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Lowering your emissions through
innovation in transport and
energy infrastructure

PROJECT REPORT

A review of the UK's workplace
EV charging sector

Transport & Environment UK

February 2022

Contents

1	Introduction	7
1.1	Introduction to the Project	7
1.2	Introduction to Workplace Charging	7
1.3	Introduction to Cenex	8
2	The scale of UK workplace charging.....	10
2.1	Workplace Charging Scheme (WCS) Installations.....	10
2.1.1	Overall Statistics.....	10
2.1.2	Analysis by Number of Sockets	11
2.1.3	Analysis by Business	12
2.2	Overall Workplace Installations	15
2.2.1	Workplace Charging Funding from Transport Scotland.....	15
2.2.2	Overall Workplace Charging Scale: Conclusion.....	16
2.2.3	Geographical Distribution.....	17
3	Suppliers and Customers.....	20
3.1	WCS suppliers	20
3.2	Supplier Business Models	20
3.2.1	Public Charging Ownership Models	20
3.2.2	Own & Operate.....	21
3.2.3	Leasing or Subscription Models	22
3.2.4	Third-Party Finance	22
3.3	Supplier Approach.....	22
3.3.1	Use Case, Customer and Scale.....	22
3.3.2	Future Proofing.....	23
3.3.3	Summary	23
3.4	Progressive Customers Case Studies	24
3.4.1	Case Study 1: Willmott Dixon (Interviewed)	24
3.4.2	Case Study 2: Tier 1 UK Local Authority (Interviewed)	26
3.4.3	Case Study 3: Landsec (Interviewed)	27
3.4.4	Case Study 4: EA Technology (Interviewed).....	27
3.4.5	Case Study 5: Aviva Perth Office (Internet Research)	29
3.4.6	Case Study Summary	30
3.5	Public Workplace Charging	30
4	Costs.....	32
4.1	WCS Data Cost Analysis.....	32
4.1.1	Summary	32

4.1.2	Costs per number of sockets	32
4.1.3	Costs history.....	33
4.1.4	Comparison with the EVHS scheme	34
4.2	Costs From Suppliers and Customers.....	35
4.3	Investment Scenarios.....	36
4.3.1	Cost-Benefit Comparison.....	37
4.3.2	Fleet Charging Infrastructure TCO.....	37
4.3.3	Staff and Visitors Charging Infrastructure Business Case.....	38
4.3.4	Discussion	39
5	Parking Policies.....	40
5.1	Statutory National Parking Policies	40
5.1.1	Impact Assessment	42
5.1.2	Discussion	44
5.2	Other Parking Policies.....	46
5.2.1	Non-Statutory Policies	46
5.2.2	Workplace Parking Levies	47
6	Barriers & Solutions	48
6.1	WCS Barriers	48
6.2	General Workplace Charging Barriers.....	49
6.3	Solutions.....	54
6.3.1	Existing Proposed Solutions	54
6.3.2	Recommended Solutions.....	56
6.4	Solutions and Barriers Summary.....	61
7	Conclusions and Recommendations.....	63
	Appendices.....	66
7.1	Appendix A - Sources of Data & Information	66
7.1.1	OZEV Workplace Charging Scheme (WCS) Data.....	66
7.1.2	Supplier Interviews	66
7.1.3	Customer Research.....	67
7.1.4	Workplace Parking Data	67
7.1.5	Use of Data.....	67
7.2	Appendix B – WCS Top Supplier Lists	68
7.3	Appendix C – Supplier Information.....	72
7.3.1	Supplier History and Coverage.....	72
7.3.2	Supplier Interview Questions	72
7.3.3	Supplier Responses.....	74
7.3.4	Supplier WCS Feedback.....	78
7.4	Appendix D – Workplace Charging TCO Assumptions.....	79

A review of the UK's workplace EV charging sector

7.4.1	Assumptions common to both use cases:	79
7.4.2	Fleet use case assumptions:	79
7.4.3	Staff/visitor fixed value assumptions:	79
7.5	Appendix E – Parking Policies Full Information	80
7.5.1	EU	80
7.5.2	England	81
7.5.3	Scotland	82
7.6	Appendix F – Parking Policy Impact Methodology	82

Executive Summary

This report has studied the current state of the UK's network of workplace charging for electric vehicles. Data provided by The Office for Zero Emission Vehicles (OZEV) on the installations completed using Workplace Charging Scheme (WCS) grant funding was used in conjunction with evidence and data from workplace charging suppliers to estimate the total scale of the workplace charging network.

It is estimated that in the region of 27,000 – 43,000 workplace charging sockets have already been installed in the UK. The best estimate of 33,000 sockets is comparable in magnitude to the public charging network. This shows therefore statistics for charging infrastructure that ignore workplace charging significantly underestimate the total scale of the UK's EV charging infrastructure network.

There were 21.7 million commuting vehicles in 2021 and 35.4% of all car and van miles in England in 2019 were for commuting or business purposes. These statistics alone highlight the importance of workplace charging when attempting to size or optimise the UK's overall EV charging network to support the electric transition.

The rate of deployments funded by the WCS - indicative of all installations - has increased each year since its inception in 2016, and is expected to increase further when the eligibility criteria is relaxed for the 2022/23 financial year. Despite this, it is concluded that businesses can do more to provide charging and help enable and accelerate the EV transition. Whilst examples of progressive businesses installing workplace charging at scale are shown, even in 2021 amongst a backdrop of record EV sales, 78% of businesses accessing the WCS fund did so to install only one or two sockets. At best this shows a lack of strategy, forward thinking and ambition and at worst could be businesses guilty of deploying as part of a box-checking exercise.

Cenex has combined its own experience with feedback from leading suppliers and customers to identify 14 barriers experienced by businesses deploying workplace charging. The most significant of these are infrastructure deployment costs and business case; power availability and upgrade costs; and leased premises.

Analysis is presented which shows the difference in the investment cases for workplace charging for fleets and for staff and/or visitors. For fleet vehicles, in most scenarios, the reduction in operational costs for electric vehicles (relative to their diesel equivalent due to fuel, tax and maintenance savings) is sufficient to cover the costs of both the vehicle purchase premium and the capital and operational costs for the charging infrastructure. On the other hand, the business case for workplace charging infrastructure for staff and visitors is not as good. The investment is only likely to cover its costs if the system achieves a very high level of utilisation; the business is able to secure a low-cost energy supply; or sets a high charging tariff to its users without reducing utilisation.

The potential impact of the implementation of requirements to install EV charging in non-residential car parks from the EU Energy Performance of Buildings Directive (EPBD) into UK policy has been investigated using three scenarios. This highlights the significant impact of excluding existing buildings and limiting the eligibility criteria to new premises and those undergoing major renovations. It is estimated that only including new and major renovations would only directly mandate the installation of approximately 60,000 sockets by 2035. This is less than 23% of the total expected from an unregulated market and only 2-4% of the totals that are estimated if the whole of the UK followed Scotland's proposed policies or the EPBD 2021 proposal.

