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The professional voice of the
UK Fire & Rescue Service

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8th October 2019

To the Department for Transport,

Electric Vehicle Charging in Residential and Non-Residential Buildings

Please find attached the National Fire Chiefs Council (NFCC) response to the Department for Transport's consultation on *Electric Vehicle Charging in Residential and Non-Residential Buildings.*

NFCC is the professional voice of the UK fire and rescue services and is comprised of a council of UK Chief Fire Officers. This submission was put together through the NFCC's Petroleum and Explosives group, in consultation with members of the NFCC's Fire Engineering Technical Standards Group and coordinated under the NFCC's Protection and Business Safety Committee. The Committee is comprised of protection and fire safety specialists from across the UK.

NFCC is supportive of environmental policies such as the Road to Zero strategy and recognises the need to adapt to changing technologies with regard to alternative fuel sources for transportation. In this regard, it is sensible to outline minimum requirements for charging infrastructure for new buildings to enable the adoption of Electric Vehicles (EV) and also to provide guidance on the minimum standards expected.

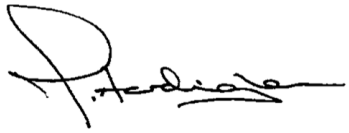
NFCC is concerned to ensure the implementation of new requirements in the built environment is not taken in isolation, but forms part of the overall Building Safety Programme being led by the Ministry of Housing, Communities and Local Government (MHCLG) in response to the Independent Review of Buildings Regulations and Fire Safety. The standard of safety expected in car parks, (particularly covered car parks or those in basements) should not be undermined by the introduction of technology which did not exist when the original guidance was written. As part of our submission for the *Technical Review of Approved Document B*, (ADB) NFCC has called for a review of the requirements for car parks to take account of the products and materials used in modern cars, and to consider additional requirements for automatic water suppression systems and structural safety above those specified in the current guidance.

Whilst the full technical review of ADB is still underway, NFCC consider that the proposal to introduce new requirements for EV in car parks should also consider the need to issue additional guidance detailing considerations that need to be made in order to comply with Part B of the Buildings Regulations 2010 and the Regulatory Reform (Fire Safety) Order 2005.

The reviewed documents contain very little guidance on how the proposed EV charge points and supporting infrastructure can be safely integrated into the built environment, both for new construction and retrospectively. We can foresee numerous challenges with regard to Firefighting and Fire Safety which should be addressed in the guidance provided to support the Building Regulations.

Whilst much of the consultation goes beyond the scope of NFCC, it is considered appropriate for comment to be made on areas that may affect fire safety features of buildings and the ability of firefighters to tackle any incidents that may occur.

Yours sincerely,



Mark Hardingham

NFCC Protection and Business Safety Committee Chair

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Consultation Questions

Q1: Do you agree with our proposed policy position? Please note that we are legally obliged to transpose the EPBD minimum requirements for residential buildings with more than 10 parking spaces.

NFCC supports the drive towards zero emissions vehicles and agrees with the policy position(s) to require charging points in residential and non-residential buildings. However, we urge the government to undertake further work to ensure that Electric Vehicle charging does not have a negative impact on the fire safety of the public and of firefighters.

As discussed in our answers below, the proposed policy has an impact on other areas of the Building Regulations, which have not been considered as part of this consultation. NFCC believes that the impact of EV charging needs to be considered further, particularly with regard to B1 to B5 of Schedule 1 to the Building Regulations 2010 (amended). The requirements of EV charging will likely require additional technical requirements to safely implement the policies contained within this consultation. The guidance to support those additional technical requirements (such as in Approved Document B – ADB) needs to be in place prior to the mandating of extensive charging facilities.

The installation of EV chargepoints may have greater implications on building safety than anticipated. It may be unclear to those undertaking the work whether the building's existing fire precaution arrangements are sufficient to mitigate the introduction of the additional risk of EV charging, or whether additional measures, are required to be retrospectively installed. There is a danger that in complying with this mandate, those responsible for a building may fall foul of other legislation or unwittingly make their building less safe than it was prior to the installation of the charge points.

