WESTERN POWER DISTRIBUTION

INNOVATION

NEXT GENERATION NETWORKS

Marketing and PR Report
January 2018
Electric Nation

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Glossary

Abbreviation	Term
EV	Electric vehicle
PR	Public relations
WPD	Western Power Distribution

This report provides a comprehensive overview of all marketing and public relations (PR) activity that has taken place for the Electric Nation project (the Project) from November 2017 to January 2018. EA Technology manages all aspects of marketing and PR for the Project on behalf of Western Power Distribution (WPD) and its project partners and suppliers. Automotive Comms delivers strategic direction and all associated marketing and PR services for the Electric Nation project.

1.1 Electric Nation

Electric Nation is the customer-facing brand of CarConnect, a Western Power Distribution and Network Innovation Allowance funded project. WPD's collaboration partners in the project are EA Technology, DriveElectric, Lucy Electric GridKey and TRL.

Electric Nation, the world's largest electric vehicle (EV) trial, is revolutionising domestic plug-in vehicle charging. By engaging 500-700 plug-in vehicle drivers in trials, the project is answering the challenge that when local electricity networks have 40% - 70% of households with electric vehicles, at least 32% of these networks across Britain will require intervention.

The project is developing and delivering a number of smart charge solutions to support plug-in vehicle uptake on local electricity networks. A key outcome will be a tool that analyses plug-in vehicle related stress issues on networks and identifies the best economic solution. This 'sliding scale' of interventions will range from doing nothing to smart demand control, from taking energy from vehicles and putting it back into the grid, to traditional reinforcement of the local electricity network where there is no viable smart solution.

The development of the project deliverables is being informed by a large-scale trial involving plug-in vehicle drivers that will:

- Expand current understanding of the demand impact of charging at home on electricity distribution networks of a diverse range of plug-in electric vehicles - with charge rates of up to 7kW+, and a range of battery sizes from <20kWh to 80kWh+.
- Build a better understanding of how vehicle usage affects charging behaviour.
- Evaluate the reliability and acceptability to EV owners of smart charging systems and the influence these have on charging behaviour. This will help to answer such questions as:
    - Would charging restrictions be acceptable to customers?
    - Can customer preference be incorporated into the system?
    - Is some form of incentive required?
    - Is such a system 'fair'?
    - Can such a system work?

The results of this project will be of interest and will be communicated to the GB energy/utility community, UK government, the automotive and plug-in vehicle infrastructure industry and the general public.

2.1 PR to support recruitment - overview

A key aim of marketing and PR under the Electric Nation project is to demonstrably support DriveElectric's customer recruitment goals to achieve 500-700 WPD customers recruited into the project trials by June 2018. To this end, weekly project management telephone calls are organised and facilitated by EA Technology between itself, Automotive Comms and DriveElectric to ensure that the marketing activity is providing the recruitment campaign with the tools that it needs in order to boost and maintain customer engagement in the project. WPD is invited onto these calls on an ad hoc basis to keep the WPD team informed, engaged and updated as required.

2.2 PR to support dissemination - overview

Formal reporting and dissemination of information and results, being technical where appropriate, is required to relevant government-related organisations such as Ofgem, OLEV, BEIS and DfT, as well as the utilities (including all GB distribution network operators, energy suppliers and generators), energy industry and consultants. The main message to these stakeholders is focused on progress and results of the trial, and technical measures that can be adopted around electric vehicle demand management, and potentially vehicle to grid technologies.

More general and less technical cross-sector and customer dissemination of information and results will be directed to Government, public sector, academic and professional bodies and institutions, and to the general public to an extent.

The marketing and PR strategy underpins all communications and dissemination activity for Electric Nation. It establishes a uniform approach to describing the project, its funding mechanism and key collaboration partners, together with both a long and short summary for the project (Appendix 1), as well as the key communication messages for use by all project partners and suppliers.

3.1 Key recommendations

The strategy identified the need to intercept buyers of plug-in vehicles before orders for vehicles and charge points are placed. These customers must live in WPD's area of the South West, South Wales, and Midlands; a map and postcode checker have been developed and used in the maximum amount of communication and housed on the Project's website. The strategy also identified the following:

- DriveElectric to encourage people taking out new plug-in leases to take part
- Need to encourage manufacturers, and critically their dealers, to promote the project
- Wider marketing, communication and PR, ultimately targeting all people who may be considering buying a plug-in vehicle in the near future

Managing expectations is critical to Electric Nation; there may be people who are keen to take part but who may not be able to do so due to a number of reasons, such as:

- They are outside of the initial areas
- Their property may not be suitable to have a charging point installed
- They may have to wait too long to acquire a vehicle
- All places for their vehicle technology may be already filled

Therefore, the Project is careful to manage expectations in all its communication; all communications materials stresses phrases such as "subject to eligibility and availability".

Trial participants and conduits to engagement / recruitment are:

- Potential trial participants, i.e. primarily prospective plug-in vehicle buyers
- DriveElectric customers
- Plug-in vehicle manufacturers and their dealers
- The Go Ultra Low Cities of Milton Keynes, Bristol and Nottingham / Derby through the relevant delivery organisations and Councils
- Low carbon/low emission automotive organisations (e.g. LowCVP)
- EV charge point/equipment suppliers and installers, particularly those companies contracted by DriveElectric to install the smart chargers under the Project
- Other automotive industry organisations (e.g. SMMT)

The strategy identified the need to intercept buyers of plug-in vehicles before orders for vehicles and charge points are placed.

In this period, trial recruitment has continued apace exceptionally well. Integrated partnership working between EA Technology and DriveElectric has achieved great results with 700 trial participants recruited into the project as at 10 January 2018; 3,007 EOIs have been received in total, 542 smart chargers installed, with 158 in process.

DriveElectric forecasts that all 700 smart chargers will be installed by end of February / early March 2018. All people expressing interest in the trial from now on will go on the reserve list (previously those on the reserve list went on to take place in the trial). This manages customer expectations, whilst also allowing any future attrition from the project trials to be managed, reducing risk of under achieving on trial participant numbers. The homepage was revised accordingly, in the last reporting period, as well as the message that appears on all enquiry forms (Appendix 2).

EA Technology is developing a positive and ongoing relationship with the Office for Low Emission Vehicles, which is supportive of Electric Nation, with smart charging being on the UK Government policy's agenda under the new Automated and Electric Vehicle Bill[1]. EA Technology met with the Head of Energy for OLEV on 4 January 2018 to provide an in-depth update on Electric Nation. As a result of this engagement, the project has been offered OLEV's Electric Vehicle Home Charge Scheme charging data, under an MOU to be signed by WPD. This data will support project analysis and in particular the development of the Network Assessment Tool.

As the project moves further into the demand management phase with its customers, management of trial participants' expectations continues to be critical. EA Technology is supporting DriveElectric's engagement with trial participants through provision of timely and appropriate letters and email communications.

[1] The Automated and Electric Vehicle Bill is currently going through Parliamentary process this year, as a successor to the Vehicle Technology and Aviation Bill.

4

During this period, activity has been geared towards:

- Supporting trial recruitment: maintaining and increasing momentum in both registrations of interest ('leads') and securing commitment to taking part in the trial, evidenced through numbers of smart charger installations completed
- Planning for managing customer expectations as the trial recruitment winds down
- Dissemination of early learning: of charging and plug-in times, at events such as COP23 and the Low Carbon Networks and Innovation (LCNI) Conference
- Introduction of the Network Assessment Tool (NAT): dissemination of the detail and work to date on the NAT at LCNI

4.1 PR to supporting trial recruitment - activity

Table 4.1 summarises the marketing and PR activity that took place between November 2017 - January 2018 in support of customer recruitment into the project's EV demand management trials. Due to the success of trial recruitment, this phase of activity has moved into managing customer expectations rather than active recruitment. The news item on the website reflects this.

Table 4.1: Marketing and PR activity November 2017 – January 2018: Supporting trial recruitment

Item	Date	Detail	Appendix
News item	29/11	Electric Nation is on track to achieve its target of 700 trial participants	Appendix 3

4.2 PR to support dissemination - activity

EA Technology has attended a number of relevant industry events to raise the profile of the Electric Nation project and to share early learning arising from the 'funnel diagram' showing spare capacity for managed charging. There has been good general media coverage in a number of high profile media outlets during this reporting period. These are detailed in table 4.2.

Table 4.2: Marketing and PR activity November 2017 – January 2018: Dissemination

Item	Date	Detail	Appendix
News items	06/12	Electric Nation launches smart charging guide at LCNI 2017 as 500 smart chargers are installed	Appendix 4
	29/11	Electric Nation to launch smart charging guide at LCNI 2017	
	29/11	Electric Nation in the news	
	29/11	Electric Nation presents at COP23, LowCVP and WPD conferences	
	15/11	Electric Nation in Autocar	
	14/11	Electric Nation presentation at the 2017 UN Climate Change Conference	
	05/11	Electric Nation on BBC Radio 5 Live	
	02/11	Electric Nation to present at the 2017 UN Climate Change Conference	
	01/11	Electric Nation featured in Energy World	

Of particular note is the media coverage for Electric Nation throughout November 2017, which included high profile presence in Energy World and Autocar magazines, plus radio interviews on BBC Wales and Radio 5 Live. Presence at events was high in this month as well, with WPD and EA Technology attendance for the project at COP23.

It is also incumbent on a project of this nature to raise awareness of its existence amongst the industry to guard against project duplication. Table 4.3 details the events attended at which EA Technology and WPD has presented on the project, the audience composition and estimated audience numbers, together with coverage in publications to disseminate project learning.

Table 4.3: Marketing and PR November 2017 – January 2018: Dissemination through events

Item	Detail	Appendix
COP23 9-10 November 2017	The Electric Nation project was presented at the 2017 UN Climate Change Conference (COP23), 6 to 17 November in Bonn. The Government had a UK Pavilion within the Bonn Zone at the conference, and specifically requested Electric Nation's presence. On the 9 & 10 of November it showcased UK expertise in low carbon innovation, particularly with an energy focus. Mark Dale from Western Power Distribution and Esther Dudek from EA Technology gave presentations on WPD's innovation projects including Electric Nation and OpenLV in the UK Pavilion.	Appendix 6
LCNI 6-7 December 2017	Dissemination of Electric Nation learning by EA Technology to the Distribution Network Operators and energy sector; introduction of the Network Assessment Tool, charging times and spare capacity. Also, formal launch of the Smart Charging Summary Guide.	Appendix 7
New Energy Forum 9 January 2018	WPD and EA Technology took part in an industry roundtable on 'EVs: Paving the way for transport electrification and the evolving business models for charging infrastructure'.	Appendix 8

Planning went well for Electric Nation's presence at LCNI 2017, a key event in the project's diary for mass dissemination of learning and raising project profile to all GB DNOs and energy industry. Arrangements were made in a number of respects:

- Electric Nation featured on one quadrant of the main WPD exhibition stand at the entrance to the event in the main hall; and
- Speaking slot at the event to disseminate early learning on EV demand management and progress towards securing suitable vehicle to grid units for integration into the customer trials.
- A photoshoot for project partners and suppliers was arranged to maximise exposure for the project from the event
- The presentation included official launch of the Smart Charging Summary Guide

Figure 4.1: Electric Nation partners and suppliers on the project stand at LCNI 2017

The Electric Nation demand management model was very well received at the event; WPD's Mark Dale was filmed talking through how EV demand management and vehicle to grid works in a domestic setting on the local electricity network. This has the potential to be used at both national and international events.

4.3 Smart Charging Summary Guide

In recognition of the need to establish the accurate facts around smart EV charging in a domestic setting, the project has produced a publication 'Smart Charging: A brief guide to managed electric vehicle home charging'. It may be downloaded here: http://www.electricnation.org.uk/wp-content/uploads/2016/08/EN-Smart-Charging-Guide-Summary-SCREEN.pdf. The Guide sets out the need for managed EV charging in relation to the grid; it details the technology and customer benefits. The Guide is written in a style that is accessible to all stakeholders.

