



# EVCONNECT

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NEWSLETTER

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## FROM THE CEO'S DESK

Dear Friends,

I am pleased to present to you the thirteenth issue of EVConnect. In the last several months, India has made steady progress – more than 5,500 electric buses have been sanctioned for subsidies under FAME 2 scheme and taxes on electric vehicles and chargers have been reduced. Gradually, India's pathway to electric vehicles is shaping up but challenges of technological and institutional nature need to be addressed. It is also important to recognise that within electric mobility there are several sub-systems that hold big opportunities for India. Take, for instance, the batteries that power EVs. These can also be used to store renewable energy, which can be supplied back to a bi-directional grid, or for small scale use like powering a home during an outage. Certainly, India should actively explore these.

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.

This edition of the newsletter includes a conversation with Dr. Manas Fuloria, CEO, Nagarro, an organisation that recently converted a portion of its corporate fleet into electric. We also bring a feature that demonstrates the crucial role of battery storage in reinventing the power grid and an opinion piece on the salubrious impact of electrifying vehicles in India.

We hope you find this edition of the newsletter beneficial and share your thoughts to help us improve.



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 Dr Manas Fuloria**  
CEO of Nagarro



**How Electric Vehicle Batteries Could Be Used to Power Entire Cities** by Mashable



# POWERTALK

## IN CONVERSATION WITH DR. MANAS FULORIA

CEO, NAGARRO, GURUGRAM, HARYANA

*Interview taken by Amit Bhatt, WRI India*

**Interviewer:** Can you briefly tell us about Nagarro?

**Dr. Fuloria:** Nagarro is a technology services company that is part of a German group. We have clients in 25 countries and an employee strength of approximately 6,000 people.

**Interviewer:** What draws your organisation to the EV space?

**Dr. Fuloria:** Many of our employees live in the Delhi NCR region and face a massive air pollution problem. As we worked on this topic, we realised that air pollution is closely linked to urban mobility. We have been chasing this thought for some time now, even as focus shifted from diesel to CNG, and from private mobility to shared solutions, public transportation, walking and cycling.

Electric vehicle mobility, the concept that the government is pushing, has come at the right time. There is a need for it, and we want to embrace it early on - and not just for our own fleet mobility. We are looking to incentivise individuals, encourage them to try out electric vehicles and facilitate the switch from petrol/diesel to electric. It's a nascent ecosystem and things are still not very clear to the manufacturers, charging providers, individuals or even the government. We are just trying to support the whole effort by participating in it early on.

**Interviewer:** Are you looking at EVs for employee transport? Can you also tell us a little more about the recent EV launch at Nagarro?

**Dr. Fuloria:** We have a CNG based fleet and are in the process of launching electric vehicles for our shared fleets. We have partnered with Lithium to introduce electric vehicles and we will gradually transition the whole fleet to electric. We have already switched some and the rest will follow over the next 18 months or so. We are also working with EV manufacturers to test their products. Our goal, at some point, is to offer special incentives and programmes (such as loans) to people who are considering electric vehicles for their personal use.

"It's a nascent ecosystem and things are still not very clear to the manufacturers, charging providers, individuals or even the government. We are just trying to support the whole effort by participating in it early on."

"I think if companies are willing to provide spaces where people can experience EVs, and how the ecosystem works, it will become easier to adopt electric vehicles."

**Interviewer:** In your opinion what can the private sector do to accelerate EV adoption?

**Dr. Fuloria:** A lot of what people feel, in terms of doubts about the technology, are addressed by their neighbours, friends and colleagues. The idea is to provide examples and case studies of successful usage of EVs. So, for example, if I see an electric car being charged, the fears that I have about the risk of fire, risk of explosion, etc. get dispelled. That way, it is a lot easier to adopt a new technology. I think if companies are willing to provide spaces where people can experience EVs, and how the ecosystem works, it will become easier to adopt electric vehicles. Additionally, we are also thinking of giving people loans and special incentives for EVs. So, with various small nudges, we can get people to move towards EVs.

