



# EVCONNECT

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NEWSLETTER

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## FROM THE CEO'S DESK

Dear Friends,  
Wish you all a very happy new year.

In December 2019, we saw how COP25 fell short of reaching its goals. Regardless of these outcomes, it makes eminent economic and environmental sense for India to ambitiously reduce fossil fuel use in urban transport systems for which electrification is an essential component. Let us remind ourselves of its many benefits – reduced air pollution and greenhouse gas emissions, increased share of renewables through batteries, and increased energy security that EVs can directly bring. We have our work cut out for us. We need to take a multi-pronged strategy and bring in key stakeholders to build an electric vehicle market, scale up battery production capacities and charging infrastructure, and create overarching assets – skills, financing, governance – to facilitate this transition.

New developments are taking place at a very rapid pace, and it is often difficult to keep up with them. These are reported through multiple media channels and are hard to track. This newsletter seeks to bring together several of these developments into one accessible document. We hope this curated and compiled content will come in handy to those who are seeking the latest information on electric mobility.

In this edition of PowerTalk, we have Sergio Avelleda (Director of Urban Mobility, WRI, Washington DC) weighing in on how India should best approach the electrification of public transportation. A feature describing the impact of charging modes on battery performance, in addition to several national and international news pieces, are other highlights of this month's EV Connect.

We hope you find this edition beneficial and share your thoughts so that we can improve further.



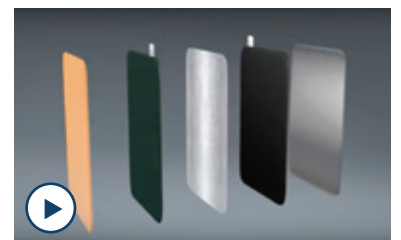
Sincerely,  
Dr. OP Agarwal  
CEO, WRI India

## WATCH

Presenting the monthly EV Connect Powertalk interviews exclusively discussing insights from EV experts. We also present one hand picked video to showcase EV innovations from across the world.



**Power Talk with Sergio Avelleda,** Director of Urban Mobility, WRI Ross Center for Sustainable Cities, Washington DC, USA



**Lithium-ion batteries: How do they work?**



# POWERTALK

## IN CONVERSATION WITH SERGIO AVELLEDA

DIRECTOR OF URBAN MOBILITY, WRI ROSS CENTER FOR SUSTAINABLE CITIES, WASHINGTON DC, USA

*Interview taken by Neha Yadav WRI India*

“How can we improve the quality of public transport? It could be through infrastructure, such as corridors, because corridors ensure reliability and timely travel. If that is not possible, bringing in exclusive lanes for buses helps a lot.”

“We should have a national fund for large scale procurement of electric buses for five years and lease buses to local operators. This could have guarantees from the national government, the private sector and bilateral agencies and development agencies.”

***Interviewer:* Many Indian cities, and states, are intent on adopting electric public buses and the government is supporting this transition through the massive subsidy scheme - FAME 2. How do you think this will alter mass mobility in cities?**

***Sergio:*** First of all, electrification is not just about replacing diesel/gasoline buses with battery powered electric buses. While we need to work on the electrification of buses, we simultaneously need to improve the quality of bus services. I am not sure about India, but many countries are losing public transport passengers to private cars, two and three-wheelers and ride hailing services. Of course, this is not good. The best way to move people in cities is to have a massive transit network that is connected to these different mobility solutions. But when we are losing passengers to other models, we are reducing the capacity of public transport to be sustainable —and in particular to be financial sustainable. When we lose financial sustainability, we start losing the quality of services which results in a further loss of passengers. So, we need to interrupt this negative cycle. But how can we improve the quality of public transport? It could be through infrastructure, such as corridors, because corridors ensure reliability and timely travel. If that is not possible, bringing in exclusive lanes for buses helps a lot. In addition, data and technology plays a key role and we need to incorporate the same to improve services and reach.

