

# EVCONNECT

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**NEWSLETTER**

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## FROM THE CEO'S DESK

Dear Friends,

The past issues of EVConnect received many praises and worthy inputs. The interest generated has excited us and we now look to expand the information we share through the 9th edition of WRI India's electric mobility newsletter. To do so, WRI India and Shakti Foundation have come together to jointly produce the EVConnect from this month onwards. WRI India is immensely grateful to Mr Krishan Dhawan (CEO) and Mr Vivek Chandran (Program Manager: Transport) of Shakti Foundation for their continued support to our work.

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 Mr. KR Jyothisal, Principal Secretary of Transport of the Government of Kerala. It also includes our take on the FAME 2 scheme. The feature highlights key insights from the electric mobility session held at Connect Karo, our annual conference that took place last month.

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



Dr. OP Agarwal  
CEO, WRI India

## WATCH

Presenting the montly 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 KR Jyothisal**  
Principal Secretary, Transport,  
Government of Kerala



**Battery Electric Vehicles**  
A film by NaturalResourcesCa



# POWERTALK

## IN CONVERSATION WITH MR KR JYOTHILAL

PRINCIPAL SECRETARY, TRANSPORT, GOVERNMENT OF KERALA

*Interview taken by Amit Bhatt, Director, Integrated Transport, WRI India*

(Copy-edited for the print version)

“By 2025 we would like to have at least 2 million EVs. To make this happen, we need the cooperation of all. First priority for us are the transport vehicles, personalized vehicles come in the last phase.”

“We are looking at further technologies also like hydrogen fuel cells so that we can away from the battery costs, which at present is 40% of the vehicle cost.”

**Interviewer:** Kerala has come up with an EV policy, can you share some insights about it?

**Mr Jyothilal:** The National Green Tribunal (NGT) issued an order banning all vehicles which are polluting six cities in Kerala - all diesel vehicles that are ten years or older. So we looked at what are our options – i.e. LNG, CNG and then electric. In fact, we were the first state to launch LNG buses in India. Electric is the other option. We set up a committee headed by Professor Jhunjhunwala and we drafted an EV policy which is very progressive. By 2022 we would like to have 1 million EVs on Kerala roads. He has identified a pilot fleet of about 2 lakh two-wheelers and 50,000 three-wheelers, 100 goods vehicles and 3,000 buses, out of a fleet of 6000 public utility buses, which are run by KSRTC. By 2025 we would like to have at least 2 million EVs. To make this happen, we need the cooperation of all. First priority for us are the transport vehicles, while personal vehicles come in the last phase. Next is para-transit which includes three-wheelers, and then two-wheelers, which are in maximum use. In fact, we issued a notification saying that we will not allow re-registration of diesel autos in the 15th year - they will either have to convert into electric or buy a new EV. And in three cities we gave additional permits, other than what is existing. We identified three cities – Trivandrum, Kochi and Calicut – for adoption in the first phase. In fact, by next year, Trivandrum city will have 100% electric buses. So now the bigger challenge that I am working on is how to make FAME 2 happen in one year. If you make the public transport in one city 100% electric, then it boosts other cities to come in line. Then we need to address why people are not attracted toward electric vehicles – first is the economics of it, second is the charging infrastructure that should be made available. In fact, we are in talks with IOCL and all the oil marketing companies and we feel that they should transform into total energy companies so that they set up infrastructure every 25 kms. So KSRTC, Kerala Electricity Board and Oil companies – all these ecosystem players – have to work together. You need to attract talent also in this field. Because unless you have a manufacturing base who can supply these many vehicles – 1 million vehicles is not an easy task. To do so we have to focus on a conversion kit which are available in other countries. Second is manufacturing and assembly of the vehicle