**Interviewer:** What is your vision for employee transportation at Nagarro over the next few years?

**Dr. Fuloria:** It is very likely that in the next 12 months, 20% of our fleet will be converted to electric. We have about 20% employees using the metro – so if you count that as electric, we have already achieved our 20% goal. People are also using electric rickshaws for the last mile. So altogether 40% of electrification, in the next 12-18 months, is a reasonable estimate. Our goal is more than 50% adoption over the two years.







## UPDATES FROM THE WORLD

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### **An autonomous EV charger is coming to San Francisco** | *Technology*

A San Francisco based startup (Stable) and Electrify America are testing autonomous vehicle charging stations that wouldn't require any human intervention. These charging stations will be focused on fleet vehicles, rather than consumer-centric charging stations, considering the former is expected to grow significantly in the near future. The autonomous EV charging system will combine expertise in robotics and data analytics. In effect, the companies aim to re-invent the concept of a gas station as a new era of transportation sets in.

*Takeaway for India:* The extent to which automation of charging stations will work, to the benefit of India, is debatable at the moment. Some of the influencing factors include the type of charging (slow/fast) that will be predominant. It is true that charging a large numbers of vehicles would be easier and safer when done with automated systems. However, it is also worth considering that the charging infrastructure is a significant source of employment in the electric mobility value chain and this will be impacted if automation were to be introduced. [Read more](#)

### **Indonesia plans auto rules overhaul to form electric car hub** | *Policy and Market Development*

Indonesia is competing with its South-East Asian counterparts - Singapore and Thailand - in creating a localised supply chain of electric vehicles. The island country is prepping its auto manufacturing and export capacity, through a slew of incentives, to grow a localised industry for electric vehicles. These include taxes on internal combustion engines, carbon taxes on hybrid vehicles and tax exemption on electric, hybrid and fuel cell vehicles – marking the biggest overhaul in automotive regulations in the country. As a result, global automakers and investors, such as Toyota Motors and the SoftBank Group, are looking to invest in Indonesia.

*Takeaway for India:* Clear and ambitious regulations create confidence in investors, and the industry alike, to join the government's plans for electrification. While India has made significant commitments, as reflected in tax breaks and subsidies, fiscal systems such as carbon dioxide-based pricing could further tip the scales in favor of electric vehicle manufacturing. [Read more](#)



### **Colorado's most powerful climate tool isn't what you think** | *Policy and strategy*

Many regions in the world are actively making vehicle electrification an integral component of their strategy to mitigate greenhouse gas (GHG) emissions. For example, the state of Colorado in the United States has set ambitious mitigation targets – aiming to reduce GHGs to 90 percent by 2050.

A study in the state has found that electrifying vehicles would reduce carbon, beyond just completely decarbonising the state electricity sector, pushing state emissions down 42 percent (from 2018 levels) by 2040. Second, electrifying vehicles saves consumers almost USD 600 a year on average. Third, electrifying vehicles will also help in managing the influx of renewables in the states - adding to the effectiveness of the state's clean energy goals.

*Takeaway for India:* Drawing inferences from the case of Colorado, electric vehicles hold multiple benefits for India such as decreasing greenhouse gas emissions and increasing the share of renewables in India's energy mix. Similar studies to evaluate the impact of electric vehicles, in the local scenario, would prove useful. [Read more](#)

## Traditional manufacturers and startups cheer reduction in GST on electric vehicles | *Policy and*

### *Market Development*

Manufacturers of electric vehicles and charging infrastructure received a boost as the government decreased the GST rates on both items - in a bid to promote the nascent electric vehicle (EV) industry. This tax reduction will not only allow young companies, and startups, to make products that are cost competitive but will also reduce the sticker price shock for consumers. [Read more](#)

## Mahindra confirms three new EVs for the Indian market by 2021 | *Market Development*

Mahindra and Mahindra will be launching three new models of electric vehicles, in the country, in the coming years. The models will be launched in a phased manner - with the first model coming out in 2019, the next in 2020 and the third in 2021. While these models will be converted from their ICE counterparts; from 2022 onwards the company will be launching a brand new platform in which electric vehicles will be built from scratch. [Read more](#)