The following six recommendations are made to overcome the barriers to workplace charging identified:

1. Financial – The WCS fund has successfully supported over 7,000 businesses in deploying workplace charging in less than five years. The upcoming changes to the eligibility criteria are welcomed and expected to increase the scheme's popularity. However, for business

that do not operate fleet vehicles (where the vehicles' operational cost savings can pay for the charging infrastructure), the costs of deploying and operating workplace charging for staff and visitors at the required scale is still a significant barrier. Therefore, alternative economic measures such as access to affordable finance and tax reforms are recommended.

2. Parking policies – New policies to mandate the installation of EV charging in new or refurbished non-residential car parks must include existing car parks to have a significant impact, particularly helping to overcome the barrier experienced by businesses that lease their workplaces, by placing the responsibility on the landowner. Local Authorities could also implement local policy – such as exemptions to Workplace Parking Levies – to encourage even greater levels of deployments.
3. Audit and support schemes – This would be one or more of a carrot and stick approach to force or encourage businesses to become better structured internally to deliver EV charging projects. An audit scheme could mandate that businesses assess their needs for EV charging using an approved method and act on the results. Alternatively, or in addition, support schemes could help by providing assistance with strategies to enable businesses to make better decisions.
4. Education – Many suppliers fed back that a lot of businesses do not understand EV charging infrastructure and that many of their enquiries are from customers trying to educate themselves. Potentially more importantly, businesses do not well understand the benefits that can be achieved from workplace charging. Cenex recommends that a central organisation – such as OZEV – sponsors and disseminates educational material specifically designed for businesses and workplace charging. There is precedence for this type of activity with the guide that OZEV is currently producing for Local Authorities on EV charging with Cenex and the IET.
5. Support for DNO costs – Ofgem's Significant Code Review (SCR) will reduce the costs associated with new and upgraded connections. Whilst this will remove what is typically cited as the number one barrier for scaled EV charging deployments, it will not remove them. As with recommendation 1, funding could be provided to help businesses with the DNO costs that will remain to install or upgrade non-shared assets, which will vary on a case-by-case basis. This would make the cost of deploying workplace charging more equitable.
6. Standard contractual templates for landlords and tenants – Another key barrier identified by customers and suppliers is where the business leases their premises. In this case, they are reliant on the landlord to deploy workplace charging. The creation of standardised contractual templates could lessen the legal barrier to deploying EV charging at leasehold locations.

1 Introduction

1.1 Introduction to the Project

This project examines how the workplace EV charging market is evolving in the UK to gain an understanding of the barriers to its development and identify potential policy solutions. It has been undertaken for Transport and Environment (T&E). T&E is Europe's foremost sustainable transport environmental NGO. Based in Brussels, it has around 80 staff in 7 countries including the UK office that commissioned this study.

Workplace charging is one of the key components of a successful UK charging strategy and this project has been designed to shine a light on progress to roll out workplace charging in the UK and identify barriers to progress. It specifically addresses the following questions:

1. The current scale of workplace charging in the UK compared to the number of dedicated workplace parking places, if possible, with an indication of distribution across the UK?
2. The current market for workplace charging: who are the principal suppliers and what are the most widely adopted business models?
3. Examples of progressive companies that are champions in installing EV charging for employees or fleet vehicles?
4. What are the common reasons for the failure to roll out workplace charging and potential solutions?
5. What are the typical costs of workplace charging installation, where possible with a range?
6. What will be the impacts of proposed government plans to require the installation of chargers on land used for parking?

1.2 Introduction to Workplace Charging

From the 2019 National Travel Survey¹, 35.4% of all car or van miles are for commuting and business purposes. Whilst the pandemic has increased the prevalence of remote working, miles driven for commuting and business purposes will remain a significant proportion of miles driven.

Additionally, the average trip distances for commuting and business are just 9 and 19.5 miles¹ respectively, and with long dwell times for recharging, the majority of these trips can be made by electric vehicles.

For the purpose of this report "workplace charging" encompass any electric vehicle (EV) charging infrastructure that is installed for one or more of the following use cases:

1. On-site based fleet vehicles

EVs that use the business premises as their base location. Typically, these are fleets of commercial vehicles, but can also include passenger vehicles such as pool cars. Whilst operations will vary by business, a common usage pattern would be vehicles that are in operation during the day and are parked, and therefore available for charging, at a depot overnight.

Workplace charging will be the primary means of charging for on-site based fleet vehicles.

2. Home-based vehicles

Vehicles that are based at employees' homes. Many households have access to off-street parking and therefore are able to install their own home chargepoint. There are two sub-categories:

- a. Commuting staff private vehicles

¹ NTS0409b - Average distance travelled by purpose and main mode: England, from 2002; NTS9912 Average trip length by purpose, region and Rural-Urban Classification1: 2002/2003 onwards. [National Travel Survey: 2019 - GOV.UK \(www.gov.uk\)](http://www.gov.uk)

Vehicles used by employees to commute to their place of work. These vehicles typically have a significant dwell time at the workplace (e.g. an eight-hour working day).

Workplace charging, in coordination with the public charging network, can support this use case transition to electric when it is not possible to charge from a private home chargepoint.

b. Home-based fleet vehicles

Typically, commercial vehicles that for operational reasons are based at the employee's home and are used to travel to various work locations. This use case also includes salespeople's vehicles. These vehicles may only rarely visit the workplace location.

As these vehicles may not visit workplace locations often, a business will need to consider the availability of private home charging and the adequacy of the public charging network when making decisions about transitioning to EVs.

There are also methods by which a business can reimburse its employees for the expense incurred to charge a home-based fleet vehicle. However, it is more difficult to transition these vehicles to electric for the estimated 31%² who do not have off-street parking.

3. Visitors

Vehicles of non-company employees that travel to the business premises for a work reason, such as meetings or on-site work with variable dwell times. As charging for visiting vehicles is a less predictable use case, in the short-term it is unlikely that this would supplement other use cases for workplace charging.

Depending on the priority and usage patterns, it may be possible to maximise the value of charging infrastructure by meeting the demand of multiple use cases. For example, for charging commuting staff's private vehicles during the day and on-site based fleet vehicles overnight.

For certain workplaces, it may also be possible to make the charging infrastructure available to the general public. Depending on the workplace location, this could be low-powered AC charging to local residents without off-street parking who cannot charge using a private home chargepoint; or high-power DC charging for passing traffic requiring a charge. In both cases, the business would want to prioritise the typical workplace charging use cases above.

1.3 Introduction to Cenex

Cenex was established as the UK's first Centre of Excellence for Low Carbon and Fuel Cell technologies in 2005.

Today, Cenex focuses on low emission transport & associated energy infrastructure and operates as an independent, not-for-profit research technology organisation (RTO) and consultancy, specialising in the project delivery, innovation support and market development.