For users to choose to travel via public transit, timely travel and reliability is crucial. As a passenger, if I have the money to choose between public and private travel, I will evaluate my options based on these two factors. Unfortunately, merely deploying electric buses can't fix these two issues. An electric bus stuck in congestion is the same as a diesel bus stuck in congestion. So, to bring in reliability and timely travel, we need to get cities to invest in infrastructure, data and technology. This is the first important component.

***Interviewer:* What are some of the key business models and financial strategies, for the procurement and operation of electric public transport, that you foresee becoming mainstream?**

***Sergio:*** We need to manage barriers. So, which are the most important barriers for electrification? First, it is the financial barrier because the capital cost to invest in electric buses is higher than diesel buses. Bus

Bus operators in general are afraid to invest this money upfront. One important component to accelerate electric mobility is to design financial solutions. And here I would like to point out the aspects of pilot projects that we are observing around the world. Cities and bus operators are buying small quantities of electric buses to test it. E.g. São Paulo bought 15 buses, Santiago de Chile bought 200 buses, Bogota bought 500 buses. But these are small quantities, and far from expansive. It is a paradox because while a pilot project hopes to open the door for electrification, it limits electrification since a pilot project cannot enjoy all the benefits of electrification. Now, what is the most important benefit of electric buses for an operator? It is the reduced OPEX or operational costs. But when you have a small number of buses you don't get to reduce the operational costs because you still need to maintain diesel bus operations – i.e. the depot, maintenance, human resources etc. At the same time, you need to have the same resources for electric buses. So, we risk losing resources in maintaining two types of buses at the same time. We need to start working on building massive financial solutions to support the procurement of a large number of electric buses. This will reduce the cost for investment because then we will be able to create scale for electric buses. We will also be able to boost the manufacturing sector because they will now large big volumes to manufacture and more suppliers will join the market. This will prove advantageous to electric bus operators.

***Interviewer:* As bus operators and transport authorities begin adopting electric bus solutions they will be working with electric utilities and service providers. What, according to you, are the key points for making the stakeholder partnership work?**

***Sergio:*** The electrification market brings different stakeholders together – e.g. we need to engage the electricity distribution companies. At the moment, they are outside the electric public transportation market. However, they are working with the metro and train companies because they have been providing electricity to them. Electric buses are creating a new market and we need to engage with the electricity distribution companies to make them a part of this change. In Chile, for example, the electricity distribution companies buy electric buses and lease them to operators. It is a good solution because they are making money by leasing buses and by selling energy to power the buses. While we are engaging with different stakeholders, we need to think about different business models for operating public transportation systems. I don't know exactly how it works in India, but my sense is that India has adopted the same model of hiring bus operators. Bus operators are the owners of the assets (buses); and the depots and they are responsible for operating and maintaining the fleet. A new and modern way of hiring bus operators is to split who will be the owner of the assets, one concessionaire, such as a private funding agency, will be the owner of the buses and depots and a different company will provide services. It has brought more efficiency and two important cities in Singapore have adopted this model. First of all, we have the city— A public authority has much more power to regulate and control the quality of the services. When we have a situation wherein an operator is not working out well, it is easier for the public authority to replace the operator when the operator is the owner of the buses. Or you can hire the operator for a shorter duration because they have capital costs to bear. No capital risks. So, the two cities in Singapore invite bids from operators every five years - this way replacing operators is easier. For instance, Santiago in Chile adopted this model of hiring operators when they decided to electrify their public bus fleet.

***Interviewer:* Electrified public transport could be the golden combination to achieve near zero emissions in transport. If you were to assign tasks to policymakers, auto manufacturers, energy businesses and financiers in India, to make this happen, what would they be?**

***Sergio:*** We have policymakers at different levels - at both the national and local levels. The role of a national level policy maker is to develop policies that incentivise the adoption of electric buses. It could be in different ways, e.g. tax incentives to adopt electric buses. An example is China, which created the subsidy for bus electrification by creating a national industrial policy to incentivise bus manufacturers to make electric buses. The most important role for national level policymakers is to create a pool of public and private funds and offer a massive financial incentive to adopt electric buses. So, my idea is that we should have a national fund for large scale procurement of electric buses for five years and lease buses to local operators. This could have guarantees from the national government, the private sector and bilateral agencies and development agencies. Let's say we begin with a purchase of 25,000 buses for five years. This guaranteed order of buses will help in better planning and will also incentivise bus manufacturers to make buses at scale and at lower prices.