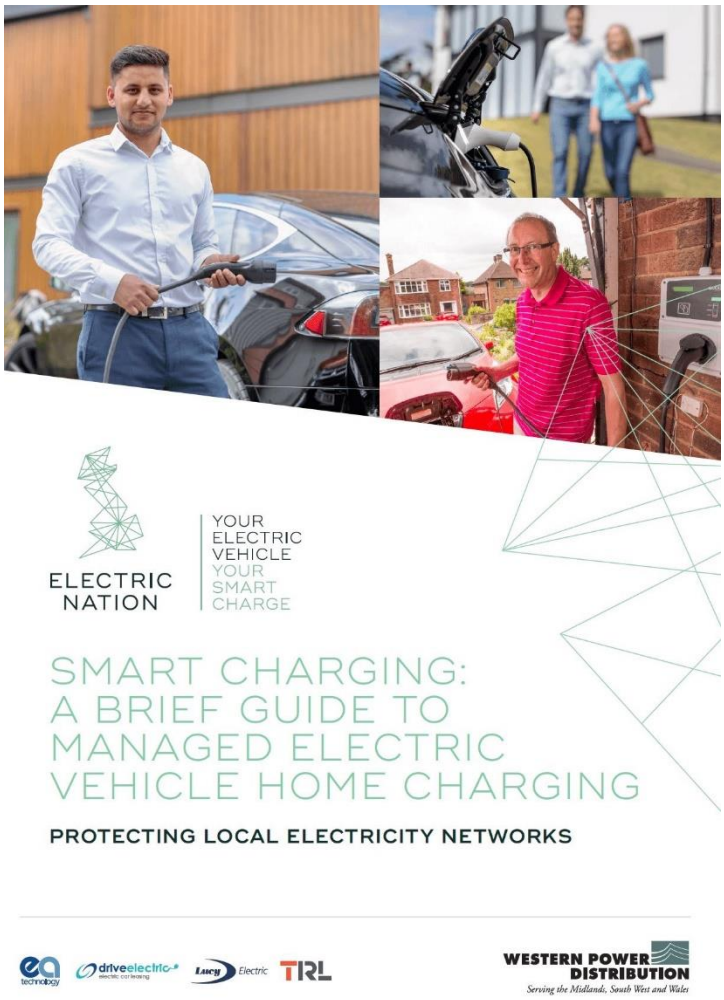


Figure 4.2: The front cover of the Smart Charging summary guide

4.4 Social media

Social media is recognised as a key tool to support both trial participant recruitment activity and dissemination in the Electric Nation project. All project-related social media activity is supported by a WPD approved Social Media Policy, which has been circulated to all project partners and suppliers.

4.4.1 Twitter

Responsibility for managing the Twitter account is split between EA Technology and DriveElectric. This approach maintains the delineation between DriveElectric and its customer interface role, and EA Technology, which must have no direct communication with customers, as per the project's Customer Engagement Plan.

EA Technology is responsible for:

- Maintaining a pipeline of relevant EV-industry related news tweets (and retweets)
- Tweeting news directly linked to the Electric Nation Twitter account

- Tweeting Electric Nation project updates to support learning dissemination activities on behalf of the project and its partners / suppliers

DriveElectric is responsible for:

- All customer interaction and communications through the Electric Nation Twitter account. This includes responding to all queries, complaints and comments in general in a timely manner
- Monitoring the Electric Nation Twitter account daily to enable timely responses, and to manage unwanted contacts
- Scheduling daily / bi-daily tweets to support recruitment activities
- Tweeting about Electric Nation EV test drive events and related recruitment activities

The Electric Nation Twitter account (@ElectricNation_) was launched at LCV 2016 to align with the official launch of the project and its recruitment activity. To date, the Electric Nation Twitter account has 1,402 followers, an increase of 20% since the last reporting period. The account has delivered 776 tweets, a 13% increase since last reporting period and achieves a good level of retweet activity, including regular retweets by WPD, the Office for Low Emission Vehicles, and project partners and suppliers.

Table 4.4: Twitter activity increase from last reporting period

Item	Last reporting period	Current reporting period	% increase
Twitter Followers	1,165	1,402	20%
Tweets	686	776	13%

4.4.2 LinkedIn

Managed by EA Technology, Electric Nation has a LinkedIn Group that currently has 44 members from across automotive / energy / DNO stakeholder groups. It is used on a relatively infrequent basis to deliver news items and event details at which the project and its partners will be appearing. The Group will become more active once the project starts to deliver trial results and learning.

4.4.3 Facebook

Electric Nation has a Facebook page that is customer-facing and is therefore managed by DriveElectric, albeit its set up was supported by Automotive Comms to ensure branding and message were in line with strategy. Progress on this front is reported separately by DriveElectric.

4.5 PR report

In this reporting period there have been ten items of project news produced on the project news section of the website, and disseminated via Twitter and LinkedIn. See tables 4.1 and 4.2 for details. There has been one item of industry news.

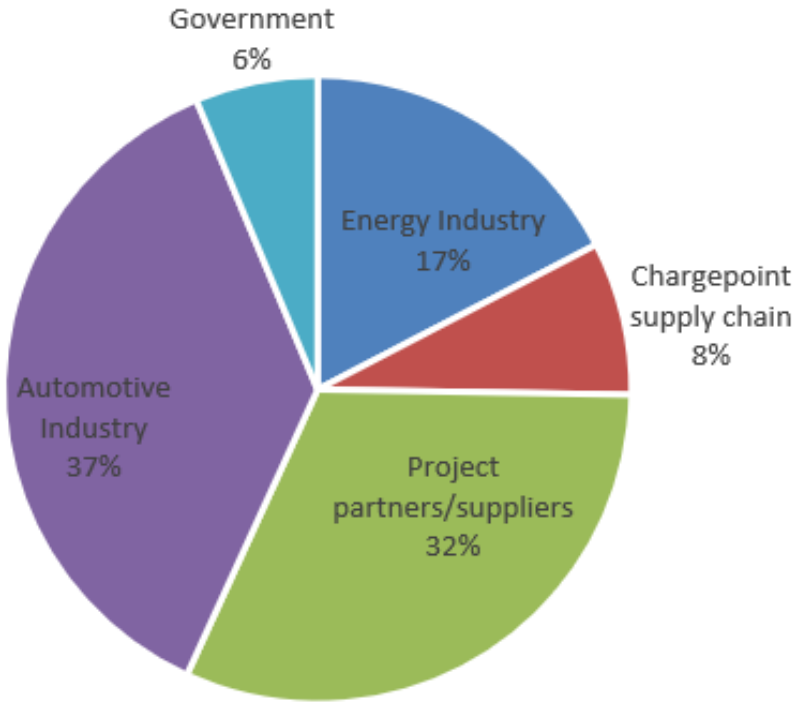


Figure 4.3: Press release coverage by sector

The breakdown of coverage by sector in Figure 4.3 shows that 37% is by automotive publications, a decrease of 5% from the last reporting period, with 32% by project partners and suppliers, which is a 9% increase on the last reporting period. Energy sector coverage has remained the same at 17%.

It has been an aim of the marketing and PR strategy from the outset to encourage uptake and dissemination of press releases by the collaboration partners and suppliers, and to engage effectively with the automotive sector to raise awareness of the challenge of EVs connecting to local electricity distribution networks, and the demand management solutions being trialled through Electric Nation. The press release coverage breakdown indicates that the project is effectively reaching out to these stakeholders, albeit perhaps more focus could be given to automotive given the slight decrease in PR take-up.

The charging point supply chain accounts for 8%, offering a 2% increase from the last reporting period. Coverage from Government has halved from 12% in the last reporting period to 6%. This could be speculatively explained by the Government's focus elsewhere (Brexit) and recent Cabinet reshuffle. In addition to this Go Ultra Low has launched a comprehensive media campaign in the last reporting period, which suggests that its PR efforts have understandably focused on its own campaign. Government coverage encompasses both local and central Government, notably the Go Ultra Low cities of Nottingham, Bristol and Milton Keynes.

4.6 Next steps

The Project team at EA Technology will continue to work alongside project partners to ensure that all marketing and PR activity supports partners to achieve their deliverables. Trial recruitment has ended, so that communication and marketing activity will now focus on dissemination of learning, and managing any issues that may arise with trial participants in PR terms.

WPD produced a short film, which will be edited in the next reporting period, to demonstrate demand management and V2G using the Electric Nation model.

The full Guide to Smart Charging will be available in the next reporting period, and this will be communicated to stakeholders, particularly those who have expressed interest in it as a direct result of the summary Guide to Smart Charging.

It is anticipated that the full complement of 700 smart chargers will have been installed with trial participants in March 2018. The project will release this news to mainstream media and maximise on the PR opportunity to raise awareness of the project and the work that Western Power Distribution is doing to facilitate a smooth transition to EVs on their networks.

APPENDIX 1 – PROJECT DESCRIPTION AND SUMMARIES FROM MARKETING AND PR STRATEGY

Uniform project description – to be included in all project communications

Electric Nation is the customer-facing brand of CarConnect, a Western Power Distribution (WPD) and Network Innovation Allowance funded project. WPD's collaboration partners in the project are EA Technology, DriveElectric, Lucy Electric GridKey and TRL.

Long summary

The Electric Nation project will develop and deliver a number of smart charge solutions to support plug-in vehicle uptake on local electricity networks. A key outcome will be a tool that analyses plug-in vehicle related stress issues on networks and identifies the best economic solution. This 'sliding scale' of interventions will range from doing nothing to smart demand control, from taking energy from vehicles and putting it back into the grid, to traditional reinforcement of the local electricity network where there is no viable smart solution.

The development of the project deliverables will be informed by a large-scale trial involving plug-in vehicle drivers that will:
1. Expand current understanding of the demand impact of charging at home on electricity distribution networks of a diverse range of plug-in electric vehicles - with charge rates of up to 7kW+, and a range of battery sizes from 20kWh to 80kWh+.
2. Build a better understanding of how vehicle usage affects charging behaviour.
3. Evaluate the reliability and acceptability to customers of controlling the demand for electricity/taking energy from vehicles and putting it back into the grid.

The results of this project will be of interest and will be communicated to the GB energy/utility community, to UK government, to the automotive and plug-in vehicle infrastructure industry and to the general public.

Short summary

Electric Nation, the world's largest EV trial, is revolutionising domestic plug-in vehicle charging. By engaging up to 500-700 [2]plug-in vehicle drivers in trials, the project is answering the challenge that when local electricity networks have 40% - 70% of households with electric vehicles, at least 32% of these networks across Britain will require intervention. Electric Nation is pioneering our electric future.

[2] Updated from '500' in the first strategy draft, June 2016, to '500-700' in a marketing strategy update session, October 2016.

APPENDIX 2 – AMENDMENT TO WEBSITE TEXT

Electric Nation Website – New Text, 10 Oct 17 v2

Home page

http://www.electricnation.org.uk

BE PART OF THE ELECTRIC NATION COMMUNITY

Change to:

ELECTRIC NATION IS ON TRACK TO ACHIEVE ITS TARGET OF 700 TRIAL PARTICIPANTS.
APPLICATIONS WILL NOW GO ON A RESERVE LIST.

(CURRENT TEXT):

APPLY TO TAKE PART
Electric Nation is seeking to recruit 500-700 people buying or leasing new electric vehicles (including pure electric and plug-in hybrids) to take part in a trial to ensure the UK can charge electric vehicles at peak times as the numbers of EVs rise.

For the first six months of the project (at least) the trial will only take place in certain geographical locations: the WPD network areas in the South West, South Wales, West & East Midlands – view the map

After six months the trial may broaden out to the rest of Britain if there are still places free. The free smart charger is only available to people who have not previously taken advantage of the OLEV home charger grant.

Find out more about eligibility and what the trial will involve.

Check your eligibility for the project.

Change to:

ELECTRIC NATION IS ON TRACK TO ACHIEVE ITS TARGET OF 700 TRIAL PARTICIPANTS.
APPLICATIONS WILL NOW GO ON A RESERVE LIST.

Electric Nation is on track to achieve its target of recruiting 700 people buying or leasing new electric vehicles (including pure electric and plug-in hybrids) to take part

in a trial to ensure the UK can charge electric vehicles at peak times as the numbers of EVs rise.

The trial is only taking place in certain geographical locations: the WPD network areas in the South West, South Wales, West & East Midlands – view the map

The free smart charger is only available to people who have not previously taken advantage of the OLEV home charger grant.

Applications to take part from now on will go on a reserve list; unfortunately, we cannot guarantee that such applications will be processed or responded to.

Find out more about eligibility and what the trial will involve.

Check your eligibility for the project.

> Postcode Checker

Message to appear in response to all enquiry forms:

Thank you for your interest in Electric Nation. We are delighted to announce that the project is on track to achieve 700 trial participants - five months ahead of schedule. Applications to take part from now on will go on a reserve list; unfortunately, we cannot guarantee that such applications will be processed or responded to.

APPENDIX 3 – PR TO SUPPORT TRIAL RECRUITMENT

ELECTRIC NATION IS ON TRACK TO ACHIEVE ITS TARGET OF 700 TRIAL PARTICIPANTS

Electric Nation has been a huge success, having received almost 3,000 enquiries from people wanting to take part in the project. As there are only 700 spaces available, we are reaching capacity and all future applications received are being placed on a reserve list.

DriveElectric, the UK's leading specialist in electric car leasing, has had the envious task of dealing with all 3,000 or so enquiries for the project, with the aim of helping people at the initial enquiry stage, and all the way through to becoming part of the trial. Many participants will be familiar with members of the team at DriveElectric such as Vicky Reed, who must now be one of the country's foremost experts regarding all types of questions about electric vehicles and smart chargers!

