



Briefing Note: Electric Vehicles in Food & Farming

15th July 2021

Rural Policy Group is a visionary think tank shaping the future of the rural economy; established in 2019 it supports economic actors in the rural economy with a programme of knowledge exchange, debate and dialogue with government. The group brings together the best minds in politics, economics, business, finance, medicine and science to discuss the big issues of the day, support rural leaders to find and seize opportunities for progress and growth and lobby policymakers for appropriate innovation.

The Speakers

Daniel Zeichner MP: Daniel Zeichner is the MP for Cambridge and Shadow Environment Minister. As a life-long environmentalist, Daniel is an executive member of Labour's national environmental campaign group (SERA), making the case for a shift to a greener tax policy. He is a member of Greenpeace and he has brought leaders on divestment to speak in Cambridge. He is also a bee fan – he is a passionate Species Champion for the Ruderal Bumblebee and he campaigns to stop bee-killing pesticides. Daniel is active in a number of All Party Parliamentary Groups concerned with the environment, technology and health including Chalk Streams, Climate Change, Design & Innovation, the Innovation Corridor, Life Sciences and Medical Research.

Peter Rolton: As Chairman of the Rolton Group and a built environment engineer Peter Rolton was appointed as non-executive director to the board of Britishvolt. Peter has previously helped develop strategy for the government on renewables and low carbon technologies. Britishvolt is building the UK's first battery gigaplant, targeted to start production in 2023. Peter has extensive expertise in energy, low carbon design and engineering of the built environment and has over 30 years' experience in engineering complex construction projects. As a Director of Rolton Kilbride, who is providing a sustainable future for the UK's energy needs, he is well positioned to provide strategic support on the gigaplant project. He has also acted as a Government advisor on renewable and low carbon technology implementation, regularly reporting at ministerial level.

Nigel Morris: Employment Tax Director and Automotive Specialist at MHA MacIntyre Hudson. Nigel was an HMRC Inspector and has worked in the Big 4 for 18 years before joining MHA MacIntyre Hudson in January 2017. His experience includes work on a range of employment tax matters for a range of major national and international businesses as well as SME and OMB businesses. This includes work primarily in the Automotive, Hospitality & Leisure, Logistics and Construction sectors. Nigel has aided clients in managing employment tax risk and mitigating HMRC settlements, as well as spending a considerable amount of time designing, implementing and communicating arrangements to reduce employment tax cost. He has worked on a large number of car consulting projects, including the development and design of bespoke arrangements for clients, including ECOS, Salary sacrifice and Hybrid fleet arrangements. He is a member of the Association of Taxation Technicians.

Emily Fraser: Business Development Manager, OX. With a background in physics, Emily joined OX after many years at Jaguar Land Rover where she brought her technical and engineering expertise to bear on their hybrid and electrification strategy as far back as 2012. The OX truck is a unique zero-emissions vehicle designed to provide affordable transport whilst also supporting the UN Sustainable Development Goal focused on reducing pollution and CO₂. The OX delivers high-carrying capacity, extreme durability, all-terrain capability, yet has



minimal parts, low-cost manufacture and the ability to be shipped flat-pack. Plus, the benefits of zero tailpipe emissions, ultra-low energy costs, low maintenance costs and being easy to drive & repair.

Simon Davis: Managing Director, OX. Simon obtained degrees in mechanical engineering before joining Jaguar Land Rover in 2003 and working across product strategy, portfolio planning and business transformation. He joined OX in 2019 to create the world's first clean-transport ecosystem involving a unique approach to transport operations enabled by an electric truck, digital platform and innovative Driver Plus operations model.

Summary of insights

We have reached the end of combustion engine technology and electric vehicles are on their way. Batteries are constantly improving, costs are coming down and businesses are becoming increasingly aware of their impact on the environment. However, the commercial sector needs its own Tesla to galvanise the market. It also needs guidance and tax & policy innovation from government to help it achieve the many targets and strategic aims that have been set for a more sustainable food system.

