

MY ELECTRIC AVENUE



DRIVING TOGETHER
FOR A CLEANER FUTURE

MY ELECTRIC AVENUE



MY ELECTRIC AVENUE HAS BEEN TRIALLING NEW TECHNOLOGY TO HELP ELECTRICITY DISTRIBUTION COMPANIES MANAGE THE DEMANDS FROM INCREASING NUMBERS OF ELECTRIC VEHICLES.

THIS IS A SUMMARY OF WHAT WE'VE LEARNT

WHAT IS MY ELECTRIC AVENUE?

MY ELECTRIC AVENUE, A PIONEERING OFGEM-FUNDED PROJECT, HAS BEEN EXAMINING THE IMPACT OF ELECTRIC VEHICLES (EVS) ON THE LOCAL ELECTRICITY NETWORK AS SALES OF EVS CONTINUE TO RISE.

THE PROJECT HAS BEEN ADDRESSING TWO KEY, PREVIOUSLY UNANSWERED QUESTIONS:

CAN LOCAL ELECTRICITY NETWORKS COPE WHEN LARGE NUMBERS OF EVS ARE CHARGED AT PEAK TIMES? IF NOT, WHAT CAN WE DO ABOUT IT?



My Electric Avenue is the public-facing name for the Ofgem Low Carbon Networks Fund project which is officially titled '12EV - Innovation Squared: managing unconstrained EV connections'.

My Electric Avenue has been working with specially created clusters of neighbours around the country who have all been driving Nissan LEAF electric cars for 18 months. This has been carried out to mimic a future scenario where many people in an area choose to use a pure electric vehicle or plug-in hybrid electric vehicle (PHEV).

The project has been led by EA Technology, a trusted third party innovation technology deliverer, with project partners Scottish and Southern Electricity Networks (SSEN) (the lead Distribution Network Operator, or DNO), Nissan (EV supplier), Fleetdrive Electric (EV rental programme management), Zero Carbon Futures (charging point network developer) and Northern Powergrid (participating DNO).

In addition there are two academic partners, the University of Manchester (providing network modelling support), and De Montfort University (providing socio-economic support). Ricardo has been providing independent technical verification to the project.

The project set out to look for ten 'electric avenues' – groups or 'clusters', with ten people or more – where each person would drive an electric car for 18 months to trial a new technology, 'Esprit', which would monitor and control the electricity used when their car was being charged.

The Esprit system is designed to avoid any potential power outages and damage to network infrastructure by temporarily curtailing high load devices to reduce the overall load on a single feeder or transformer.

Over 100 people in different clusters around Britain were successfully recruited to My Electric Avenue's Technical Trials. A further 100 people were recruited to the project's Social Trials; they also drove Nissan LEAF electric cars, but they didn't need to be in a cluster and they didn't have the Esprit technology fitted.

The project aimed to provide essential learning about managing the strain on the distribution network from the anticipated increased uptake of EVs, and to deliver a cost-effective solution to DNOs to reduce the need for network reinforcement and allow a faster uptake of EVs.

CAN LOCAL ELECTRICITY NETWORKS COPE WHEN LARGE NUMBERS OF EVS ARE CHARGED AT PEAK TIMES?

MY ELECTRIC AVENUE'S 18 MONTH TRIAL SHOWS THAT SOME LOCAL ELECTRICITY NETWORKS WILL REQUIRE UPGRADES TO HELP MANAGE THE INCREASE IN DEMAND THAT COMES WITH MORE AND MORE PEOPLE CHANGING OVER TO EVS.

The results of the project's modelling has shown that across Britain 32% of low voltage (LV) feeders (312,000 circuits) will require intervention when 40% – 70% of customers have EVs, based on 3.5 kW (16 amp) charging.

Susceptible networks are typically characterised by available capacity of less than 1.5 kW per customer.

My Electric Avenue has analysed the various kinds of low voltage networks in the UK and four types are expected to experience issues due to the uptake of EVs at differing penetration levels.