Mike Potter, Managing Director, DriveElectric, says: "The overwhelming response and enthusiasm of EV drivers to get on board with the project and offer their support for this important research has been fantastic. The pioneers of electric vehicles in the UK are genuinely passionate about their vehicle of choice and are obviously keen to ensure that the UK's power network will be able to provide for the future's growing demand for charging."

Electric Nation is now entering the main trial phase, with the aim of testing the smart charging technology, and people's acceptance of managed charging. As 2018 progresses, more learning will be shared from the project.

APPENDIX 4 – PR TO SUPPORT DISSEMINATION

19th October 2017

ELECTRIC NATION PRESENTS AT THE LOWCVP SEMINARS AT ENERGY 2017

Dave Roberts and Mike Potter, both from Electric Nation, presented at a LowCVP seminar entitled 'The Electric Vehicle Revolution: Managing Impacts on the Powergrid' which preceded the Low Carbon Vehicle Partnership's (LowCVP) Low Carbon Champions Awards dinner.

Dave and Mike contributed to the debate about whether the UK's electricity grid can cope with increasing numbers of electric vehicles. The different views primarily stem from whether this is looked at from a national or a local perspective; read on to discover the definitive answer to this question from both points of view.

The National Grid and a Distribution Network Operator (responsible for local electricity networks) both appeared on the same stage to answer this question, at the event which coincidentally took place the day before the release of the government's Clean Growth Strategy, which sets out a blueprint for Britain's low carbon future, and includes a commitment to 'develop one of the best electric vehicle charging networks in the world'.

Andy Eastlake, Managing Director of the LowCVP, chaired the seminar sessions, with Marcus Stewart from National Grid and Stewart Reid from Scottish and Southern Electricity Networks being the first two speakers, giving their views on the subject of 'EVs and the grid'.

Firstly, in terms of the national picture, Marcus referred to National Grid's recent Future Energy Scenarios (FES) report which provided four scenarios about differing levels of take-up of EVs, and the resulting additional power generation required. This had been misinterpreted by some media, especially in the light of what Marcus described as "lots of excitement about EVs this year", and he confirmed that the 'two degrees' scenario was felt to be the most realistic. This would need much less additional power generation than some of the other scenarios quoted in the media. Marcus made the point that this lower demand scenario was based on smart charging being adopted. Marcus also

referred to other initiatives that would help, such as vehicle to grid (V2G), where an EV can provide a service to the network.

Marcus said that he expects EVs to develop rapidly; he is “positive about EVs but there is a lot of work to do”, and the UK “needs to get organised around this”. Our interpretation of what this means is that to achieve the lower demand scenarios for energy from EVs, initiatives such as smart charging can’t be left to chance – someone needs to make them happen.

Stewart Reid from Scottish and Southern Electricity Networks (SSEN) agreed with a number of Marcus’s points, however the view about EVs from a local network perspective is very different in many ways to that of National Grid.

SSEN manages local electricity networks – the low voltage (LV) network rather than the high voltage (HV) National Grid. One of Stewart’s key points was about the “law of large numbers”. If a number of people charge an EV at the same time, this will have little impact at a national level, because this extra demand will be lost within the millions of people using electricity from the National Grid throughout Britain.

However if ten people all plug in their EV at the same time on a local electricity network, which may only serve 50 properties in total, then the impact on this local network is much larger – especially when you consider that adding an EV on a network is equivalent to adding an extra house. So there is a mismatch between the national and the local situations. Although EV sales nationally are relatively low at the moment, it only needs clustering of a few EV owners in a local area to cause potential problems – and it is expected that such clustering is likely to happen. Stewart made the point that it takes just one overload for the lights to go out.

So in an ideal world, all local electricity networks would be upgraded to cope with the possibility of lots of EVs. However that would result in huge cost and disruption. Stewart also raised the issue of who pays for reinforcement of local electricity networks. With a new housing development, the developer pays for the network (and developers generally want to pay the minimum cost, which results in minimum capacity). With existing housing, the cost of any upgrade work is ‘socialised’ – in other words, people who don’t own EVs pay for upgrades for EVs.

The solution to avoiding unnecessary cost to protect against perhaps just one potential instance of excess demand per year is ‘demand side management’ – which could result, for example, in a signal being sent to a smart charger to defer charging for a short period of time to move it away from times of peak demand.

Stewart concluded by saying that we need to ensure that EV owners see that demand side management is a good thing and that they accept the principles. We need accessible open standards, and the industry needs to deliver the necessary data and control signals, communications infrastructure and the products and services needed. Perhaps most importantly, EV owners need trust in whoever is delivering all these services.

A panel session allowed further debate about EVs and the grid, specifically looking at ‘Managing EV uptake and grid capacity: The role of ‘smart charging’ and energy storage in facilitating mass adoption of EVs in the UK’. Panel members consisted of Dave Roberts from EA Technology, Peter Stephens from Nissan, and Mike Potter from DriveElectric.

Dave Roberts talked about the Electric Nation project, which is trialling smart charging with electric vehicle drivers. Recruitment for the project has been a huge success, with the target number of 700 participants now being in the pipeline five months ahead of schedule, and over 400 smart chargers have already been installed at people's homes. However Dave's main point was about how we take learning from trials and turn this into standards. To do this, the collaboration that has recently started between the automotive and energy industries needs to be accelerated. EA Technology and SSEN are currently working together with the automotive industry on the SmartEV project, which is looking at standards to ensure every single EV charger is capable of being communicated with in a consistent and coherent way.

Dave made the point that the pace of change of EVs is growing, and this pace is outstripping the rate of change at which electricity networks can adapt.

Peter Stephens from Nissan agreed that smart charging will be needed, and explained that Nissan is involved with energy storage, solar and V2G systems, which will help us move from EVs being part of the problem to being a solution for the grid. However the key issue is how you get the business model to work.

Peter agreed with Dave Roberts about the automotive and energy industries needing to work together more closely, and he also included the area of digital in this collaborative approach.

Mike Potter from DriveElectric stressed the need to "think about things from an end user point of view", and to make all the developments needed for EVs and the grid – such as the complex data behind V2G systems – simple for consumers.

The point was made that although many current EV batteries could have their charging paused overnight and still be fully charged the following morning, the next generation of EV batteries will need the entire overnight period if they need to be fully charged from empty from a domestic charge point (where a 7kW charger is the maximum that can be used on a single phase domestic supply).

Combined with EVs having larger batteries and therefore longer ranges, the audience was informed that the Benefit in Kind tax rate for EVs is due to drop back down to 2% in 2020. This could lead to a rapid take-up of electric vehicles, and result in many clusters of EVs with large batteries having a significant impact on local electricity networks as soon as 2-3 years from now. Therefore our conclusion is that action is needed now to deal with domestic EV charging issues and local network problems before they happen.

Paul Clarke

1st November 2017

ELECTRIC NATION FEATURED IN ENERGY WORLD

Electric Nation has been featured in the November 2017 issue of Energy World magazine. The 2,000 word article provides all the information you need to know about the Electric Nation project and smart charging.

Energy in transport

SMART CHARGING

How will the growth of electric vehicles impact the grid?

National Grid's *Future Energy Scenarios*, published in July this year, included a number of forecasts that estimated that the additional system-wide peak electricity demand from electric vehicles could range from 6 GW to 18 GW in 2050. This resulted in a selection of articles in the media with dramatic claims about the impact that electric vehicles (EVs) would have on the UK's electricity grid – including the need for up to ten new nuclear power stations to support them.

Barely two weeks after National Grid's scenarios were published, the UK government announced that it would ban the sale of conventional petrol and diesel cars and vans by 2040. Although this wasn't particularly newsworthy to the automotive industry, as it was heading towards a similar target anyway, this resulted in further media stories about whether the UK's electricity grid would be able to cope with charging millions of EVs.

In response to the various items of media coverage, National Grid issued an 'EV myth buster' document in August, which aimed to clarify the most likely future scenario – termed 'Two Degrees' – with regards to EVs and the grid.

Photo: Electric Nation

Following striking media headlines about how much new electricity generating capacity might be needed to support electric vehicles, *Nick Storer* explains how the truth will be less dramatic – through the use of smart charging and demand management.

Titled 'Energy use in transport: EV charging and how this would impact the grid', the feature looks at National Grid's 'Future Energy Scenarios' (FES), published on 13 July 2017, which included a number of scenarios which estimated that the additional system-wide peak electricity demand from electric vehicles would range from 6 to 18GW in 2050.

Barely two weeks after the FES document was published, on 26 July 2017, the UK government announced that it would ban the sale of conventional petrol and diesel cars and vans by 2040.

In response to various items of media coverage about EVs and the grid resulting from the two items above, National Grid issued an ‘EV myth buster’ document on 8 August 2017, which aimed to clarify the most likely future scenario (‘Two Degrees’) regarding EVs and the grid.

Since then there have continued to be many stories on this subject. There is one key issue that has not been made clear, which is the differentiation between National Grid’s power supply (generation) and local, low voltage (LV) electricity network capacity to deliver that power to consumers of power. The main issue around network capacity relates to clusters of EVs charging at peak times on local electricity networks – i.e. the cables running from local substations to people’s homes, which Distribution Network Operators (DNOs) are responsible for. The expected peaks on such networks are likely to be for short periods in the early evening in winter months.

Electric Nation is trialling smart charging solutions to the issue of potential local electricity network capacity challenges with 500-700 electric vehicle drivers, comprised of over 40 makes and models of battery electric vehicles and plug-in hybrids.

You can read the full article in Energy World here

Find out more about Energy World here:

https://knowledge.energyinst.org/magazines/energy-world

Energy World, the magazine of the Energy Institute, is a monthly magazine that looks at the entire energy industry and its customers. Through content from its editors, energy writers and industry experts the magazine offers informed analysis on the big energy picture, covering everything from small-scale solar to nuclear power; energy demand to supply; policy to technology – and how these are interlinked and affect the environment.

2nd November 2017

ELECTRIC NATION TO PRESENT AT THE 2017 UN CLIMATE CHANGE CONFERENCE

Western Power Distribution's and EA Technology's Electric Nation and OpenLV projects are being presented at the 2017 UN Climate Change Conference (COP23), 6 to 17 November in Bonn. The Electric Nation and OpenLV presentations are taking place on 9 November.

The Government has a UK Pavilion within the Bonn Zone at the conference. On the 9 & 10 of November it will be showcasing UK expertise in low carbon innovation, particularly with an energy focus.

At 12.30pm in the UK Pavilion on 9 November Mark Dale from Western Power Distribution and Esther Dudek from EA Technology will each be giving 15 minute presentations on WPD's innovation projects including OpenLV and Electric Nation.

The Electric Nation project has been recruiting 500-700 electric vehicle drivers to take part in a smart charging trial. The project now has 700 participants in the pipeline, with over 400 smart chargers installed.

The OpenLV project is opening up live local electricity usage data. This will help accelerate the transition to low carbon technologies including electric cars, renewable energy generation and smart buildings.

With 197 Parties, the United Nations Framework Convention on Climate Change (UNFCCC) has near universal membership and is the parent treaty of the 1997 Kyoto Protocol. The Kyoto Protocol has been ratified by 192 of the UNFCCC Parties.

The ultimate objective of both treaties is to stabilise greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system.

The nations of the world will meet at COP23 to advance the aims and ambitions of the Paris Agreement and achieve progress on its implementation guidelines.

Recent news items released in advance of COP23 include that Concentrations of CO2 in the Earth's atmosphere surged to a record high in 2016, according to the World Meteorological Organisation (WMO) (see http://www.bbc.co.uk/news/science-environment-41778089) and in its annual review, the UN says the gap between carbon cutting plans and the reductions required to keep temperature rises below 2 degrees Celsius is "alarmingly high" (http://www.bbc.co.uk/news/science-environment-41802982).

The photograph above is a winner from the COP23 Pacific Photo Competition, of the Adagege artificial island on Lau Lagoon in the Solomon Islands, North Malaita, which has become vulnerable to sea level rise as a result of climate change.

See more at: https://cop23.com.fj/cop23-pacific-photo-competition/

6th November 2017

ELECTRIC NATION ON BBC RADIO 5 LIVE

Gill Nowell from EA Technology and the Electric Nation project took part in today's BBC Radio 5 live Breakfast Show about electric vehicles. Rachel Burden presented the programme, which included what is best described as an interesting range of views about EVs. The headline issue being discussed was "What would make you convert from petrol or diesel to electric?"

The backdrop to the debate was that sales of diesel cars are declining, whilst sales of hybrids and electric vehicles are on the increase. One guest on the phone-in show had an electric Nissan LEAF, which she was absolutely delighted with. Another participant was very vocal about his perceived issues with electric vehicles – who was presumably selected for the programme due to the BBC's desire for balance.

Gill explained that EA Technology had worked with almost 1,000 electric vehicle drivers through the My Electric Avenue and Electric Nation projects, with the overwhelming feedback reflecting a very high level of satisfaction with electric vehicles.