- Sale of petrol and diesel HGVs to be banned from 2040 as part of the government's decarbonisation plan for vehicles.
- For electric vehicles to be green, we need to consider the energy supply. Farms will need their own local energy ecosystem with a supply of renewable electricity generated by solar panels or wind turbines, electricity storage capability and charging points for vehicles.
- There are 100% tax deductions and even 130% 'super deductions' to incentivise the adoption of green business practices. However, the legislation supporting those tax breaks needs modernising to keep pace with the emerging technologies and the ambitions and aims of government policy.
- The initial outlay on EV may be higher but the running costs will be lower due to a lesser requirement for maintenance, servicing and repair and the relatively cheap cost of electric versus diesel or petrol.
- The evolution of EV for commercial applications allows business leaders to re-imagine how their organisations operate. Electrification is also opening doors to automation, using smaller machines and 'swarming' technologies.
- Mobility as a service is coming to the fore with electrification of vehicles. While it is better suited to urban locations, there is some transference to rural settings. Farm clusters, neighbouring farms, machinery rings and so on can share electric vehicles, plant and machinery. In a sense, this type of collaboration is not a new concept in farming as expensive pieces of kit such as tractors or combine harvesters have long been shared.
- Battery technology is inherently suited to rural applications. EVs deliver high torque at zero rpm and you can modulate that torque very precisely, much more so than traction control. In a rural context that translates into the ability to tow more and do less damage whilst doing so.
- 26% of businesses in food and farming see EVs as a realistic option in the near future. The rest have concerns around cost, capability, infrastructure requirements and need more encouragement from government.

Recommendations

After a spell of activity circa 2015 - 2019, there has been a period of inertia about commercial EV in the food industry. It is conspicuously absent from conversations about agritech or sustainability. RPG will re-open the conversation and bring together representatives of the food supply chain with the developers and



manufacturers of EV technologies to work towards the design of capable and accessible EV ecosystems (energy supply, charging infrastructure and vehicles) for businesses within the food system.

We will:

- Establish an electric vehicle alliance to bring together all stakeholders
- Hold further discussions and surveys to raise the voice of the food industry in the research and development process.
- Engage Parliament and lobby for the support business needs to make the transition to EV

Political Speaker: Daniel Zeichner MP

Yesterday (14th July 2021) the Secretary of State for Transport, Grant Schapps, announced the government's decarbonisation plan for vehicles, with targets around banning the sale of petrol and diesel HGVs from 2040. At the moment, there are plenty of targets for reaching net zero and greening the economy, but there does not seem to be many good practical plans for achieving those targets.

I was recently at the Great Yorkshire Show speaking to farmers about what needs to happen in the real world to make the environmental transition work and the consensus is that it will not be easy. The financial pressures on farming and agriculture as we shift from food subsidies to payments for environmental goods will be tough. I am not sure ELMS will deliver anything like the amount of money into the system that BPS currently does. I was very struck by a conversation I had with one of the bigger agricultural machinery suppliers who supply to much of the East of England; they are extremely concerned about the financial pressure because they think farms will put off replacing tractors, combine harvesters etc because these big pieces of kit are possibly not going to fit with the more environmentally friendly modes of farming the industry will need to adopt. Indeed, I am also hearing from farmers about the rising costs of machinery adding to their financial pressures. It will be difficult for farm businesses to adopt new technologies when the cost of machinery is already very high.

For electric vehicles to be green, we need to consider the energy supply. We have a long way to go to develop the charging capacity to enable the transition. On farms, ensuring a sufficient supply of sustainable electricity could mean installing solar panels or wind turbines. It is very difficult for the industry to start planning their investment in new technology when there is still so much uncertainty around what the technology will be capable of and when it will be ready.

There is a lot of interest in hydrogen as a fuel and that may prove more reliable than batteries, which again adds uncertainty to investment decisions. There is a lot of lobbying for hydrogen in parliament; there may be a way for the fossil fuel industry to carry on producing in the same way but producing hydrogen. However, if we really want an environmental shift it needs to be green hydrogen produced sustainably.