Q3: Do you agree that the proposed Building Regulation should mandate the introduction of electric vehicle charging points rather than set them as optional?

Any proposal to mandate EV charging points should be accompanied by a review of other appropriate aspects of the Building Regulations as outlined in our answer to Question 1.

Q5: What other issues do you think, relevant to using Building Regulations to set standards for the provision and safety of electric vehicle chargepoints, we should consider?

Introducing chargepoints in and around buildings, and the encouragement for potentially exclusive EV use within these spaces have significant impact on many areas of the Building Regulations, most notably fire safety.

NFCC outlined in response to the *'Technical review of Approved Document B of the building regulations: a call for evidence'* that ADB requires significant strengthening. The primary purpose of the guidance is to support the functional requirements of the Building Regulations (in respect of fire) but, due to the historic lack of regular review, now lags many years behind common practice and new and developing construction methods and techniques.

It is a common assumption within guidance that a fire is unlikely to spread to multiple vehicles and ADB states that the fire load is well defined. However as suggested by government commissioned BRE

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research[1] those assumptions are based on “initiation and fire growth involving cars whose designs are decades old”. The research document goes on to say that “there has been increasing concern about the consequences of fires in car parks associated with modern car design (e.g. plastic fuel tanks) and how these fires may spread to other vehicles parked adjacently and nearby.” While that research was commissioned by the government, no changes have resulted in terms of fire protection measures for carparks within the approved documents.

Those outdated assumptions are explicitly challenged by fires such as that which destroyed approximately 1300 vehicles in Liverpool in 2017 - https://www.bbc.co.uk/news/uk-england-merseyside-42542556, or the more recent fire which took place in a multi-storey shopping centre carpark in Douglas, Cork. https://www.bbc.co.uk/news/world-europe-49541782

Guidance has not kept pace with the extensive use of plastics in vehicles over the last 30 years or so, including plastic fuel tanks, which has significantly changed the way vehicles behave in fire. More modern vehicle design (such as EVs, incorporating high capacity batteries) cannot be subject to the same lag between a significant change in the fire load within buildings (such as basement car parks) and the guidance which is supposed to support their safe design. Where guidance does lag, it may be that buildings are quickly found to be prohibitively dangerous for both their occupants and attending fire crews.

Research and innovation with battery technology continues to evolve which means that consideration should be given to how future technologies (e.g. sodium based batteries) may behave in a fire and therefore potentially impact on the built environment as noted elsewhere.

Therefore, the expectation of the chargepoints as set out within this consultation, needs to be linked to significant review of guidance such as ADB to consider the impact of EVs in and around buildings, with particular focus on:

- Structural fire protection – for example a building such as that in the Liverpool fire is only required under current guidance to perform to a minimum of 15 minutes structural fire protection, as it was open sided. It appears that the structure in this case was built with significantly higher protection than the minimum, yet still there were significant structural failures during the fire. While the structural fire protection requirements for car parks in basements is greater than 15 minutes, they do not account for the fire load of cars with extensive plastics, and nor for the future extensive use of EVs.

- Suppression – because of the out of date appreciation of fire load of modern vehicles ADB states that “Car parks are not normally expected to be fitted with sprinklers”. We believe that suppression such as sprinklers is vital, and should be mandated, to allow the suppression and control of fire development to allow for both safe means of escape for occupants (including persons with disabilities) and to allow fire crews to be able to access the basement levels for firefighting. Basement fires are the most onerous in terms of firefighting and can quickly exceed (by many hundreds of degrees) conditions which firefighters can possibly descend in to. Current and future battery technologies and how they may react in both a fire and to the means of suppression should be properly considered, to ensure that suppression is to an appropriate level. The use of suppression in areas of EV charging should also take account of the need for automatic electrical cut-off in the event of a sprinkler activation to prevent additional hazards relating to water and electricity.

[1] Fire spread in car parks BD2552 BRE

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Following a review of this aspect of ADB, where retrospective installation is required in existing car parks, it may be necessary to mandate increased fire protection measures which should include the installation of suppression systems to account for the change in fire load.

