Setting the standard for decarbonised transport and higher-powered batteries

Nick Fleming and Dr Katerina Busuttil
BSI Knowledge Solutions

By Royal Charter

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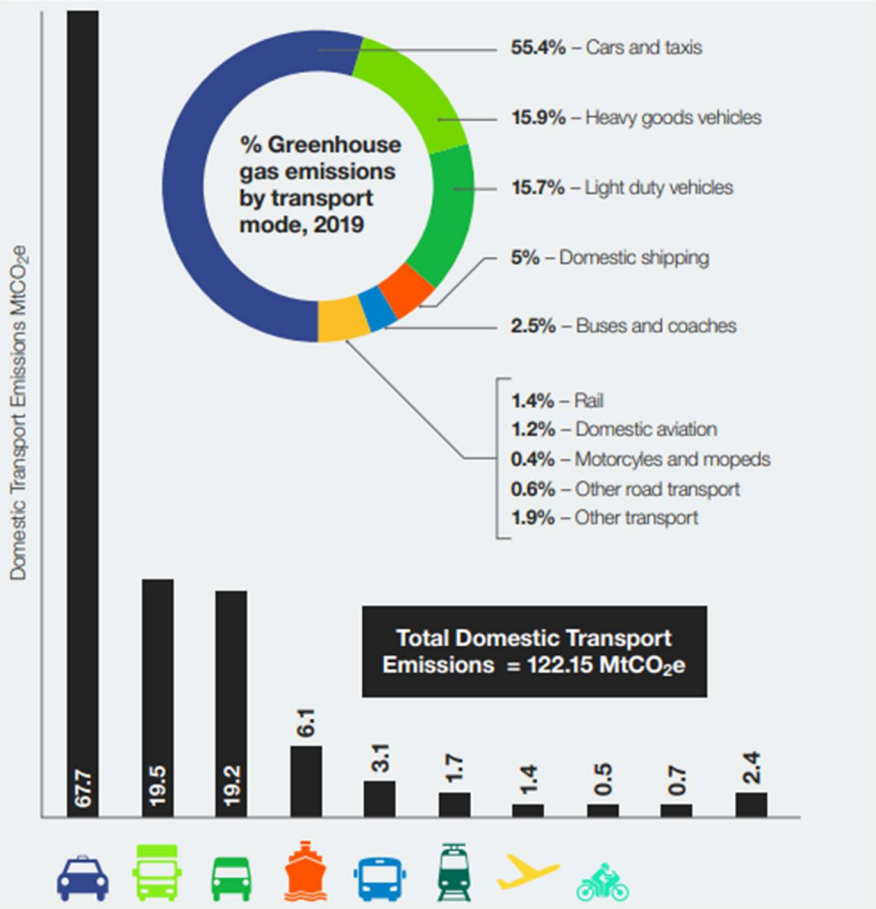
The impact of transport modes on GHG emissions



UK domestic transport emissions 2019

- Transport largest carbon emitting sector
- Major cause of air pollution in cities
- Impact on health and social care
- Cars greatest proportion of emissions but vans and HGVs emit more CO2
- Many vehicles on roads over 8 years old

- Registrations of EVs on rise but represent less than 2% of cars on the UK's roads
- Barriers to market uptake can be overcome
- Recent investment in EV infrastructure, R&D
- Various interventions including standards can help accelerate transition to zero-emission vehicles

Road to zero-emission transport – holistic approach

Smart mobility

Sustainable manufacturing processes

Consumer behaviour

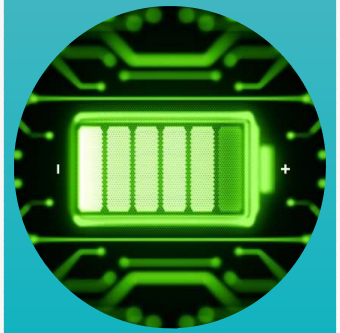
Zero-emission vehicle technologies (& supply chain)

Infrastructure & Grid

Net-zero transport. BSI KS supporting decarbonisation

Zero-Emission HGVs

Developing a standards roadmap for decarbonising road freight (ZERFT)

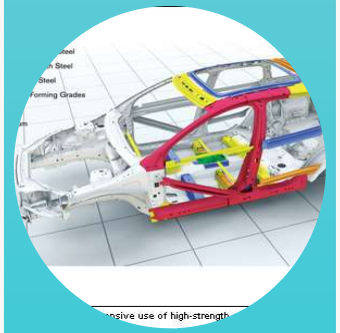


EV Battery Development

Standards programme in parallel with Faraday Battery Challenge to promote UK capabilities

EV Smart Charging

Establishing minimum standards for domestic, public and private EV charge points and future networks