The government is starting to realise there is a big gap between targets and what needs to be done to get there. The Climate Change Committee has explained how it can be done, in a way which is not prohibitively costly and is not detrimental to productivity, and we all need to keep pressing for action to help close the gap. Decarbonising transport in the commercial sector is an incredibly important part of the transition to a more sustainable economy and we need the finances and structures to make it happen.

Mark Lumsdon-Taylor (Chair): The big story today is the ban on the sale of diesel HGVs from 2040, part of the decarbonisation strategy Daniel mentioned. Obviously, the transport and logistics industry feature in the



strategy but from a brief glance, I cannot see any mention specifically of the food and farming industries. The rural economy often seems to be a bit of an afterthought in policy. Do you think this needs to be addressed?

Daniel Zeichner: This is not a new problem. Defra does not feature highly in any government's thinking. One of the challenges is how to make sure rural businesses are part of the discussion at the beginning, rather than an afterthought. At the moment, the rural economy is not being viewed as centrally as it should be.

Battery Industry Speaker: Peter Rolton

Britishvolt are building the UK's first gigafactory. The UK needs a source of batteries close to vehicle manufacturing; they are heavy, expensive and do not move particularly well around the globe. A UK supply of batteries is an important part of the transition to the net zero carbon farming. Interestingly, we are getting an increasing number of enquiries from plant and machinery manufacturers now in addition to road vehicle manufacturers.

By the time the gigafactory has been built, it will be the fourth largest building in Britain, have 28 megawatts of solar power on the roof and produce 30 gigawatt hours minimum of batteries for electric vehicles of all sizes. Not just cars, but for lorries, plant, machinery and buses.

The government is stopping the sale of new cars with combustion engines from 2030 and that is causing consternation among automotive manufacturers. They have very long product plans and very long trajectories in terms of their model ranges. There are literally powertrain facilities now in the UK which are half built and they have been mothballed because it is the end of the combustion engine. The cars we are driving around in today are the end of that technology. We are at the tipping point where people are now getting their heads around the inevitable transition to EV. For many, the next car they buy could be an EV.

The cost benefit of EV is starting to come to the fore as the price of batteries start to come down. Combined with the savings on running costs, EV starts to become a cleaner and cheaper proposition. In the rural setting, if you have the means to generate and store your own power, the costs can be almost entirely offset. Solar power has come down dramatically in price and by combining it with battery storage, you effectively create your own mini green power station to collect power, store it and use it to charge your vehicles.

One of the issues with electric farm vehicles, which get high levels of utilisation at certain times of the year, is finding time to charge them. A combine harvester which may be running day and night during harvest, will need a very big charger to charge it quickly, and that charger will probably not be supported by the existing electrical infrastructure so there is a need to create an ecosystem of power generation, charging and storing. By creating a farm level infrastructure you could reach a point where even large machinery can be charged within 20-30 minutes.

Mark Lumdson-Taylor (Chair): How far away are we from electric agricultural machinery being as efficient and reliable as current red diesel vehicles?

Peter Rolton: To date, the emphasis has been on road vehicles. Now, we are getting more enquiries about trucks, buses and larger vehicles and the battery requirements are quite different in terms of energy density, power take off and charge cycles. This technology will lend itself to the requirements of the food and farming industry. Big companies such as Massey Ferguson have the R&D budgets to develop the vehicles, the bigger challenge for the rural economy is putting the infrastructure in place to charge and support the vehicles. The vehicles will not be any use if they need frequent long charges. The infrastructure required to charge vehicles



quickly is almost certainly not going to be supported by your typical farm grid connection. Equally, a massive cost upgrade to the grid connection into farms is also probably not practical because the local network would likely not cope with multiple applications for upgrades. In farm applications, we definitely need to be thinking about battery storage combined with renewable generation such as solar or onshore wind to ensure a charging capacity of suitable size. An alternative solution to keeping farm EVs in operation would be changeable battery packs. However, I suspect that would be ruinously expensive. The good news is that we will see the cost of static storage batteries really start to come down soon. Not only because of mass manufacturing, but because the battery packs going into vehicles have an 8-10 year life and when they come out they still have circa 80% storage capability. They would then be sold as 'second life' battery packs and you will start to see cost efficiencies coming in.

