomings, trucking and warehousing locations.

SCAG'S Role on Electrifying Last Mile Delivery

Scott Strzelecki, program manager at Southern California Association of Governments.

Scott Strzelecki, program manager at the Southern California Association of Governments (SCAG) spoke in this Dialogue about the last mile delivery, its challenges and especially how the SCAG region will help private companies in their electrification efforts. He started the proceeding by explaining how last mile delivery works.

Last mile delivery is an integral component of the supply chain, specifically the final step to it which is when the consumer finally gets the product delivered to their house. This segment of delivery has become especially important in recent times as the E-commerce industry became one of the most prominent ones due to the recent pandemic, both the demand,



the customer's expectations and the companies promises have made it important that we have a strong system that supports deliveries in the least amount of time. The process of last mile delivery involves complex networks of logistics and distribution strategies, it is aimed at optimizing delivery times and reducing costs, while meeting the customer's demand for quality and speed of service. Strzelecki's focus is that the evolution of last mile delivery reflects a broader shift in goods movement dynamics, influenced by technological innovations and changing consumption patterns.

Strzelecki went on in the conversation by adding that the SCAG region is showing a remarkable scale of operation, serving as a critical nexus for goods movement and came with a substantial economic footprint. However, this rapid growth comes against a backdrop of challenges such as inflation and supply chain complexities, from the three airports in the Inland empire to all the warehouses/Industries that supply our region with the goods, it is important to keep the efficiency and the quality of service while also complying to our environmental needs and expectations form

the state, it is important to act upon the electrification of this important sector of the region and to keep coming up with innovative logistic solutions, and for this reason is that the SCAG created with the Last Mile Freight Program as a governmental effort to support a sustainable electrification of this side of the supply chain while still maintaining the quality and the efficiency.

The Last Mile Freight Program as described by Strzelecki, is focused on transitioning the Last Mile Delivery services towards a more sustainable practice, particularly emphasizing on the integration of near-zero and zero-emission vehicles within the goods movement sector. The program works in two phases:

- Phase 1: The foundational step. It involves 30 companies who were awarded a total of \$16.7 million to support the acquisition of near-zero and zero-emission vehicles and the deployment of necessary infrastructure to facilitate these technologies usage. This phase includes companies with business models like “Truck as a Service” & “Fleet as a Service”.
- Phase 2: To build on top. This phase is focused on building upon the groundworks of phase 1, including the newest technologies to the infrastructures and vehicles brought to the region. This includes exploring the use of autonomous vehicles, operational strategies, and operational towers in collaboration between public and private sector. This phase aims to not only control but reduce the current consequences of our last mile delivery practices.

Strzelecki concludes by highlighting the significance of SCAG’s role in collaborating with private companies to bring about the expectations that the Californian government has for sustainability effort.

The last speaker spoke about the Last Mile Delivery and its important role in today’s society as logistics become more complicated. The next speaker will talk about the various programs and projects that UPS (United Parcel Service) is involved in.

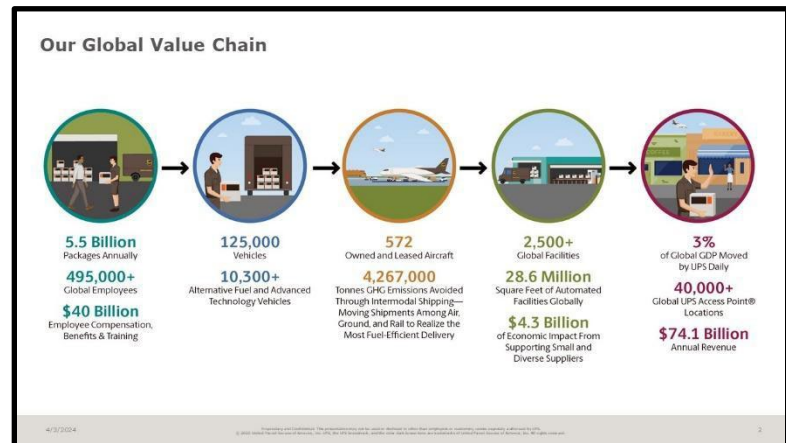


Sustainability at UPS

Bruce DD Mac Rae, US Government Affairs Vice President for Western US and UPS.

Bruce starts by explaining that UPS had originally been attempting to make the industry more sustainable. He refers to the electric vehicles back in 1935, but unfortunately due to the technological limitations at the time. The electric vehicle was never fully realized until later in the future. Bruce also adds that the CEO and company have Sustainability at their core.

He will go over how UPS approaches sustainability, how they are executing sustainability strategies, and how UPS is helping customers be more sustainable. To understand UPS and its sustainability strategies we must understand how UPS functions. UPS is first and foremost a transportation and logistics company that transports 5.5 billion



packages annually with 520,000 employees worldwide. To accomplish the goal of transportation the company has 1,205,000 vehicles and to power the machines 10,300 alternative fuels with that being half a year ago. UPS has a new bid on 10,000 new electric packaged cars that will come to the States and spread across equally in all areas of the U.S.

Bruce explains that UPS leases and owns 572 aircraft, by this process they have avoided 4,267,000 million tons of emissions. Along with this achievement, UPS has made great efforts to be a major focus for electricity to power its facilities instead of diesel.

Bruce then goes over the sustainability goals that have been met. Boasting that UPS has made well over \$117 million in charitable donations, along with 20 million global volunteering hours. As for the nature side of things, well over 15 million trees have been planted. This venture of planting trees gains a net 0 amount of money earned for UPS but in the kind hearts of UPS; the main goal is to counteract the wildfires that plague America.

