Identifying and quantifying risks

Summary

Evidence increasingly suggests that e-bike battery fires are principally caused by the vehicles used by delivery riders in the 'gig economy'.

- Riders are incentivised to compete on delivery speed, so feel obliged to use e-bikes which are often faster than legally permitted. This makes the vehicles not even "e-bikes" as such - they are unregistered, illegal to use e-motorbikes.
- Riders are also generally economically marginal, so usually obtain cheap e-bike conversion kits (or individual components) online rather than buying complete e-bikes from reputable UK retailers.
- These kits or components are usually fitted DIY rather than by professional installers.
- Reputable retailers will not work on e-bikes created in this manner, so maintenance is also often DIY in nature.
- Fire risk is often intrinsically high in these kits. They are often of low quality and of uncertain compatibility (especially if components were sourced separately). And having higher speeds and power than legal e-bikes means higher currents, leading to greater chances of overheating.
- Riders also often fit multiple batteries (to last a working day) and source extra batteries and chargers separately via online marketplaces. This type of DIY modification results in very high fire risk situations, especially if the battery and charger are not compatible.
- Riders in the 'gig economy' are likely to be living in HMOs or otherwise cramped accommodation, and will often have nowhere to securely store or charge their e-bike other than in their residential accommodation, often blocking fire exits. This is, we believe, a contributing factor why many e-bike fire incidents have such severe and often tragic consequences.

While we believe that all evidence available to date supports our contention that vehicles used by gig economy riders account for the significant majority of fire incidents, data also suggests that a relatively small number of incidents do occur outside of this sector, caused by e.g.:

- Unsafe e-bikes, or batteries, or incompatible spare chargers, imported direct by consumers from overseas, usually via online marketplaces
- Unsafe e-bike conversion kits fitted for non-delivery use
- Unsafe e-bikes or batteries imported by 'rogue' or naive UK importers who do not properly control testing, compliance and product safety.

Fire incidents involving safety-tested and compliant products from reputable e-bike brands are very rare, and only a very small number indeed have been reliably identified. In the cases that we are aware of, serious customer misuse or damage to what are normally very safe products cannot be excluded.

As the vast majority of e-bikes in use today are from reputable brands, safety tested and CE or UKCA marked, insurers may consider that once high risk groups are excluded (and some mitigation measures to achieve this are described below), fire incidence should be very low for the majority of users.

Quantifying UK e-bike fleet size and nature

- Industry estimates informed by sales data compiled by the BA Market Data Service suggest that there are currently between 500,000 and 1m e-bikes in the UK fleet (excludes kit-converted e-bikes).
- OPSS survey data (link above) suggests that ca 2% of the population own an e-bike i.e. ca 1 million people.
- The OPSS survey also notes that ca 20% of e-bike owners have an e-bike created from a kit (ca. 200,000). This number correlates roughly with estimates of the number of gig economy delivery riders ("more than 120,000" from just the two main operators, and "tens of thousands" more from others, as reported here).

Quantifying and benchmarking incidence frequency

- OPSS e-bike and e-scooter fire data suggests ca 161 fire incidents/year for 2023 attributed to e-bikes (with caveats that data is likely incomplete). Using a fleet size of 1m e-bikes (per OPSS survey data) this suggests an average (across the whole fleet, including kit-created e-bikes) fire incident frequency of ca 0.016%/year.
- It is reported here that in 2023 there were ca 1.47 million electric cars in the UK (including hybrids). This report indicates that 239 fires recorded in the UK from July 2022 to June 2023 were linked to EVs. This suggests a near identical fire incident frequency of ca 0.016%/year.

Quantifying low risk of reputable e-bikes

- Specialist scheme brokers specialising in cycles and e-bikes have made statements on the fire risk of the legitimate e-cyles they insure (in general, suggesting that incidents are so rare as to be negligible). It is generally more responsible consumers who seek out specialist e-bike insurance (which typically covers third party risks alongside theft and damage), and as noted below these brokers all take measures to ensure that the e-bikes they insure are legal EAPCs (electrically assisted pedal cycles).
    - Bikmo, reported as then insuring ca 34000 e-bikes, stated in August 2023 that "the frequency of e-bike fires is so low that it doesn't play into the cost of our claims with

any significance". They also note that they use a four-question quiz process to establish that the insured e-bikes are EAPCs.

- A survey of the reputable UK e-bike industry recorded:
    - a major e-bike brand (Tern) reporting no incidents since they launched in 2017 using a reputable drive system, and another major brand (Giant) reporting zero fires across three product ranges.
    - That 95% of e-bike retailers had never recorded an e-bike battery fire related issue, and that "The exceptions were a single store where a customer wheeled in an unverified 'e-bike' of uncertain origin and a further two stores (4%) that said they had encountered a single incident with a stocked brand's product." No further info on that severity or nature of these incidents was provided.
    - It was also confirmed off the record that "one of the nation's largest bike retail chains had also never encountered a single incidence of fire in its shops or workshops."

Quantifying prevalence of fires in high risk products

- As the OPSS incident data report notes, identifying the details of fire-affected e-bikes or battery packs after a fire incident is often very difficult. For incidents reported in 2023, Figure 5 suggests that at least 46% of fire incidents involved an e-bike created via a kit, but there is also a very large "unknown" percentage (28%) and it is likely also that some of the e-bikes involved which are described as "manufactured" were also in fact created from kits. We consider that the real percentage of kit-involved fires is likely to be significantly higher than 46%.
- Numerous statements from fire and rescue services, and other stakeholders, confirm the high risk nature of e-bikes converted from normal bikes using kits, especially in the gig economy. For example:
    - London Fire Brigade in August 2023 identified ca 40% of e-bike fires could be attributed to conversion kits - reported here. LFB also has specific guidance on kits here and has worked to target delivery riders with educational messaging.
    - As reported here, LFB is further quoted by the BBC as advising people to take safety measures including "not converting pedal bikes into e-bikes using DIY kits bought online, as they "can be very dangerous" and "pose a higher risk of fire"
    - In October 2024 the BBC reported on comments from the West Yorkshire Fire Authority on the "Fire risk of delivery riders' modified e-bikes".
    - Charity Electrical Safety First has called for "delivery services to take responsibility and liability for the e-bikes operated by their delivery riders"

Next steps/further research to quantify and understand risks:

- Systematic international comparisons: Other countries in mainland Europe have very much larger e-bike fleets but do not report similar levels of fire incidents as the UK. We believe this to be largely due to differences in 'gig economy' labour laws, better enforcement against non-legal

e-bikes, and also better border controls on unsafe imports. However, systematic research could provide further insight. The cycle industry would welcome support from Government and/or the insurance industry to fund this work.

- Geographical analysis: The cycle industry is urging OPSS to urgently publish data indicating the postcode at which each reported UK e-bike battery fire incident has occurred. This data may enable insurers to identify high risk locations (which we expect to correlate with intensity of 'gig economy' delivery rider residential locations) and to reassess risk levels elsewhere (where we expect there to be much lower risk)
- OPSS research: A detailed research report commissioned by OPSS into the causes of e-bike fires is expected to be published in Q1 2025. This may provide further evidence as to risk factors.