Materials manufacture

Research to identify the next generation of light-weight materials for use in transport

Smart Mobility and Data

Promoting transport data interoperability for more efficient transport networks and user journeys

Connected and Automated Vehicles (CAVs)

Accelerating the safe development of self-driving vehicle technologies on UK roads

BSI European and global standards influence

BSI Faraday Battery Challenge Programme

Sponsored by Innovate UK and the Faraday Battery Challenge (FBC).
17-month standards programme led by BSI

By Royal Charter

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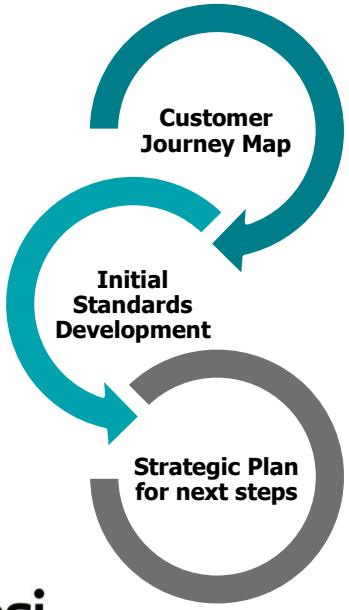
Technology for 2030s is developing now

Global climate issues and regulatory demands with emission targets set for 2030.

Coherence of the supply chain, alignment with the transition towards clean economic growth and net zero, and harnessing of smart technologies to support manufacturing growth are key elements for the UK's penetration of the battery industry. Design and development are happening now



A customer journey map of the battery manufacturing process carried out by Innovate UK in 2019 helped define pressing issues, including regulatory and standardization needs from a battery manufacturing perspective.

This led to FBC Investment into the future of manufacturing batteries and their components for EVs.

BSI were asked to implement a programme of work intended to address key technical gaps and immediate market priorities around health, safety and environmental considerations in battery manufacture.

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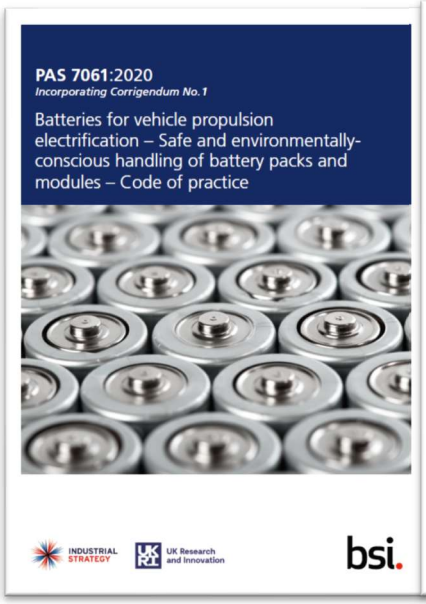
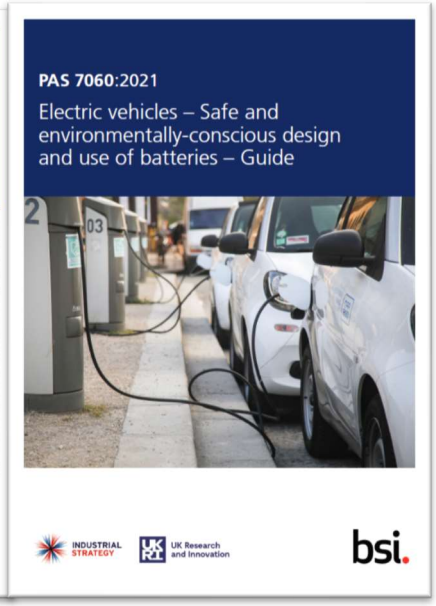
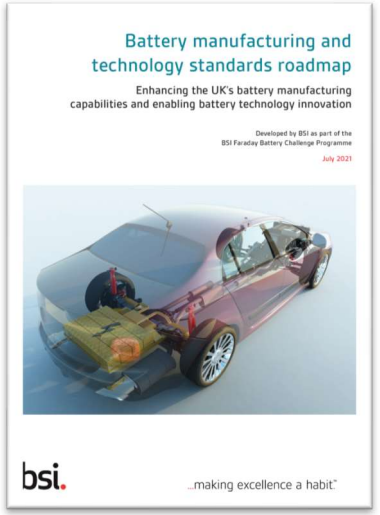
The FBC Standards Programme has advanced good practice in the UK for battery manufacture

- ✓Develop and codify good practice to fill in key knowledge gaps and respond to pressing challenges (i.e. PASs around H&S and environmental considerations) - critical to UKBIC and UK industry
- ✓Build public confidence in batteries and EVs
- ✓Identify further gaps and challenges, devise appropriate response
- ✓Grow the Faraday battery network







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Five publications: FBC standards landscape report, PAS 7062, PAS 7061, PAS 7060 and Battery Manufacturing and technology standards roadmap report

Key findings from the roadmap

The Standards Roadmap is based on information collated from the standards landscape report, workshops and feedback from across industry, academia and government.