As for future goals, Bruce explains that UPS is on track to reduce its overall global emission status in the world by 12%. They aim to accomplish this by 2025 by using renewable sources, and by the same year, they aim to have 25% of its electricity run on renewable resources. Along with 40% of alternative fuel sources being used for ground fuel, by the year 2020; more than 25% of vehicles purchased by UPS will be vehicles that run on alternative fuel or Advanced technology. Bruce also

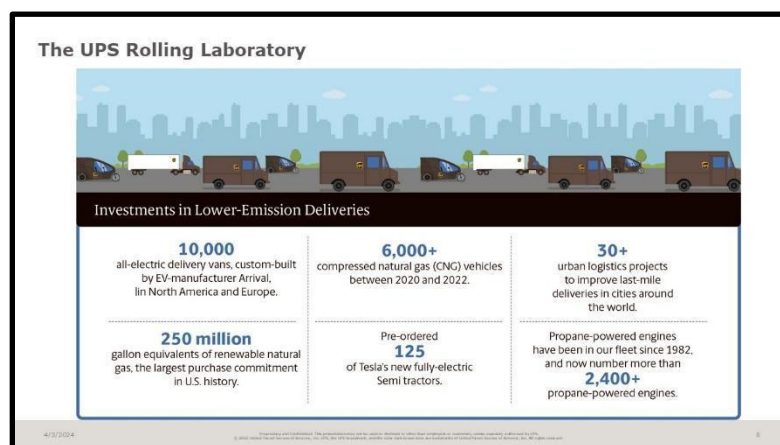
adds that UPS has become the largest single user in California to use renewable gas to power all of the vehicles the company owns.

Further looking into the numbers Bruce shows more data about UPS. With a total of a little over 1 million miles for every business day in the UPS fleet, they consume approximately 10,300 alternative fuels. By doing so they avoid well over 1 million tons of emissions. Along with creating 40,000 access points to avoid having to drive back to deliver your package if

you aren't there the first time. As for the field of drones and technology, UPS was the first Federal Aviation Administration (FAA) certified to operate a drone airline. Bruce uses an example to emphasize the importance of a drone air fleet. Imagine if you are testing to see if you have cancer. A drone cut the transportation process of moving a blood sample by three and a half hours. If testing on a blood sample can be reduced by that significant amount of time imagine something bigger such as a heart ready to be transplanted. So far, this fleet has been operating in Africa and testing small-scale operations within the United States. As for the African Drone Fleet, it currently to deliver blood and medicine where needed, especially as Bruce highlights in the middle of nowhere. Bruce has full confidence that drones will be the next major step in the field of transportation and logistics.

The presentation goes on as he explains that they have used air to ground to rail, to avoid further emissions since 2015. Bruce highlights that UPS is the single largest rail user in the United States. Although Rails have proved to be reliable, they have also shown vulnerabilities. Such as lackluster security, allowing people to break into containers and stealing products. UPS has purchased 10,000 new all-electric vehicles and is waiting to be shipped

to North America and Europe. The first group to use these vehicles will be San Diego as it is the only city that has the infrastructure to handle the new electric vehicles. However, Bruce notes that to see these Electric vehicles employed in mass will take a long time, and he does not have a clear estimate of when.



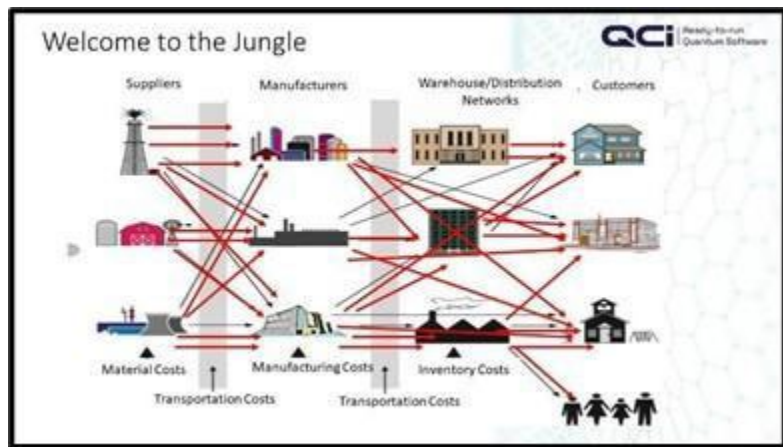
The last speaker emphasized the various achievements that UPS has achieved, as well as speaking about the various projects the company is involved in. The next speaker will talk about the importance of quantum computing and how it will be used to revolutionize the logistics industry.

Optimizing Transportation Using Quantum Computing

Rebel Brown, Vice President of Strategy & Marketing, Quantum Computing, Inc

Ms. Brown takes us into the future while she talks about quantum computing. She has worked in the computing business for over 30 years and knows this operating system will advance goods movements through logistics and supply chains.

Quantum computing is an exciting, cutting-edge technology that has the power to revolutionize freight and truck industries. Ms. Brown refers to the complexity of life as the “jungle.” Goods movement has changed due to e-commerce. People started to use internet commodities rather than buying in stores. Shipping has gone from large volumes of goods in low



baskets, to low volumes of goods in large quantities of baskets. This increased the number of orders and deliveries. In turn, customers began to expect their goods to be delivered almost instantaneously. A study reads that 74% of customers choose to purchase an item based on its immediate delivery option (24 hours).