Local authorities will also have to create local laws that determine goals for reducing greenhouse gas emissions. E.g. São Paulo local authorities created emissions mitigation goals every five years for which they stipulated that the emissions from public transportation must be zero by 2037. While the goals have ambitious targets to reduce emissions, they don't obligate on the vehicle technology to achieve this - whether it is electric, hydrogen-fuel or bio-diesel buses. For instance, the local law clearly tells the operators to reduce emissions by say 25% in five years, 50% in ten years and so on. Under this law, private bus operators can experiment with new technologies to choose clean energy buses and the local operators to run such buses. And energy businesses will have to understand that this is a new and wonderful market for them. For example, in São Paulo, 14,000 regular buses consume about 450 million litres of diesel per year. This is a big market for energy companies that they haven't tapped into, as of now. It is a new opportunity to make money and electric businesses should lead in engaging local and national policymakers, and local operators, to adopt electric bus solutions.

We have currently two different kinds of bus manufacturers. We have one group that have adopted electric bus solutions and another set of manufacturers who continue to make conventional buses that comply with Euro 5 or 6 emissions norms. The latter businesses are looking for opportunities. If the national and local government announce a transition to electric buses, this second set of manufacturers will follow suit. But to encourage them, we need to incentivise them and create a market. The real challenge is getting together the financial solutions that support this massive procurement of electric buses. The manufacturers who start early have an advantage as they can experiment with technology as it progresses and find viable price points.

## UPDATES FROM THE WORLD

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### **How 5G will transform the electric vehicle industry** | *Market Development and Technology*

5G connectivity plays a key role in the electric vehicle industry as higher internet speeds are vital for the safety and survival of the vehicle. EV markets, aggressively growing electric vehicles in their regions, are simultaneously investing in digital infrastructure to ensure cars are connected to 5G networks. This way data from vehicles - e.g. time-to-time battery health and performance and available charge to feed into the grid - is shared quickly and reliably. South Korea, followed by China, are the first two countries to roll out fifth generation cellular network technology.

*Takeaway for India:* Investing in digital infrastructure, such as a 5G cellular network technology, is critical for creating a high performing electric vehicle network. Countries that are rapidly moving towards transport electrification are simultaneously building the digital infrastructure essential for scaling data sharing for monitoring battery performance and enhancing connectivity of vehicles to smart grids. These countries will also gain from the host of benefits that an electric mobility ecosystem brings. [Read more](#)





### **340 electric vehicle charging stations at schools, parks and beaches in San Diego county** | *Strategy and Market Development*

A county government and a local utility in California are erecting charging stations at educational institutes, beaches and parks in a bid to grow the share of electric vehicles in the neighborhood. About 54% of greenhouse gas emissions in San Diego county are from transportation alone which this public utility and the local government are looking to reduce. The utility is investing USD18.8 million in the setting up of infrastructure - around 30 schools and college campuses will see chargers installed soon while 22 parks and beaches will also get chargers. Furthermore, the utility also intends to conduct stakeholder discussions to determine the exact sites that will host the charging infrastructure.

