

## **The Safety of Electric-Powered Micromobility Vehicles and Lithium Batteries Bill**

### **Equalities Impact Assessment**

#### **1. Purpose of this Document**

To comply with Section 149 of the Equality Act 2010, it is necessary to assess the impact of the proposed legislation on individuals with relevant protected characteristics, as specified in the 2010 Act, and ensure that the proposed legislation takes due regard to eliminating discrimination.

It should be noted, however, that inequalities relating to protected characteristics occur in clusters of deprivation. For example, those on a low income tend to live in poorer housing and experience poorer health, all of which can increase the risk and impact of a fire. This is clearly illustrated when considering the potential impact of the proposed Bill on individual protected characteristics. Consequently, the accumulated positive impact of our proposed Bill can be assumed to be greater than the sum of its parts.

#### **2. The Issue**

Electric micromobility, namely e-bikes and e-scooters powered by lithium-ion batteries, has growing popularity in the UK and an expanding market<sup>1</sup>. Fires caused by these batteries have increased fourfold since 2020, leading to deaths, injuries, homelessness, and substantial financial losses. The UK is projected to experience nearly one e-bike or e-scooter fire daily in 2023, primarily due to thermal runaway<sup>2</sup> risks associated with lithium-ion batteries. Substandard components, manufacturing issues, misuse, and improper charging can all render these batteries unstable, often leading to the release of toxic gas and uncontrollable fires which are extremely challenging to extinguish.

##### **2.1 Fires caused by e-bikes and e-scooters**

In 2020, Electrical Safety First (ESF) estimates there were 77 fires from e-bikes and e-scooters in homes across the UK, increasing to 102 by April 2023. If this trend continues, we could witness over 300 fires in 2023 alone. Many UK Fire and Rescue Services anticipate that this upward trend is likely to persist in 2024 and well beyond.

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<sup>1</sup> [https://www.electricalsafetyfirst.org.uk/media/sgyikuwb/esf\\_batterybreakdown\\_report\\_2023\\_v7\\_-final.pdf](https://www.electricalsafetyfirst.org.uk/media/sgyikuwb/esf_batterybreakdown_report_2023_v7_-final.pdf)

<sup>2</sup> The process of thermal runaway starts when a battery cell overheats, perhaps due to an internal fault, physical or electrical abuse, or extreme temperatures. This elevated cell temperature results in exothermic reactions, which produce more heat than can be dissipated to surroundings. Eventually the internal structure of the cell begins to become unstable and collapse, resulting in the venting of flammable and toxic gases, fire, and explosion. The heat spreads to nearby cells, causing them also to enter an uncontrollable and irreversible state of thermal runaway.

## 2.2 Fires at waste disposal sites

In 2020, there were approximately 200 lithium battery fires at UK waste disposal sites, according to research by Eunomia and the Environmental Services Association<sup>3</sup>. Research from Material Focus, analysed by ESF, indicates a significant increase in these fires in 2022, when it is estimated 350 took place. It is assumed that this upward trend will persist into 2024.

## 2.3 Other issues – conversion kits

There are additional fire safety concerns regarding the absence of safety standards for conversion or 'retrofit' kits<sup>4</sup> and the use of non-compliant charging systems for e-bikes and e-scooters. This was confirmed during a meeting of the London Assembly Fire, Resilience and Emergency Planning Committee, by London Fire Brigade Deputy Fire Commissioner, Dom Ellis<sup>5</sup>, who told the Assembly that there was a particular worry about fires arising from retrofit kits.

Convenience and lower cost mean many of these kits are bought via online marketplaces. Yet multiple investigations by ESF have shown the prevalence of dangerous, sub-standard and counterfeit electrical goods available online, particularly from third-party sellers<sup>6</sup>.

However, these fires can not only arise because of a substandard product but also because the conversion is undertaken by an unqualified individual.

ESF recently commissioned targeted research to investigate gig economy workers using an e-bike or e-scooter for their work<sup>7</sup>. Of the 80% who had these vehicles, 65% had one which had been converted and almost 70% had undertaken the conversion themselves. (In earlier research, with a nationally representative sample size, the figure for self-conversion is even higher, at 80%).<sup>8</sup>

Our gig-economy research also found 30%<sup>9</sup> of respondents were using an 'after-market' charger – i.e., one not included as part of the conversion kit, raising issues around compliance and compatibility – and over half of these were purchased online.