1

Immediate/FBC Programme Phase 1 related

- to address the gap/need for detailed, systematic guidance on fire risk management across the battery lifecycle, and in specific battery lifecycle stages
- to build upon existing fire codification effort and draw attention to existing standards
- to address waste and environmental issues, encourage recyclability, second life and product circularity

Fire risk management (throughout the battery lifecycle: in use, transport, storage, repair & replacement, etc.) – *specification(s), management system(s), test method(s), or signposting guidance document(s)*

Design considerations (design for performance, recyclability, 2nd life) – *guidance document(s), code(s) of practice, possibly specification(s)*

General recyclability, second life, circularity requirements/guidance – *guidance, code of practice, specification*

Performance and abuse testing requirements, e.g. 2nd life testing specifically – *specification(s), test method(s)[3]. Validate if these are sufficiently addressed, or not.*

Battery management system – general *(management system or specification)* +

- commonality of module interface
- battery systems and energy storage (format and No tbc)
- smart and connected systems (format tbc)

Battery boxes (health, s… *specification(s), code(s)* (

Code(s) of practice/guid… they need to provide to

2

Other (sector) applications of lithium-ion

- To address health, safety challenges which are sector specific such as off highway, HGV, in remote areas, etc.
- to build upon the FBC 1 PASs effort, ensuring continuity, consistent practices, and higher levels of consumer confidence

Health, safety and environmental considerations *(PAS 706x series application/adaption or additional guidance)* for:

- Defence, aerospace[2], rail, marine, freight
- mining (underground)
- off-highway and agriculture machinery/vehicles
- consumer batteries (drones, hoverboards), medical devices
- space?

Safety considerations of battery use in (e.g. detailed guidance, specification(s), test methods):

- Hybrid rail, marine, all electric aero, eVTOL
- Stationary storage (residential); fast-charging infrastructure

Recyclability and second life *(assessment/further research of the applicability and adaptation of standards/ guidance developed under 1 for application to other sectors)*

Predictability/modelling for all electric aero and eVTOL *(research and assess the need for, scope out and develop standards and/or guidance)*

3

Other battery technology and its sector applications (e.g. solid-state batteries, sodium, lithium sulfur, carbon ion, cobalt, nickel, hydrogen fuel cell etc.)

- To address standardization needs in evolving technologies which are developing in parallel with Li+ batteries.
- to build upon the previous/ongoing codification effort, ensuring continuity, consistent practices, and higher levels of consumer confidence in emerging battery technologies
- to attract expertise and form a community of experts to enable a timely codification response (as/when required)

Community established / expertise identified

Agreement on key concepts, terms and definitions – vocabularies, initial guidance

Energy density vs cost is a major consideration – is there a role for standardization? *(requires further research and assessment of issues needed; assessment of standards gaps needed; scoping and development of additional standards confirmed as needed)*

Application/adaption of health, safety and environmental performance standards for lithium-ion batteries to other chemistries, technologies and their sector applications *(requires assessment of standards needs, scoping of validated standards, and development of safety and performance standards for other battery chemistries and technologies)*

Standard test methods for materials, components and cells (mainly for the UK, in R&D) for emerging lithium-ion chemistries and other types of batteries *(requires assessment of standards needs, scoping of validated standards, and development). Other/evolving codification needs assessed and met in line with technology development cycles.*

Battery manufacturing and technology standards roadmap

Enhancing the UK's battery manufacturing capabilities and enabling battery technology innovation

Developed by BSI as part of the BSI Faraday Battery Challenge Programme

July 2021

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Our committees and standards-makers

BSI standards-makers members are volunteers.

They participate in standards committees, either as individual experts in their own right, or nominating organization representatives.