Business Advisory Speaker: Nigel Morris

Everything we hear about EV at the moment is focussed on passenger cars and cities. However, rural and suburban users are still going to need cars after 2030. Discussions around mobility as a service – car sharing, car pooling and so on – are not relevant to a huge number of people who need their own transport. What is relevant to electrification is the when, where and how of creating an appropriate infrastructure, and first of all we need to look at the capacity of the National Grid. Passenger cars are often plugged in at home overnight when electricity use is otherwise at its lowest; that cycle may not suit commercial use and we need a system of energy supply that can meet this additional requirement. That means looking into renewable energy and battery storage as Peter Rolton has said.

In rural settings, it is not about spending money helping the distribution network operator to dig up a road to get you to the substation. That money is better spent on becoming energy self-sufficient so you can get energy at the best price and available when you need it. So, there is some infrastructure investment that will be required.

Where money is spent on things the government regards as being green, there are some good tax breaks. EV charge points and solar panels attract tax efficiencies. However, the tax legislation needs to be checked carefully before making an investment to make sure what you are purchasing is eligible for tax breaks. At the moment, electrical systems do not qualify for the 100% or 130% deductions. The solar panels and charging points may be deductible, but the bit in the middle supplying and storing power might not. So, it is important to look carefully at infrastructure investments to make sure you are doing the right thing for your business and your property, while structuring the investment in such a way as to maximise the tax breaks that are out there.

There is a lot of talk about road pricing and fuel duties. It is not so much an issue for agricultural vehicles as the duties are not the same, but it will have more of an impact on the logistics side. At some point there will be an impact on the Exchquer and I suspect a technological solution will be found.

Electrification is a long journey and we need to do things the right way from the start. That means lobbying for governmental support to bring it all together and creating an infrastructure in which businesses can secure an appropriate supply of energy and utilise the energy markets in the right way.

Mark Lumsdon-Taylor (Chair): The point about tax legislation needing an update is extremely interesting. What changes would you support to enable businesses to adopt EV?

Nigel Morris: The 130% super deduction caused great excitement when it was announced. However, the legislation around capital allowances is too old. So, while the super deduction is a great initiative and extremely welcome, the Treasury and HMRC need to update the capital allowances legislation and tax legislation to meet



the ambitions and the aims of the incentive. For example, an electrical supply to support EV charging is treated the same as an electrical supply for the daily running of the business. In reality, they are two very different things and an electrical supply to support the decarbonisation of vehicles needs to be open to the special allowances in its entirety. That's just one example of where legislation could be modernised to enable the super deduction to encourage more environmentally-friendly expenditure. There are many examples where tax legislation could be updated.

I would also urge all the stakeholders to get together. At the moment we are in danger of having lots of siloed markets that do not support real world implementation. In the passenger car market, some car marques have closed charging networks. The networks need to be unified – any car being able to charge at any point.

Panel Q&A

Question from the audience: How can we join up incentives, tax, technology to speed up the electrification of vehicles within the food supply chain?

Daniel Zeichner MP: There is a structural problem within government when it comes to joining these issues up. Defra in particular has a problem because when you look at issues affecting the rural economy a very large number of government departments are involved. A stronger ministerial overview is needed to pull all that together. There is always a tension with the Treasury and that does not change very much from administration to administration. Now, however, given the heightened need to meet the environmental challenges it feels there is a problem.

Mark Lumdson-Taylor (Chair): What would you like to see from the Treasury in terms of incentives and how can industry get the support it needs?

Daniel Zeichner MP: The Labour Party is developing its proposition at the moment in preparation for the next general election. I do not think much will change under the current government. The National Food Strategy launched today, the first time we have had a food strategy in over a decade, and the Prime Minister chose to schedule an alternative speech. You can draw your own conclusions about the value the government places on this food and farming industry.

Question from Dr Jonathan Scurlock, Chief Advisor – Renewable Energy and Climate Change, NFU: Do you think batteries could help provide vehicle to grid services to help meet electric agriculture vehicle needs without overwhelming the grid?