There is also particular concern because of the impact a fire arising from an e-bike or e-scooter can create in high-density housing, such as high-rise blocks.

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<sup>3</sup> <https://www.eunomia.co.uk/reports-tools/cutting-lithium-ion-battery-fires-in-the-waste-industry/>

<sup>4</sup> A conversion kit is the electrical drive train, battery and charging system, which is fitted to a regular pedal bicycle to convert it to an electric bike. A conversion kit is usually sold unassembled and typically includes a motor, a motor controller, and interconnecting components. The battery is usually sold separately.

<sup>5</sup> [London sees 60% spike in e-bike fires this year | Evening Standard](https://www.eveningstandard.com/news/uk-news/london-sees-60%_spike_in_e-bike_fires_this_year_1.6811111)

<sup>6</sup> - <https://www.electricalsafetyfirst.org.uk/media/rh5klrcl/online-marketplaces-the-evidence-and-impact.pdf>

<sup>7</sup> Censuswide Survey Conducted on Behalf of Electrical Safety First, 03/08/2023-04/08/2023, of 254 People Who Use an E-Bike or Scooter for Work.

<sup>8</sup> Censuswide Survey Conducted on Behalf of Electrical Safety First, 30/06/23-07/07/2023, of 1000 people who own an E-Bike or E-Scooter.

<sup>9</sup> Censuswide Survey Conducted on Behalf of Electrical Safety First, 03/08/2023-04/08/2023, of 254 People Who Use an E-Bike or Scooter for Work.

Research commissioned by ESF on gig economy delivery drivers found 26% of respondents lived-in high-rise blocks or apartments and 10% in terraced housing<sup>10</sup>. Additionally, the English Housing Survey Households Report found that, in general, ethnic minorities are more likely to live in high rise flats than their white counterparts. This is significant given that the gig delivery economy, in which the use of e-bikes and e-scooters is prevalent<sup>11</sup>, is also disproportionately comprised of low-paid workers from ethnic minorities. Consequently, the cost of an e-bike conversion kit may be their primary focus, rather than safety. Further details of the equalities impact of the Bill are detailed below.

### **3. The policy intent of the proposed legislation – ‘The Safety of Electric-Powered Micromobility Vehicles and Lithium Batteries Bill’**

There are three key issues that require urgent attention and which our proposed legislation addresses.

- The rising number of dangerous – sometimes fatal – e-bike and e-scooter fires.
- The increasing financial and human costs associated with these fires.
- The inadequate safety requirements and standards for e-bikes and e-scooters, and their conversion kits and charging systems.

**3.1** Unlike other high-risk products, such as fireworks or medical devices, e-bike and e-scooter manufacturers can self-declare safety compliance before their products enter the UK market. Clause 1 of the Bill proposes third-party safety certifications for these products, to enhance product and consumer safety.

**3.2** Clause 2 of the Bill aims to enhance the safety of lithium battery disposal in response to their documented role in causing fires at waste disposal and recycling sites. These regulations can apply to all types of lithium batteries – which are used in a variety of products, including disposable vapes – not just those utilised by e-bikes and e-scooters.

**3.3** Clause 3 of the Bill requires the Secretary of State to establish regulations specifying the safety standards for micromobility conversion kits. It would also require all micromobility vehicles to have either a non-proprietary charging system<sup>12</sup> with a communications protocol<sup>13</sup>, or a proprietary charging system<sup>14</sup> with a matched charger.

**3.4** The absence of dedicated safety standards for conversion kits creates significant safety concerns, exacerbated by the fact that they are widely used by low-income

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<sup>10</sup> Ibid.

<sup>11</sup> Castiglione, M., Comi, A., De Vincentis, R., Dumitru, A. and Nigro, M., 2022. Delivering in Urban Areas: A Probabilistic-Behavioral Approach for Forecasting the Use of Electric Micromobility. Sustainability, 14(15)

<sup>12</sup> A non-manufacturer specified plug and socket system consisting of a standardized plug and socket and a communications protocol.

<sup>13</sup> A set of formal rules describing how to transmit or exchange data.