*Takeaway for India:* Schools and college campuses could be lucrative spots for two reasons. Firstly, they could help grow electric vehicles in school zones which have a large population of children who are particularly vulnerable to tail pipe emissions from vehicles. Secondly, educational institutes are hubs for employment (educators and staff) and visitors (such as parents) are potential customers for EV chargers. [Read more](#)

### **Battery factories power up to cut costs and drive the EV revolution** | *Market Development*

Battery storage technology helps store renewable energy which is otherwise constrained due to intermittency. Battery storage is becoming cheaper with a 13% fall in battery costs, presently costing about USD 156/ kWh and likely to reduce to USD 100/kWh by 2023. The falling prices of battery pack manufacturing are affecting this decline and are likely to continue doing so. Battery pack designs are becoming simpler, and easier to standardise across vehicle segments, which is prompting businesses to set up localised manufacturing plants. This, in turn, is allaying the costs of importing cells from abroad which businesses and policymakers would otherwise would have had to invest in.

*Takeaway for India:* The conditions for local production of battery packs are ripe owing to the advancements in manufacturing technology. Indian businesses can also tap into this opportunity. However, given that many raw materials are not available in India, it is essential Indian policymakers find ways to secure raw material from international suppliers. Battery storage technology is additionally beneficial for increasing the share of renewables in India's energy mix. [Read more](#)

# UPDATES FROM INDIA

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## **Ather Energy to set up EV, lithium-ion battery manufacturing facility in Tamil Nadu** | *Market Development*

Ather Energy will be setting up a 4,00,000 square feet electric two-wheeler and lithium-ion battery manufacturing facility in Hosur. The company recently signed a Memorandum of Understanding with the government of Tamil Nadu for the same. Hosur is the ideal location given Ather's research and development facility is located nearby in Bengaluru and the company anticipates most of its future supply chain to be located between these two regions.

[Read more](#)

## **Hyundai introduces a vehicle-to-vehicle charging facility** | *Market Development and Technology*

In a first of its kind service, to gain consumer confidence, Hyundai has started a Vehicle-to-Vehicle (V2V) charging service for its recently launched 'Kona Electric'. Customers can now charge their Kona anytime anywhere via V2V by requesting Hyundai to send an electric vehicle to their location. This service is currently available in Delhi, Chennai, Mumbai and Bengaluru. [Read more](#)

## **Rail Ministry to transform railways into green railways** | *Strategy*

The Cabinet Committee on Economic Affairs (CCEA) has approved the complete electrification of the railway network. This move will not only save railway companies money, in reduced fuel costs, but will also bring down overall greenhouse gas emissions. India's Ministry of Railways signed a Memorandum of Understanding with the Department for International Development (DFID) of the United Kingdom which entails planning of Indian railways with 100% renewables including offshore wind and solar, in combination with energy storage technologies. [Read more](#)