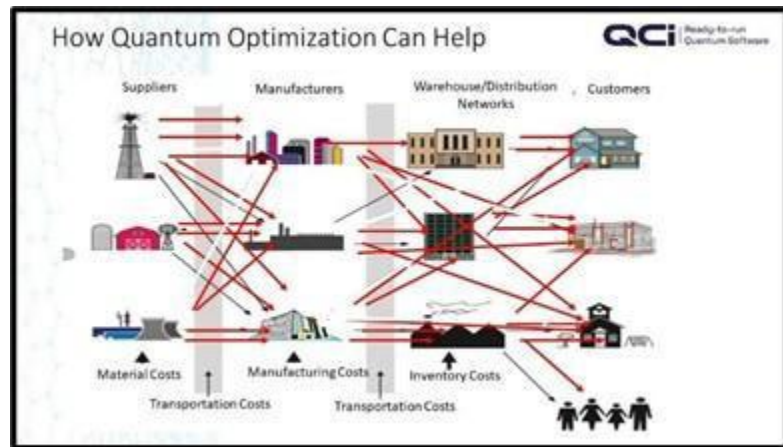
COVID caused the supply chains to be delayed, which resulted in lower efficiency and higher costs. California has more trucks than many states, making optimization increasingly difficult. The annual growth and demand have increased by 150% and is continuing to climb. This puts many more trucks on the road. As destinations increase, the complexity of routing transportation increases. If one has only 15 destinations, 87 billion routes can be possible to take. Supply chains may be delayed due construction, which calls for optimization of the goods movement.

Classical computers cannot process the amount of data in the necessary time to load trucks. Quantum computers operate differently than classical computers. It is designed to simulate the real world, as classical computers look for patterns. Quantum computing allows for multiple possibilities of operation, which allows for better optimization. It will eliminate some routes used today as well. Ms. Brown was able to reduce one third of traffic congestion for a private agency, due to quantum computing. The potential of quantum computing is unprecedented. Current computers run as a 2-dimensional model, or a binary space. They look for patterns and pairs.

Quantum computing runs just like nature does, making it versatile. If one dimension is changed in this program, it will display the possible outcomes of that alteration. It allows for cause and effect, delivers better performance, and has the potential to model complexity.

Quantum computers simulate in real time, making them more accurate, providing a diversity of results. One of Ms. Brown's customers contracts with the federal government, who transport billions of pieces of paper every day. The federal customers determine the routes and time windows for the delivery. Brown's company determines best practices

by optimizing costs for each component. The system is in progress now and is already reducing costs.



In the last section we looked at quantum computing and its applicable benefits, challenges in supply chains, changing nature of commerce market, efficient locations for trucking and warehousing, the various projects and achievements of UPS. In the next section we will look at SCAQMD and their various efforts in Southern California to combat pollutants and involved projects aimed toward zero emission, Foothill Transit focused its on electric buses and aims to overcome its challenges, and SCE focused efforts on various programs and electrification projects.

Enhancing Electrification

The future city of America is powered through electricity, electric vehicles, and clean air, to this end SCAQMD has made it its prime mission to combat pollutants. As for electric vehicles, Foothill Transit has made great efforts focused around all electric vehicles, from all electric buses to heavy duty vehicles and how to overcome each of their shortcomings. SCE has made great efforts to support electrification across various markets, from infrastructure to vehicles.

Heavy Duty Zero-Emission Truck Projects

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 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 Hydrogenic, 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.

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 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 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.


The last speaker focused on SCAQMD and their efforts to combat air pollutants, and to support electric vehicles. The next speaker, Doran Barnes, will talk about Foothill Transit community focus, unique challenges faced using all electric vehicles, the focus on environmental impact, and challenges faced with infrastructure.




KENWORTH
A PACCAR COMPANY

BAE SYSTEMS
INSPIRED WORK


Technical Progress



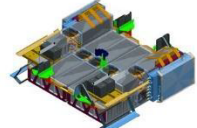
- ✓ Solid models for BAE HybriDrive™, Ballard HD85 fuel cell, high voltage battery pack and hydrogen storage system have been fitted to the T680 truck model
- ✓ Combined 100 kWh XALT battery pack enclosure with integrated cooling and center pivot to accommodate frame twist designed
- ✓ Multiple cooling loop designs for power electronics, battery pack, traction motors, and fuel cell complete
- ✓ Ballard has approved Kenworth's fuel cell integration design
- ✓ Hydrogen fuel cell drayage truck design passed critical design review



High Voltage Routing





H2 Fuel Cell Truck Layout




Battery Pack Assembly

Volvo LIGHTS

- Volvo LIGHTS (Low Impact Green Heavy Transport Solution)
- Showcases zero-emission freight movement in support of CA's clean air goals
- The scope of Volvo LIGHTS encompasses the development of Class 8 demonstration units, production of Class 8 commercial units, facility improvements, installation of the charging infrastructure, public outreach, and data collection and reporting.



