Electric Vehicles and the Grid

12.45pm, Thursday 22 February 2018

Committee Room 2

The Scottish Parliament

Convenor: Mark Ruskell MSP

1. Attendees

A provisional list of attendees is attached to the end of this note. If you attended and are not shown on the list, please email Peter Speirs (pspeirs@scottishrenewables.com)

2. Introduction by Chair and approval of minutes from the last meeting

Mark Ruskell MSP welcomed everyone to the meeting and apologised for the late start to proceedings. He then moved on to the presentations.

3. Presentation, Electric Vehicles - Electricity Network Impact Scenario: Gerry Boyd, Scottish Power Energy Networks (SPEN)

SPEN is part of the wider Scottish Power group, but Gerry spoke from a SPEN perspective. SPEN has around 3.5 million customers across the UK, 3,000 direct staff and 3,000 contractors, 12,000 jobs indirectly supported in supply chain, and £1 billion in turnover.

Gerry pointed to Norway, which shows that the automobile industry's innovation cycle is relatively fast and if there is sufficient range, affordability and desirability electric vehicle adoption can happen quickly. With commitments from government, an international leader like Norway took 5 years to get to 6% electric vehicle penetration, and 4 years to get to 33%.

SPEN is doing a great deal of work on mapping the future of the grid with relation to electric vehicles. With no behavioural changes, electric vehicle use will change the demand profile of the country. SPEN has mapped out a scenario predicated on a move to 7kw chargers, although there are faster charges out there. It is important to remember that this is *a* scenario, not *the* scenario.

The scenario is based on National Grid's future energy work, which suggested 400,000 electric vehicles in Scotland by 2032. This acceleration in use could cost £2-300 million, but without innovation on smart charging it could be up to £600 million.

From a street level, when you get to 1 in 8 households owning an electric vehicles changes are limited, but when this increases to 1 in 4 it is a major issue with significant costs. Gerry noted that East Kilbride was used as a model for the practical implementation of the scenario, and this demonstrated more practical issues with electric vehicles and the grid. Gerry closed by noting that everyone is keen to minimise the impact on customer bills, and that we could see a net reduction in

charges on fuel as electricity is cheaper than petrol or diesel. The question is who pays: if general reinforcement is carried out by SPEN and others like them, then the costs are effectively socialised across all customers, which is a wider question that must be considered.

4. Presentation, Electric Vehicles Squeezing out Full Value: Felicity Jones, Everoze Partners

Felicity discussed squeezing value from electric vehicles. Felicity noted the wide range of values that can be derived from a vehicle. Value goes beyond cost, and the most interesting part is the question of portable storage. Portable storage can help energy providers and others.

Felicity invited us to imagine a scenario: you are parked up and plugged in, and perhaps the system inertia is quite low and National Grid needs storage help to manage the frequency. They might pay tens of pence for an hour just to rent the car battery. Imagine the power system changes and perhaps some local constraint issues have to be dealt with: the value is dispersed and changeable as individually the value is often quite small, with revenue hopping between small services.

This is already happening. Felicity noted the hard won lessons from stationary storage, in which Everoze has been a significant player. It is a really complex and difficult task for everyone involved with multifaceted levels of complexity. This is compounded when it is dispersed.

Felicity said that electric vehicles offer multiple services: they are mobility machines; they are portable energy storage; and they are data generators. We have lot of small devices, dynamically hopping between a large number of sources of value, for multiple actors. This is in exchange for what are individually very small payments. That means that, to extract the most value, we need to be much more efficient. Focusing specifically on portable storage value – this is highly dispersed and changeable: There are lots of services that can be provided – value is maximised by hopping between them. Felicity believed there are major implications for optimisation analytics, AI solutions, and potentially even blockchain solutions, for developing new platforms for trading flexibility from batteries, and for taking a system view to transportation and electricity – especially on charging infrastructure. Felicity said that our current approach is too manual, too bureaucratic, too expensive and ended by asking how technology can help.