A question for the show's 'panel' from a listener was about charging EVs on local electricity networks, which allowed Gill to explain about the potential demand challenge around peak times, and how Electric Nation is trialling a smart charging solution. Gill also commented on the situation regarding power generation from a national perspective, stressing the increasing proportion of UK generation that is coming from renewable energy.

You can listen to Gill on the Radio 5 live Breakfast show here:

http://www.bbc.co.uk/programmes/b09czr59

Please note that the link is only live for 30 days, so you'd better be quick!

Later the very same day, Electric Nation's Mark Dale was also interviewed for Radio Wales.

You can read a summary about the EV challenge for local electricity networks, and the potential solution being trialled by the Electric Nation project, in this month's Energy World magazine, see: http://www.electricnation.org.uk/2017/11/01/electric-nation-featured-in-energy-world/

In a very busy week for promotion of the project, Electric Nation is also being presented at the 2017 UN Climate Change Conference (COP23) in Bonn on Thursday 9 November, within the UK Pavilion; find out more at http://www.electricnation.org.uk/2017/11/02/electric-nation-to-present-at-the-2017-un-climate-change-conference/

14th November 2017

ELECTRIC NATION PRESENTATION AT THE 2017 UN CLIMATE CHANGE CONFERENCE

Western Power Distribution's and EA Technology's Electric Nation and OpenLV projects have been presented at the 2017 UN Climate Change Conference (COP23), 6 to 17 November in Bonn.

The Government has a UK Pavilion within the Bonn Zone at the conference. On the 9 & 10 of November it showcased UK expertise in low carbon innovation, particularly with an energy focus.

Mark Dale from Western Power Distribution and Esther Dudek from EA Technology gave presentations on WPD's innovation projects including Electric Nation and OpenLV in the UK Pavilion.

The Electric Nation model was used to demonstrate the project to a wide range of COP23 delegates from across the world.

There was lots of interest in how uptake of EVs is occurring in the UK, and how smart charging could help, either for solving network issues (as is being investigating in Electric Nation) or for maximising the use of renewable energy.

Mark and Esther's presentations, part of the UK's Smart Systems and Flexibility slot, and arranged in partnership with the Department for International Trade, enjoyed an audience which filled the room in the UK Pavilion.

Mark Dale described WPD's innovation portfolio, particularly focussing on projects on Low Voltage networks closest to homes and businesses, including the new OpenLV project. EA Technology then explained the Electric Nation project and showed some early findings.

The presentations reflected the UK's leading approach to electricity network innovation and research and development/demonstration projects.

The Electric Nation and OpenLV videos were included on a loop in the UK Pavilion, providing delegates a further opportunity to find out information about the projects.

Esther Dudek comments: "It was a very busy event with a really impressive range of pavilions highlighting the importance of climate change to countries from around the world. There was a lot of interest in the Electric Nation and OpenLV projects, so hopefully people were able to take this knowledge away with them and apply them within the context of their own countries."

The Department for International Trade (DIT) helps UK-based businesses export and grow into global markets, and overseas companies locate and grow in the UK. DIT provides its services in over 100 markets throughout the world. In Germany, DIT is present in the British Embassy in Germany as well as in the General Consulates in Dusseldorf and Munich. The local teams provide tailored support and advice for business on how to enter the German market and connect German buyers with UK suppliers.

15th November 2017

ELECTRIC NATION IN AUTOCAR

The Electric Nation project has been featured in this week's edition of motoring magazine Autocar. Written by Jesse Crosse, the article explains how smart charging could prevent the need for a costly overhaul of the nation's electricity infrastructure to cope with the widespread adoption of EVs.


NEWS

EVs will need smart chargers

Managed electric car recharging will ensure our lights stay on, a study has found

ELECTRIC NATION TRIAL FINDINGS

48%

12

2

The story explains about the trial of Alfen and eVolt smart chargers, provided free to 700 users of EVs, in return for access to their charging data. Jesse Crosse interviewed Mark Dale from Western Power Distribution (WPD) for the piece, with Mark explaining that the worst time for local electricity networks is cold winter evenings when people put the kettle on during football matches on TV. Although the networks can cope with this, adding electric vehicles onto networks as well – which can double the electricity demand from houses – is when challenges can start to happen for distribution network operators (DNOs). The Electric Nation project is trialling a smart charging solution to this issue, which will allow demand management on networks if needed.

Autocar pulled out some headline data from the Electric Nation project so far: 48% of electric vehicle users plug their cars in between 5pm and midnight, vehicles are plugged in for an average of 12 hours, yet the vehicles are only charging for an average of two hours.

Smart charging is included in the Government's Automated and Electric Vehicles Bill, which had its first reading in Parliament on 18 October (no debate), with the second reading (with debate) on 23 October.

Electric Nation being featured in Autocar comes at the end of a high profile two weeks which have seen the project being presented at the 2017 UN Climate Change Conference (COP23) in Bonn, Gill Nowell from EA Technology being interviewed on BBC Radio 5 Live, Mark Dale from WPD being interviewed on Radio Wales, and the project also enjoyed a 2,000 word feature in Energy World.

The Electric Nation project is hosted by Western Power Distribution. It is delivered by the following collaboration partners:

- EA Technology
- DriveElectric (a brand name of Fleetdrive Management)
- Lucy Electric GridKey
- TRL

29th November 2017

ELECTRIC NATION PRESENTS AT COP23, LOWCVP AND WPD CONFERENCES

Electric Nation has presented at a number of conferences over recent weeks, including the 2017 UN Climate Change Conference (COP23) in Bonn, a LowCVP event, and WPD's Balancing Act Conference.

The Electric Nation project was presented at the 2017 UN Climate Change Conference (COP23), 6 to 17 November in Bonn. The Government had a UK Pavilion within the Bonn Zone at the conference, and specifically requested Electric Nation's presence. On the 9 & 10 of November it showcased UK expertise in low carbon innovation, particularly with an energy focus. Mark Dale from Western Power Distribution and Esther Dudek from EA Technology gave presentations on WPD's innovation projects including Electric Nation and OpenLV in the UK Pavilion.

Mark and Esther's presentations, part of the UK's Smart Systems and Flexibility slot, and arranged in partnership with the Department for International Trade, enjoyed an audience which filled the room in the UK Pavilion.

Dave Roberts (EA Technology) and Mike Potter (DriveElectric) from Electric Nation presented at a LowCVP seminar entitled 'The Electric Vehicle Revolution: Managing Impacts on the Powergrid', which preceded the Low Carbon Vehicle Partnership's (LowCVP) Low Carbon Champions Awards dinner. Dave and Mike contributed to the debate about whether the UK's electricity grid can cope with increasing numbers of electric vehicles. The different views primarily stem from whether this is looked at from a national or a local perspective; read the full story to discover the definitive answer to this question from both points of view.

A presentation about Electric Nation, which provided information for the first time about the project's Network Assessment Tool, was delivered at Western Power Distribution's Balancing Act Conference, which took place in London on 5 October 2017. The 'Future Networks – A Balancing Act' event was held at the Park Plaza, Westminster Bridge, organised by WPD's Innovation division, with an audience primarily comprised of members of the DNO community and the energy industry.

The Electric Nation presentation, delivered by Mark Dale, Innovation Manager, Western Power Distribution, together with Nick Storer and Daniel Hollingworth from EA Technology, explained the need for smart charging as numbers of electric vehicles increase.

29th November 2017

ELECTRIC NATION IN THE NEWS

Electric Nation enjoyed lots of media coverage during November. The project was featured in motoring magazine Autocar at the end of a high profile two weeks which also saw Gill Nowell from EA Technology being interviewed on BBC Radio 5 Live, Mark Dale from WPD being interviewed on Radio Wales, and the project also enjoyed a 2,000 word feature in Energy World.


NEWS

EVs will need smart chargers

Managed electric car recharging will ensure our lights stay on, a study has found

ELECTRIC NATION TRIAL FINDINGS

48%
Percentage of users who plug their cars in to recharge between 5pm and midnight

12
Average number of hours the users' vehicles are plugged in for

2
Average number of hours the users' vehicles are actually recharged for

Electricity demand could grow by 8% due to increased EV usage

Written by Jesse Crosse, the article in Autocar explains how smart charging could prevent the need for a costly overhaul of the nation's electricity infrastructure to cope with the widespread adoption of EVs. Autocar pulled out some headline data from the Electric Nation project so far: 48% of electric vehicle users plug their cars in between 5pm and midnight, vehicles are plugged in for an average of 12 hours, yet the vehicles are only charging for an average of two hours.

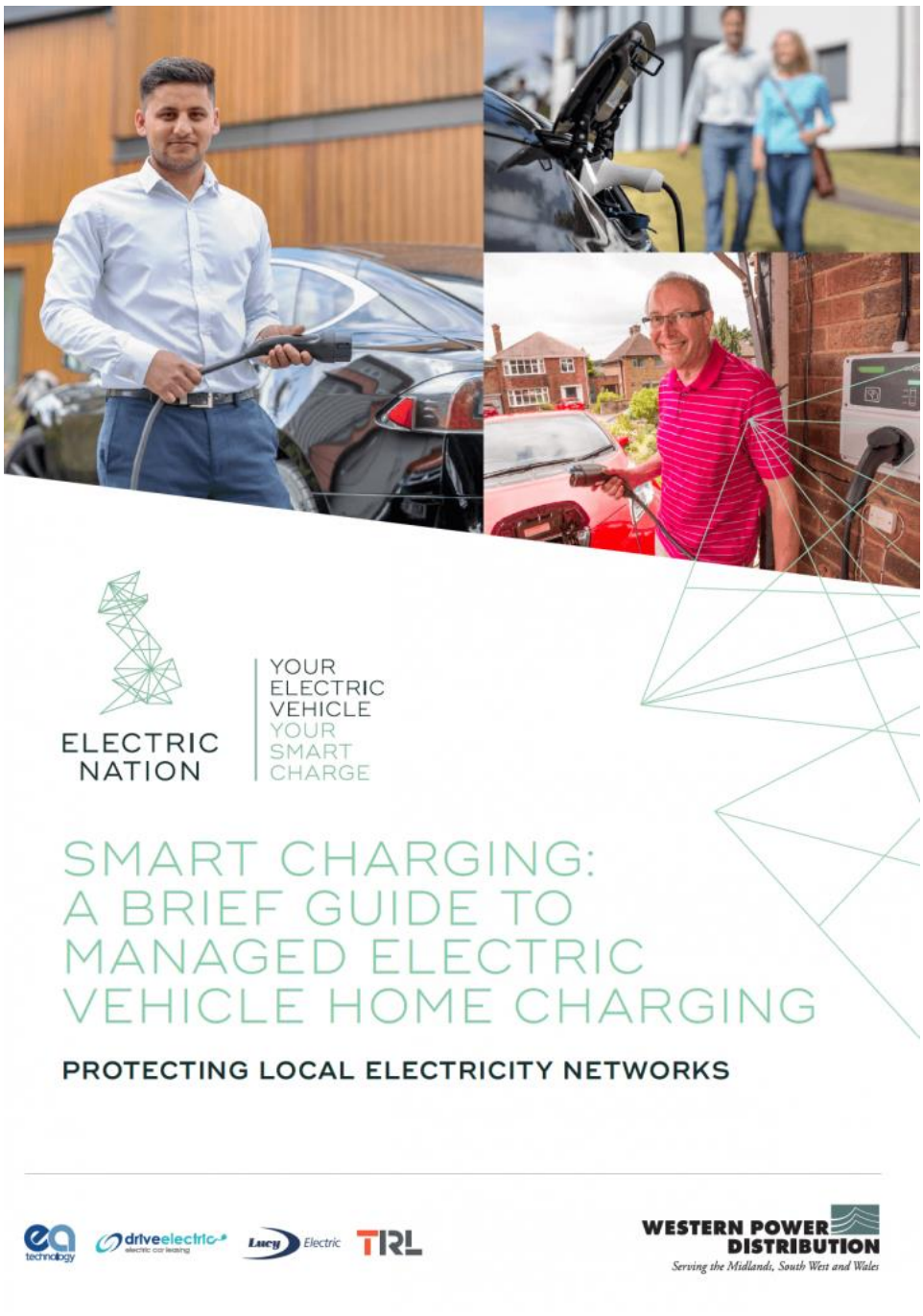
Gill Nowell from EA Technology and the Electric Nation project also recently took part in the BBC Radio 5 live Breakfast Show about electric vehicles. Rachel Burden presented the programme, which included what is best described as an interesting range of views about EVs. The headline issue being discussed was "What would make you convert from petrol or diesel to electric?" Later the very same day, Electric Nation's Mark Dale was also interviewed for Radio Wales.

And Electric Nation was featured in the November 2017 issue of Energy World magazine. The 2,000 word article provides all the information you need to know about the Electric Nation project and smart charging. Titled 'Energy use in transport: EV charging and how this would impact the grid', the feature looks at a range of issues, including National Grid's 'Future Energy Scenarios' (FES), published on 13 July 2017, which included a number of scenarios which estimated that the additional system-wide peak electricity demand from electric vehicles would range from 6 to 18GW in 2050.