We also organise Cenex-LCV, the UK's premier low carbon vehicle event, to showcase the latest technology and innovation in the industry.

Our independence ensures impartial, trustworthy advice, and, as a not-for-profit, we are driven by the outcomes that are right for you, your industry and your environment, not by the work which pays the most or favours one technology.

Finally, as trusted advisors with expert knowledge, we are the go-to source of guidance and support for public and private sector organisations along their transition to a zero-carbon future and will always provide you with the insights and solutions that reduce pollution, increase efficiency and lower costs.

To find out more about us and the work that we do, visit our website:

² Estimates vary, however this statistic is from 2019 data for all housing types from [English Housing Survey data on amenities, services and local environments - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/statistics/english-housing-survey-data-on-amenities-services-and-local-environments)

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2 The scale of UK workplace charging

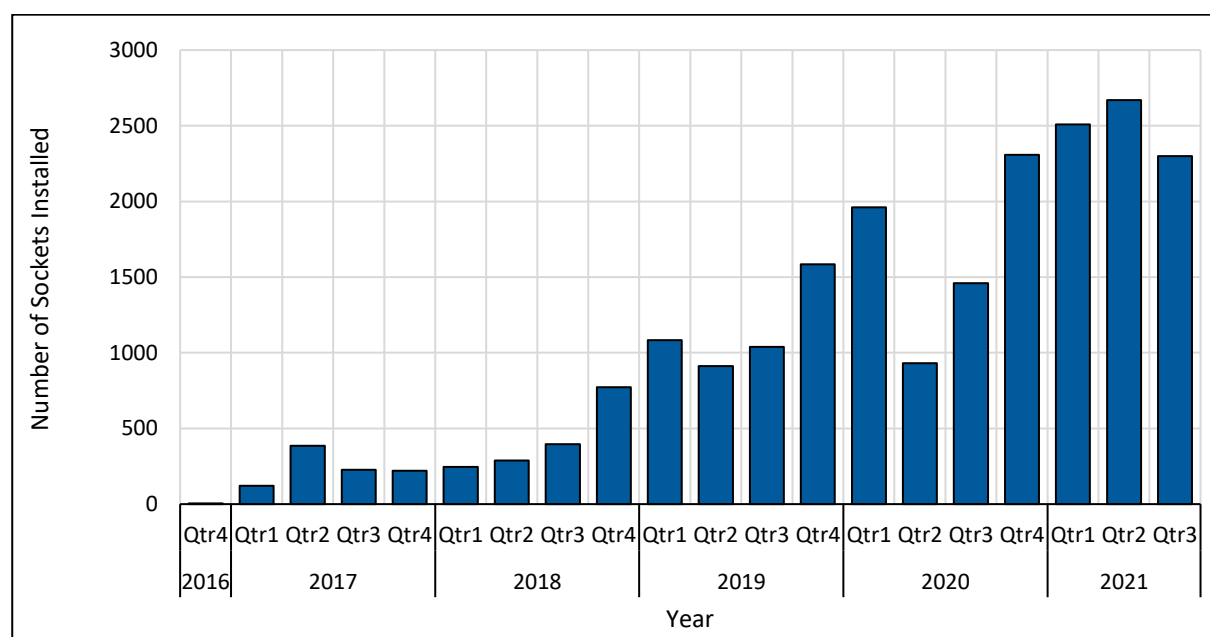
2.1 Workplace Charging Scheme (WCS) Installations

The Workplace Charging Scheme (WCS) grant provides funding for the installation of workplace charging. The scheme is voucher based, allowing recipients to claim for multiple charging sockets across multiple sites with a single voucher.

2.1.1 Overall Statistics

For the 7,833 WCS vouchers claimed from December 2016 (scheme start) to 30th September 2021, 21,417 sockets were installed across 8,763 separate locations.

The number of sockets installed using the scheme has increased year on year with the 2021 year-to-date total already exceeding the number of sockets installed in 2020, despite the £150 reduction in grant funding in April 2020.



	2016	2017	2018	2019	2020	2021
Sockets Installed	4	955	1,702	4,620	6,659	7,477
Cumulative Total	4	959	2,661	7,281	13,940	21,417

Figure 1: Year by year WCS socket installations

These sockets have been installed across a total of 8,662 unique business locations:



Figure 2: Number of locations installed

2.1.2 Analysis by Number of Sockets

The majority (75%) of businesses are using the scheme to install just one (38.1%) or two (36.9%) sockets per location. The next most popular number of sockets installed is four (11%) which is likely to be where two twin socket-outlet chargepoints have been installed.

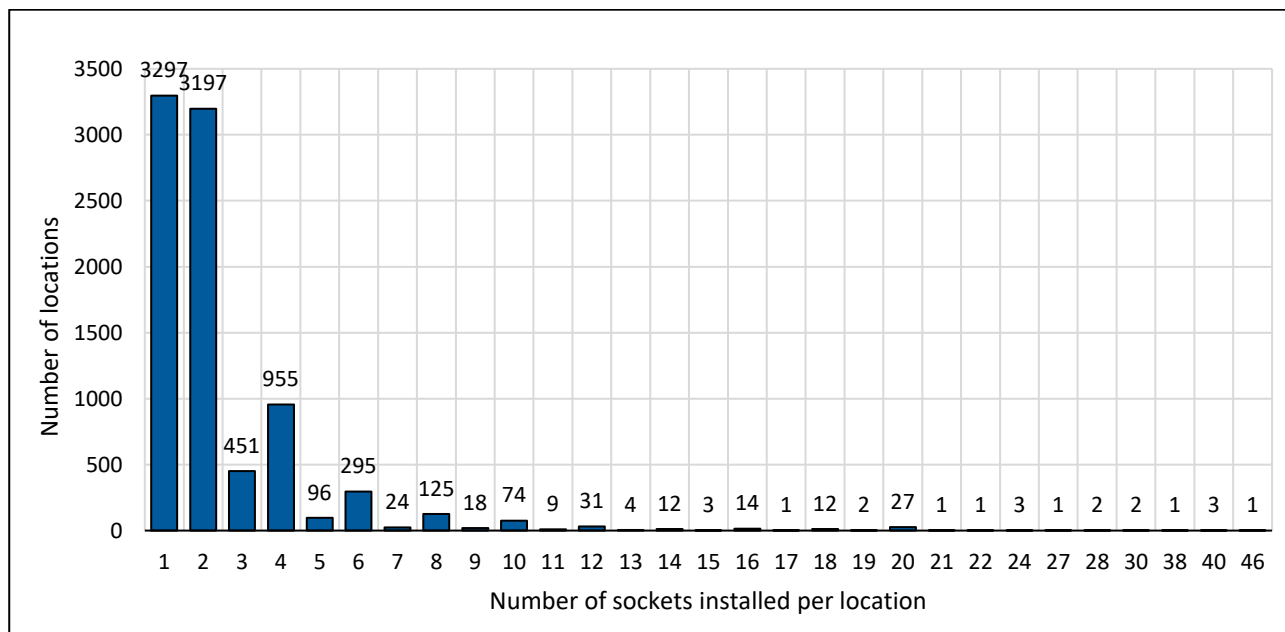


Figure 3: Number of sockets installed per location

There is no significant change in the relative proportion of number of sockets per location over the history of the scheme.