5. Presentation, Electric Vehicles and the Grid from a User Perspectice: Alister Hamilton, Chair, Electric Vehicles Association Scotland (EVAS)

Alister began by noting that EVAS formed about 8 years ago by 7 early adopters of EV in Scotland and now has membership of over 650. EVAS consists of a voluntary board of largely unpaid directors from a wide range of backgrounds. Alister said that their upcoming AGM is on the 24 March and that all are welcome to come along (provided you pay your membership!)

Aliseter became chair last April and that EVAS is now a community interest company that tries to address the issues that electric vehicle drivers face and improve access. Alister noted that there are charge points accessible via an access card handled by Chargeways Scotland, which gives access to hundreds of chargers across Scotland. There are, however, lots of different charging rates available and if someone is going from Edinburgh to Aberdeen, they may have to charge for some time during that trip.

Alister compared the aspiration to have no need to sell petrol or diesel cars by 2032 in Scotland with Norway's 2025 target before outlining the strong links EVAS has with similar associations across the world, including Costa Rica, the USA, and Norway.

Alister noted that the subtleties of difference between conventional and electric vehicles are greater than most people believe. He said that 'rapid charger rage' is a common theme, as is the annoyance at being "iced" which is where an electric vehicle charging bay is occupied as a parking space by conventional car. Alister explained that data has been mentioned as an important solution in the past: how do you know which rapid chargers are being used or iced at any given time? Or even if the charger you want to use is working at all? These issues are not immediately clear to Transport Scotland and those who work on the network, so data can be utilised to provide information. Alister noted that EVAS talks to central government and local authorities to put the case for electric vehicles and ask questions about tenements and on street charging, for example. Alister concluded by saying that EVAS hopes to offer more services as we go forward and work closer with the vehicle manufacturers.

6. Question and Answer Session

NB As people did not identify themselves when asking their questions, the questions are unattributed

- When will SPEN start adapting and plugging in chargers; who's going to pay for it all; and should we build in chargers in newbuild housing?
    - Gerry Boyd said that the question is who is going to build the infrastructure? The drive from BEIS is for network companies to not build the infrastructure, but for the market to deal with it reactively and EU regulations to encourage the market to do the same. Gerry said that if we are building new housing, it should be future-proofed. Felicity Jones wondered whether we mean physical kit or digital infrastructure when we discuss infrastructure; e.g. when we talk about charging points, should we be constructing new ones or should we be making people aware of what's there – should we have an Airbnb for charging points? She suggested we focus on the digital as well as the physical. Alister from EVAS agreed and indicated that Guy: That's true. There is some UK-level talk of having some infrastructure commonalities across the UK, and noted his view that there should be more planning requirements on electric vehicle infrastructure.

- There is an APPG being set up on electric vehicles at Westminster. The rage issues discussed in the meeting could be quite acute as the car traditionally typifies individual freedom, so battery powered vehicles have to support that
- Codebase in Edinburgh has a number of companies brought together in hackathons which have included solutions like adapt Lothian buses app to take in all transport and amend to the prevailing circumstances: will EVAS take in electric bikes and can EVs help to contribute inmproving feedback to EV drivers and car charging at home was considered in the SPEN scenario, but have you included vans in the scenario?
- To drive from Orkney to Edinburgh requires 9 chargers. Robustness is an issue: if a couple of rural chargers are broken, then you can break down. It is key that issues are fixed timeously (experience of broken one for 2 weeks) and that there are more than one charger per location.