Foothill Transit’s Electric Bus

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



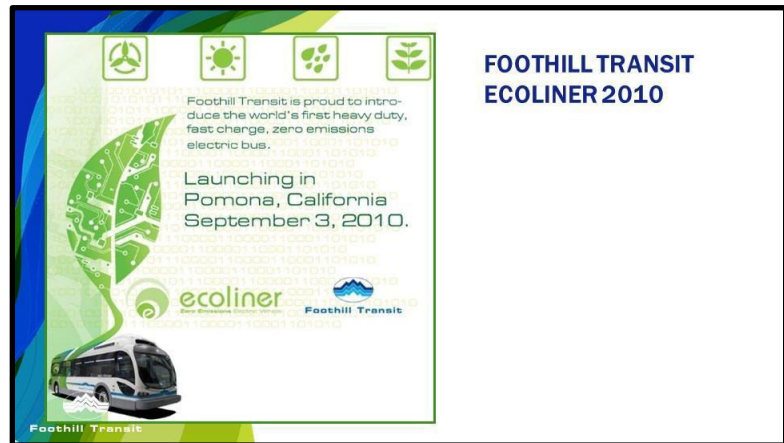
population area of 1.5 million people and 327 square miles that Foothill Transit serves. That translates to about 12 million customer trips annually with 36 local and express routes. The fleet is primarily powered by compressed natural gas; but Foothill Transit currently has an electric bus fleet of 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’s kind of doesn’t help us achieve our mission,” said Barnes.

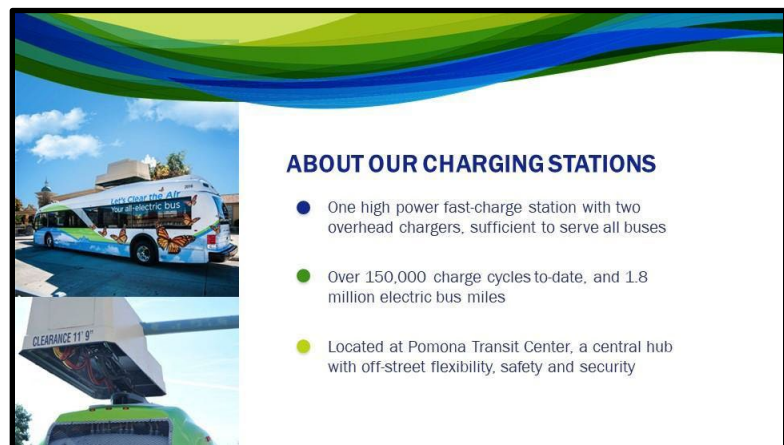
Being a not-for-profit-business, Foothill Transit aims to focus on safety and responsiveness to the community in providing a public service – which may make it a bit challenging to move into newer

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 publicly 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 those 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

IN-DEPO CHARGING



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 were delivered sometime between late 2019 and were 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.

The last speaker spoke about how Foothill Transit aimed for a more community centered approach, the unique challenges faced with all electric vehicles, the overall environmental impact, and the challenges with infrastructure. The next speaker, Simon Horton, will talk about Southern Edison California (SCE) and its various approaches to the community, supporting current and new

infrastructure, innovations in charging models, and gathering data on the usage on its infrastructure.

Charged Ready Transport

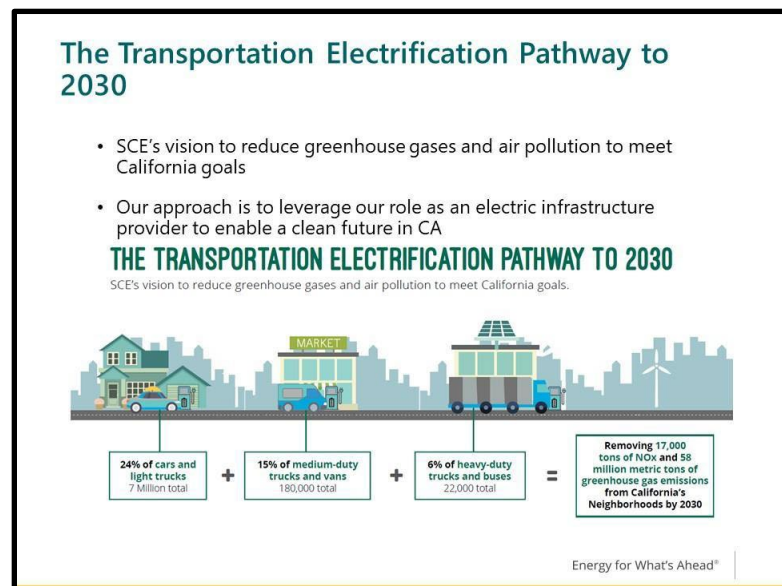
Simon Horton, Senior Project Manager, Southern California Edison (SCE)

Horton stressed the main takeaway from his presentation is, “What I want you to take away from this is engaging 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.

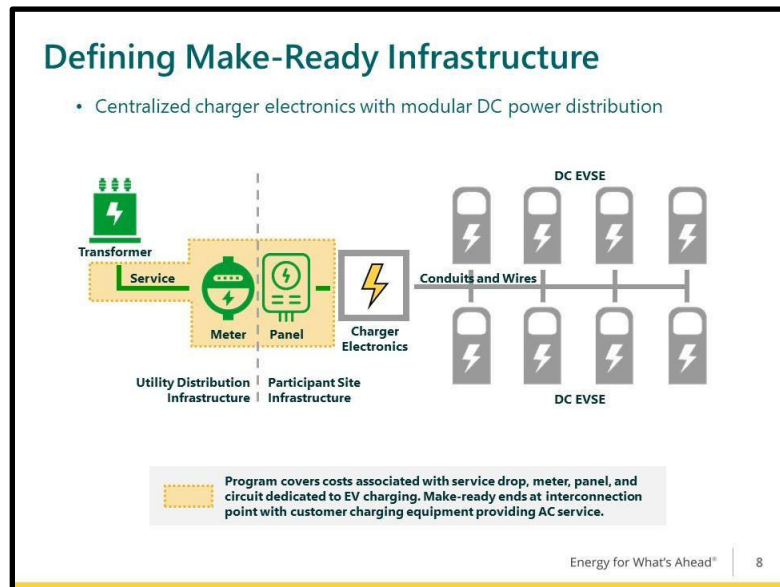
Although the goals of the state are aggressive, Horton mentioned that Southern California Edison (SCE) supports not just transit, but all market segments. Horton added, “medium/heavy duty segment, as well as a very aggressive light duty set of programs” are all being supported. “We have a program based 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 DACs 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. 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 Barnes' case with the buses as an example, “in a transit yard, not only would we come in and serve 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:

- Standalone charging equipment that sits in the yard – typically for a level two charger for a passenger car in a standalone infrastructure.
- 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 to add a block of power of 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

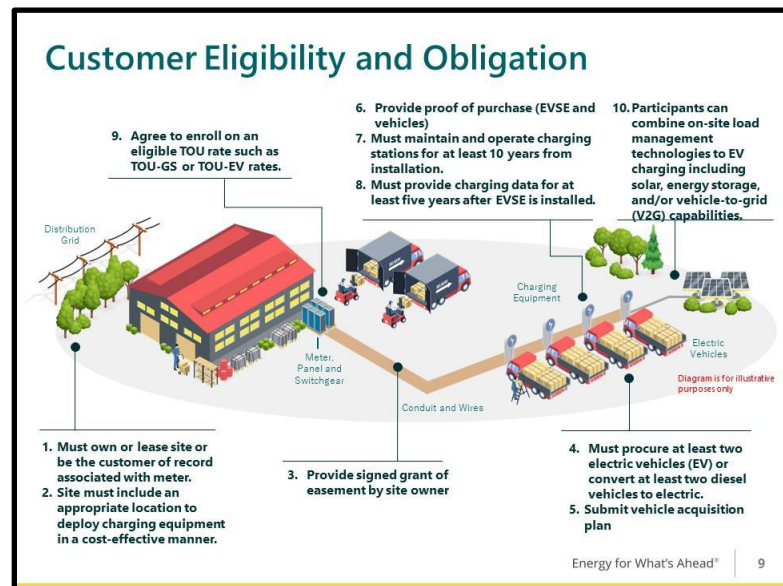
needs to be installed to support the fleet. There is also the need for proper management of time and charge scheduling.

In an example explained by Horton, “if you bring in 20 buses in 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 if 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 made 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 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. 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.

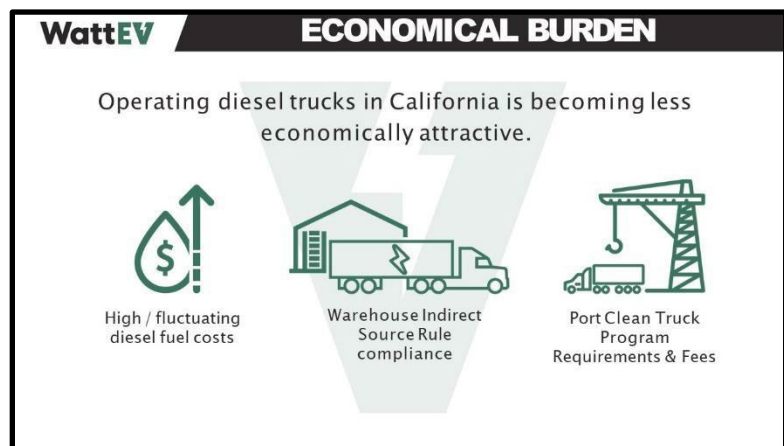
The last speaker emphasizes the importance of a community centered approach, the supporting of current infrastructure and building on it, gathering data with infrastructure, and new innovations to change charging models. The next speaker, Salim Youssefzade, will talk about the importance of needing to shift from diesel to electric and the benefits of doing so, societal impact of electricity, infrastructure considerations for charging, and new software to help with logistics.

Zero-Emission Freight Transport Made Easy, Affordable & Reliable

Salim Youssefzade, CEO of WattEV

Salim starts by explaining that diesel is the #1 of urban air pollution, he adds that “it’s definitely not a matter of if, but when this transition needs to happen to zero.” Looking at sustainability pressure specifically, he adds that multiple states have pushed for a greater emphasis on zero emissions and or tackling global warming, not just California. This push is enforcing new regulations on ports and warehouses. As states and customers push for Zero Emission goals, many companies also follow suit with sustainability goals by adopting “cleaner uses of transportation” as Salim puts it.

Shifting the focus to economic burdens. Salim points out that diesel trucks in California are quickly becoming a burden on the state. From fluctuating fuel costs, the warehouse Indirect Source Compliance Rule, and to the cleaning of the trucks and the fees it brings. Salim also goes over the barriers that new all-electric vehicles need to overcome. This



includes the high price, inadequate public funds and or incentives. The overall limited range of the vehicles, the unknown residual value, and overall lack of infrastructure needed. Salim then goes onto detail about supporting electric vehicles, this is done by building new or aiding the current infrastructure to be able to handle electric vehicles on mass. Another solution they are attempting is making the electric trucks more affordable and accessible to the operators.

Shifting focus to Improving Society Impact. Salim talks about the societal impacts on the drivers. Salim is quick to point out how each driver instantly falls in love with the new electric vehicle and the positives speak for themselves. There is no exposure of diesel or exhaust, there is significantly

less noise that the trucks produce, and overall, the performance on accelerating and braking is greatly improved.