and the battery. We missed the bus on ICE buses, but we should not miss the bus on this. Kerala Automobiles, a state-owned automobile company, is in the process of obtaining ARAI certification. They are coming out with electric autos. Then to support the charging infrastructure, we need to give incentives – bulk charging and public charging – with subsidised electricity of 5 INR per unit. We also need centers of excellence for R&D - because in the long run whatever we do it should be technology neutral. This is an evolving area. We are trying battery swapping with Ashok Leyland, and charging with Pentagraph, plus various other initiatives. For FAME 2, our idea is that the viability gap should be bridged, and the scheme should be technology neutral. For instance, we did a pilot in Sabarimala with ten electric buses and we made profits with no subsidy because every bus was made to run minimum 100 km per day and night. In-between they were charged. We got it for roughly INR 43 per km from an operator – only thing is that if you run more kms you get a lesser rate. So, we should have one system in city buses and with long distance buses we should have another system. Because you can't compare one with the other. For electric vehicles, we need a different tax structure. Non farebox revenue are also important for operating electric bus systems.

*Interviewer:* Where do you see electric mobility, in the medium to long term, in the state?

*Mr Jyothislal:* We are looking at public transport vehicles – one is auto rickshaws, second is buses. So that is para-transit and public transport. In the case of auto rickshaws, we have limited the number of permits. This is to create transformation. Then the bottom line is money – the business model that you are proposing to the auto owner. So we brought in a subsidy scheme, we give 3,0000 INR to the auto owner when s/he registers – we immediately note down their bank account details and transfer the amount. So instead of the OEM getting the benefit, the buyer gets it. Feeder vehicles is another segment that we are looking to grow. E.g. Kochi metro has already started small scale with about 20 electric autos and this will slowly pick up when other drivers see the operational benefits and make the natural shift from other modes. But it's a slow process. In the medium term, another segment that we are looking to grow is public transport – wet lease and dry lease plans for the three cities.

In fact, we request WRI India to do a detailed study on various technologies with which we can convert – wet lease, dry lease or buying own buses etc. – what is the best experience from around the world. WRI India can tell us what is best because we may not have to reinvent the wheel and we can learn from mistakes that others have committed. And where all should the charging infrastructure be set up. Then what about private sector buses – Kerala's private bus fleet is 3x the size of the public fleet at around 15,000-20,000 vehicles. So unless we get them also to electrify, we may not achieve the target. So one is conversion kits that we can cross-subsidise. Another is to look for alternate sources of revenue – e.g. we could allow digital advertisements. Third is getting some multilateral funding with an escrow account. In Kochi all the private buses are made a part of one company. Similarly, auto owners have also been made into seven organisations. You organise everyone, then it is easy for us.

Then comes route rationalisation – this should also work with everything else, so that there is no competition and everyone is able to survive. This way the individualistic attitude is discarded and you look at how best you can collectively bargain and maximise your revenue. For a demand based route design, we brought about a legislation which is in the assembly. Now you can know in real time how people move – with Google data. Use the digital platforms to see the demand and based on demand you should be able to plan your routes so that you optimise your revenue. So probably we should look at per km subsidy – this should not be limited to STUs only – it should also be extended to the private sector because it plays a major role. A public-private partnership (PPP) is the best. Ultimately it is citizen centric governance that we should look at – what a citizen wants and how best we can deliver – it is immaterial whether the public or the private sector does it. There are some restrictions among private players, for instance they don't operate in the night whereas STUs are required to do so because they have a social part to play. Apart from that, on commercial terms, we should treat them at par. This way private buses can also be electrified.

That is what we are looking at in the short and medium term. In long term, we would like to impose a congestion fee, polluter fee, parking fee – based on the globally accepted idea that the polluter has to pay. Our parking policy is in the offing. We should look at Singapore's LTA that is doing wonderful work – they charge as per the time. Just like Time of the Day metering for electricity – we can do something similar for transportation. This can be done electronically by using technology. The quality of public transport also has to be improved – earlier 85% of the people used to travel in public transport, now it has come down to 15%. So this is actually creating havoc in cities – air pollution, emissions etc. Kerala has seen the worst of climate change – recent floods and now heat waves. Seeing these effects of climate change, we should be all the more geared towards zero emissions or low carbon vehicles.