    - Alister from EVAS said he is blue in the face talking to Transport Scotland on this, but putting ourselves in a vulnerable position; we want three separate chargers per section, in France they have a failsafe plug in socket as well. Felicitywanted to take the question about peak power challenge and noted that the National Grid has done a lot of work on this. She is not concerned from a technical perspective, but the challenge is DNOs don't yet have the clear visibility of where the support is needed and then markets building up around that
    - Gerry from SPEN noted that they have considered fleets and vans and are trying to devise both top down and bottom up solutions on this.
- What is the life expectancy of an EV?
- Electricity is a secondary source of power, so we have to generate electricity, which could cost more for EVs. Batteries have existed for quite some time, and there is Scottish work being done to improve battery technology and increasing capacity.
- If we are talking in hundreds of millions of infrastructure costs, the issue when socialising them is when saying there will be a potential benefit to households that is based on a median sample, but not everyone. The potential benefits should also be socialised, e.g. if there are reductions in cost that derive in the long run how do we ensure that everyone benefits?
    - Gerry noted that it is costing more to run electric vehicles. SPEN did a C02 impact assessment on running electric v diesel and established the efficiency levels of electric vehicles in terms of the grid. Gerry also said that storage is not a net generator of electricity, but can help manage demand and supply. A key challenge is simplifying and improving processes for customers.
    - Felicity said that on cost, the national evidence from National Grid is that as soon as you open the market up to demand side response and battery storage the costs fall. She said that we should think about broader implications of all forms of battery change
    - Alister said that In terms of mileage, you're looking at upwards of 150,000 miles of life for an electric vehicles on average. He said that there is already a large fleet of batteries that are electric, so the EVAS is interested in how the fleet can be kept going. He noted that his Nissan leaf is five years old and he knows you get some information on the wear and tear of the battery.
- What should the Scottish Government do and is it doing it?
    - Gerry Boyd said that it a key is understanding what this actually means in terms of vehicles and usage across the network; we've started the process with the Scottish Government and the public, and would like this process to continue.
    - Felicity said that the Sottish Government should reframe the challenge beyond kit and as one of digital infrastructure.
    - Alister said that the Scottish Government needs to get systems in place to improve reliability.

7. AOB

Peter Speirs apologised for the lack of provision of sandwiches and promised to ensure it is provided in the future.

8. Attendees

Members

FIRST NAME	LAST NAME
Mark Ruskell	MSP
Alexander Burnett	MSP
Stephen Strachan	Individual
Alan Beal	Bacra Ltd
Andrew Faulk	Individual
Claire Addison	AES
Colin Campbell	Scottish Futures Trust
Eilidh Clark	Scottish Renewables
Elaine Waterson	Energy Savings Trust
Enrique Troncoso	SystenGConsulting
Ewen Cairns	Brodies
Hannah Smith	Scottish Renewables
Ian McCaskey	Building Engineering Services Association
Joan Pisanek	Sunamp
John Maclean	Individual
John Taylor	Individual
Joseph Mitchell	Scottish Renewables
Julia Wallis	Wood
Karen Freel	Perspectiva Consultants
Katie Alcock	Edinburgh Napier University
Keith Baker	Glasgow Caledonian University
Lynne Bryceland	Scottish Power
Mark Whiffett	Scottish Energy News
Matthew Eastwood	Energy Saving Trust
Michael Gettinby	Vattenfall
Nigel Holmes	Scottish Hydrogen and Fuel Cell Association
Paul Gill	Environmentally Sustainable Systems
Peter Speirs	Scottish Renewables
Shem Weekes	Individual
Stephen Strachan	ChangeWorks
Tariq Muneer	Edinburgh Napier University
Will Sutton	Individual
Yvonne Lawrie	Edinburgh Napier University
Hannah Smith	Scottish Renewables

John Birchmore	Shrews
Lindsay Mcgregor	SFT
Martin Lee	Orkney Renewable Energy Forum
Michelle Cullis	Scottish Power
Gerry Boyd	Scottish Power
Felicity Jones	Everoze Partners
Alister Hamilton	Electric Vehicles Association Scotland
Andy Kerr	University of Edinburgh
Paul Wilkinson	TRL
Jamie Stewart	Citizens Advice Scotland
Stephanie Conesa	Scottish Renewables
Neil	Barnes
Aisling	Doyle
Katy	Dickson
Alasdair	Campbell

For suggestions of corrections for this note please contact the secretariat, Peter Speirs (pspeirs@scottishrenewables.com).