29th November 2017

ELECTRIC NATION TO LAUNCH SMART CHARGING GUIDE AT LCNI 2017

Electric Nation has a stand at the 2017 Low Carbon Networks & Innovation (LCNI) Conference taking place at The International Centre in Telford on 6-7 December 2017. LCNI provides an opportunity to explore the key learnings from electricity and gas network innovation projects.



Electric Nation can be found on the stand of Western Power Distribution, the 2017 Conference Sponsor. At the event the Electric Nation project will be launching its Smart Charging Guide, in the form of a four page summary; the Smart Charging Guide Summary PDF can be viewed in our Resources section. The full Guide is aimed at those

who are involved in the decision-making process about how we charge electric vehicles – in Government, the energy industry, the automotive industry, the EV charging sector, planning and other stakeholders – and will be available in due course.

Electric Nation's smart charging guide provides essential background information for the eventuality of smart charging being rolled out nationally; smart charging is included in the Government's 'Automated and Electric Vehicles Bill' and is expected to be mandated.

If you would like a copy of the full Guide which will be available soon, please email electricnation@eatechnology.com

6th December 2017

ELECTRIC NATION LAUNCHES SMART CHARGING GUIDE AT LCNI 2017 AS 500 SMART CHARGERS ARE INSTALLED

- Electric Nation launches Smart Charging Guide Summary
- The project also achieves a major milestone of 500 smart chargers installed
- Electric Nation presents at LCNI event

Electric Nation has launched a Smart Charging Guide Summary at the 2017 Low Carbon Networks & Innovation (LCNI) Conference taking place in Telford from 6-7 December 2017. At the same time, the project has achieved a significant milestone of installing 500 home electric vehicle (EV) smart chargers for trial participants.

The Smart Charging Guide Summary is a four-page version of the full Smart Charging Guide, aimed at those who are involved in the decision-making process about how we charge electric vehicles – in Government, the energy industry, the automotive industry, the EV charging sector, planning and other stakeholders – which will be available in due course.

Electric Nation's Smart Charging Guide provides essential background information for the eventuality of smart charging being rolled out nationally. Smart charging is included in the Government's 'Automated and Electric Vehicles Bill' and is expected to be mandated.

As the LCNI event opened, Electric Nation celebrated a significant project milestone: its 500th home EV smart charger was installed. This reflects the huge success of recruitment for the project, which has received almost 3,000 enquiries from people

wanting to take part. As there are only 700 spaces available, the project is reaching capacity and all current applications received are being placed on a reserve list.

Additional demand from clusters of EVs could require reinforcement of some local electricity networks. Electric Nation is investigating the benefits that smart charging could provide for such networks.

Electric Nation, one of Western Power Distribution's (WPD) innovation projects, with collaboration partners EA Technology, DriveElectric, Lucy Electric GridKey and TRL, is believed to be the world's largest domestic smart charging trial, and has been offering a free smart charger to 500-700 electric vehicle drivers. The smart chargers are provided by Alfen and eVolt.

Visitors to LCNI can find Electric Nation on the stand of Western Power Distribution, the 2017 LCNI Conference Sponsor. A presentation about Electric Nation is also being delivered at the event. LCNI provides an opportunity to explore the key learnings from electricity and gas network innovation projects.

If you would like a copy of the full Smart Charging Guide when available, please email electricnation@eatechnology.com

APPENDIX 5 – EV INDUSTRY NEWS

24th October 2017

AUTOMATED AND ELECTRIC VEHICLES BILL

The Automated and Electric Vehicles Bill has had its first reading in Parliament on 18 October (no debate), with the second reading (with debate) on 23 October.

The following sections relates to smart charge points:

12 Smart charge points

(1) Regulations may provide that a person must not sell or install a charge point unless it complies with prescribed requirements.

(2) The requirements that may be imposed under subsection (1) include requirements relating to the technical specifications for a charge point, including for example the ability of a charge point –

(a) to receive and process information provided by a prescribed person,

(b) to react to information of a kind mentioned in paragraph (a) (for example, by adjusting the rate of charging or discharging),

(c) to transmit information (including geographical information) to a prescribed person,

(d) to monitor and record energy consumption,

(e) to comply with requirements relating to security,

(f) to achieve energy efficiency, and

(g) to be accessed remotely.

(3) Regulations under subsection (1) may also prescribe requirements to be met in relation to the sale or installation of a charge point.

(4) In this section –

(a) “sell” includes let on hire, lend or give;

(b) references to a prescribed person include references to –

(i) a person of a prescribed description, and

(ii) a device operated by one or more prescribed persons.

To view the Bill itself: https://publications.parliament.uk/pa/bills/cbill/2017-2019/0112/18112.pdf

To follow its progress through Parliament, see: https://services.parliament.uk/bills/2017-19/automatedandelectricvehicles.html

The Electric Nation project has been providing electric vehicle owners with smart chargers in order to trial the technology and the associated demand management systems. The target was to recruit 700 EV drivers and the project is now on track to achieve this number, therefore applications to take part from now on will go on a reserve list.

EA Technology is one of the leading authorities on smart charging, having trialled the technology in the My Electric Avenue and Electric Nation projects.

9th January 2018

RECORD GROWTH IN UK ELECTRIC VEHICLE SALES IN 2017

Electric and plug-in hybrid vehicle registrations in 2017 increased by more than 27% compared to the previous year.

The total number of plug-in cars on UK roads passed 130,000, and 46,522 ultra low emission vehicles were registered in 2017.

Go Ultra Low expects that electric car registrations could reach 60,000 for the first time in 2018.

The Go Ultra Low numbers show that records tumbled throughout the year with every quarter comfortably out-performing 2016. The second half of 2017 recorded in excess of 24,000 registrations of 100% electric and plug-in hybrid cars – up more than 40% on July-December 2016.

Poppy Welch, Head of Go Ultra Low, said: “2017 was a stellar year for electric vehicle registrations with strong growth of 27%, demonstrating the massive consumer appetite for 100% electric and plug-in hybrid cars.

“There are already more than 130,000 electric vehicles on UK roads, a figure that could pass 190,000 this year as new models come to market and consumers reap the cost saving benefits of electric driving.”

Robert Llewellyn, actor, electric car expert and TV presenter, said: “I’ve been driving electric cars for eight years – they have proved incredibly reliable, cheap to run and easy to use. I’d urge everyone considering a new car to test drive a 100% electric or plug-in hybrid model. In my opinion, put simply, electric cars are the future.”

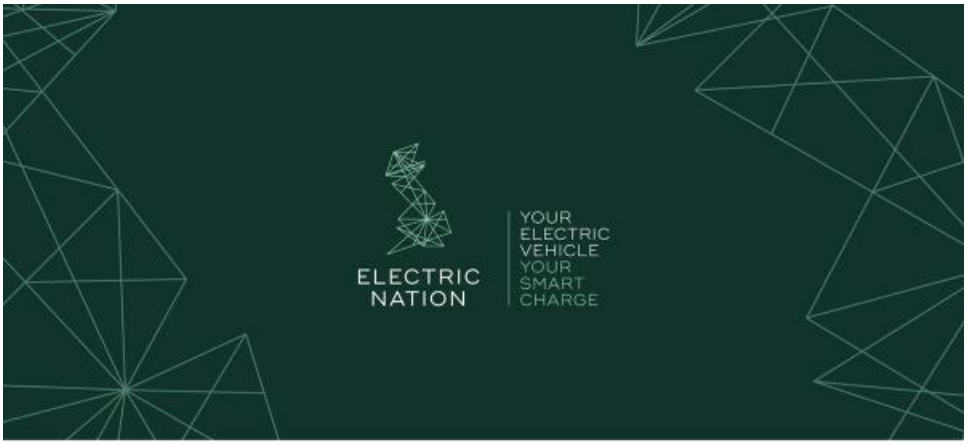
Across the country, several regions stood out with London (9,274) and Eastern England (8,685) registering the most electric vehicles (EVs), a rise of 42% and 21% respectively on 2016. Meanwhile, the South West and Scotland grew the fastest, boosting plug-in uptake by 140% and 70% respectively against the previous year.

The demand for 100% electric cars, such as the UK's best seller – the Nissan LEAF, continued to grow with the sector's registrations increasing by around a third, to top 13,000. Meanwhile, plug-in hybrid cars like the popular BMW 330e, VW Golf GTE, and Hyundai IONIQ delivered the highest volume of registrations with more than 33,000 arriving on UK roads, an increase of a quarter versus 2016.

Greater choice of models and growing consumer appetite for ultra low emission cars means that 2018 looks set to be another record breaking year. If similar growth continues, 60,000 vehicles could be registered during 2018, taking the total number of plug-in cars on our roads to more than 190,000.

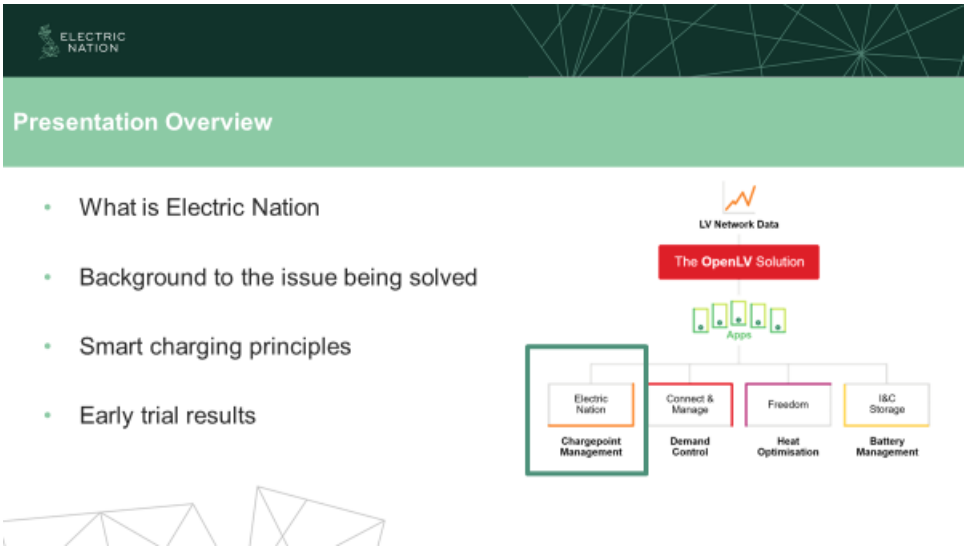
Go Ultra Low is a collaborative campaign and is the first of its kind, bringing together a consortium of vehicle manufacturers, government and the Society of Motor Manufacturers and Traders (SMMT). Visitors to www.GoUltraLow.com can access a specially-developed interactive cost calculator and input their own vehicle type, fuel consumption and mileage data to gain cost saving-figures for owning a 100% electric or plug-in hybrid vehicle.

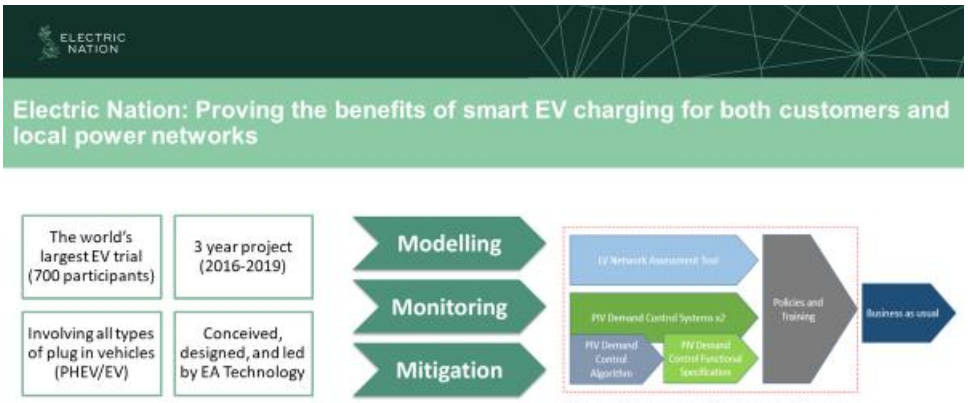
APPENDIX 6 – COP23 PRESENTATION



COLLABORATION PARTNERS

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales





COLLABORATION PARTNERS

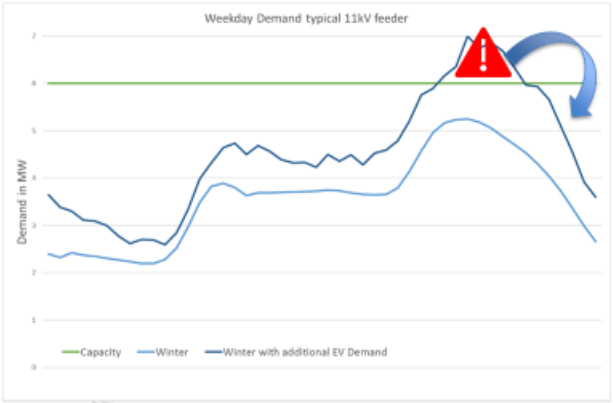
WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

ELECTRIC NATION

Why do we need Smart Charging?

