

## Written evidence submitted by Green Alliance

### About Green Alliance

Green Alliance is an independent think tank and charity focused on ambitious leadership for the environment. Since 1979, we have been working with the most influential leaders in business, NGOs and politics to accelerate political action and create transformative policy for a green and prosperous UK.

### What contribution could battery electric vehicles make to achieving net zero by 2050?

Shifting vehicles to battery electric will play a significant role in ensuring the UK can achieve net zero by 2050. Transport is the UK's largest emitting sector and was responsible for 31 per cent of greenhouse gas emissions in 2019. Cars and vans accounted for over half of these.<sup>i</sup> To cut emissions, the UK must promote the transition to battery electric vehicles, which avoid tailpipe emissions and have significantly lower lifecycle emissions compared to petrol, diesel and all hybrid vehicles.<sup>ii</sup> The Climate Change Committee (CCC) recommends BEVs represent nearly half of new vehicles sales in 2025 and nearly all sales by 2030.<sup>iii</sup>

Acting early to switch to electric cars and vans will help to maximise UK emissions reductions. This will especially be the case for battery electric vehicles, rather than plug-in hybrids, which only lead to minor emissions reductions compared to petrol and diesel cars.<sup>iv</sup> If, instead, widespread uptake is delayed until the late 2020s and plug-in hybrids represent a large share of vehicles sales, Green Alliance analysis shows that annual emission savings in 2030 would be just over half of what could be achieved through rapid uptake of battery electric vehicles in line with the CCC's recommended sales targets.<sup>v</sup> With the UK currently not on track to meet its 2030 Nationally Determined Contribution target, setting policy to ensure fast uptake would put the UK on a stronger footing to meet the target, and would be a strong signal of intent ahead of hosting the COP26 climate summit at the end of 2021.

Crucially, alongside promoting a rapid transition to battery electric vehicles, the government must also invest significantly in supporting more people to shift away from private vehicles towards sustainable alternatives, including public transport and active travel. The CCC has recommended that in order for the UK to meet net zero emissions by 2050, through its Balanced Net Zero Pathway, total car miles must fall by 9 per cent by 2035 as a result of modal shift, a reduction in the need to travel and increased car occupancy. Their more ambitious recommendations call for total car miles to fall by 34 per cent by 2050.<sup>vi</sup> Reducing car travel will also help reduce emissions generated through vehicle production, supporting decarbonisation in the UK and along global manufacturing supply chains. And it will improve air quality, reduce congestion and delivery better health outcomes from greater physical activity.<sup>vii</sup>

Alongside promoting rapid decarbonisation, fast uptake of battery electric cars will also enable lower income households to gain all the benefits of owning clean vehicles sooner, by bringing down costs and increasing the supply of electric vehicles to the second and third hand market. Households in the bottom 40 per cent of the income range mostly buy used cars. Analysis by Element Energy for Green Alliance shows that once new

battery electric cars, bought today, reach the second hand market, their owners could save between £700 and £2,300 compared to a petrol or diesel equivalent, on a total cost of ownership basis. And the savings for third hand owners would be between £3,500 and £5,600.<sup>viii</sup>

How well is Government policy aligned with high-level commitment for growth of battery electric vehicles to support its net zero ambition?

Last November, the UK government announced a ban on the sale of new petrol and diesel cars and vans from 2030 and allowing only zero emission vehicles to be sold from 2035. This is a significant step up in ambition, which must now be translated into near term action. Battery electric car sales are increasing but are currently only 6.6 per cent of car sales, and there are seven times more conventional petrol and diesel car models on the market as battery electric cars.<sup>ix</sup> Sales figures for vans were even lower.<sup>x</sup>

To support the uptake of BEVs, the government must put in place a comprehensive policy framework, which should include:

- Regulating car manufacturers to ensure adequate supply of clean vehicles. In particular, we recommend the use of a zero emission vehicle (ZEV) mandate, with interim targets over the next 15 years, to require car manufacturers to sell an increasing proportion of ZEVs. This would promote supply of a wider variety of models at more competitive prices and, by guaranteeing more battery electric vehicles are sold on the UK market, it would also help push more onto the second hand market, where they are more affordable to a wider set of car owners.
- Incentives for battery electric vehicle adoption. Apart from the existing incentives, we recommend the government consider progressively raising 1st year vehicle excise duty (VED) rates for conventional cars with engines and using revenues to support grants for battery electric vehicles until upfront cost parity is reached in all segments. We also recommend raising the Benefit in Kind rates for company plug-in hybrids, to avoid incentivising adoption of models which do not lead to significant emission savings.
- Ensuring adequate supply of charging infrastructure across the country. We recommend the government to develop a comprehensive strategy to facilitate delivery of charging infrastructure including by: empowering local authorities, many of which have struggled to access the current funding available for electric vehicle charging points and which, in the case of rural areas, face challenges related to poor business case due to lower population density and higher grid connection costs;<sup>xi</sup> tackling the cost of strategic grid connections for fast charging; setting policy to promote delivery of charging at home and workplace.

Crucially, policy to promote adoption of battery electric vehicles should be part of a comprehensive approach to decarbonise transport, which should include new policy and funding to promote modal shift. The government should commit to these policies

and funding as part of the upcoming Transport Decarbonisation Plan and provide a clear roadmap for how it plans to support decarbonisation of surface transport.

Developing UK charging infrastructure and clean energy to support EV uptake would also support economic recovery and employment across the country.<sup>xii</sup>

What natural advantages in terms of access to raw materials, renewable energy supply, technological readiness, IP or other competitive advantage does the UK have to encourage development of battery manufacture in the UK?

Securing the long term resilience of UK industries means investing in solutions that will make them competitive in future. With the global market for battery electric vehicles set to grow quickly, the UK has a good starting point: in 2018, it built a quarter of the battery electric cars in Europe. But the global race is now on. The EU is moving in on the market, though its growth is only expected to pick up significantly later in the 2020s. The UK can either capitalise on its early mover advantage in the first half of the 2020s, to secure and bolster its position in both the domestic and EU markets, or wait and risk falling behind.

Analysis by Cambridge Econometrics also suggests that the shift to electric vehicles would benefit UK industries by promoting growth in domestic power generation, away from oil products (where most of the value is realised outside of the UK), as well as in supply chains to support charging infrastructure.<sup>xiii</sup>

What action is needed to support investment and establishment of UK gigafactories?

Central government must ensure that there is a coherent and comprehensive framework which clearly supports the shift to battery electric vehicles.

The 2030 and 2035 phase out date sets the long term direction. However, with the global market for battery electric vehicles set to grow quickly and the EU also expected to see strong growth in battery electric cars later this decade, the UK needs to capitalise on its early mover advantage in the first half of the 2020s, to secure and bolster the position of its manufacturing in both the domestic and EU markets.

This is especially important in light of the rules of origin, which require a certain share of a vehicle to be made in the EU or UK (if the vehicle is to be exported to the EU) and will become stricter later in the 2020s. A more concerted effort to establish more battery electric vehicle manufacturing, as well as battery production, will be essential to ensure UK manufacturers remain competitive and will require immediate steps to grow the domestic supply chain.

Crucially, a ZEV mandate will play a strong role in promoting investment in battery electric vehicle supply chains and should be central to government efforts to establish the UK as a leader in the electric vehicle market.

With the current CO<sub>2</sub> regulations alone, UK manufacturers might continue to invest in producing conventional vehicles, as well as hybrids and plug-in hybrids, potentially locking jobs into high carbon supply chains. Instead, by requiring zero emission

vehicles, such as battery electric vehicles, to be at least a specific share of all cars and vans sold in the UK each year, a ZEV mandate would strengthen the business case for investment in battery electric vehicle and battery production. It will also help to attract inward investment from manufacturers specialised in zero emission vehicles.

What action is needed to support growth of associated power electronics, machines and drive supply chain, including securing supply of raw materials and material processing?

As above, central government must ensure that there is a coherent and comprehensive framework which clearly supports the shift to battery electric vehicles, including through introducing a ZEV mandate.