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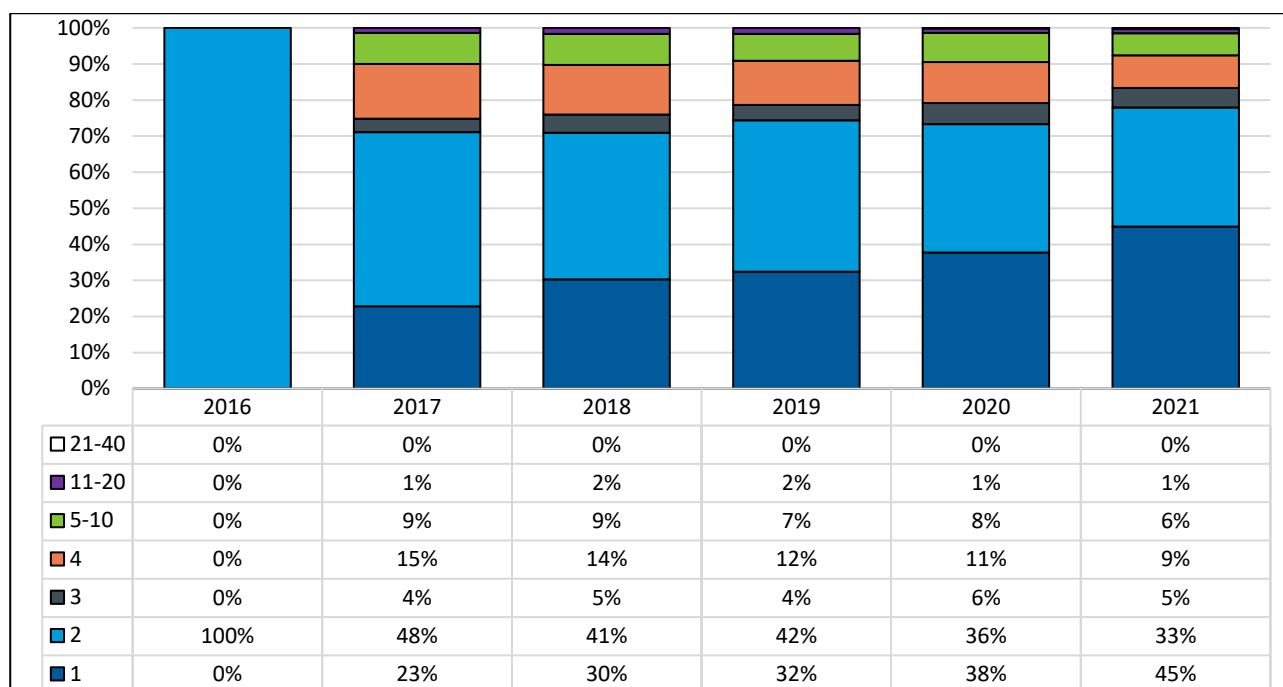


Figure 4: Number of sockets installed per location year on year

Workplace charging funded by the WCS is eligible for two use cases; on-site based fleet vehicles and commuting staff's vehicles use cases. Charging for visitors is not an eligible use case for the WCS.

Figure 3 and Figure 4 show that workplace charging deployments, at least those that have been funded by the WCS grant, are dominated by small scale deployments. Only 22% of installations in 2021 included more than two sockets.

2.1.3 Analysis by Business

The WCS grant has always allowed businesses to install chargepoints at multiple locations so long as the combined number of sockets claimed for does not exceed the total limit. This can be done by either claiming for multiple locations within a single voucher or claiming more than one voucher.

A total of 7,091 businesses have accessed the scheme. 7.4% of these having claimed more than one voucher, as shown by Table 1.

Number of vouchers claimed per business	Count of businesses	Percentage
1	6,569	92.6%
2	406	5.7%
3	68	1.0%
4	25	0.4%
5	12	0.2%
6	1	0.0%
7	3	0.0%
8	4	0.1%
9	2	0.0%
11	1	0.0%

Table 1: Count of businesses by number of vouchers claimed

Businesses claiming multiple vouchers is illustrative of two potential behaviours:

A review of the UK's workplace EV charging sector

- Businesses see the benefit of workplace charging and go on to install further infrastructure at other locations (no locations claimed more than one voucher) and make a subsequent claim.
- Businesses, most likely larger organisations, are not set up to manage a single claim centrally – potentially due to variations in local premises ownership - and therefore delegate the responsibility to a site level. This claim structure was mentioned by suppliers during interviews.

Figure 5 suggests that, as can be expected, repeat claims from businesses have become more common over the scheme's history, increasing from the first repeat claims in Q2 2018 until stabilising to around 11-13% since Q2 2020.