- Ventilation – similarly, ventilation is required in car parks to allow for the transportation of products of combustion away from the fire location, which assists control of fire spread and is essential for protecting the lives of firefighters. The current minimum smoke ventilation for car parks (for example 10 air changes per hour for a basement) are likely to be woefully inappropriate for a multiple vehicle fire. Toxicity from failed batteries should also be considered.

- Access and facilities for firefighting – whilst access for firefighting is clearly linked to our expectations in terms of structural fire protection, suppression and ventilation, there are additional firefighting requirements for extensive use of EV. All EV installations should require a mandatory cut off switch for use of fire and rescue services so that power to all charging points within a car park can be isolated with a single action. This will allow firefighters to apply firefighting media (such as water), and to conduct search and rescue safely without power being supplied to the charging facilities. The cut-off switch should be located at the fire service entry point to the car park and may require repeater switches to alternate entry points.

  EV fires require a prolonged period of battery cooling and the most common method is by the continued application of water. The provisions for the supply of water for firefighting within legislation and guidance are too vague, and are deficient in ensuring appropriate supplies of water for firefighting are achieved.

  Minimum flow rates are not set in legislation, and rates outlined in national guidance are unrealistic and no longer meet fire and rescue service needs. The National guidance on water for firefighting2 published in 2007 is in desperate need of review.

  For some recent large incidents, it is hypothesised up to 5,000 litres a minute would be appropriate. However actual average flow rates may be closer to 9 litres a minute, which may be as a result of old legacy standards that are no longer fit for purpose.

  As such, there is a risk that existing water supplies to some buildings may not be sufficient to safely enable EV charging to be retrofitted. Firefighting water supplies need to be accessible and sufficient in capacity to be able to support this as well as other firefighting activities (such as protecting adjacent structures from fire spread). Consideration would also need to be made for the drainage and treatment of firefighting water run-off that would be required for the duration of any incident.

- Automatic parking and car stacker systems – a modern solution to lack of space within car parks is to provide a system to automatically (i.e. without a driver) park vehicles, or frames to allow for parking vehicles on top of one another (stacker systems). Both car stackers and automatic parking systems result in cars being far closer together, either side by side, or on top of one another. These systems significantly increase the potential for, and the speed of, fire spread between vehicles, and common systems such as suppression and ventilation need to be specifically designed to account for that increased potential fire development. These systems will need to be carefully considered

[2] https://www.water.org.uk/guidance/national-guidance-document-on-the-provision-of-water-for-firefighting-3rd-edition-jan-2007/

to determine if they are appropriate for EVs, and if so, clear guidance incorporated into the required technical revision of ADB.

While we have separated elements above into discrete subject areas it should not be read that one allows for the removal of another. It is likely that the extensive use of EVs will require greater minimum technical requirements concurrently for all of the areas above.

Wider consideration is needed on how to prepare related infrastructure and the built environment if the Government wishes to safely enable greater uptake of electric vehicles For example, where sub stations may be required to enhance the existing infrastructure, the impact of associated earthing systems on the surrounding built environment and the applicable separation distances required (and the maintaining of compartmentation), should be factored into the design.

Q6: Do you agree that the government should mandate electric vehicle charging for all new dwellings with an associated car parking space (including both multi-dwelling and single-dwelling buildings)?

If EV charging is mandated there will be a need for clarity as to where the power for each parking space is drawn from. If it is an extension of a dwelling owner's domestic supply, then there will be onward implications when considering cabling, ducting, fire separation and fire compartmentation requirements (Part B, Schedule 1 of the Building Regulations). These would need further consideration and guidance in order to be able to comply.

Q10: Should the proposed Building Regulation requirement for electric vehicle chargepoint infrastructure apply where the building has undergone a material change of use as defined in paragraph a) or b) of Regulation 5 of the Building Regulations 2010?