*Interviewer:* What are the big barriers that you see in accelerating EV in Kerala?

*Mr Jyothislal:* The subsidy-led system is not sustainable in the long run so we need to think about alternatives to make it viable. Since the technology is still evolving, after some time the costs may come down. In fact, we are looking at new technologies like hydrogen fuel cells so that we can reduce battery costs, which at present is 40% of the vehicle cost. Other issues we are looking at is a solar based system for vehicle to grid connection. This can also help us in grid balancing. For this we are also setting up a center of excellence, with the University of Birmingham, for research and development. Skilling is another very important area because in the switch from ICE to electric, there is a complete switch from mechanical to electrical engineering. The industry needs youth with new skill sets – I think that is another challenge ahead of us. All of our engineering colleges and universities need to be geared up for generating the talent pool that is required for the industry.

*Interviewer:* How can research organizations like WRI help in addressing these barriers?

*Mr Jyothislal:* WRI India is an organisation with global presence and global insights. We would like to make use of your inputs in implementation where the real work begins. This is where we will need support. For instance, we would need a detailed action plan for where exactly we need to set up the charging infrastructure, which is the best way of doing it, how should companies merge or transform themselves – for instance electricity boards and oil companies, and public and private bus operators – are there experiences from international cities that we can adopt? Second, the most viable model for different charging technologies – you will be the best organisation to advise what will be best for the state. The implementation strategy for Trivandrum, Kochi and Calicut is where we would like detailed studies with your help. So that tomorrow we should not say that we made a mistake by not looking into that aspect.





## UPDATES FROM THE WORLD

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### **China's plans for the electrified, autonomous and shared future of the car** | *Policy*

A majority share of the global electric vehicle sales can be accorded to China. Conventional wisdom would attribute this to a strong local auto industry but that is not the case. The auto production of indigenous Chinese car makers doesn't match up to the offerings of foreign businesses who began production in China in the 1980s. Nonetheless, this hasn't impeded the country's plans for making electric, shared and autonomous vehicles available in the country. Using a systems-approach, China has built a network of infrastructure and has given impetus to technologies and policies that help attract users to this infrastructure. This includes ride-hailing apps, smart public transport, bike and scooter sharing schemes, and refueling systems. Despite having a middle-of-the-road auto industry, this far-sighted approach is giving China an edge in what is undoubtedly the future of mobility

*Takeaway for India:* Taking an ecosystem approach in India would help create a widespread network of electric mobility that is convenient and viable for citizens, cities and businesses to invest in. Drawing out such plans, and implementing them, would be a gradual process but it will help diversify India's industrial innovation and create multiple avenues for job creation. [Read more](#)

### **In Germany consumers embrace a shift to home batteries** | *Market Development*

One in every two solar photovoltaic panels in Germany are now sold with a battery storage system and nearly 1,20,000 households now own a battery storage system. For a country with 81 million people, this is not a very large number, yet what is fascinating is the rate at which battery systems are being adopted. The rising energy costs in Germany, coupled with the falling prices of batteries, makes for a compelling offering targeting people who increasingly want to disembody from the utilities to fulfill their energy needs for their cars and homes. As a result, energy use is increasingly becoming decentralised – giving a fillip to the solar industry. Shifts in consumer preferences have also signaled the industry to the extent that many oil companies are rising to the occasion and investing in energy storage businesses. Scholars of climate change add that to meet the goals of the Paris Climate Agreement more batteries will be needed – as many as 10 million in Germany alone. This will necessarily entail making the use of energy storage systems simpler and cheaper.