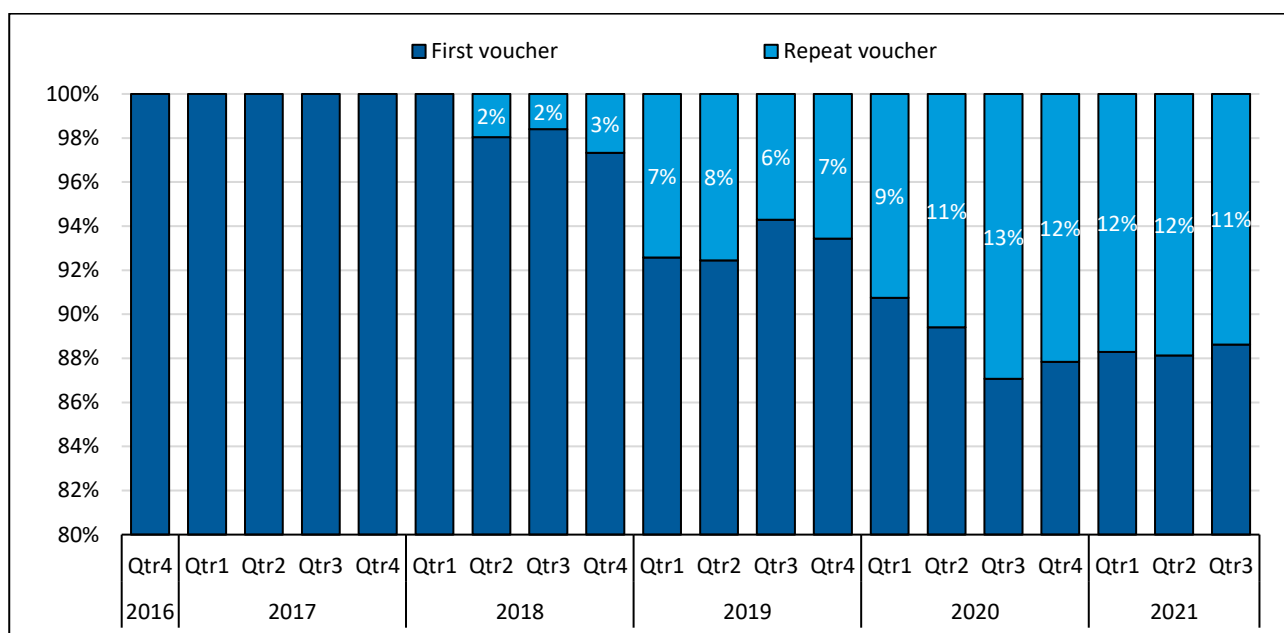


Figure 5: Repeat (second or subsequent) voucher claims by install date

Whilst only 501 (6.4%) of vouchers are for more than one location, businesses claiming more than one voucher means that in reality 840 (11.8%) of businesses have installed at more than one location, up to a maximum of 20 individual sites, for a total of 8,663 unique locations.

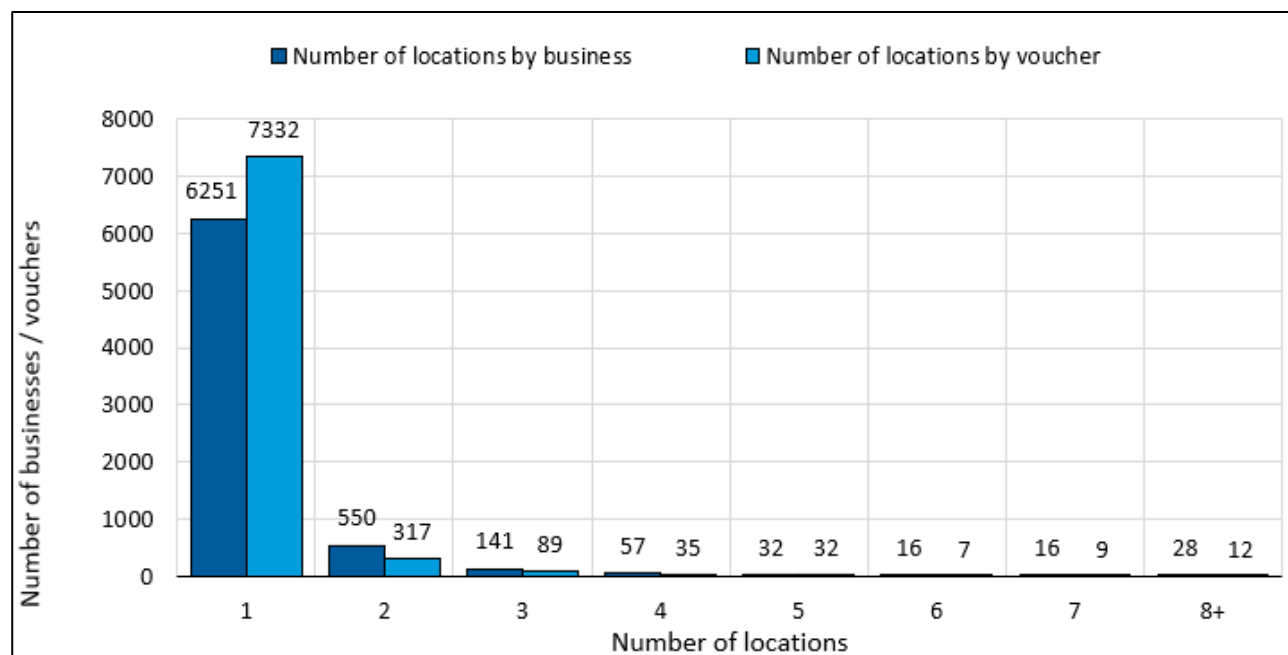


Figure 6: Number of locations installed by business and by voucher

Figure 7 shows the number of sockets installed per business showing the reducing number of businesses installing a large number of sockets.

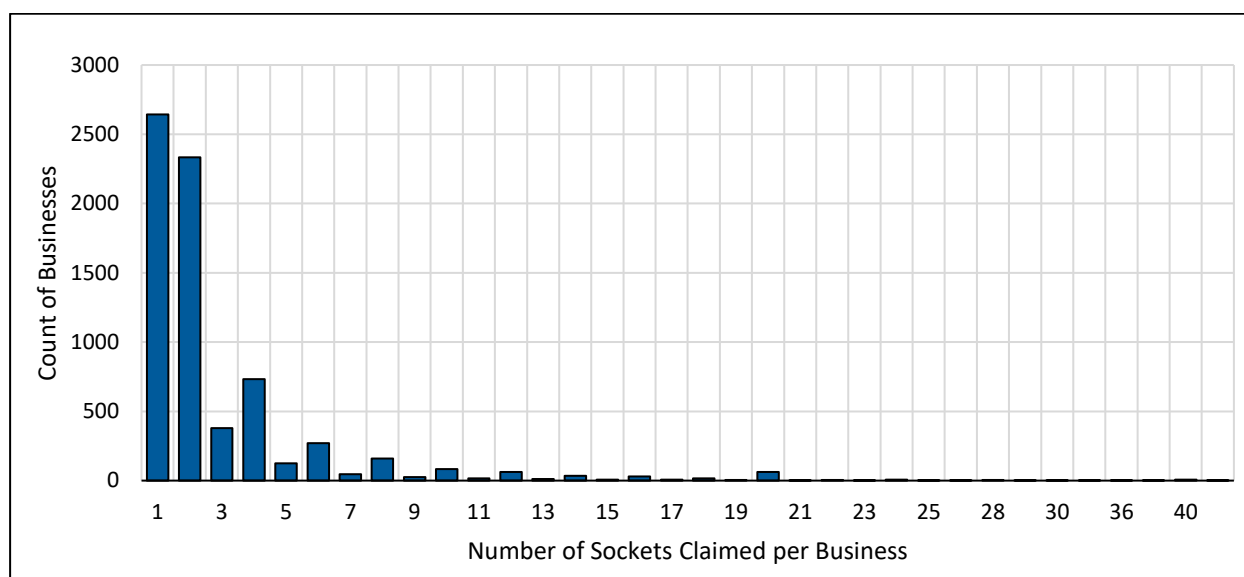


Figure 7: Number of sockets installed per business

OZEV also provided data on the sizes of the businesses (by number of employees) claiming the WCS grant. Data was available for 5,853 (82.5%) of the 7,091 total businesses from dataset 1.