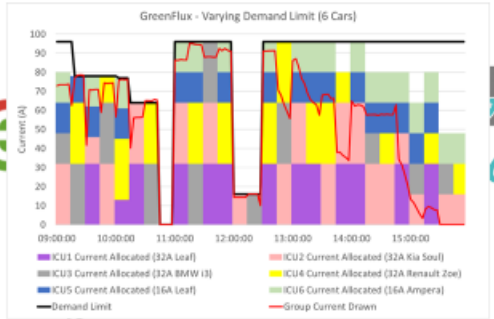
- EVs will require the generation and transmission of additional electricity to charge up:
  - Challenges for the generation industry and National Grid
  - And Distribution Network Operators in their networks down to 11kV network level
- For Distribution Network Operator's on 11 kV and LV networks EV loads may overload these networks – in certain seasons and times of day
- Additional loading on LV networks would result in at least 30% of these networks in GB requiring investment by 2050 costing at least £2.2bn *(My Electric Avenue)*
- Investment = upgrade/replace these networks – disruption affecting all of us
- Costs of upgrades go onto customer bills – a hidden cost of EV ownership?
- **Smart Charging could reduce/delay or avoid the need to upgrade/replace networks**
- **UK Government looking to mandate smart charging**
  - **This project will provide evidence whether it will work**

ELECTRIC NATION



ELECTRIC NATION

Smart Charging in Action

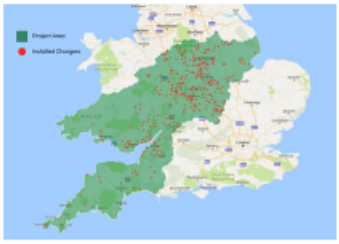


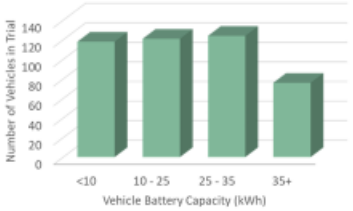
For more test results: https://www.westernpowerinnovation.co.uk/Document-library/2017/CarConnect/CarConnect-Algorithm-Development-and-Testing.aspx

ELECTRIC NATION

The World's Largest EV Trial

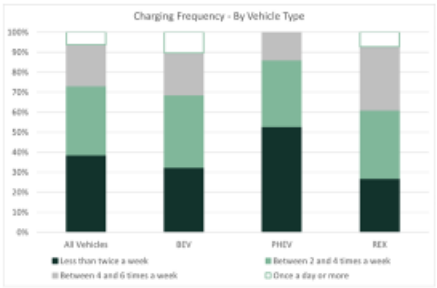
- 450 chargers (and counting), throughout WPD's licence areas
- 40 different makes/models of EV
- Over 6,300 charging events captured to date



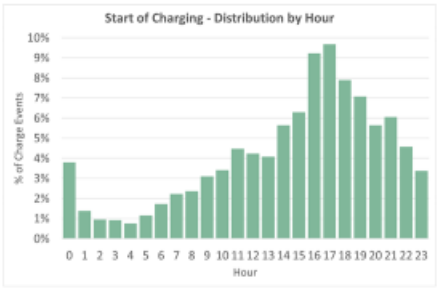


ELECTRIC NATION

What's the additional load from Plug-In Vehicles?

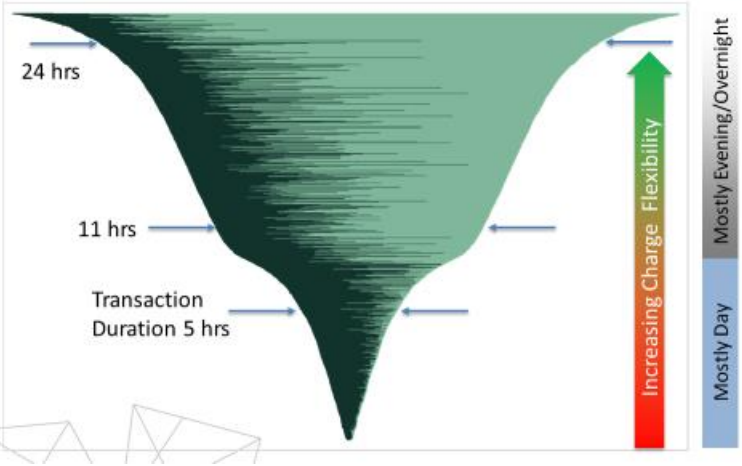


- Very few people plug in every day, or even most days
- The majority is less than 4 times a week
- PHEV drivers (so far) appear to charge less frequently



- Peak of charging events occurring in the early evening
- Some charging begins at night – mainly using timers (plug-in is earlier)
- Some charging begins in the middle of the day

ELECTRIC NATION



ELECTRIC NATION

Summary – Electric Nation Will….

- Demonstrate how smart charging could enable EV owners to charge at home while minimising increasing electricity bills, and whether this is acceptable to EV owners
  - Early findings show charging behaviour does create flexibility for smart charging at the key time of day for distribution networks
- Show charger manufacturers and the whole electricity sector how smart chargers can work in the home and the value of this, including V2G
- Produce the biggest ever statistically significant data set on smart EV charging at home – and this will be publicly available
- Inform Government thinking on smart charging

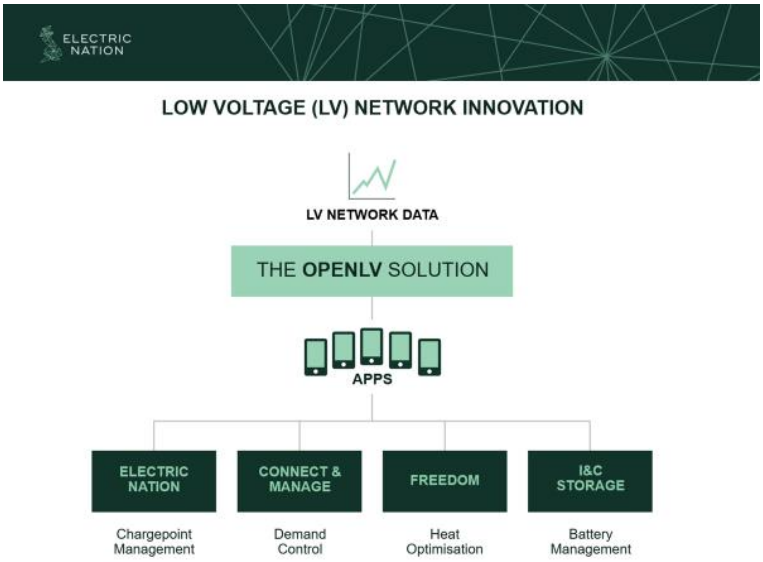
ELECTRIC NATION

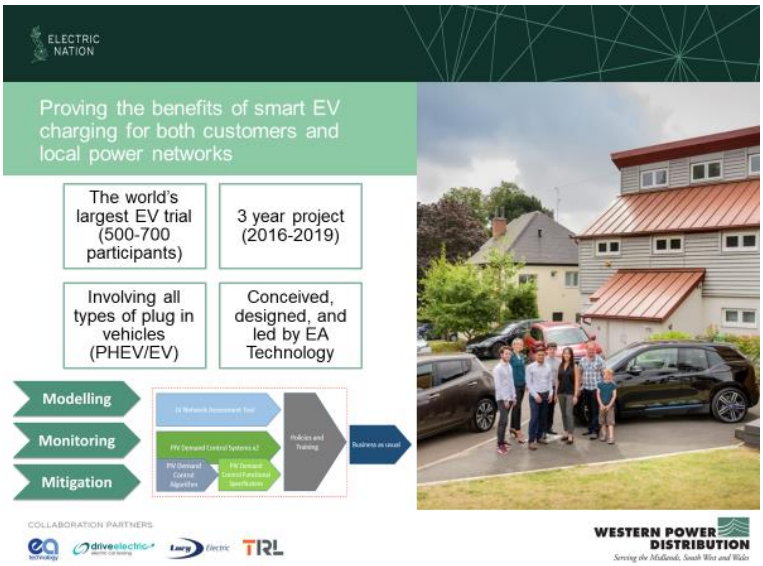
YOUR ELECTRIC VEHICLE YOUR SMART CHARGE

Thank You

For more information come and visit us in the UK Pavilion

APPENDIX 7 – LCNI PRESENTATION



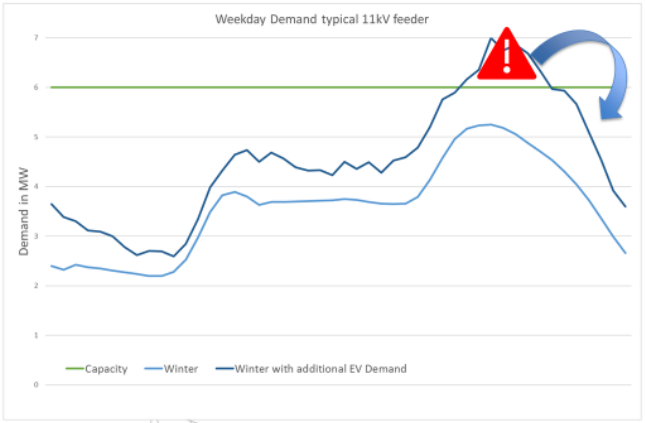


ELECTRIC NATION

Why do we need smart charging?

- EVs will require the generation and transmission of additional electricity to charge up:
  - Challenges for the generation industry and National Grid
  - And Distribution Network Operators in their networks down to 11kV network level
- For Distribution Network Operator's on 11 kV and LV networks EV loads may overload these networks – in certain seasons and times of day
- Additional loading on LV networks would result in at least 30% of these networks in GB requiring investment by 2050 costing at least £2.2bn *(My Electric Avenue)*
- Investment = upgrade/replace these networks – disruption affecting all of us
- Costs of upgrades go onto customer bills – a hidden cost of EV ownership?
- **Smart charging could reduce/delay or avoid the need to upgrade/replace networks**
- **UK Government looking to mandate smart charging**
  - **This project will provide evidence whether it will work**

ELECTRIC NATION



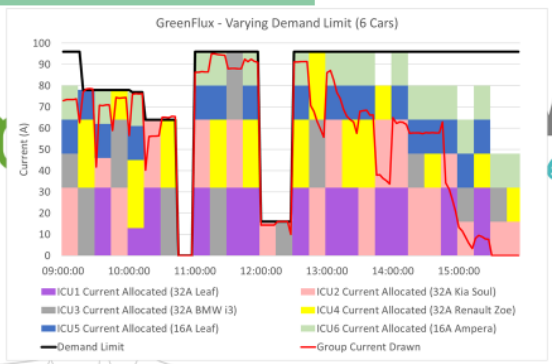
ELECTRIC NATION

Test system (1)

- Test system designed, built and commissioned by end September 2016
- Purpose of the test system:
  - Test smart charging algorithms before release to trial participants
  - Check the response of different cars to demand control
- During 1st year of the project:
  - 1st algorithm configurations for GreenFlux and CrowdCharge successfully tested ready for deployment
  - 10 makes/models of EVs tested
- Details reported in Algorithm Development and Testing report – available online: https://www.westernpowerinnovation.co.uk/Document-library/2017/CarConnect/CarConnect-Algorithm-Development-and-Testing.aspx

ELECTRIC NATION

Test system – smart charging in action

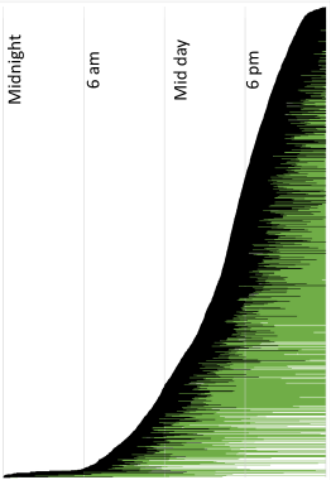


For more test results: https://www.westernpowerinnovation.co.uk/Document-library/2017/CarConnect/CarConnect-Algorithm-Development-and-Testing.aspx

ELECTRIC NATION

Customer trial

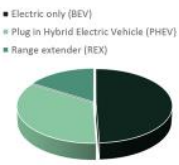
- 2017 – getting cohort built
  - Charge at will → demand management
- What we hope to get
  - Data to identify factors that influence customer behaviour under demand management
    - Size of battery vs EV use
    - PHEV vs BEV
- Use this to design further trials in 2018
  - Including more sophisticated DM systems
  - Customer interaction
  - SOC data