In terms of overall infrastructure that supports electric vehicles on a national level. With plans throughout the nations to use more electric vehicles, but due to factors such as no incentives and or costly infrastructure. So far California is the only major state that has seen any use of electric trucks. Salim points out however despite the slow progress he envisions that electric vehicle will be used throughout the nation, and brings up the fact other states are slowly but surely adopting similar “mandates and incentives” that California provides and enforces. A reequipment as Salim puts it, needed for adoption on a massive scale is for the Megawatt Charging Standard, as any other electrical charging standard would take hours just to fully charge someone vehicle.

Lastly, Salim explains that the biggest field sites are in San Bernardino and Gardena with Sacramento along with many other sites being considered as another option to create a “fully zero emissions quarter” as Salim describes it. With this quarter we can deliver freight all the way from the Port of Long Beach to areas in Northern California.



Salim also adds they are looking to expand eastward, as much of the traffic goes into New Mexico, Arizona, to all the way to Chicago. However, many of the previously mentioned have to no incentive to expand in those areas of the country but Salim is firm that it is a necessity to expand eastward. Salim also sees autonomy playing a big role down the road as some companies are looking into adoption autonomous and electric vehicles.

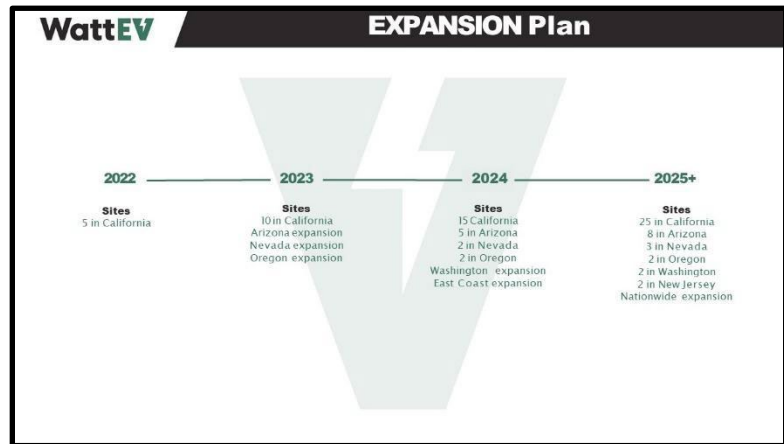
Salim then goes into the newly developed software that helps a user match their loads with the proper truck and where they are going to charge. Supposing a customer does not have the proper funds to use one of the electric vehicles, Salim explains that the solution in this scenario is for the customer to join the platform to have the ability to access the vehicles. However, for different customers that want a dedicated model of electric vehicle to be used at their facilities, Salim offers

to work with them. Whether to develop infrastructure to support the vehicle or create a model that will work with both him and the customer's company.

At the end, Salim uses an example to show how much they are reducing pollution and emissions. Imagine replacing 100 diesel trucks a week on a 160-mile route, this would equate to 17 tons of

Greenhouse Gases and a reduction of 1.7 tons of Nitrogen Oxide. Salim emphasizes how this is only a “drop in the bucket” when compared to the total number of diesel trucks currently in operation. Salim explains that as we scale out infrastructure to support electric vehicles, we are able to go beyond the short, middle, and the long mile. Along with developing technology that supports and makes electric vehicles more available such as Megawatt Charging Standard.

In the last section we looked at various organizations that combat air pollutants, supporting electric vehicles, supporting or adding on to existing infrastructure to support all electric vehicles. In the next section we will look at Truck Parking Availability System (TPAS), influx of deliveries from the pandemic, emphasis of new technology, the issues with cross border trade, and infrastructure developments.



Public Projects for Workforce Care

The United States Government is largest importer of goods around the globe, but in the face of challenges of cross border trade with Mexico and the surge of deliveries due to the pandemic, it has cause further collaboration between companies and the Federal Government; along with developing new operations to support internal interstate corridors and international logistics. We also see new technologies and infrastructure are being developed to further support trucking across the United States and the everyday drivers, as well as looking at the impact of these technologies and their implementation.

The TPAS Project

Gretchen Ivy, VP & Project Director of Transportation Planning and Policy at HNTB

Gretchen started the conversation by introducing the Truck Parking Availability System (TPAS) project in the I-10 Corridor, an interstate federal funded initiative that seeks to improve the infrastructure for truck parking. The TPAS is an integral component that supports truck drivers in planning their routes along the I-10 corridor, aiding in locating safe, accessible, and convenient parking for rest periods. The Corridor passes through California, Arizona, New Mexico, and Texas, it is an extensive 1,700-mile corridor, for this reason HNTB assumed the pivotal role of consultant project manager, facilitating the coordination of the regional technology and freight deployment across the four states.



TPAS, the truck parking availability system supports truck drivers as they plan their routes along the I-10 Corridor. This helps them find safe, available, and convenient parking for hours of rest. There are 37 rest areas deployed throughout the Corridor, with six of them being located on the Californian side.

Ever since the COVID-19 pandemic we have seen an exponential increase in the number of deliveries that are being made. Americans rely on the goods movement in order to keep the economy healthy, this has caused us to see more cases of truck traffic around the state and the country. Around 80% of truck drivers are spending 30 minutes or longer just trying to find a parking spot and 40% of these drivers are spending sometimes even more than an hour, considering

that truckers can be fined if they don't take their required breaks. It seems like there is a necessity for this infrastructure to be developed.