	Number of Employees	Count of Businesses	% of WCS business sizes	% of all UK businesses ³
Micro	1-20	2,212	37.8%	95.2%
Small	21-49	1,358	23.2%	2.9%
Medium	50-249	1,423	24.3%	1.5%
Large	250+	859	14.7%	0.4%

Table 2: Business sizes

At first it appears that workplace charging funded by the WCS is most popular with micro-sized businesses. However, when accounting for relative proportions of all UK businesses, small, medium, and large businesses are much more likely to install workplace charging.

Figure 8 shows that, unsurprisingly, smaller deployments (by number of sockets) are more common at smaller businesses and the larger deployments of 11 or more sockets are mostly implemented by large businesses with 250 or more employees.

³ [UK business: activity, size and location - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk/business-and-the-economy/business-activity-and-productivity/uk-business-activity-size-and-location)

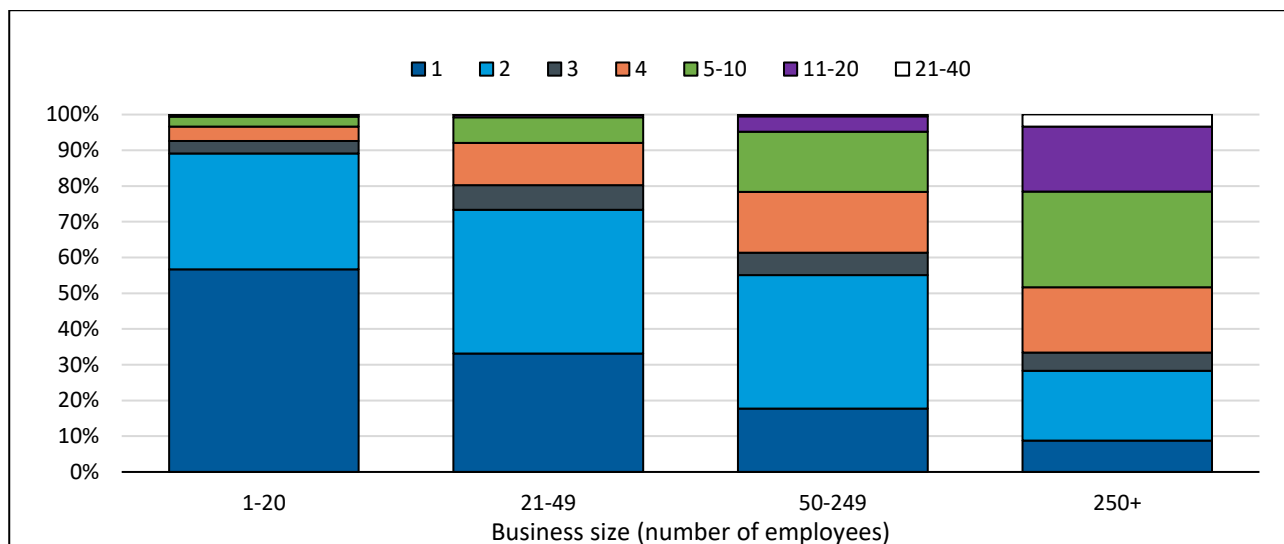


Figure 8: Deployment scale by business size

2.2 Overall Workplace Installations

Chargepoints funded by WCS do not represent the full scale of workplace charging in the UK. Three main reasons are identified as to why a business would install workplace charging without accessing the grant:

- Limitations due to the WCS eligibility - Refer to section 6.1
- The business deems the funding is not worth the additional administrative effort to claim the grant and subsequently report on the chargepoints' usage.
- Alternative grant funding. The only grant fund identified that is applicable to workplace charging is the new fund from Transport Scotland – see below.

2.2.1 Workplace Charging Funding from Transport Scotland

Since July 2021, alternative funding from Transport Scotland for workplace charging has been available⁴ to Scottish businesses. Unlike the WCS, charging for visitors is eligible. It is not believed however that workplace installations that are also publicly accessible would be eligible, as guidance states “Funding is currently available for charge points for sole use by occupiers, staff and visitors.”

Additionally, the evidence that is required to justify the use case (i.e. evidence of existing electric vehicles such as on-site fleet or commuting staff, or anticipated demand from future EV ownership or other users) is not judged to be a significant barrier. There is also no requirement to report usage data as there is with the WCS.

⁴ [Business charge point funding - Energy Saving Trust](#)

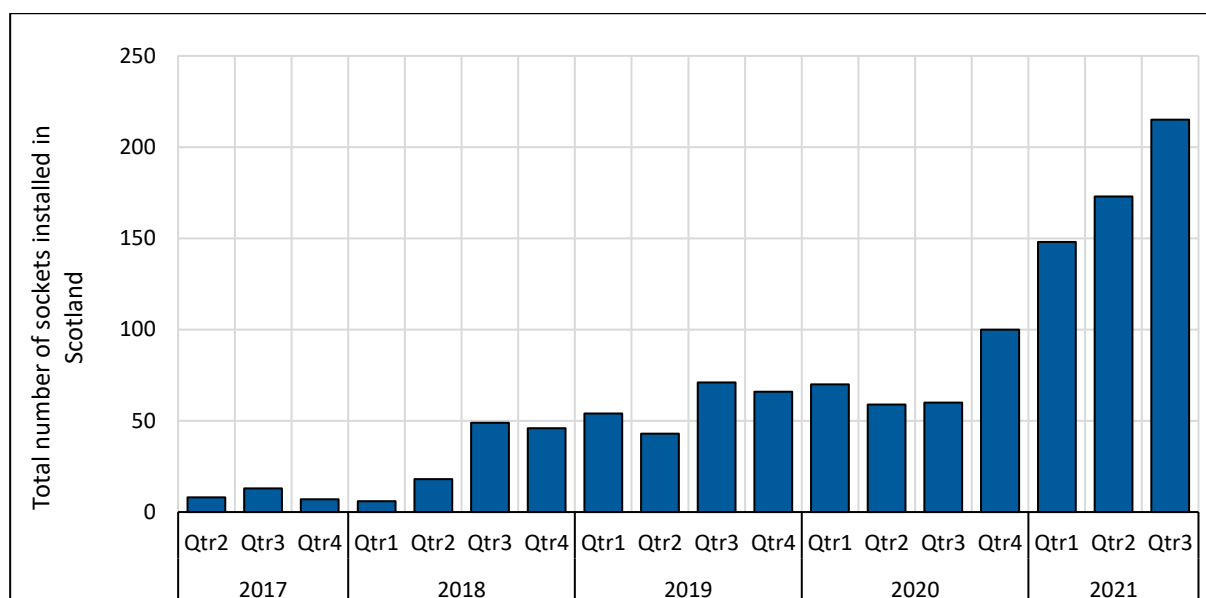


Figure 9: Total number of installed sockets by quarter, Scotland only.

Data for the Transport Scotland scheme was requested, from administrators Energy Saving Trust (EST), but at time of authoring had not been received.