## Govt approves sanction of 5,595 electric buses under second phase of FAME India scheme in Telangana | *Policy and Strategy*

The Ministry of Heavy Industries has approved a total of 5,595 electric buses, for 64 cities, for intra-city and inter-city operations. Each selected city will now enter into the procurement stage, in a time bound manner, for deploying the sanctioned number of electric buses. The Ministry estimates that the buses will run about 4 billion kilometres in their contract period resulting in a reduction of 1.2 billion litres of fuel and 2.6 million tonne of CO<sub>2</sub> emissions. [Read more](#)

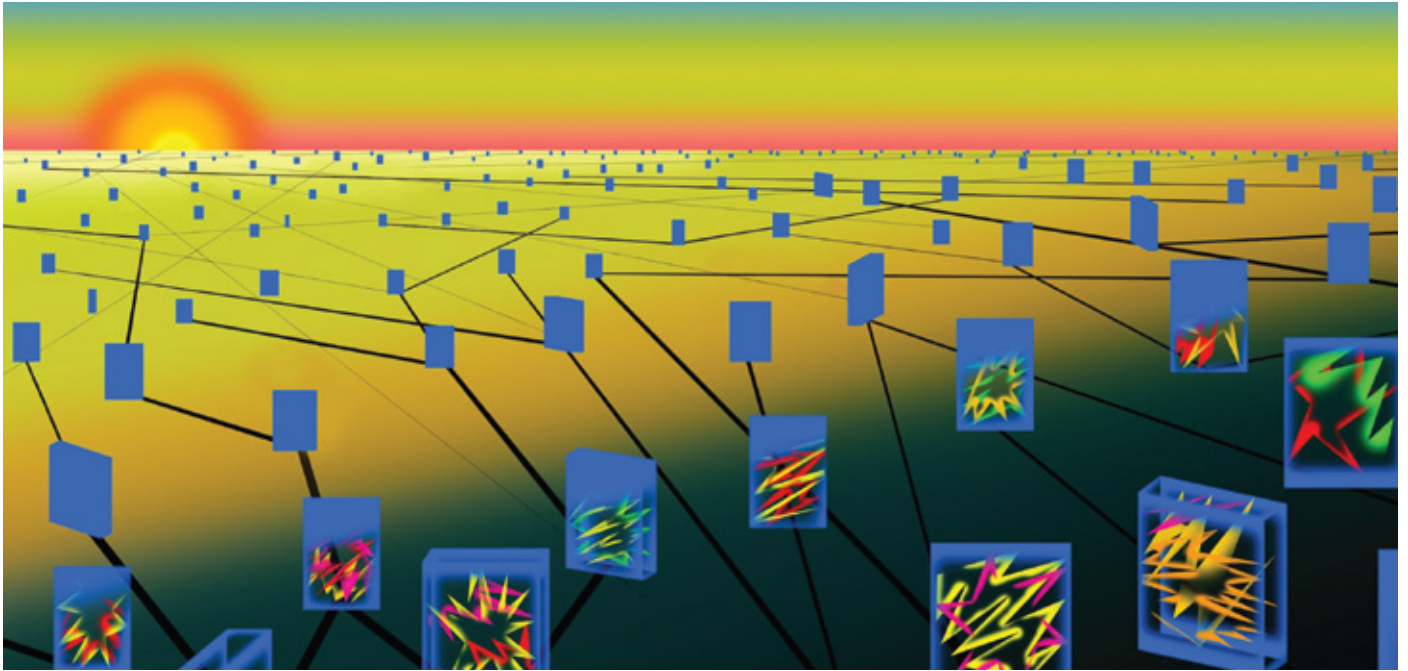


## EV @ WRI

### Going electric: The right mobility choice for India

*by Dr. OP Agarwal, CEO, WRI India*

Rapidly falling battery prices, increasing energy density of batteries, increasing attractiveness of shared mobility and the growing concern about climate change has prompted many countries around the world to look at electric vehicles (EVs) as a cleaner option. India is no exception and stands to secure additional benefits from such a transition. Urban air quality is a serious issue with 14 of the 15 most polluted cities in the world being in India. Further, our import bill for petroleum fuels has reached astronomical proportions, having gone up from a mere Rs. 16 billion in 1981 to Rs 870 billion in 2017. Violent fluctuations in international crude oil prices have led to an adverse impact on our energy security and our financial planning for reasons over which we have no control. [Read more](#)