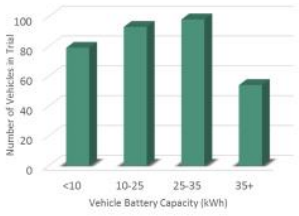


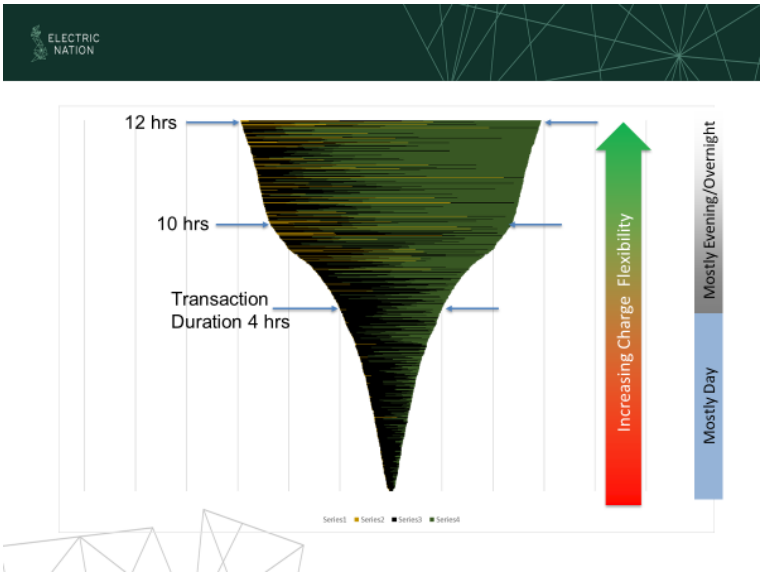
ELECTRIC NATION

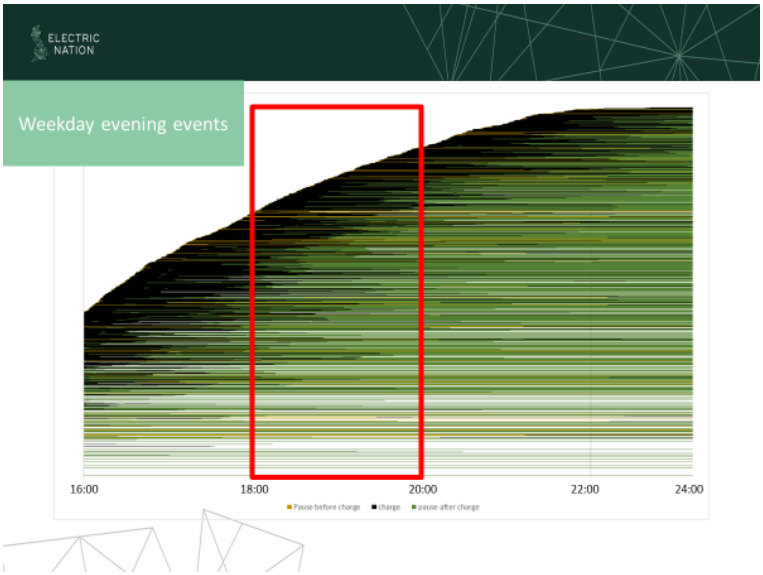
The world's largest EV trial

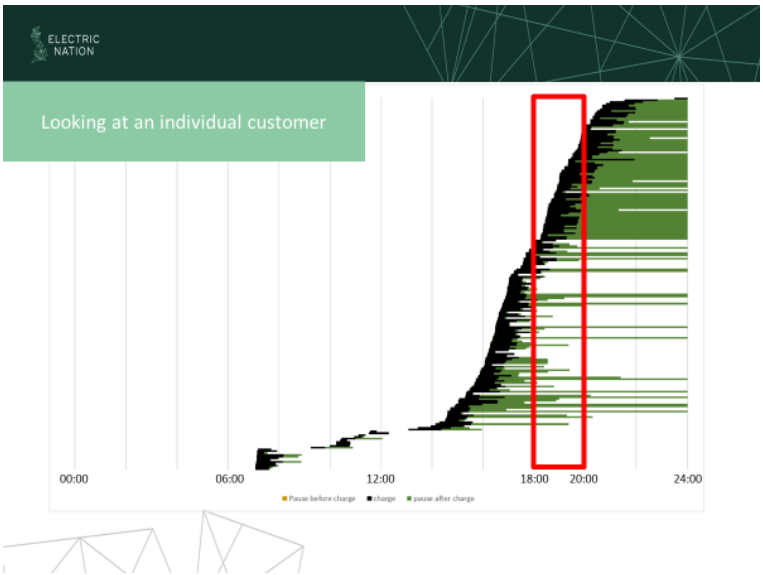
- 420 chargers (and counting) installed throughout WPD's licence areas
- 40 different makes/models of EV
- Over 10,000 charging events captured already leading to 120,000 hours of charging data





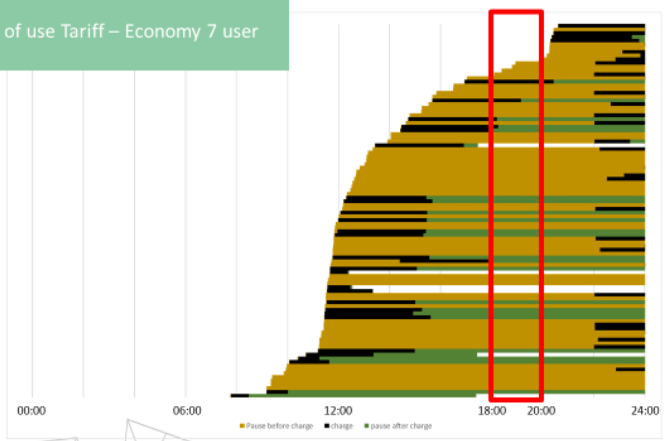

ELECTRIC NATION
12 hrs
10 hrs
Transaction Duration 4 hrs
Increasing Charge Flexibility
Mostly Evening/Overnight
Mostly Day


ELECTRIC NATION
Weekday evening events
16:00
18:00
20:00
22:00
24:00


ELECTRIC NATION
Looking at an individual customer
00:00
06:00
12:00
18:00
20:00
24:00

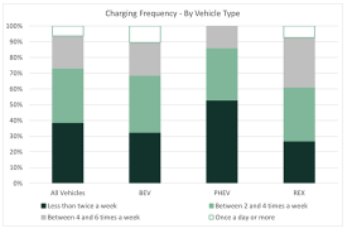
ELECTRIC NATION

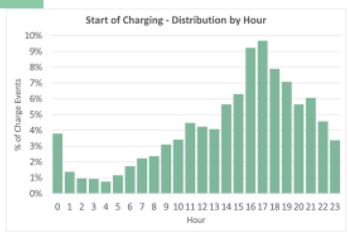
Time of use Tariff – Economy 7 user



ELECTRIC NATION

What's the additional load from Plug-In Vehicles?





- Very few people plug in every day, or even most days
- The majority is less than 4 times a week
- PHEV drivers (so far) appear to charge less frequently

- Peak of charging events occurring in the early evening
- Some charging begins at night – mainly using timers (plug-in is earlier)
- Some charging begins in the middle of the day

ELECTRIC NATION

Vehicle to Grid (V2G)

- What is it?
  - Charging equipment that allows an EV to act as a small scale generator
  - Could provide an additional source of flexibility – benefits for decentralising generation and increasing use of renewables
- Electric Nation will be testing a single phase domestic scale V2G charger late 2017/early 2018
- Aim to get a pilot scale customer deployment mid 2018 to investigate potential benefits of domestic V2G to distribution networks
  - Voltage support
  - Thermal/Load management
- Customers could benefit from V2G
  - Supplying special power services to the electricity network & grid
  - Generating income to offset cost of EV ownership

ELECTRIC NATION

YOUR ELECTRIC VEHICLE YOUR SMART CHARGE

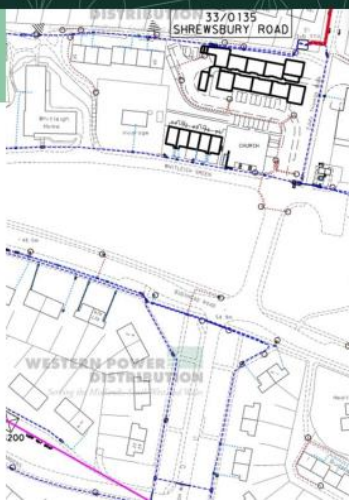
MODELLING

NETWORK ASSESSMENT TOOL

ELECTRIC NATION

Network Assessment Tool - The problem

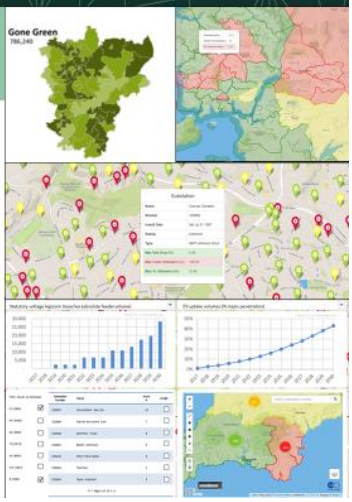
- EV charging will lead to overloads in some cases
- DNOs can't implement solutions overnight – they need early warning
- Key questions:
  - How many networks will need reinforcement?
  - When will it be needed?
  - Which solution is the most cost effective?
- Answering complex questions usually needs good data



ELECTRIC NATION

Network Assessment Tool - What is it?

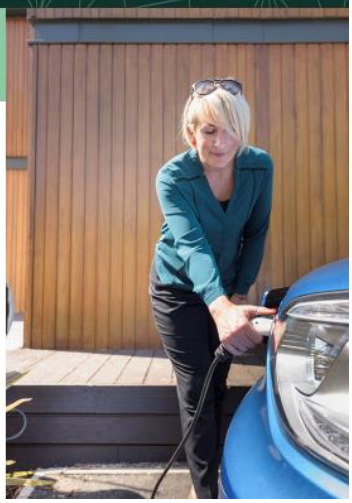
- A modelling tool that can assess:
  - Likelihood of overload and voltage excursion
  - Range of scenarios
    - EV uptake / time
    - Usage characteristics
    - Consumer car choices
- Two main areas:
  1. Network-wide overview
  2. Detailed analysis and solution guidance



ELECTRIC NATION

In summary – Electric Nation will…

- Establish a method for identifying EV contribution to high loads on LV Networks
- Demonstrate how smart charging could enable EV owners to charge at home while minimising increasing electricity bills, and whether this is acceptable to EV owners
- Show charger manufacturers and the whole electricity sector how smart chargers can work in the home and the value of this, including V2G
- Develop an LV network assessment tool that will identify parts of networks that are susceptible to growing levels of EV charging
  - And assess whether smart charging can mitigate this impact
    - To enable WPD to defer, minimise or avoid reinforcement works
- Inform Government thinking on smart charging



ELECTRIC NATION

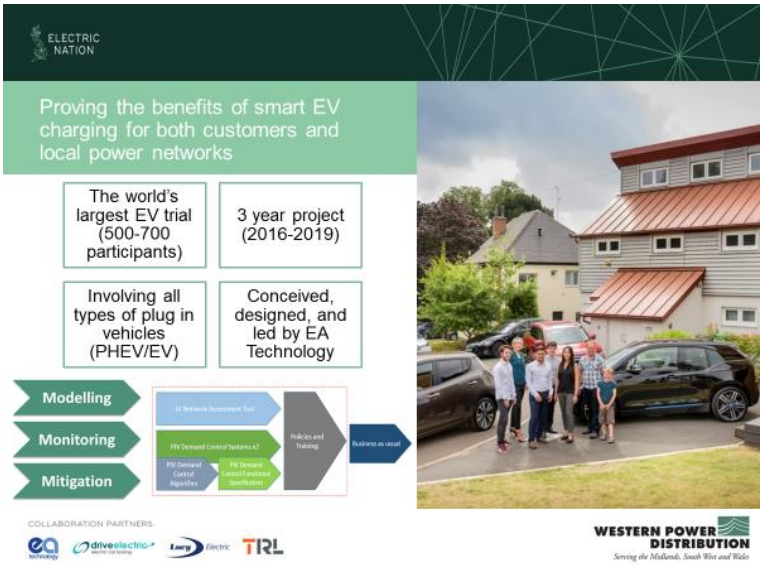
YOUR ELECTRIC VEHICLE YOUR SMART CHARGE

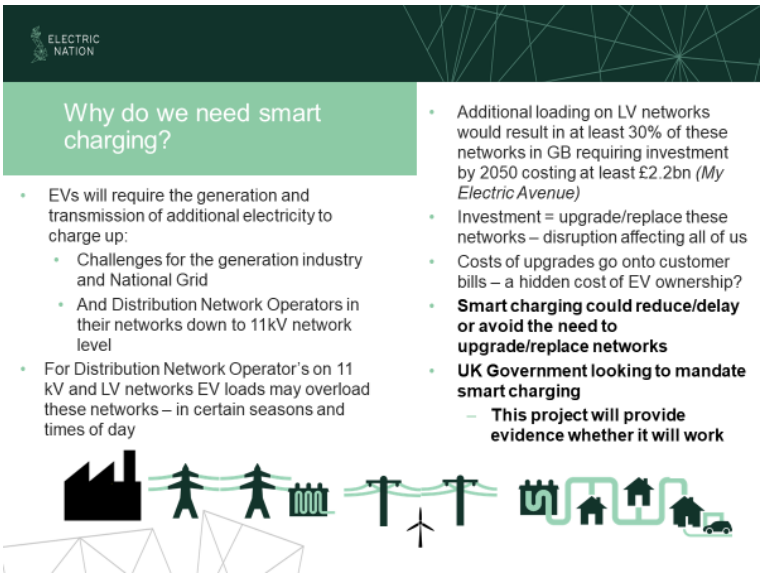
Thank you

Any questions?