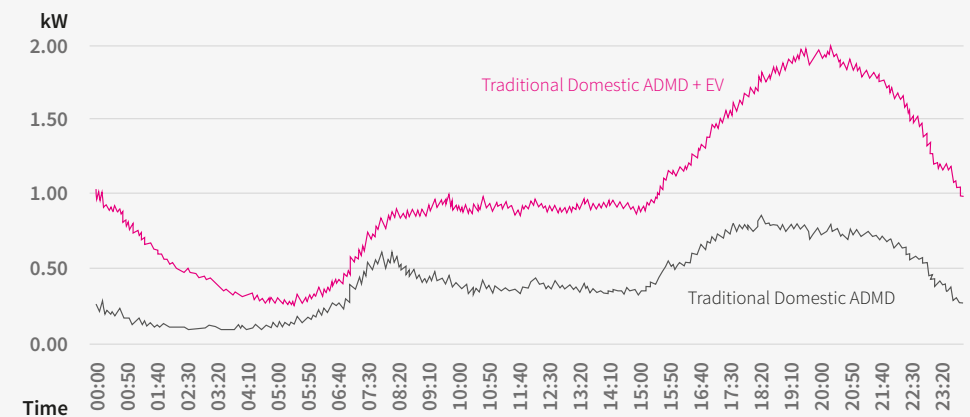
Traditionally, these findings would mean the replacement of underground cables in the street, however My Electric Avenue has been trialling a lower cost solution to this in the form of 'Esprit'.

It is worth noting that new EVs can charge at a rate (7kW) that is double that of the My Electric Avenue EVs (3.5kW), with charging rates and battery capacities continuing to increase further; more work is needed to understand what this means for local electricity networks.

FORECASTS SUGGEST THAT ESPRIT COULD SAVE AROUND £2.2 BILLION OF REINFORCEMENT COSTS UP TO 2050.

DOUBLING THE LOAD

THE AFTER-DIVERSITY-MAXIMUM-DEMAND (ADMD) TRADITIONALLY USED FOR DOMESTIC PROPERTIES IS 1KW; WITH THE INCLUSION OF AN EV THIS NEEDS INCREASING TO 2KW.



WHAT CAN WE DO ABOUT THE CAPACITY ISSUE WITH SOME LOCAL ELECTRICITY NETWORKS?

MY ELECTRIC AVENUE HAS BEEN TRIALLING A NEW TECHNOLOGY CALLED ESPRIT – AN INTELLIGENT CONTROL BOX, I.E. THE HARDWARE THAT IS ABLE TO CONTROL CHARGING – TO TEST IF THIS COULD HELP TO MANAGE THE LOAD ON THE LOCAL ELECTRICITY NETWORK AT TIMES OF STRESS.

The Esprit system employs demand side management techniques to protect power networks from potential overload that might be caused by the simultaneous recharging of numerous EVs on the same substation feeder. It does so by instigating temporary curtailment of recharging on a rolling basis (typically, in this trial, for 15 minutes each) across the local cluster of EVs.

The project showed that this technology was successful in curtailing charging when necessary, and therefore Esprit has the potential to be a solution for DNOs to prevent roads being dug up and new higher capacity cables installed. By 2050 we think this will give an economic saving of around £2.2 billion.

Any project that is attempting to do something new that hasn't been done before is almost guaranteed to experience challenges. One such challenge for My Electric Avenue was the prototype version of Esprit. Issues were experienced with both the 'Mark 1' and 'Mark 2' versions, however by the end of the project sufficient curtailment of EV charging took place in all clusters and enough data had been recorded to provide meaningful results, and to prove the capabilities of the Esprit Technology.

Esprit also helps DNOs maintain network voltages. Large loads like EVs can affect the system voltage, Esprit typically allows an additional 10% of customers to connect EVs before this occurs. Esprit can also help make networks more efficient; by shifting demand away from peak times Esprit reduces the losses in feeders by about 9%.

716% RISE IN PLUG-IN CAR SALES OVER THE LAST TWO YEARS



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PROJECT LEADS



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My Electric Avenue has received support from Ofgem through the Low Carbon Networks (LCN) Fund.