2.2.2 Overall Workplace Charging Scale: Conclusion

The intended method was to extrapolate the data from the WCS scheme using data provided by leading suppliers to estimate the total scale of the UK workplace charging sector. However, many suppliers that were not able to provide data were able to estimate the percentage of workplace charging installs that were WCS funded. A summary is provided in Table 46 in Appendix C .

There are also complicated relationships between suppliers. [The Phoenix Works](#), for which the data suggests that only 26% of their workplace installs have been WCS funded, stated that they often work as a sub-contractor with partners who may or may not have claimed the WCS grant themselves.

[Elecology](#) estimated that an insignificant number of their installations were not WCS funded, whilst [EV Charging Solutions](#), [Amp EV](#) and [Jorro](#) estimated that only 5%, 10% and 25% of their workplace installs respectively were not grant funded. On the other hand, from data provided by #1 WCS supplier [Elmtronics](#) it is estimated that only 53% of their installations were funded. However, [Elmtronics](#) acknowledged that the WCS is a key sales tool.

Clearly the limitations of the scheme (see 6.1) means that the scale of the sector is greater than only the WCS funded installs. After considering the limited number of supplier interviews; the lack of data from suppliers; the complex relationships between organisations whereby the supplier may not be the entity redeeming the grant; and the assumptions that needed to be made to extrapolate the OZEV data to account for missing supplier records, it is very difficult to confidently estimate the full scale of the UK's workplace charging sector. However, a realistic assumption would be that WCS funded installs represent 50-80% of all workplace charging installs, with a best estimate of 65%.

Table 3 shows a sensitivity analysis of the potential workplace charging total scale by number of sockets and compares this with the following statistics for public and home charging networks:

- 28,404 public devices are listed by Zap-Map⁵. It is estimated that this equates to 38,989 sockets⁶. This statistic will include any device which has some accessibility to the public.

⁵ Accessed December 2021.

A review of the UK's workplace EV charging sector

There will be some crossover with domestic and workplace charging due to the increase in shared infrastructure (see 3.5) however this number is thought to be a good indication of the scale of the public charging network.

- The Electric Vehicle Homecharge Scheme (EVHS) has funded 189,815 domestic charging devices⁷. Due to the eligibility criteria of this scheme, there will be some domestic locations, such as for shared residential parking, which have not used this scheme to install domestic charging. Also, there may be locations which have installed two chargers using the scheme. However, it is reasonable to assume that this statistic is a good approximation of the total number of UK domestic charging locations.

	Scale of WCS Funded Installs Relative to Total UK Workplace Installs	Total Number of UK Workplace Charging Sockets	Scale Relative to Public Charging Network	Scale Relative to Domestic Charging Network
Low	80%	26,771	69%	14%
Medium	65%	32,950	85%	17%
High	50%	42,834	110%	23%

Table 3: Workplace Charging Scale Sensitivity Analysis

This indicates that whilst the workplace charging sector is likely of similar magnitude to the public charging network and therefore must not be overlooked when evaluating the UK's overall charging network as a whole. However, the best estimate that the scale workplace charging network is just 17% of the magnitude of the domestic chargepoint network suggests that workplaces can do more to support the EV transition, particularly for those who are unable to charge off-street at home.

This conclusion is supported by the fact that not all workplace charging will be useable by private vehicles used by staff, visitors or the general public. The majority response from suppliers (see 3.3) is that they do provide on-site based fleet charging at workplaces and although these installs represent a lower number of customers, these deployments often include a greater number of sockets than workplace charging deployments for staff vehicles. However, suppliers were not able to share data on the use cases of their deployments and therefore it is not possible to analyse the number of workplace sockets that are available for non-fleet use.

In summary, from the data and information available, it appears that there remains an opportunity for greater provision of workplace charging in the UK for use by privately used vehicles.

2.2.3 Geographical Distribution

Figure 10 shows the distribution of WCS-funded workplace sockets by UK region.

⁶ Assuming one socket for every slow device (7,232 devices, 3-5 kW); 1.5 sockets on average for fast (15,992 devices; 7-22 kW), rapid (3,906 devices, 25-99 kW) and ultra-rapid (1,273 devices, 100 kW+).

⁷ [Electric vehicle charging device grant scheme statistics: October 2021 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/statistics/electric-vehicle-charging-device-grant-scheme-statistics-october-2021) Accessed December 2021.

A review of the UK's workplace EV charging sector

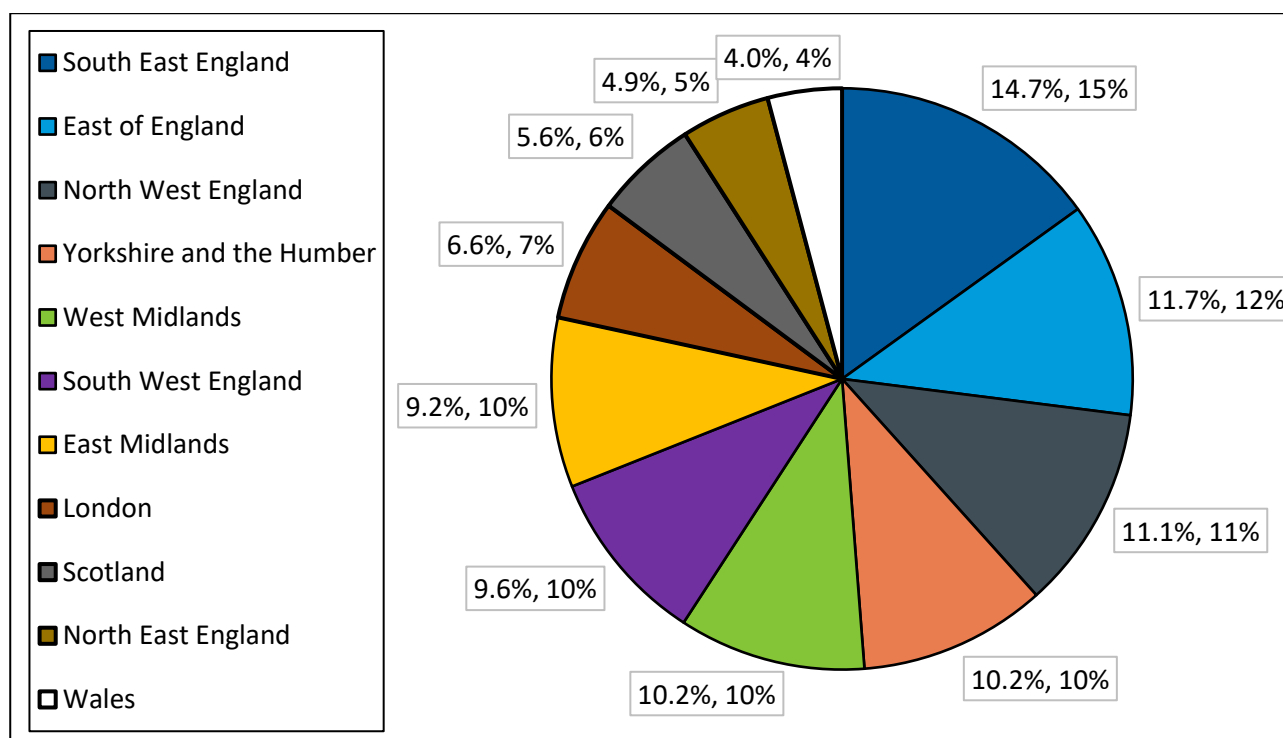


Figure 10: Distribution of workplace sockets by region

By extrapolating the WCS data by region using the most-likely estimate that WCS installations represent 65% of all workplace charging (see 2.2.2), we can compare the number of workplace charging sockets to the numbers of registered EVs (Battery Electric Vehicles, BEVs and Plug-in Hybrid Electric Vehicles, PHEVs) by region in Table 4.