*Takeaway for India:* Making battery storage systems inexpensive and accessible will allow India to replace its fossil fired electricity with cleaner energy sources. This will help in three ways – it will increase the share of renewables in the energy mix, it will increase the well to wheel efficiency of vehicles, and it will result in a plan for the safe management of used batteries that contain hazardous chemicals. Although these are early days of electric adoption, this is the right time to lay the groundwork – with policies that help in market development - for decentralised and clean forms of energy that installed batteries can facilitate. [Read more](#)

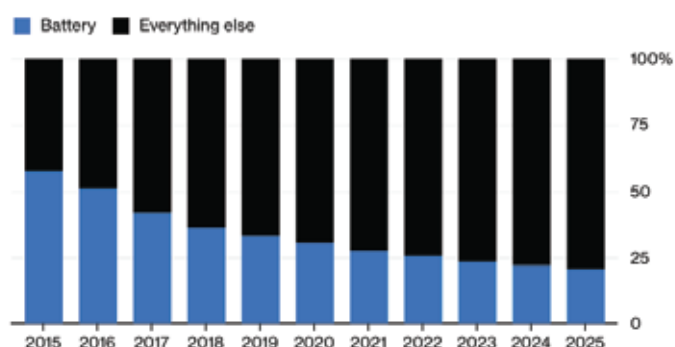
### Electric car price tag shrinks along with battery cost | *Technology and Market Development*

The cross-over point when the cost of an EV falls below that of an ICE vehicle is coming sooner than what was predicted by Bloomberg New Energy Finance. In Europe, this will happen by 2022 – as opposed to 2026 that was projected earlier. This is owing to the sharp decline in the cost of batteries. Earlier, nearly 57% of the upfront costs of the EV was attributed to the battery pack. This year it has descended to 33% and by 2025 it will further go down to 20%. Improving battery economics is improving the costs of other parts of the electric powertrain as well, such as the chassis and body, making it cheaper for manufacturers to make electric vehicles. Cost improvements are also making it viable for manufacturers to electrify vehicle segments that were hitherto considered unviable such as small excavators and water ferries.

*Takeaway for India:* Decline in the upfront costs of EVs is positive news for the Indian auto market. The plummeting costs of batteries and the cost improvements in electric powertrains will allow manufacturers to attain viability in production sooner than expected. This also means that they would be able to produce electric versions of small vehicles (2/3 and 4 wheelers), which dominate the market and are price sensitive. The regulatory plans should take advantage of this uptake by keeping pace with new developments. [Read more](#)

### The Incredible Shrinking Car Battery

EV battery cost for U.S. medium-size car as a percentage of retail price



Source: BloombergNEF  
 Note: Includes profit margins and costs other than direct manufacturing costs.

## UPDATES FROM INDIA

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### **Micromax co-founder goes mobile with electric mobility; launches EV bike company** |

*Market Development and Technology*

Rahul Sharma, founder of Micromax, recently launched a new company Revolt Intellicorp that will manufacture artificial intelligence (AI) backed electric bikes. This is a futuristic idea in which the bikes can run long distances without the intervention of a driver. Revolt Intellicorp's Manesar facility (near Gurugram) can manufacture upto 1,20,000 bikes per year. [Read more](#)

### **Government bodies float tender for 500 EV charging stations** | *Technology*

Energy Efficiency Services Limited (EESL), Rajasthan Electronics and Instruments Limited (REIL) and National Thermal Power Corporation (NTPC) have floated tenders for nearly 500 charging stations. This follows the announcement of FAME 2, which aims to create 2,700 charging stations across the country. While EESL has floated a tender to set up 200 fast chargers in Delhi and Andhra Pradesh, REIL has floated a tender for 270 fast chargers, which includes a five year maintenance contract. NTPC on the other hand has signed MoUs with vehicle aggregators, such as Zoomcar and Ola, to ensure maximum usage of the charging stations they set up. [Read more](#)

### **Hyundai looks to make some EV components in India** | *Market Development*

Hyundai is in talks with strategic partners to set up the manufacturing of some parts of electric vehicles in India. The procurement division of the parent company is exploring the possibilities at present. The company also plans to launch its first electric vehicle in India in 2019 and will be launching hybrids as and when the market is ready.