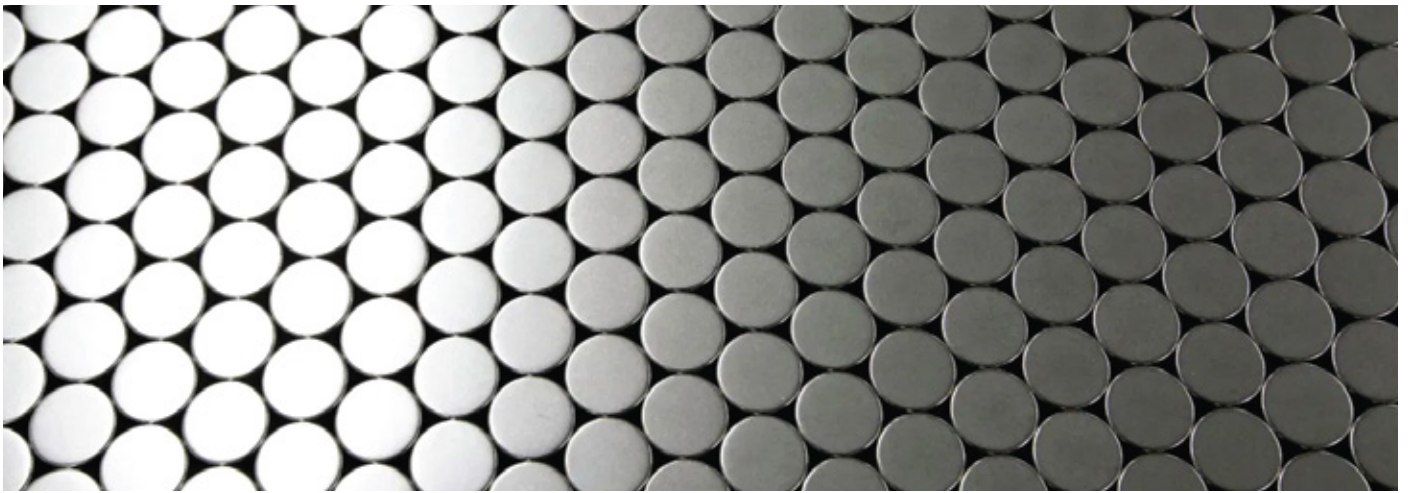


## **EV @ WRI**

### **Is it worth it to go electric? New tool helps cities understand costs & benefits of clean buses**

*By Xiangyi Li and Eduardo Henrique Siqueira*

Buses are one of the major sources of emissions in many cities, and they are undergoing a quiet revolution. A confluence of improved technology and increasing demand, driven by air pollution that is getting harder to ignore and more stringent carbon reduction targets, means more cities than ever are investing in clean bus technologies. But with growing demand are more questions about the right technologies and business models for long-term success. [Read more](#)



# EV FEATURE

## Fast charging is not a friend of electric car batteries

by Michael J. Coren | December 2019

Every year, electric car batteries degrade. How much depends on factors only now being tested in the real world. Some of the best data come from informal trials of electric vehicles (EVs) being conducted by fleet operators around the world. A detailed look was supplied this week by the fleet-telematics company Geotab. It plumbed data from 6,300 fleet and consumer EVs to understand how their batteries were faring in the real world. It was a mixed bag.

The good news was that batteries last longer than many expected. On average, EV batteries lose about 2.3% per year—or 23 miles for an EV with a 200-mile range over five years. Geotab suggests at that rate most batteries will outlast the useable life of their vehicles (fleet owners often auction off their vehicles after 100,000 miles). Or it may change how long fleet owners retain their vehicles.

A Tesla rental service in Southern California, Tesloop, has driven its vehicles well beyond 300,000 miles, with no plans to remove them from service. One Model X, after covering 330,000 miles, saw its original battery's range fall from 260 miles to 200 miles (23%)—for comparison, pooled data from Tesla owners shows batteries losing about 10% of their charge after 155,000 miles.

But not all brands performed the same: The Nissan Leaf's passive air-cooled batteries were bested by Tesla's liquid-cooled versions, suggesting thermal management is a key differentiator for carmakers. You can compare brands with Geotab's tool [here](#).