<sup>14</sup> A manufacturer specified plug and socket system designed only to operate in combination with each other.

workers<sup>15</sup>. The cost of a conversion kit which can be used to turn a traditional bicycle into an e-bike, is typically significantly cheaper than buying a new e-bike. Unsafe conversion kits can compromise the original design of a bike, and its intended use, posing dangers to both the rider and pedestrians. The cost issue is discussed further in the table below.

- 3.5** Establishing charger standards, whether proprietary or non-proprietary, ensures compatibility with the battery. A proprietary system restricts charging to the dedicated e-bike charger, while a non-proprietary charger can incorporate safety measures in the charger-battery communication. Agreed standards would prevent battery overcharging, and safeguard against overheating, short-circuit, and accidental misconnection, reducing the risk of fire.
- 3.6** During the development of these regulations, this clause would also introduce a temporary ban on the sale of universal chargers<sup>16</sup> for e-bikes and e-scooters. Such chargers continue to cause numerous fires, explosions and damage, due to their potential for overcharging at higher voltages than intended.
- 3.7** The remaining clauses of the Bill deal with definitions and procedural matters. Specifically, Clause 7 sets the commencement date as the day on which the Bill is passed. However, to uphold the devolution settlement, the Devolved Administrations must pass motions before the Bill applies to them.

#### 4. Summation

There are three significant issues that need to be addressed urgently, and our proposed legislation aims to tackle them:

- The rising number of fires, some of which are fatal.
- The increasing cost associated with these fires.
- The inadequate safety requirements and standards for e-bikes and e-scooters, conversion kits, and charging systems. The proposed legislation addresses all of these issues, as will be explained.

#### 5. The Equalities Impact of the Bill

Question	Response
<b>Name of policy being assessed?</b>	The Safety of Electric-Powered Micromobility Vehicles and Lithium Batteries Bill
<b>Summary of aims and objectives of the policy.</b>	The Bill proposes policies to regulate the safety standards for e-bikes and e-scooters, and lithium batteries and their

<sup>15</sup> Dean, E., Taylor, M.J., Francis, H. and Clark, A., 2016. An exploration of community and culture related fire injury risks

<sup>16</sup> Universal charger refers to various projects to standardise the connectors of power supplies, particularly for battery-powered devices.

	<p>safe disposal. Ultimately, this Bill will save lives, and help prevent injuries and damage caused by lithium-ion batteries.</p>
<p><b>What involvement and consultation has been in relation to the policy?</b></p>	<p>Electrical Safety First (ESF), a UK charity dedicated to reducing electricity-related fires, deaths and injuries, recently released a comprehensive report – <a href="#">Battery Breakdown</a> – which assesses the safety concerns associated with e-bikes and e-scooters.</p> <p>In developing the report, the charity collaborated with a range of stakeholders in the product safety sector and other experts in relevant fields. Additionally, extensive primary and secondary research was conducted, including a nationwide survey of e-bike and e-scooter users, and a separate, highly targeted, survey of individuals who use these vehicles for employment, such as app-based delivery drivers.</p> <p>We also liaised with a wide variety of industry experts whose services are impacted by lithium-ion battery fires. This included engagement with representatives from fire and rescue services, housing, environmental, and waste disposal services, and the insurance sector.</p>
<p><b>Who is affected by the policy?</b></p>	<p>The users, manufacturers, retailers and regulators of electric-powered micro-mobility vehicles, lithium batteries, and the secondary equipment (such as chargers and conversion kits), as well as public bodies and agencies involved in incidents caused by these devices, such as the NHS, and Fire and Rescue Services.</p>

<p><b>What are the arrangements for the monitoring and reviewing the actual impact of the policy?</b></p>	<p>If the Bill was enacted, standard government measures and mechanisms would be employed to monitor the impact of the policy.</p> <p>For example, the British Standards Institution (BSI) reviews established standards every five years. However, a more immediate impact analysis would also be undertaken, as ESF would undertake this in several ways.</p> <p>The charity undertakes regular consumer surveys and extensive stakeholder engagement, which would allow us to evaluate impact within a short time frame.</p> <p>Other means of evaluation would come via our work with stakeholders.</p> <p>For example, Fire and Rescue Services across the UK record and publish every fire incident they attend, documenting them through the Incident Recording System (IRS). Data related to dwelling fires could be monitored and assessed during the implementation and ongoing operation of the policies, to assess their effectiveness.</p> <p>ESF's close relationship with the Office for Product Safety and Standards (OPSS) will also assist in ensuring appropriate evaluation of impact.</p>
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<b>Protected characteristic group</b>	<b>Is there a potential for a positive, negative, or neutral impact?</b>	<b>Please explain and give examples of any evidence/data used?</b>	<b>Action to address negative impact (e.g., adjustment to the policy)</b>
Disability	Positive	Disabled people face increased	The policy aims to improve product safety standards,