Peter Rolton: That is where the markets will be starting to go. Companies like Octopus are starting to get into vehicle contract hire whereby you get the vehicle, the charger and the energy, and they are starting to look at how they can use the battery as a buffer on the property. With advances in AI algorithms we should certainly see battery packs in rural settings drawing on renewable sources and taking power from the grid when it is beneficial to do so, and start buffering the grid supply. The elephant in the room is that the UK tariff structure is wholly inappropriate for what we now have. We are switching to a system where we have lots of wind and lots of solar so nature is in the driving seat in terms of generation, yet the tariff structure is still based around time of day not generation. We need to overhaul the whole structure so that when a lot of generation from nature is



plentiful (lots of wind or lots of sunshine) we ought to be able to turn load on and fill up battery packs cheaply. At the moment we are stuck with a time of day tariff that is completely divorced from generation. Getting the tariff structure overhauled will really help unlock possibilities.

Mark Lumsdon-Taylor (Chair) brings in Sarah Calcutt: What are the challenges facing the industry over migrating to electric vehicles?

Sarah Calcutt: The logistics are the issue, the technology is the issue, also the disparity between different sizes of farm. You are starting to see a fairly substantial social gulf in many aspects of farming. You have the leading industry players with big lumps of infrastructure with a megawatt of roof space which powers the fleet cars for the management team and charges the forklifts and few other vehicles around the farm. That is not representative of every farm though. We need to see how the technology around solar PV cells improves over the next 10 years for those with more limited roof space. In farming there is also the challenge with weather and restrictions on the range of batteries in cold weather will massively affect the usefulness of EV; a lot of the work on farms is done in bad weather. Looking at the logistics side of things, an HGV carrying 22 tonnes of fruit on a lorry weighing 40% more than the diesel equivalent is punishing on the country roads surrounding farms.

We have reached a bit of an impasse. There are targets to decarbonise transport, manufacturers need to catch up to those targets and the infrastructure needs to be put in place to facilitate change. For farms which do not have a cold store or pack house, margins are already squeezed and we need to look at how to incentivise people to give up red diesel.

Mark Lumsdon-Taylor: We have spoken a lot about charging infrastructures, but the point about our physical infrastructure is equally important. Many councils are already not able to keep up with the maintenance of rural roads, whether because of financial pressures or having enough people to make the repairs, and if lorries get heavier, the situation will get worse. This is another aspect that needs to be thought through and integrated into a joined up policy on how we achieve the net zero targets.

Daniel Zeichner MP: I totally agree and that is why I think the government needs to bring forward a co-ordinated rural policy.

Peter Rolton: One of the issues here is the transitional arrangements. There needs to be a period of transition and tax incentivisation to help people make the shift. There cannot be a hard stop. Hefty front-end subsidies and tax incentives are going to be needed to make the financial case for transitioning. Over the next few years the cost of batteries will come down while the energy density improves, batteries will be able to be swapped out and replaced in the vehicle, old batteries will be able to be sold or redeployed for another application on the farm, all of which contribute to making the financial case. However, we need intervention. It would be chaos if left to market forces and the job of government is to set that plan and steer the ship in the right direction.

Agricultural EV Manufacturer: OX

The technology providers have a lot to do here. In the passenger car market, Tesla have really moved the needle. Very few people were taking EV seriously until Tesla started outselling BMW and Mercedes. Then all the car marques started committing hard to EV. The agricultural sector does not have a Tesla at the moment.

Electric vehicles come with a huge number of opportunities as well as the constraints that have already been mentioned, but it does mean changing how we work rather than taking an existing product and changing the



engine. The technology is highly suited to the rural context. EVs deliver high torque at zero rpm and you can modulate that torque very precisely, much more so than traction control. In a rural context that translates into the ability to tow more and do less damage whilst doing so. That means we have the opportunity to downsize vehicles and the size of the engines required.

The other benefit of EVs is their simplicity compared to petrol and diesel engines. There is one moving part in an electric motor, so it is low maintenance and does not require scheduled maintenance or servicing. That flows into a lower cost of ownership and less down time for the vehicle.