[Read more](#)

### **ARAI makes the bid for electric auto rickshaws** | *Policy and Market Development*

Automotive Research Authority of India (ARAI) is working on the technology to convert existing petrol-run auto rickshaws into electric models. ARAI believes that consumers will be more confident of adopting electric vehicles if public transportation and other government sponsored fleets go electric first. The organisation hopes to partner with established players in the three-wheeler segment to further the electric revolution in the country. [Read more](#)



## EV @ WRI

### **Past experiences should guide us in rolling out electric vehicles**

*by Amit Bhatt, Director, Integrated Transport, WRI India*

The ministry of urban development (MoUD), now known as the ministry of housing & urban affairs (MoHUA), approved around ₹5,000 crore for the bus-funding scheme in 2009. As per the scheme, MoUD jointly funded procurement of around 15,000 buses for public transport in 65 Indian cities. Seeing the positive response, the scope for funding was expanded and additional 10,000 buses were made available to all cities.

The scheme was a game changer of sorts for public transport in India. However, the on-ground results were a bit mixed and that's what the DHI should learn in order to take the FAME 2 implementation forward.

[Read more](#)





# EV FEATURE

## SIX THOUGHTS ON INDIA'S MIND WHEN IT COMES TO ELECTRIC MOBILITY *by Neha Yadav, Research Consultant, WRI India | April 2019*

The 7th edition of Connect Karo, WRI India's annual conference on urban transition of India, took place last month in Delhi. The Hon'ble Vice President of India, Shri Venkaiah Naidu, launched the Electric Mobility Forum, a convening and scaling platform designed by WRI India. Compared to last year's Connect Karo, where stakeholders looked at electric mobility as a risky proposition and questioned its relevance, this year saw a marked difference. Nearly all audience members were convinced that the future of mobility is electric, and it is rightly so because it is going to put Indian cities and businesses at a position of environmental and economic advantage. Thus, majority of the discussion focused on How to rapidly deploy electric mobility in the country.

In India, several policies schemes – the Central Government's FAME 2 subsidy, guidelines for charging infrastructure, a couple of state-level EV policies – have been designed to grow the market for electric vehicles. And while it is fairly early to draw conclusions on which technology or policy works and which doesn't, it is a worthwhile exercise to track the key questions, that face the private and public players, which could espouse business and policy ideas. To do so, here are the six takeaways from the discussions on electric mobility at Connect Karo.

### 1. Batteries are money. Even the used ones from electronic goods

India doesn't have any primary reserves of lithium and cobalt to make lithium ion batteries. But this shouldn't hobble the country's plans for electric mobility. The key here is to recycle and reuse – a closed-loop recycling system. While batteries from electric vehicles are yet to enter the market in substantial volumes, an untapped resource for extracting raw materials are the used batteries from electronic goods such as laptops and phones. These are abundantly available in the system and can be mined for raw materials, which can be further used for creating new batteries and generating alternate chemistries. Additionally, batteries retired from electric vehicles enter their second life in which they can be used as stationery power storage devices for renewables such as solar – for days when the sun isn't shining. With a bi-directional grid, renewable energy can be supplied back to the grid when required. Renewables, including hydropower, account for nearly 35% share in India's energy mix. Battery storage will help in growing this share bigger and further reduce the carbon intensity of the electricity grid.



## **2. India moves differently than the rest of the world. This should inform the electric mobility policy in the country**

Indian cities are denser than cities in the United States, Europe and other parts of the world. High density means that the average trip lengths are much shorter – nearly 40% of the trips are between 0 to 5 km (as per Census 2011). High density agglomerations also mean that the majority of the population relies on public transport and non-motorised modes, leaving only a small share to private trips. Some states have begun taking a data driven approach to burnish their understanding of how dwellers in their region move. These spatial dimensions should serve as the basis for defining the battery technology and re-energising systems (charging/swapping) for vehicles – both of which are critical for creating a convenient and affordable ecosystem for the Indian masses. Technologists in the convening reasoned that if the average driving distances in India are short, then there is no need for vehicles to have large batteries – a strategy used in other countries for overcoming range anxiety. Not only are large batteries expensive, carrying surplus battery weight also reduces the overall vehicle efficiency and increases the operational and capital costs of running. Instead, the focus should be on creating a dense network of charging and swapping stations.