# EV FEATURE

## A DELUGE OF BATTERIES IS ABOUT TO REWIRE THE POWER GRID

by David Stringer | August 2019 | From Bloomberg Markets

It's just a marketing gimmick. But it casts a spell.

A pale orange-and-gold sunset bathes the macadamia plantations and avocado orchards that sweep down to Australia's Byron Bay. The coming dusk is a cue for two sleek Tesla battery packs in the garage at Amileka, a secluded holiday villa nearby. They stir silently into action—powering the appliances in the five-bedroom home's twin kitchens, recharging a \$100,000-plus Model X SUV, driving a filter pump for an 18-meter swimming pool sparkling in the shade of a century-old native black bean tree.

From first light on this Southern Hemisphere autumn day, a bank of 33 rooftop solar panels has been capturing the sun's energy. At times, the electricity is directed back to the local grid. But mostly it's funneled into the garage and stored in Powerwall units, in the same type of rechargeable cells that fuel the automaker's vehicles. The batteries—as tall as refrigerators, as thin as flat-screen TVs—will power this unusually energy-hungry villa deep into the evening.

But not all night. The solar array and batteries meet just half of Amileka's average energy needs. So after a few hours, the 25-acre, \$1,160-a-night miniresort that Tesla Inc. uses to promote its products must tap into the local electricity grid.

The photogenic demonstration on Australia's eastern coast presents a vision of what some see as the most significant shift in the energy sector since the late 19th century: rechargeable batteries—in electric vehicles, homes, industrial plants, and power grids—that will make the transition to renewable energy possible. The actual future of energy may be less postcard-worthy. It may look more like a fleet of electric school buses. And the end of utility companies as we know them.

**If you are wanting to run your home just on solar and batteries ... it's going to be tough. ... At this point it's pretty overstated.**

By 2050 solar and wind will supply almost half the world's electricity, bringing to an end an energy era dominated by coal and gas, according to forecasts by BloombergNEF, Bloomberg LP's primary research service on energy transition.



It can't happen without storage. The switch from an electricity system supplied by large fossil fuel plants that run virtually uninterrupted to a more haphazard mix of smaller, intermittent renewable sources needs energy storage to overcome two key hurdles: using power harvested during the day to supply peak energy demand in the evening and ensuring there's power available even when the wind drops or the sun goes down.

"We think storage can be the leapfrog technology that's really needed in a world that's focused on dramatic climate change," says Mary Powell, chief executive officer of Green Mountain Power Corp., a utility based in Colchester, Vt., that's worked with Tesla to deploy more than 2,000 residential storage batteries. "It's the killer app in a vision to move away from bulk delivery systems to a community-, home-, and business-based energy system."

Utilities aren't panicking yet. The prospect of large numbers of residential consumers moving fully off the grid is probably overstated, says Zak Kuznar, managing director of microgrid and energy storage development at Duke Energy Corp., a Charlotte-based utility that supplies electricity to more than 7.5 million customers in six American states. "If you are wanting to run your home just on solar and batteries," he says, "from where the technology is today, it's going to be tough. It's something we are keeping an eye on, but at this point it's pretty overstated."

Lithium-ion batteries continue to have limits in terms of the amount of energy they can store, and they're typically able to supply energy to grids for just hours at a time, not days or weeks. What's more, concerns are rising over the environmental costs of mining lithium in Chile's parched Atacama Desert, and over a cobalt industry in the Democratic Republic of the Congo, that's tarnished by the use of child labor, to supply battery manufacturers. And the sector is just beginning to prepare for the future need to recycle or dispose off a torrent of expired battery packs.