		<p>difficulties escaping a fire.</p> <p>Given that Government will not implement a key recommendation from the Grenfell Inquiry – requiring personal emergency evacuation plans (PEEPs) for disabled people – our Bill is especially important for this vulnerable group. Particularly those living in high rise, high density, accommodation, where a fire can spread from one household to another. It seems likely that such premises house many working in the gig economy. This view is supported by anecdotal evidence from London Fire Brigade<sup>17</sup> and via our own research regarding gig economy workers. We found 26% of respondents lived in high rise blocks</p>	<p>reducing the risk of fire in all instances.</p>
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<sup>17</sup> At a meeting of the London Assembly's Fire, Resilience and Emergency Planning Committee, the Deputy Director of the LFB noted that: "a lot of the gig economy people have got (e-bikes) charging in their bedsits and HMOs (Houses of Multiple Occupation)". [London sees 60% spike in e-bike fires this year | Evening Standard](#)

		<p>or apartments and 10% in terraced housing<sup>18</sup>.</p> <p>Age and disability are closely related. See section on Age, below.</p>	
Gender reassignment	Neutral	N/A	N/A
Marriage or civil partnership	Neutral	N/A	N/A
Pregnancy and maternity	Positive	<p>Pregnant women, infants, and small children, who often have limited mobility, are at increased risk from fire, particularly rapidly igniting lithium battery fires that release toxic gases. Research reveals that 42% of e-bike users reside with partners and young children.<sup>19</sup></p> <p>Research also indicates that the gig economy is disproportionately comprised of ethnic minority workers, with many living in HMOs or high-rise flats.</p> <p>So, it is also worth noting that the</p>	<p>The policy aims to improve product safety standards, reducing the risk of fire in all instances.</p> <p>Implementing safer product standards would mitigate risks for pregnant individuals.</p>

<sup>18</sup> Censuswide Survey Conducted on Behalf of Electrical Safety First, 03/08/2023-04/08/2023, of 254 People Who Use an E-Bike or Scooter for Work.

<sup>19</sup> Statista Consumer Insights Report, 'Electric Bike (e-bike) Owners in the UK', March 2023.



		<p>Institute for Government and Public Policy states that child poverty disproportionately affects Black and minority ethnic children, with 46% now in poverty compared to 26% of white British children. This further illustrates the cluster effect of deprivation related to protected characteristics<sup>20</sup>.</p> <p>(See section on Race, below).</p>	
Race	Neutral	<p>Many of the factors that are known to increase fire risk – such as low income and poor housing – are issues that disproportionately affect ethnic minority groups<sup>21</sup>.</p> <p>The gig delivery economy, in which the use of e-bikes and e-scooters is prevalent<sup>22</sup>, is also disproportionately comprised of workers from ethnic minorities<sup>23</sup>. This puts them (and</p>	<p>The policy would provide additional safety for those using e-bikes as part of their work.</p> <p>However, this group may experience an increase in costs associated with the policy proposals.</p> <p>The introduction of the measures could be supported by an information campaign focused on BAME media outlets.</p>

<sup>20</sup> Tackling Child Poverty 2023 IGPP

<sup>21</sup> Dean, E., Taylor, M.J., Francis, H. and Clark, A., 2016. An exploration of community and culture related fire injury risks.

<sup>22</sup> Castiglione, M., Comi, A., De Vincentis, R., Dumitru, A. and Nigro, M., 2022. Delivering in Urban Areas: A Probabilistic-Behavioral Approach for Forecasting the Use of Electric Micromobility. Sustainability, 14(15)

<sup>23</sup> CIPD, 'The true story of the UK gig economy', 12 October 2023.