The installation of EV chargepoints may have greater implications on building safety than anticipated. It may be unclear to those undertaking the work whether the building's existing fire precaution arrangements are sufficient to mitigate the introduction of the additional risk of EV charging, or whether additional measures, are required to be retrospectively installed. There is a danger that in complying with this mandate, those responsible for a building may fall foul of other legislation or unwittingly make their building less safe than it was prior to the installation of the charge points.

It is unclear if the 'material change' referenced will trigger the 'material alteration' of Regulation 3, this may be a route to ensuring an element of governance is applied to the retrospective requirement.

In our experience, when considering the physical requirements in altering an existing building to support a 'change of use', issues around fire separation are often encountered. For example, the omission of cavity barriers when upgrading fire compartmentation is a common deficiency. It would appear the assessment of required upgrades is regularly found wanting, in that the understanding of how to practically achieve the mandatory enhancements is lacking or underappreciated.

Non-worsening provisions the Building Regulations result in lost opportunities to improve building safety. NFCC has recommended as part of our submission to the *Technical Review of the Building Regulations* that the Government investigate options to trigger improvements to fire safety provisions 'so far as is reasonably practicable' when major refurbishments are undertaken.

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Q12: Should the proposed Building Regulation requirement to install an electric vehicle chargepoint in every new home also apply to residential buildings undergoing a major renovation?

If so, we refer to our response to Question 10.

Q15: Do you agree with our proposed policy position? Please note that the proposed requirement is a minimum requirement that the government is legally obliged to transpose under the EPBD.

NFCC supports the policy position as long as it is accompanied by significant strengthening of ADB as per our response to the *Technical Review of Approved Document B Call for Evidence* and also by the changes that we called for as part of the *Building a Safer Future* Consultation to ensure that the introduction of the additional risk of EVs does not compromise the safety of building occupants. The policy position would also need to be supported by adequate guidance for those who design, build and manage such buildings to ensure that they can comply with relevant legislation and ensure the safety of occupants of relevant buildings.

Q22: Do you have a view on which organisation should be defined as an enforcement body for compliance with the new regulations for EV charging infrastructure?

It is assumed Building Control Bodies will be responsible for ensuring compliance with the Building Regulations for the initial changes to the building that require the installation of charging equipment. The onward regulation should be carried out by a suitable enforcing authority, although care should be taken to ensure that there is sufficient capacity within the chosen regulator to ensure that the required standards are met.

Q24: Are the definitions in the draft Approved Document accurate, clear and do they provide the intended meaning?

Yes

Q26: Do you agree with using the concept "within the site boundary" to define which parking spaces which are in scope of the regulations?

No, further detail / guidance is required, as this concept does not take into account of shared ownership.

Q27: If not, please explain what you think an appropriate definition would be.

Explanatory wording should include *'company having financial association or contractual agreement with owners of land used for the purposes of car parking'* thus capturing land used as a car parking facility for a building but under different ownership, e.g. subsidiary / sister companies, or private car park companies with ties to surrounding businesses.

It is unclear how this concept would apply to mixed-use buildings with shared car parks e.g. shopping centres, multiplexes, circumstances where residential towers are under separate ownership but share a car park etc.; where the lines of responsibility would lie. It may also be possible for lease agreements to circumnavigate these requirements.

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Q28: Do you agree that the government should specify a minimum charging power of 7 kW?

We would recommend that a maximum charging power should be stipulated to prevent abuse and / or over enthusiastic charging behaviour.

We consider it remiss not to consider higher voltage or ultra-high-speed charging etc. at this juncture. Any additional safety requirements for the built environment should be considered in order to future proof guidance and legislation to response to this type of consumer demand.

Q30: Do you agree that the government should specify that chargepoints installed under the Building Regulations should be at least Mode 3 or equivalent?

Wireless and ultra-rapid charging may be used as a marketing tool when selling dwellings within residential buildings in the future. Technology in this area is quickly evolving, and consumer demand may follow.

If mode 3 is to be stipulated as a minimum, consideration should be given to the tethers / charging leads also, we refer to our comments to Question 33.

Q32: Do you agree that the government should specify that chargepoints installed under the Building Regulations must be untethered?

No.