Cost benefits are also seen in fuelling. Even at full grid price, charging an electric vehicle is much cheaper than filling up with petrol or diesel. If you can generate your own renewable energy on site, the costs are even lower.

There are also the pollution benefits to EV. The particulates from diesel, which are not as regulated as they are in the auto sector, affect air and soil quality. Making the switch to EV will support improvements in both.

We have spoken a lot today about fuel availability and I would argue that having charging points where you park the vehicles overnight is less disruptive than going to a pump or organising fuel bowsers. It is a behavioural change, but not necessarily a bad one.

The OX truck was developed to offer mobility as a service; it comes with an app and provides an Uber-esque service helping farmers in developing countries get their product to market. The application could transfer easily to the UK where farm clusters or machinery rings are operating. The truck was intended to operate in developing countries, so it is designed to carry heavy loads along dirt roads and the operating costs are low. It is essentially a supersized pick-up truck.

Question from the audience: How can we make sure that electric vehicles are genuinely green, rather than a PR exercise? Can we ensure that the electricity comes from renewable or sustainable sources rather than fossil fuels?

Simon Davis: There are a finite number of generators making it easier to influence those than it is to influence individual purchasing choices over whether to buy petrol, diesel or electric vehicles. So, when the government has started moving people towards EV, it then has the ability to influence how the electricity is sourced through tax and tariffs. Energy will get greener.

Question from the audience: What is the range of the OX truck?

Emily Fraser: It is up to 135 miles depending on payload. However, the truck is built on a modular design meaning that there is the opportunity to use different size batteries depending on the range and payload requirements of the customer.

Key Messages from the Panel

Daniel Zeichner MP: Change is coming; do not pretend this is not happening.



Peter Rolton: Start planning your green infrastructure now, whether it be grid-based or blended. Creating the right infrastructure takes time and investment, and needs government incentivisation. If you do not have the foundations in place, you will run into problems when you try and switch the vehicles.

Simon Davis: Think differently. It is not just about taking a diesel engine out and plugging in an electric motor. There are other opportunities and technologies such as autonomous vehicles and 'swarming' of vehicles which could improve efficiency and productivity.

Emily Fraser: This is a time to think anew about what we want and need from our vehicles. The companies selling EV need to respond to industry. We may be used to comfy seats and air conditioning, but is that really what we want.

Nigel Morris: We need collaboration between EV manufacturers, energy suppliers and businesses all along the supply chain to lobby for government innovation. We also need collaboration to help one another transition.

Sarah Calcutt: The blended approach to energy supply is really interesting. Combining methane, biofuels and solar panels for greater energy efficiency and sustainability, and having the right technologies to manage those big draw down units.

Mark Lumsdon-Taylor: Start planning now. Look at your business holistically and decide what you need from the enhanced capabilities of EV. Do not just think about swapping machinery, look at how you can make efficiency and productivity gains with the available technologies. Then, the ability to transition will ultimately come down to EV will come down to money and people.

The Polls

Poll 1: Are sustainable financial and business practices something that you consider?

67%	Absolutely
22%	I would like to be able to do more but resources are restrictive
08%	It is a bit of an afterthought
03%	No, there are other more urgent priorities
00%	No, I do not believe in the climate crisis

Analysis: More than two thirds of rural businesses consider sustainability in their financial and business planning, and nearly a quarter of the businesses polled would become more sustainable still if their resources allowed. Despite the momentous changes affecting the food and farming sector as a result of covid, Brexit regulations and changes to farm payments, only 3% of businesses felt unable to devote time to improving their sustainability.

Poll 2: Do you think electric vehicles will be a realistic option for your food or farm business in the near future?

26%	Absolutely
21%	Yes, with government innovation around tax, funding and policy incentives
26%	It depends on the cost and running costs
18%	I have doubts about their capability to meet my needs
09%	The fuel supply and infrastructure is a barrier



Analysis: Food and farming businesses are sceptical about integrating EVs into their organisations. Only a quarter are confident that electric vehicles will be a realistic option, while the majority are concerned about costs, capability and the infrastructure requirements.