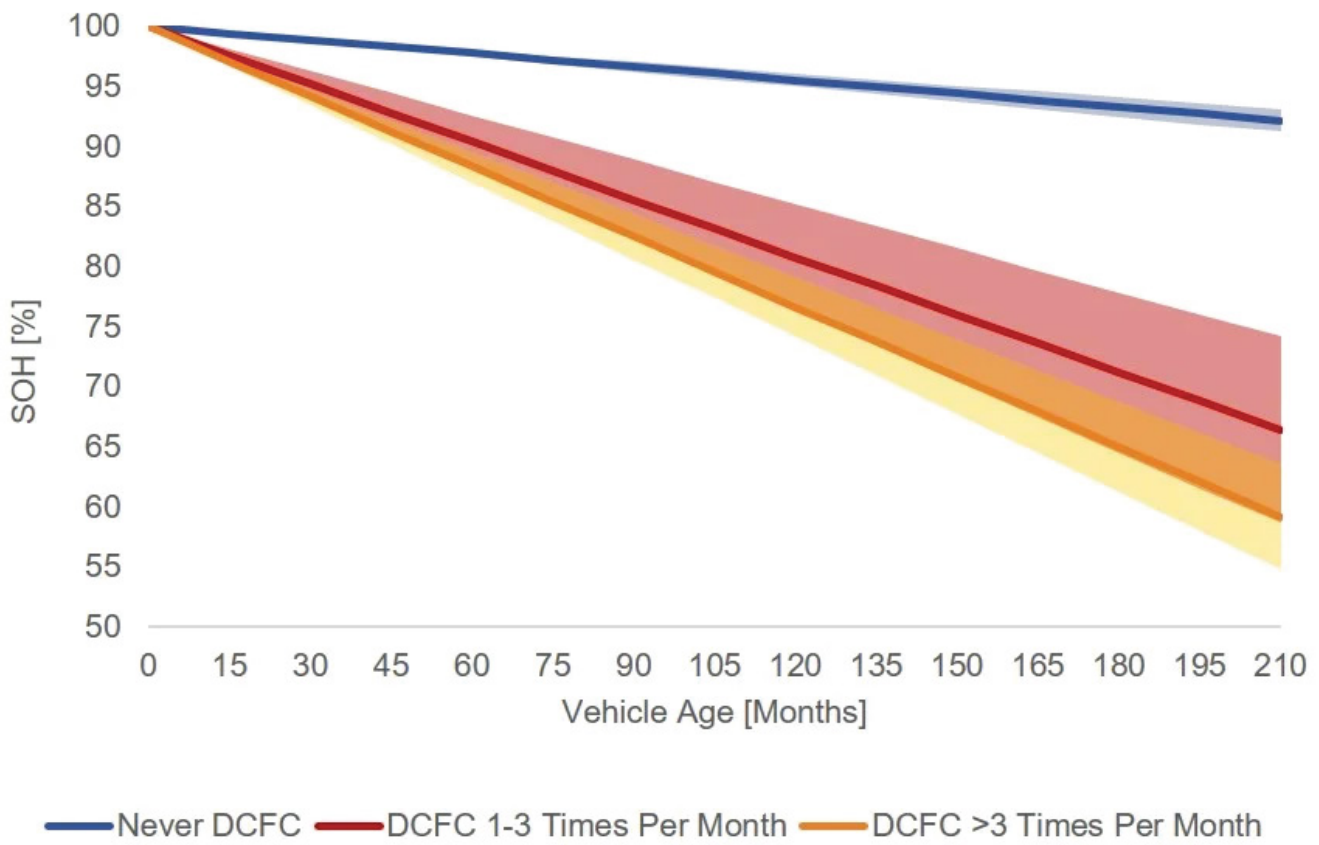
### What affects EV battery health?

Surprisingly, heavy use (charging many times per week) did not meaningfully accelerate EV battery degradation. But heat and direct current did. Batteries lost their capacity faster in warm climates. Frequent fast-charging (direct current) also took a toll compared to slower Level 1 or 2 charging (alternating current at 120 and 240 volts). Combined, the two factors led to faster battery degradation: about 10% of the original capacity after six years.

Geotab added a few caveats. Degradation is not linear. A slow decline for many years can be followed by a steeper drop. None of the vehicles studied had reached that point, so more analysis will be needed to understand the full EV battery lifecycle. Tesla owners also mentioned that range is not the only factor: how fast it charges may change over time, particularly as carmakers introduced over-the-air software updates designed to protect batteries even if it negatively affects capacity and charging times. As always, correlation is not causation: It's possible other factors associated with hotter climates (not just heat) may play a role in battery degradation.

Overall, Geotab recommended keeping EVs charged between 20% to 80%, minimizing fast charging, and sticking to temperatures on the cooler side if possible as the ideal way to extend the capacity of your EV battery. As the first generation of mass-produced EVs approaches a decade or more on the road, we'll soon have far more data about how well they age.

Battery SOH vs. Time: Varying DCFC Use  
(Exclusively vehicles operating in hot climates)



Source: cleantechnica.com



## COURTESY FOR THE ARTICLES

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**Video Courtesy:** <https://youtu.be/VXy-loRyKWk>

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