12,200 committee members

2,200 nominating organizations

1,200 committees/ sub-committees

120 universities represented

7,000 live projects

2,500 standards published annually

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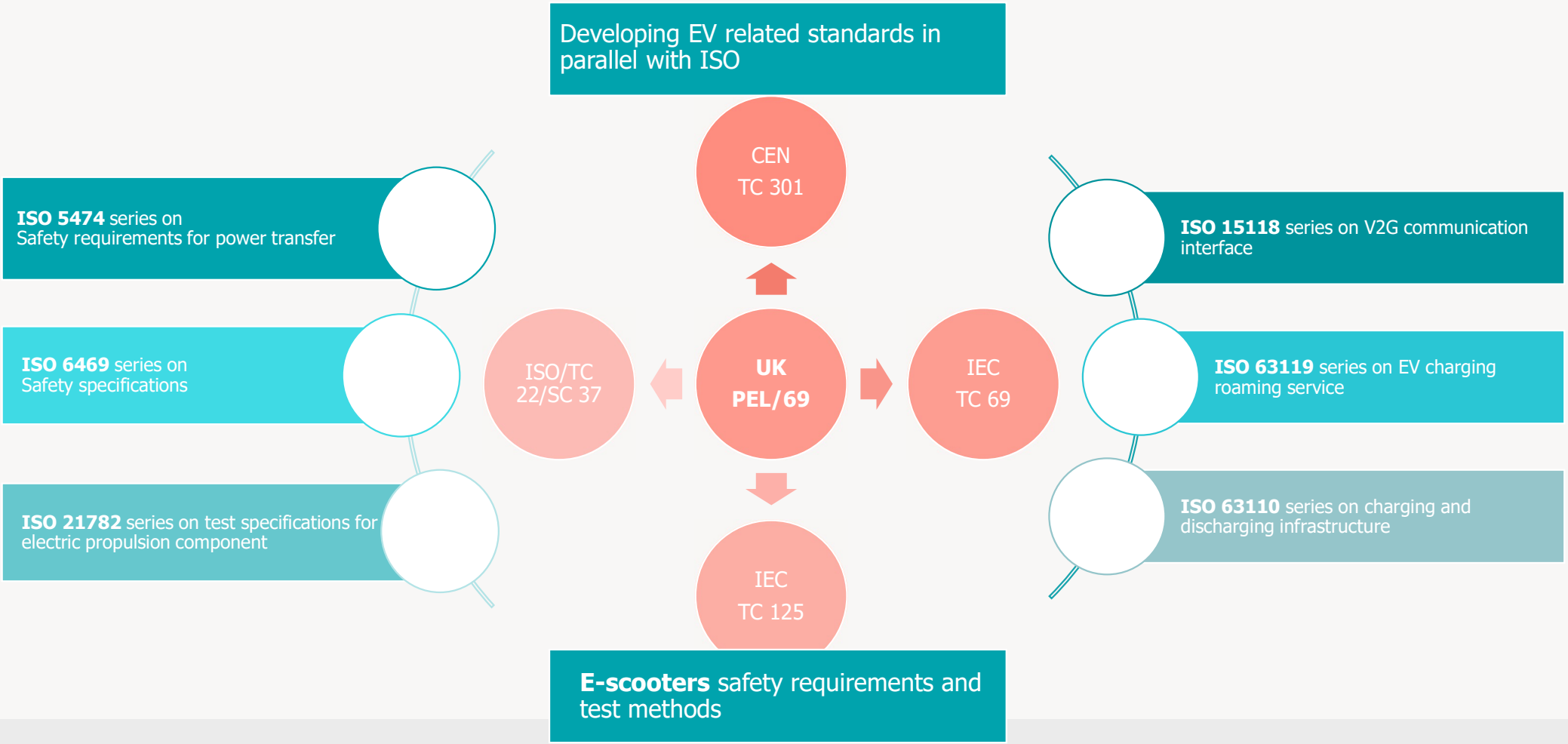
Global landscape. EV and e-mobility standards



How to find out more or get involved

Innovation programmes
- Faraday Battery Challenge
- Energy Smart Appliances programme
- Connected and Automated Vehicles

Research projects
- ZERFT
- ZEFI
- Transport data

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Events. Upcoming 30th November 2021

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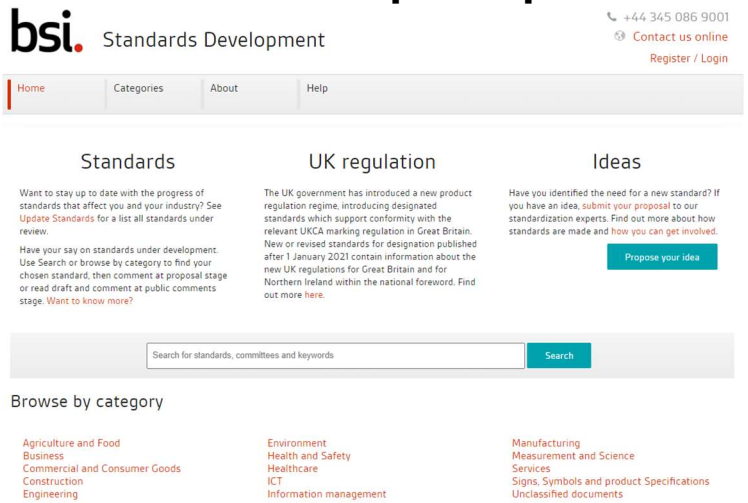
Standards development portal



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Thank you

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