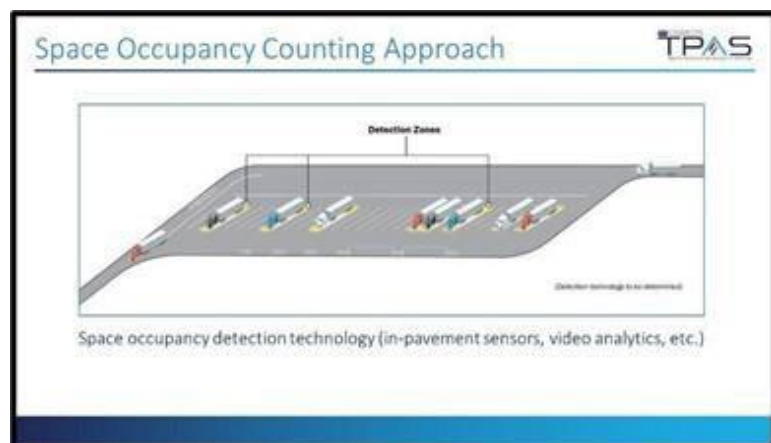
This program is a collaboration between different states, HNTB, and the federal government. HNTB Has played a crucial role in the deployment of the project; they estimated that 27,000 hours can be saved with the TPAS program, which equates to around \$1.38 trillion dollars annually. The problem is that California truck drivers are finding themselves in a

situation where there is nowhere to rest. 60% of truck stops and 50% of rest areas are overflowing during peak hours (12am-1am), especially in the Inland Empire where there is no facility within the 50-mile range away from LA & Long Beach ports. The I-10 Corridor solves the problem, it collects data, monitors sites. And integrates seamlessly with daily trucking, it's safe and convenient for the drivers. It does so by exploring different technologies and procurement methods.

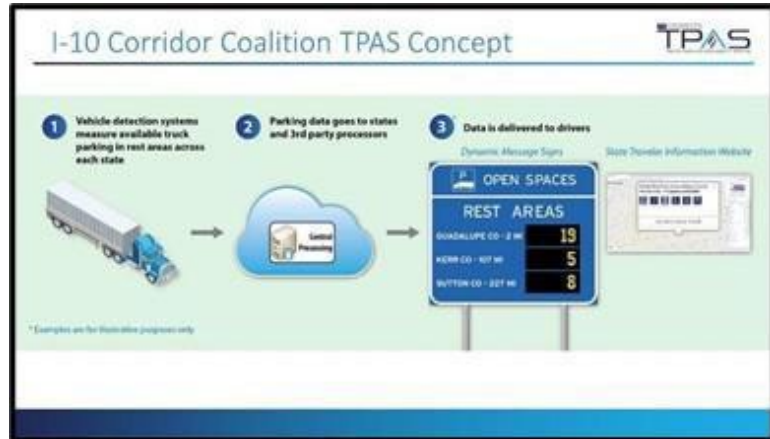
The vehicle detection systems measure available parking in rest areas. Once the data is collected, it goes to the four states, where it is aggregated and then disseminated through different communication channels. Ultimately, data is delivered to truck drivers by dynamic signs. There also is a state traveler information website, seen to the left. Information can be obtained by dialing

511. There is a complicated algorithm that goes into the TPAS technology. One method is to collect data on the entrance and exit ramps. Determining the size and layout of the lot is important. In-pavement sensors, video analytics, and radar/sonar may become more prevalent. Although it may be costly, the end goal is to deliver information seamlessly among

truck drivers. The other possible configuration is the Space Occupancy Counting Approach. The yellow seen to the left is monitoring space utilization. At times, this form of technology is optimal on smaller lots. This approach may be heavier in cost but is highly accurate. Sensors and video analytics are utilized in this approach as well. Most states either adopt the entrance/exit approach or the space occupancy approach.



Vehicle parking data is collected through a public data feed. This information can be used in smartphone applications, online, and in-cab navigation systems. It can provide information on nearby vending machines, Wi-Fi, and restrooms. Names will be displayed on private truck stops who are participating in the program, i.e., the Masto Region. There are multiple data distribution and communication methods. The trucking industry relies on this data, as it is instantaneously received in real time. However, there are many rules regarding using smartphones in vehicles. Private entities are capable of taking the public data feed and integrating this data into their apps, with Waze and Google Maps.

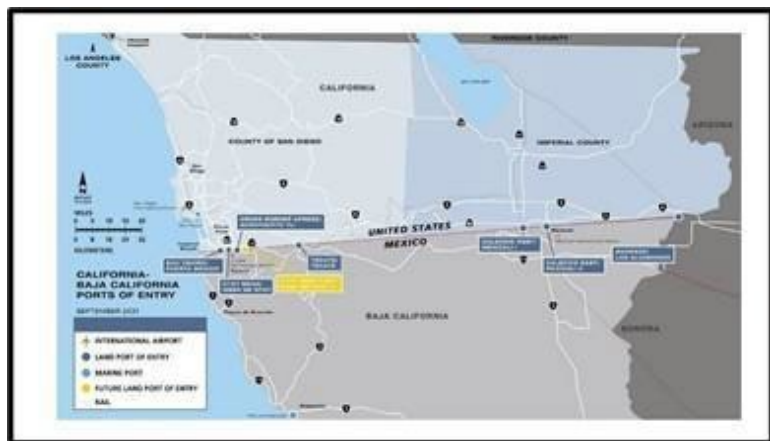


The last speaker we looked at spoke about the revolutionary Truck Parking Availability System (TPAS) and its impact, the new implementation of technology to support drivers, and more collaboration efforts between HNTB and the Federal Government. The next speaker, Mario Orosio, will talk about challenges with cross border trade between the United States and Mexico, emphasis on technology, and new infrastructure development.