Still, optimism abounds. Battery storage technology is nearing a tipping point like the one that accompanied the "massive" adoption of solar power some years ago, says David Frankel, a partner at McKinsey & Co. in Los Angeles whose clients include energy and industrial companies.

Mainstream adoption of electric cars is the third great stage in the transformation of the global energy sector—a natural outgrowth of the first two: the spread of cheaper renewable energy and the evolution of batteries, says Marcus Fendt, a managing director at Mobility House GmbH, a tech company in Munich.

And it's coming, however slowly. By 2040, according to a BNEF forecast in May, almost 60% of new car sales and about a third of passenger vehicles on the road will be electric.



On the Portuguese island of Porto Santo, a 16-square-mile outpost in the Atlantic where Christopher Columbus lived for a time, the convergence of automaker and utility company is plain to see. Renault SA and Empresa de Electricidade da Madeira are testing a suite of storage technologies as the isolated community strives to curb imports of fossil fuels. Twenty electric cars—rising to 100 or so next year—cruise the streets. Some are taxis, some are shared by residents, and one is even used by the police as a patrol car.

Islanders are also testing a network of about 40 charging stations. Banks of second-life batteries—cells that are no longer powerful enough to be used in a car but remain adequate for less-intensive storage applications—have been connected to a local grid to soak up excess energy from wind and solar farms.



The French automaker has a second project on Belle-Ile-en-Mer, off the northwest coast of Brittany. At a school on the island, rooftop solar panels and batteries power classrooms during the week and a fleet of rental cars over the weekend. Renault has struck an agreement with Electricité de France SA to expand these experiments elsewhere.

The next step in storage technology is to turn electric cars into money makers for their owners. The latest global experiments along these lines entail hooking the cars' batteries directly to power grids. These vehicle-to-grid connections enable reversible charging, the two-way transfer of electricity from cars to houses or back to power grids. A vehicle's battery can power home appliances, sure. But more significantly, whenever it's parked and plugged in, the car can make money by storing energy or helping stabilize supply and demand on the grid.

Drivers will be able to carry renewable energy wherever they go. "You can be a virtual grid," says Fendt, of Mobility House, which works with Nissan Motor, Renault, the Dutch grid operator Tennet Holding, and other clients. "I take the sun around with me."

Fendt calls the pilot projects "playgrounds for the future." Renault has begun tests in Utrecht, in the Netherlands, where electric cars have been fitted with reversible chargers. In Utrecht and elsewhere in Europe, says Yasmine Assef, program director of Renault's new-energy business, "we're not so much testing the technical part. What we really want to test here is the business case."

Customers can already earn some money by charging their cars on a schedule determined by the availability of energy on the grid, Assef says. Under a program Renault operates in the Netherlands, a typical consumer makes €60 (\$67) a year from the utility for charging during low-demand periods only, she says. "As a customer," she says, "the journey is quite easy—you plug in, you forget, and you make money."

In Hagen, Germany, a Nissan Leaf has been connected to the country's power grid since January. By storing energy when there's a surplus and returning it to the grid as demand rises, the car could eventually earn about €1,000 a year, Fendt says.

America's iconic yellow school bus is getting into the act. To go electric, a vehicle that size—one that sits idle for much of the time—requires a huge battery. Macon, Ga.-based Blue Bird Corp., which sells battery-powered models that carry 84 passengers, says it will begin selling vehicles with two-way connections to the grid before the end of the year.

Ride-hailing companies such as Uber Technologies Inc. and other operators of large fleets will likely find ways to generate additional revenue from cars that are parked and not taking fares by plugging them into the grid, Fendt says: "They will connect the car and squeeze every last cent, every last euro out of it."

Automakers are becoming "a part of the electricity ecosystem," as Renault's Assef puts it. They're not just making EVs that can return power to the grid. Like Tesla, Nissan produces and sells energy-storage products, while Volkswagen AG—the carmaker with the most aggressive timetable for adding electric models—plans to supply homes and small businesses with renewable energy through a retail power subsidiary, Elli Group GmbH.