## **3. Subsidies are good at the starting stage. But beyond that demand side management is needed**

A subsidy-led system can help bridge only a meager share of the electrification target - whether at national or state level. For deeper penetration of electric, a bouquet of demand side strategies – both fiscal and non-fiscal – that conspicuously favor EV owners over those driving conventional vehicles are needed. These include low emissions zoning which EVs can access more easily than ICE vehicles, designated parking spots, less traffic restrictions, exemptions from registration taxes, and an accessible charging network, to list a few. Preferential treatment for EV owners would create confidence in the users of conventional vehicles, who will then naturally flock to electric. Countries such as China have benefited from such an approach.

## **4. Handing consumer a vehicle and a key isn't enough. Address buyer needs with an eco-system approach**

When buying a conventional vehicle, the buyer intuitively knows how to use it – fueling, repairing, maintenance etc. A well-established value chain is at his/her command. At the moment, purchasing an electric vehicle doesn't come with this benefit. But this gap needs to be bridged soon, lest we run the risk of losing consumer confidence. Manufacturers of two-wheelers shared the importance of getting an adequate understanding of the spatial and social constraints of their customers. As part of the vehicle purchase, some manufacturers offer recces in which they identify the best spots in the customers' houses for installing charging equipment and equip the customers with a digital app that pinpoints charging points in the city. While these strategies will differ with vehicle segments, understanding dominant consumer behavior will contribute in making a seamless passage from conventional to electric.

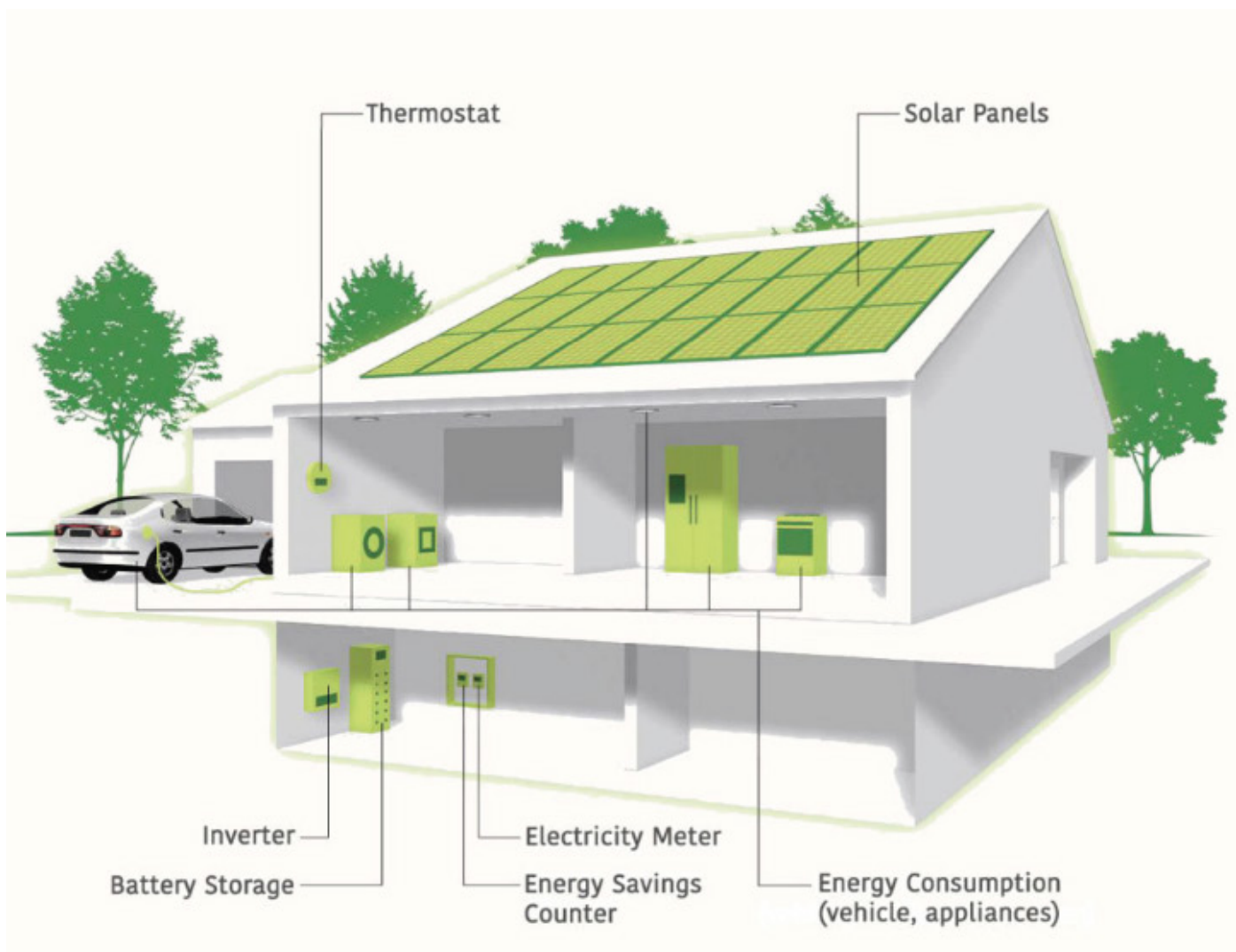
## **5. Where will the money come from?**