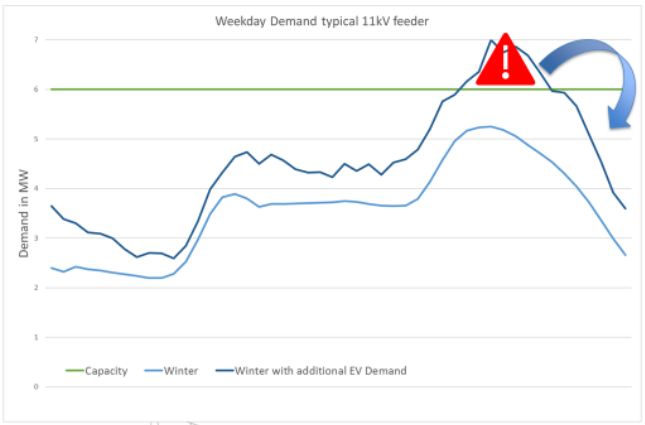
@ElectricNation_

APPENDIX 8 – NEW ENERGY FORUM



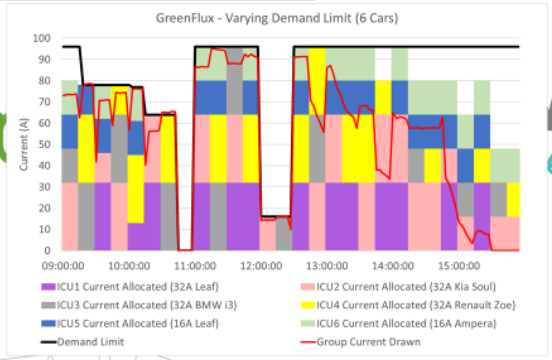


ELECTRIC NATION



ELECTRIC NATION

Test system – smart charging in action

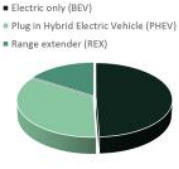


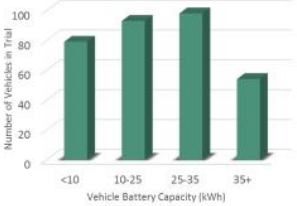
For more test results: https://www.westernpowerinnovation.co.uk/Document-library/2017/CarConnect/CarConnect-Algorithm-Development-and-Testing.aspx

ELECTRIC NATION

The world's largest EV trial

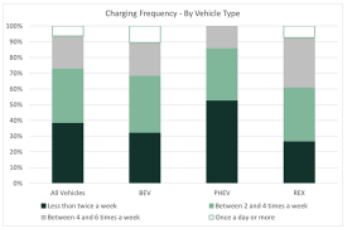
- 500 chargers (and counting) installed throughout WPD's licence areas
- 40 different makes/models of EV
- Over 5,500 charging events captured already leading to 66,452 hours of charging data

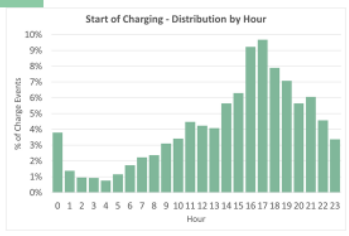




ELECTRIC NATION

What's the additional load from Plug-In Vehicles?





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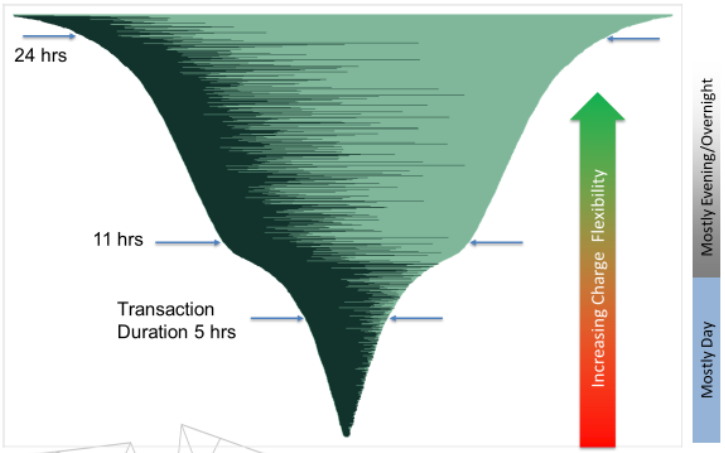
ELECTRIC NATION

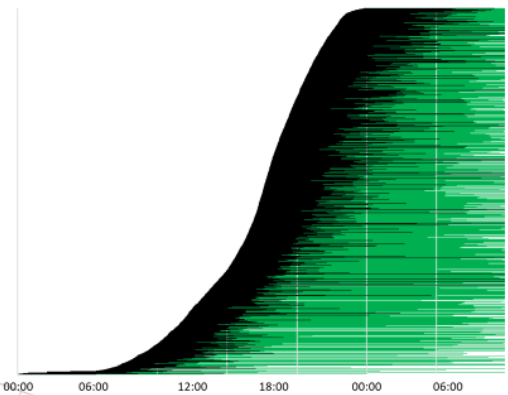


ELECTRIC NATION

Time of Day

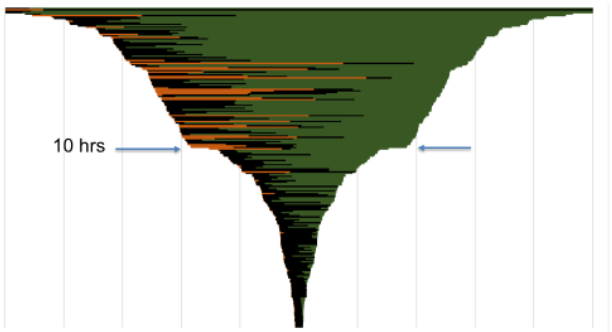
All Customers

All Charging Events



ELECTRIC NATION

Individual Customer:

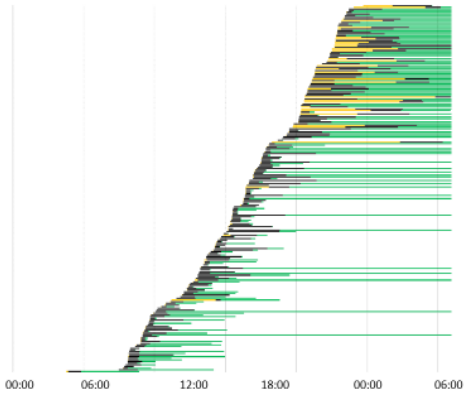


ELECTRIC NATION

Individual Customer

All Charging Events

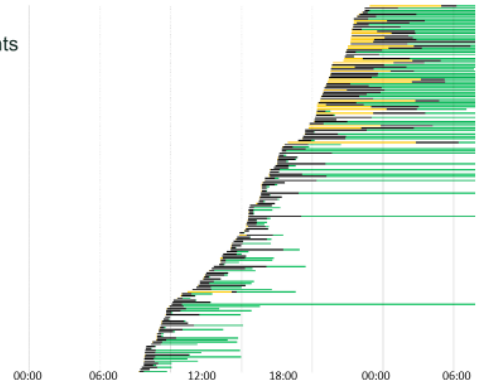
Time of Day



ELECTRIC NATION

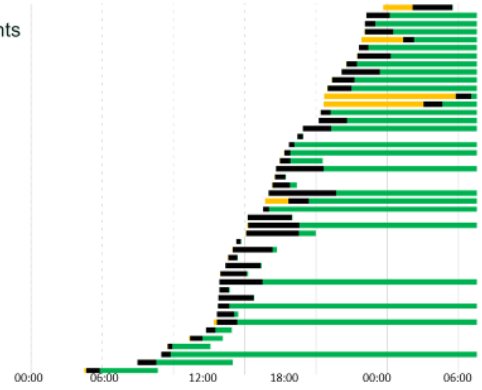
Individual Customer

Weekday Charging Events



ELECTRIC NATION

Individual Customer
Weekend Charging Events



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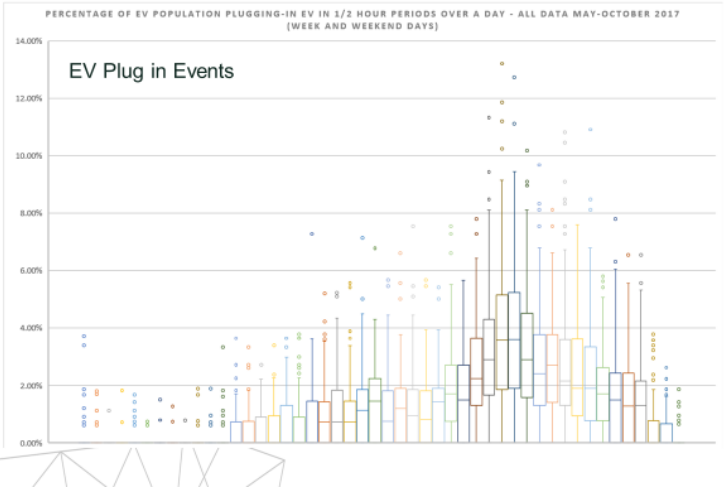

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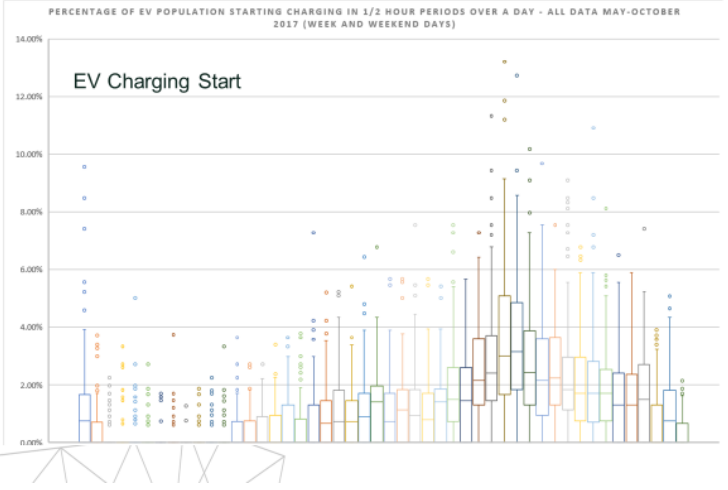
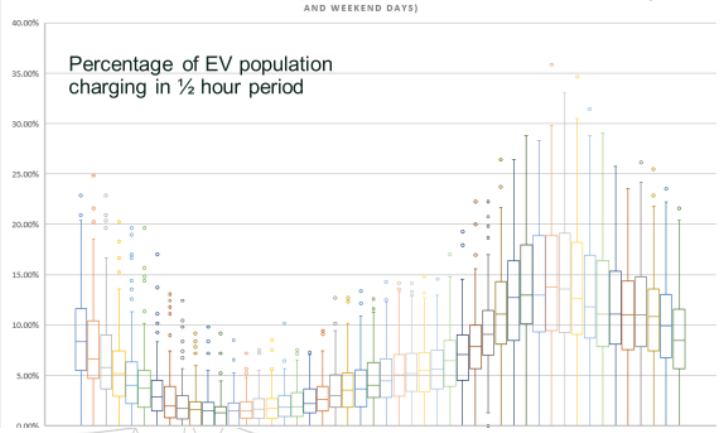


ELECTRIC NATION

PERCENTAGE OF EV POPULATION CHARGING IN 1/2 HOUR PERIODS OVER A DAY - ALL DATA MAY-OCTOBER 2017 (WEEK AND WEEKEND DAYS)



ELECTRIC NATION

What Next?

- All data presented – no significant management of charging
- Winter period – significant managed charging is occurring
- Does this affect EV owner experience?
- Does it affect their charging behaviour?
- Further developments:
  - Testing driver interaction with smart charging systems
  - Testing Time of Use Tariffs as a way of encouraging drivers to shift start of charge to overnight
- Use this knowledge for DNO assessment of efficacy of smart charging

ELECTRIC NATION

YOUR ELECTRIC VEHICLE YOUR SMART CHARGE

Thank you

Any questions?

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