What steps should be taken to ensure the UK workforce has the necessary skills to staff gigafactories and their supporting supply chains?

As above, central government must ensure that there is a coherent and comprehensive framework which clearly supports the shift to battery electric vehicles, including through introducing a ZEV mandate, which would strengthen the case for this investment along supply chains and in green jobs, and avoid locking in jobs in transitional technologies such as hybrids and plug-in hybrids.

While the transition towards clean vehicle manufacturing requires a concerted effort and policy from government, the UK is well placed to take advantage of these new industries as around 87 per cent of UK automotive sector jobs have the potential to switch rapidly to producing electric vehicles, which is significant as transport manufacturing is disproportionately located in areas of lower regional economic performance.<sup>xiv</sup>

There are also opportunities for employment creation in sector supporting the roll out of battery electric vehicles. This includes investment in charging infrastructure as well as expansion of electricity generation.<sup>xv</sup>

Importantly, central government must provide adequate resources for local authorities to be able to work with local supply chains and workforces. Local authorities are best placed to identify local companies and workforces most at risk of shifting to a greener economy.

What measures should the Government take to ensure that minerals for battery electric vehicles are sourced in a responsible way?

The UK wants to be a world leader in EVs, but these industries are heavily reliant on imported critical raw materials like rare earth elements and cobalt. The extraction these materials often creates significant human and environmental costs abroad. This may expose industry to supply disruptions and reputational risks. Cobalt, for instance, has been associated with human rights abuses in the Democratic Republic of Congo, which provides more than half of the world's supply.<sup>xvi</sup> Mining a tonne of some rare earth elements, meanwhile, can produce up to 2,000 tonnes of hazardous waste, harmful to both people and the environment.<sup>xvii</sup>

The UK should therefore put in place strong due diligence requirements on companies selling EVs, to ensure there is transparent and robust information regarding the origin of critical raw materials.

Furthermore opportunities to minimise environmental impacts from battery material extraction include: promoting modal shift and shared mobility, reducing the number of vehicles on the road; there are also opportunities to reduce the material input for battery production, with new analysis by Transport & Environment suggesting that improvements in battery design and chemistry could reduce cobalt requirements from 0.13kg/kWh in 2020 to 0.03 kg/kWh in 2030;<sup>xxviii</sup> Finally, the UK should also create a secure supply chain by reusing and recycling the materials in existing low carbon technologies, which would limit reliance on virgin materials.<sup>xxix</sup>

What action can Government take to support growth of secondary markets to extend lifetime use of EV batteries?

Setting targets for reuse could ensure that used EV batteries are repurposed for applications such as stationary battery storage, as batteries reaching the end of their useful life in a vehicle, often have significant capacity left.<sup>xx</sup> Leading companies are already investigating reuse for large battery storage operations, including Nissan and Renault, which are testing it for a 100MW battery storage system using recovered batteries.<sup>xxi</sup> Renault is now also in the process of establishing a 'Re-Factory' in Flins, France. It will be established gradually between 2021 and 2024 and will retrofit and repair vehicles, re-use batteries that do not operate at full capacity, recycle batteries, and more.<sup>xxii</sup>

Central government and local councils manage almost 75,000 vehicles and could reward battery and vehicle manufacturers that opt for recovered content.<sup>xxiii</sup> Furthermore, local authorities wanting to develop distributed storage capacity could make repurposed EV batteries a procurement requirement.

What steps should be taken to ensure that EV batteries are recycled at the end of their lives and not simply sent to landfill?

So far, critical raw materials, such as cobalt, used in the UK are either exported for recovery abroad or lost in the recycling process once they reach the end of life. Policy should encourage reuse, remanufacturing and high value recycling of batteries, including through better design and policy to promote markets for secondary use and adequate infrastructure and business models.

Setting future requirements for recycled content could unlock investment in recycling infrastructure and enable reverse logistics to support the use of recycled cobalt in batteries. By 2030, end of life batteries could support between 13 and 33 recycling plants, rising to between 42 and 91 plants by 2035.<sup>xxiv</sup> These plants could supply a quarter of the cobalt required to meet the UK's demand for low carbon technologies in 2030 and about half by 2035.<sup>xxv</sup>

Finally, government should promote battery reuse, as discussed in response to the previous question.