**Batteries Are Getting...**

<b>Cheaper</b>	<ul style="list-style-type: none"><li>• The cost of lithium-ion battery packs is down 85% since 2010</li><li>• It's forecast to fall 65% more by 2030</li></ul>
<b>More powerful</b>	<ul style="list-style-type: none"><li>• 1990s: Sony uses lithium-ion batteries for handheld video cameras</li><li>• 2019: Lithium-ion batteries propel cars at 250 mph and soak up energy from vast solar farms</li></ul>
<b>More available</b>	<ul style="list-style-type: none"><li>• Forecast: Residential, commercial, and utility-scale storage capacity will jump more than 100-fold to over 2,500 gigawatt-hours by 2050</li><li>• Forecast investment: \$843 billion, more than 60% on utility-scale batteries</li><li>• Growth in Tesla storage battery sales will "at least double" this year, Elon Musk said in June</li></ul>

Sources: Bloomberg, BNEF, Tesla Inc. Bloomberg

Oil giants are also investing in storage. Through its New Energies division, Royal Dutch Shell Plc is spending about \$2 billion a year on these technologies. The company says it wants to become the largest electrical power company in the world by the early 2030s. In addition to acquiring a U.K. electricity provider and a car-charging operator, Shell this year bought Germany's Sonnen GmbH, a leading supplier of residential storage systems. In May, Shell announced plans to install industrial-scale batteries at two facilities in Ontario, a crude refinery and a motor oil plant. Chevron, Total, and BP have also made investments in electric car charging or storage companies."

In parts of the U.S., storage batteries are already a cheaper option than so-called peaking plants. These typically are environmentally unfriendly fossil-fuel-fired power stations that are needed only for a couple of weeks each summer, when electricity demand spikes, and are idle the rest of the time. As some coal-fired power stations are retired, “there could be a situation where, instead of building that new peaking plant, I am putting more storage on the grid,” says Duke Energy’s Kuznar.

Duke has outlined plans to invest more than \$500 million in battery storage projects over the next 15 years. Other utilities from California to China are also considering how battery systems can be added to existing networks, potentially deferring or eliminating the need for some investments in power plants. Investors probably underestimate the impact falling battery prices will have on the energy sector, as well as the speed at which change will come, says Tom King, chief investment officer at Nanuk Asset Management Pty., a Sydney-based fund that focuses on renewables and energy efficiency. The consequences, he says, “will be profoundly negative for conventional utilities. That’s an almost unstoppable outcome.”

At a remote site about 150 miles north of Adelaide in the state of South Australia sits the Hornsdale Power Reserve. This is the world’s largest operating lithium-ion battery facility, a city block-size cluster of 2-meter-high Tesla battery units tethered to a field of 99 towering wind turbines.

The French renewable energy company Neoen SA spent €56 million on Hornsdale, which can deliver enough electricity to power 30,000 homes. But the plant’s key task is to help stabilize fluctuations in supply and demand, preventing outages in a state the size of Egypt where a rising share of renewables now accounts for almost half of power generation.

Australia is a natural testing ground for renewable energy research. Vying with Africa as the world’s sunniest continent, the nation of 25 million people grapples with some of the highest power prices in the world. This year, as many as 60,000 homes—admittedly, a minuscule fraction of the total—will add battery storage systems, making Australia the world’s largest residential storage market. Glorious beaches, fine weather, a counterculture vibe—these things have drawn surfers and eco-conscious hippies to Byron Bay since the 1960s. More recently, stylish resorts and swank holiday homes have moved in. Most, like Amileka, have installed rooftop solar panels. And more and more, storage batteries are joining the list of eco-accoutrements.

At the Arts & Industry Estate—a collection of boutiques, galleries, artist studios, and the like—a microgrid and storage battery setup will enable about 30 tenants to pool and share solar energy, lowering their bills. Nearby, a refurbished 1949 passenger train runs on solar power, shuttling tourists between the town’s main shopping strip and a beachside resort and sending surplus electricity back to the local grid. This isn’t exactly an eco-warrior’s utopia, but maybe it’s enough to give conventional electricity producers pause.