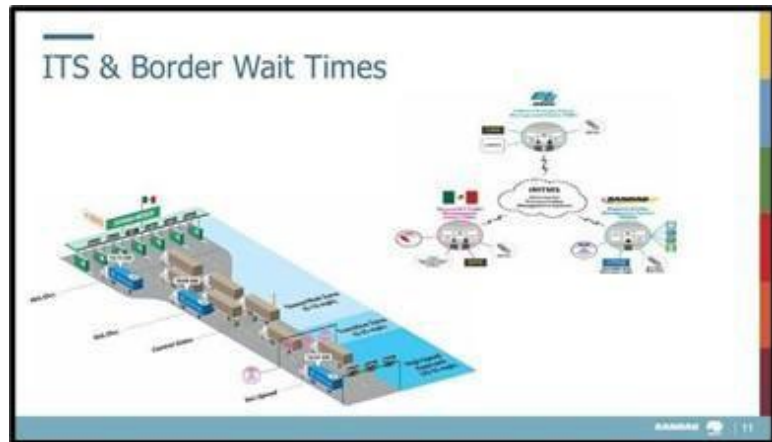
Otay Mesa East Port of Entry Project

Mario Orosio, Project Corridor Director Caltrans District 11

Mr. Orso starts by explaining the operations of OTAY Mesa and State Route 11 Projects. The port of entry project, the border between states, and logistics of goods movement, are at the heart of OTAY Mesa East. There are currently seven ports of entry, two of which are heavy freight crossing entries but out of all of them there is only one area where the major metropolitan cities on both sides of the border join- Tijuana and San Diego. Goods are usually crossed through Calexico or OTAY Mesa, they are either shipped to warehouses in the Inland Empire and arrive at their final destinations or sometimes they go straight to their destination from the border, or they can also go to the rail line to be loaded to go to further places in the country.



The benefits of the freight for the U.S is a combined 21 billion for California and 32.3 billion of output for the rest of the country. The jobs created for citizens supports 230,000 in the U.S and around 3 million in Mexico. The situation though, is that there is 50% reduction during peak hours in border crossings. Integrating a system is key in the collaboration and is mandatory for the advancement of goods movement, the corridor project has helped Mr. Orso to visualize the challenges and determine which operating system fits best for the supply chain.



Technology is key in this project. From the I-10 Corridor Coalition, electrification, and quantum computing. Integrating all elements will mitigate wait times, similar to Ms. Ivy's presentation regarding rest areas. Mr. Orso cannot stress enough how important collaboration is to the success of implementation of technology. American transportation departments partner with Mexican governments to remedy the same issues. The federal government resists change and is slow to adoption. Obstacles include state government's regulations, which impedes private sectors timing of execution. For this project to work, it will take both countries' government agencies to cooperate with innovation requests. Mr. Orso asserts that a 20–25-minute wait time is optimal, because it affects the reliability of the freight network.

Innovation is a requirement due to the large demand for trucks. The building seen to the left is an Amazon Warehouse. Amazon recently built a 3.4 million square foot distribution center. It is the biggest commercial building in San Diego. There will be four more buildings around this one. Amazon also built a new distribution center in Tijuana. This is a diverging



diamond in SR11 and the first one in San Diego. A diverging diamond is an interchangeable pathway that moves the traffic in the opposite direction. Mr. Orso asserts that this system is a compendium, requiring many players and components. There will be a 120-acre commercial crossing, the largest in the western hemisphere. By having the tolling authorities partnering with Mexico, sharing tools, the technology and physicality of the port of entry will become established.

The next steps focus on agreements with the federal government, financial strategies, and designs. CVP monitors District 11's progress and provides feedback for better practices. The construction will begin once all the elements are prepared and aligned.

Conclusion

In conclusion, due to the shift toward zero emission and a need for an all-electric vehicle to suit that demand; it has given way for private organizations, companies, and the government to all contribute number of resources to solve it, transportation and to this effort we see the fruits of their labor and how they will further be innovated in the future.

Following up, these are the main takeaways from this Contemporary Conversation (CC):

1. Zero-Emission trucking will be the future business of logistics

If you are looking for an investment opportunity in the electrification process, perhaps Volvo with its Volvo Lights Project is the way to go. Electric trucks will be widely used throughout the world, all combustion trucks will be replaced eventually, which means that throughout that change there will be a huge demand for what the company is going to make, sustainable growth seems to be possible in a business like that.

2. Improving the productivity of our logistic chain will prove to be important

The electrification is not the only thing that adds up to sustainability, in the near future we will need to figure out ways to improve the productivity of our logistic chains. One thing we can conclude from our second dialogue is that this will also improve the carbon footprint left by the logistics sector and thus make it more sustainable.

3. There is no sustainability without the people aspect

Caring about people is one of the big three concepts that make sustainability. Figuring out social programs that care for workers in the industry will also be required in order to truly say that we are making logistics a more sustainable industry, from changes in the way people are treated in the warehousing sector, to properly providing places for rest and good wait times to people who constantly cross the border with the goods that power our region.

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.

About San Bernardino Valley College

San Bernardino Valley College will become the college of choice for students in the Inland Empire and will be regarded as the alma mater of successful, lifelong learners. We will build our reputation on the quality of our programs and services and on the safety, comfort, and beauty of our campus. We will hold both our students and ourselves to high standards of achievement and will expect all members of the college community to function as informed, responsible, and active members of society. For more information, visit



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