High capital costs of electric vehicles, and charging and swapping systems, is preventing wider electrification. With only scanty projects on ground, performance benchmarks are yet to be established. This makes it difficult for financiers to hedge against the possible failures that a new technology may encounter – e.g. failure of a battery to give the promised electrical mileage, or a sooner than anticipated end-of-life for an electric bus. Addressing the need of finance in the market and limiting the risk that financiers face will need joint work from both public and private finance firms. New business models will be needed – e.g. those that diversify the ownership of batteries. Some opined that if procuring project finance is easy, the need for subsidy is less.

## **6. Judicious use of existing assets and infrastructure.**

The advent of electric mobility will generate the need for new forms of infrastructure – such as charging and swapping points, and new vehicles. Whether public or privately funded, this transition shouldn't saddle any entity with the need to generate large sums of funds. First focus should be on adapting existing infrastructure to support electrification. Take, for instance, using existing fuel stations for setting-up charging points and battery swapping centers and retrofitting conventional vehicles instead of scrapping them altogether – a possibility that is being explored with electric three-wheeled autos. Even in the event that new infrastructure is put in place, shared systems can be explored. For instance, electric fleet operators, such as buses and taxi fleets, could explore opening their charging and swapping infrastructure for use by vehicles using similar charging requirements, for a market determined fee.

Electric mobility is a new but promising path for India. Winning it will need stakeholders to focus on - efficient technologies, deep understanding of vehicle users and commuting patterns, financial models that cap the risks, and maximizing the use of existing assets. Active response to these factors will help us take meaningful actions on the ground.



**With smart home energy systems, energy generated by solar panels is stored in batteries and used to power appliances and charge electric vehicles.**

*Source: GRAPHIC by ENERIX*

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WRI is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity and human well-being.

[www.wri-india.org](http://www.wri-india.org)

## ABOUT SHAKTI FOUNDATION

Shakti works to strengthen the energy security of India by aiding the design and implementation of policies that support renewable energy, energy efficiency and the adoption of sustainable transport solutions.