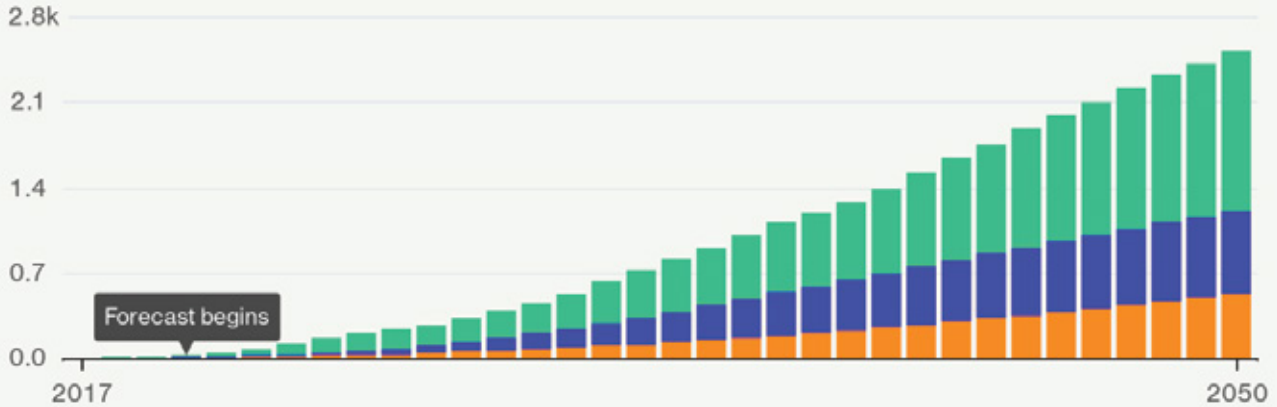
“I wouldn’t want to be a utility provider, particularly in the suburbs, in another 30 years,” says James Kennedy, chief technology officer at Brisbane-based Tritium Pty. The company, which manufactures some of the world’s fastest electric car charging stations two hours north of Byron Bay, is also studying the integration of vehicles into power grids. “What might sound like science fiction is in reality only two or three years away.”



## Storage Room

Cumulative global installed battery capacity, in gigawatt-hours

Residential small-scale Commercial small-scale Utility-scale



Source: BloombergNEF

## EVENTS

### Webinar on Impact of EV Charging on the Local Grid

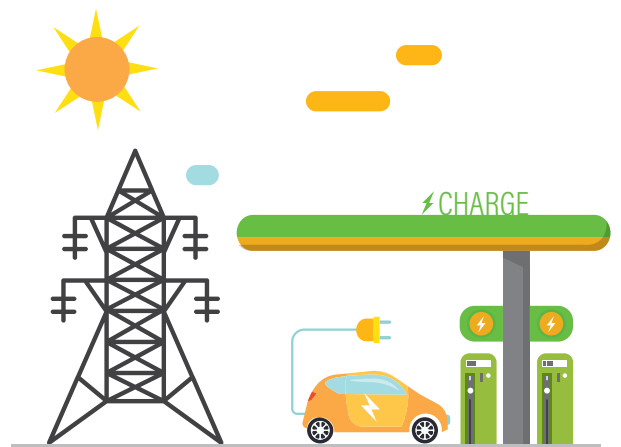
**Organised by TheCityFix Learn of WRI India**, this webinar will discuss the basics of electricity distribution networks (EDN) and its readiness for dynamic load from electric vehicles, and challenges and opportunities in using solar and wind energy to charge electric vehicles. With EV fleets slated to grow, we can expect a significant impact on the power demand in India. In this webinar, experts from GIZ and PRDC will discuss a study they did on this topic recently.

**When: September 16, 2019, 3 to 4 pm IST**

#### Speakers

- 1) Dr. Indradip Mitra, GIZ GmbH, India
- 2) Sudhanshu Mishra, GIZ, India
- 3) Dr. Chandrashekhara Reddy Atla, Power Research and Development Consultants Pvt Ltd, Bengaluru

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