		<p>their families) at particular risk from fires caused by lithium-ion battery fires.</p> <p>A report from the Office for National Statistics in 2019<sup>24</sup> showed that most ethnic minority groups earned less than their white British counterparts. In a cost-of-living crisis, those using a bike for work may well look for the cheapest e-bike conversion kits and repairers. They may also undertake such conversions themselves.</p> <p>In general, households with a black, Asian, or minority ethnic household reference person (HRP1), were also more likely to live in a high rise flat compared to households with a white HRP<sup>25</sup>. As previously noted, lithium-ion battery fires in high rises</p>	
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<sup>24</sup> [Ethnicity pay gaps - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk)

<sup>25</sup> English Housing Survey Households Report, 2017-18 - GOV.UK

		are particularly concerning.  (See also details under Pregnancy and Maternity, above).	
Religion or belief	Neutral	N/A	N/A
Sexual orientation	Neutral	N/A	N/A
Sex (gender)	Neutral	Research indicates that 63% of e-bike owners are male. <sup>26</sup> While this is just over half, it still represents a significant demographic.	Implementing stricter products safety standards will improve the safety of both e-bike and e-scooters users and those living with them.
Age	Positive	Research shows e-bike ownership is predominantly among younger individuals, with 40% falling in the 30-39 age group. This trend aligns with the primary demographic of app-based delivery riders, as seen in a survey by Electrical Safety First, where those aged 25-34 and 35-44 are most commonly using e-bikes for work.  However, older individuals face challenges escaping fires due to reduced mobility,	Implementing stricter products safety standards will safeguard both users and those in proximity, regardless of their age. The disposal policy (clause two) addresses the risk of unintended contact with lithium batteries, even for older individuals who may not possess an e-bike or e-scooter.

<sup>26</sup> Statista, E Bike Report.

		<p>particularly in densely populated accommodation. They might not own e-bikes or scooters, but may live near someone who does, with increasing fire spread risk in high-rise flats.</p> <p>Age and disability are also closely related<sup>27</sup>.</p>	
<p>Other: Low-income individuals</p>	<p>Neutral/negative</p>	<p>The policy for safer disposal standards will enhance the safety of low-paid refuse workers, particularly in communal waste disposal areas in flats, by ensuring safer handling of lithium batteries.</p> <p>ESF's survey of 1,000 e-bike owners revealed that 38% had incompatible aftermarket chargers, with 20% unsure about compatibility.<sup>28</sup> In a</p>	<p>In the medium to long term, the policy measures outlined in the Bill, such as higher safety standards, will incentivise manufacturers to compete in producing safer goods, ultimately benefiting individuals in this demographic.</p> <p>Two strategies can counter the potential short-term negative effects on this group:</p> <p>(i) Encourage manufacturers to proactively invest in developing</p>

<sup>27</sup><https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandwellbeing/bulletins/disabilityenglandandwales/census2021>

<sup>28</sup> Censuswide Survey Conducted on Behalf of Electrical Safety First, 30/06/23-07/07/2023, of 1000 people who own an E-Bike or E-Scooter.

		<p>separate survey of 253 app-based delivery drivers, 84% had converted their traditional bicycles into e-bikes.<sup>29</sup></p> <p>Mandating specific charging measures will temporarily affect low-income individuals by making easily accessible universal chargers unavailable.</p>	<p>products that meet safety standards.</p> <p>(ii) Consideration for amending the policy to set a later commencement date providing for more time for mitigations to be implemented.</p>
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<b>Decision</b>	<b>Explanation/justification</b>
<p>There is little evidence to show that this Bill could discriminate or unfairly disadvantage people, given the proposed risk mitigation detailed above.</p>	<p>In conclusion, we believe that the Bill will promote safety equality among individuals, regardless of whether they share a protected characteristic or not. However, it is clear that the safety measures outlined in the proposed Bill would be particularly important in ensuring safety for many people with protected characteristics.</p> <p>ESF is committed to raising awareness about the Bill's provisions and the benefits it will deliver.</p> <p>Pairing the policy with consumer-focused educational information is crucial to raise awareness about the importance of safety standards for e-bikes, e-scooters, and lithium batteries, as well as promoting safe usage of these devices. ESF</p>

<sup>29</sup> Censuswide Survey Conducted on Behalf of Electrical Safety First, 03/08/2023-04/08/2023, of 254 People Who Use an E-Bike or Scooter for Work.

	undertakes regular, high-profile media campaigns every year to raise consumer awareness of electrical safety issue.
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