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- <sup>i</sup> The total emissions for the UK in 2019 were 520 MtCO<sub>2</sub>e, in which the transport sector (including international aviation and shipping) contributed 169 MtCO<sub>2</sub>e, where 88 MtCO<sub>2</sub>e were from cars and vans. Climate Change Committee (CCC), December 2020, *Sixth carbon budget*
- <sup>ii</sup> Transport & Environment, 2020, 'UK briefing: the plug in hybrid con'
- <sup>iii</sup> CCC, 2020, *The sixth carbon budget*
- <sup>iv</sup> Transport & Environment, 2020, 'UK briefing: the plug-in hybrid con'
- <sup>v</sup> Green Alliance, *Accelerating the electric vehicle revolution*, forthcoming
- <sup>vi</sup> CCC, December 2020, *The sixth carbon budget*
- <sup>vii</sup> Green Alliance, 2020, *Balancing the energy equation*
- <sup>viii</sup> Green Alliance, *Accelerating the electric vehicle revolution*, forthcoming
- <sup>ix</sup> SMMT, 2021, *Delivering the triple bottom line: a blueprint for the electric vehicle revolution*
- <sup>x</sup> Transport & Environment, May 2021, *European van market unplugged: how weak regulation is failing electrification*
- <sup>xi</sup> BEIS Strategy Committee, October 2018, 'Electric vehicles: driving the transition'
- <sup>xii</sup> Cambridge Econometrics, 2020, *The impact of a 2030 ICE phase-out in the UK*, report for Greenpeace
- <sup>xiii</sup> Ibid
- <sup>xiv</sup> Green Alliance, October 2019, *The route to clean growth: using local industrial strategies to drive change*
- <sup>xv</sup> National Grid, 2020, *Building the net zero energy workforce report*; Transport & Environment, 2020, *Powering a New Value Chain in the Automotive Sector: the job potential of transport electrification*
- <sup>xvi</sup> Amnesty International, 2017, *Time to recharge: corporate action and inaction to tackle abuses in the cobalt supply chain*
- <sup>xvii</sup> The Guardian, March 2014, 'Rare earth mining in China: the bleak social and environmental costs'
- <sup>xviii</sup> Transport & Environment, 2021, *From dirty oil to clean batteries*
- <sup>xix</sup> Green Alliance, June 2018, *Completing the circle: Creating effective UK markets for recovered resources*
- <sup>xx</sup> Note that, while earlier evidence suggested that batteries would have to be replaced after around 8 years, more recent evidence suggests that the lifespan of batteries might be comparable to the average lifespan of a vehicle (for cars not used intensely).
- <sup>xxi</sup> Reuters, June 2017, 'Renault plans foray into energy market with mega battery'
- <sup>xxii</sup> Green Alliance, March 2021, *Targeting success: Why the UK needs a new vision for resource use*
- <sup>xxiii</sup> The Daily Telegraph, July 2014, 'Government cars go electric'; Fleet news, February 2015, 'UK council fleet drops below 50,000 vehicles'
- <sup>xxiv</sup> There could be between about 460,000 and over 1.16 million EV batteries reaching end of life by 2030, rising to about 1.5 and 3.2 million by 2035. The ranges are based on two estimates: the lower option is based on CCC analysis that 60 per cent of new vehicle sales in 2030 will be EVs. The higher number assumes that the ban on new petrol and diesel vehicle sales will be brought forward to 2030. The number of recycling plants is calculated assuming each plant capacity is equal to the current 35,000 EV batteries capacity of Umicore's recycling plant in Belgium, see: <http://csm.umicore.com/en/recycling/battery-recycling/our-recycling-process>
- <sup>xxv</sup> Assuming a rate of EV uptake in line with the CCC projections, the following share of demand can be met by recycling and reusing cobalt: 18 per cent of demand in 2030, and 34 per cent of demand in 2035