Q33: If no, please explain you answer.

In specifying untethered devices, the responsibility for the maintenance and safe use of cabling etc. is then passed to the end user / consumer. We have concerns surrounding the potential use of faulty, inappropriate, unregulated or even counterfeit tethers / charging cables and the associated risks.

We would recommend that the responsibility for the entire charging units, tether included up to the vehicle be placed on the building / dwelling owner. Therefore, an element of control of the facility is afforded to the building management.

We would recommend that the currently unregulated cable length for untethered cables is addressed to ensure safety is applied across all installations.

Q34: Do specifications with regards to location of the cabling route as outlined in the draft Approved Document sufficiently consider accessibility requirements?

There may be a potential conflict in considering accessibility in this instance. Due care should be given to means of escape and firefighting access.

Current guidance states fire risk rooms should be located remote from final exits or adequately protected, this should also be the case when considering EV charging points, particularly if a single egress / access point is provided.

Q36: Do the proposed accessibility requirements in section 1.24 of the draft Approved Document sufficiently consider accessibility requirements?

N/A – We refer to our response to Question 34.

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Q38: Are the specifications with regards to safety standards as outlined in the draft Approved Document appropriate?

No.

Q39: If no, please specify which further safety specifications we need to include.

In that the implications of these proposals on the building in which they are to be installed have not been adequately considered. We refer to our response to Questions 5 and 10 and reiterate our recommendation that supporting guidance must be made available.

Q40: Do you agree that the installation, addition or alteration of dedicated circuits and earthing and bonding arrangements for electric vehicle chargepoints should be notifiable building work?

NFCC do consider this requirement to be notifiable building work, and there should be a prompting/notifying mechanism in place in order to bring such works to the attention of other interested parties/authorities /regulators.

Q41: Is the proposed guidance in the draft Approved Document clear and fit for purpose and provide sufficient detail in order to comply with the requirements?

No.

Q42: If you think the guidance could be improved, please suggest how.

NFCC believes that guidance to accompany this policy should be introduced with a holistic consideration of how EV charging can affect other aspects of the building regulations, and related guidance (e.g. National guidance on the provision of water for firefighting[3]). Any guidance should include clear cross referencing to other Approved Documents and safety standards. Please see our answer to Question 5.

With regard to the numbers of required EV chargepoints per parking space, we feel the guidance would benefit from written examples, i.e. 11 spaces would require 1 charge point, 15 would require X, 25 would require X in both residential and commercial instances.

Q43: The diagrams in the draft Approved Document are illustrative only. Are they accurate and do they provide sufficient detail?

The diagrams appear to meet the required need.

Q45: Does the draft Approved Document meet our proposed policy intent?

To meet policy intent, clear cross referencing to other Approved Documents and safety standards is needed. The relevant documents, for example ADB, will require further review which should include fire safety arrangements pertaining to EV's.

[3] https://www.water.org.uk/guidance/national-guidance-document-on-the-provision-of-water-for-firefighting-3rd-edition-jan-2007/

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Q46: Is there any information missing from the draft Approved Document?

Please refer to our answer to Question 5.

Q47: What is a reasonable transition period between publishing the new regulations and guidance and the requirements coming into force?

We agree that the time limit should be set to include sufficient time to address the government's recommendations as detailed in section 7.4 of the consultation document. This should also include the review of other relevant documents for example ADB, which will require further review which should include fire safety arrangements pertaining to EV's. Please see also our answer to Question 5.

Q70: Do you agree with the assumptions, costs and impacts set out in the Impact Assessment?

See Question 71 below.

Q71: If you do not agree, please provide supporting evidence.

It is not clear from the impact assessment whether the potential for additional requirements of other aspects of the building regulations have been factored into the costings. It appears that the costs consider the work required to install charging equipment, but it is unclear whether there would also be additional requirements in terms of fire safety features such as fire stopping, suppression and ventilation etc. or costs associated with the supply of adequate water for firefighting. Without additional research in order to understand the nature of fires in EVs and associated charging equipment, it would be difficult to appreciate the true requirements for installation.

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