	Number of WCS funded workplace sockets	Extrapolated number of workplace sockets	Number of registered EVs	EVs per workplace charging socket	Rank
South East England	3,159	4,860	119,865	24.7	11
East of England	2,502	3,849	61,409	16.0	7
North West England	2,380	3,662	65,699	17.9	8
West Midlands	2,186	3,363	38,467	11.4	5
Yorkshire and the Humber	2,182	3,357	39,922	11.9	6
East Midlands	2,053	3,158	27,437	8.7	3
South West England	1,977	3,042	73,880	24.3	10
London	1,419	2,183	70,200	32.2	12
Scotland	1,206	1,855	34,170	18.4	9
North East England	1,040	1,600	8,198	5.1	1
Wales	865	1,331	11,023	8.3	2
Northern Ireland	448	689	6,590	9.6	4
Totals	21,417	32,949	564,694		

Table 4: Difference in geographical distribution of workplace charging to BEV registrations⁸

⁸ VEH0132b – Licensed BEVs by end Q2 2021 [All vehicles \(VEH01\) - GOV.UK \(www.gov.uk\)](https://www.gov.uk/all-vehicles-veh01). It is acknowledged that the geographical distribution of licensed BEVs will be skewed by vehicles provided by large lease providers not being attributed to their active region.

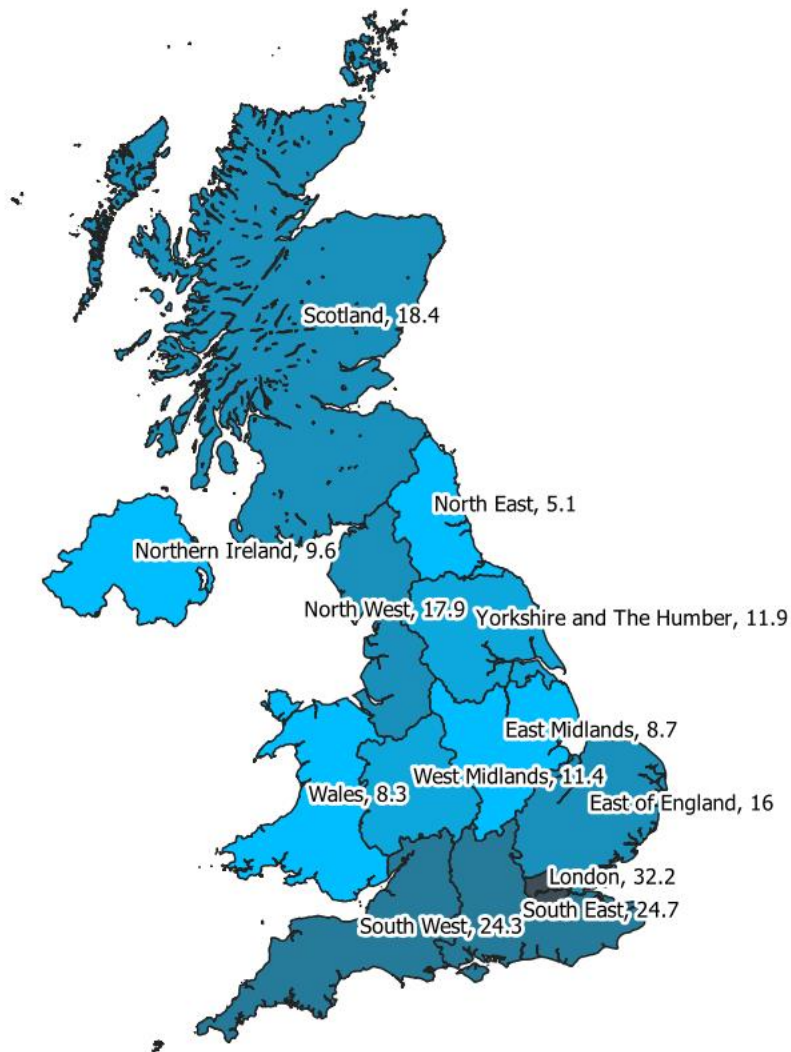


Figure 11: Number of EVs per workplace socket, all UK regions

There are significant differences in the rollout of workplace charging relative to local EV adoption. London (32.2 EVs per workplace socket), the South East (24.7) and the South West (24.3) are the worst performing regions whereas the North East (5.1), Wales (8.3) and East Midlands (8.7) are the best performing regions. There is a correlation here; the ratio EVs to workplace sockets is highest where EV adoption is highest; this is indicative of regions of high early EV adoption reliant on home-based charging and despite, rather than because of, workplace charging deployments.

3 Suppliers and Customers

3.1 WCS suppliers

Table 44 within Appendix B – WCS Top Supplier Lists shows that the dominant model (20 of the top 31) for suppliers is to provide installation and maintenance (potentially with ongoing customer support) services of hardware sourced from a third party. In order to operate the chargepoints and collect the data required by the WCS grant (in addition to authenticating and billing users if this function is required by the business) chargepoints need to be connected to and managed by a Chargepoint Management System (CPMS). Some suppliers have proprietary systems whilst others, typically the smaller contractors, will connect devices to third party systems.

Six of the top WCS suppliers offer each of the three services in-house (albeit likely with a network of approved supplier sub-contractors). Another five provide installation and maintenance and chargepoint management services only.

It is important to highlight that the top 31 suppliers only represent 28% of the sockets installed in dataset 2 for which a supplier was associated. OZEV's WCS authorised supplier list includes 5,648 suppliers of which 1,203 have made a claim for at least one socket. It is clear from these numbers that there is substantial market coverage with suppliers, giving businesses huge choice when it comes to appointing their supplier.

The majority of these suppliers will be small electrical contractors or even self-employed electricians which have recognised the opportunity of EV charging. Many will also have applied to join OZEV's authorised WCS list at the same time as joining the equivalent domestic list for the Electric Vehicle Homecharge Scheme (EVHS) but have not been active in workplace charging, hence the large difference (4,445⁹) between the total authorised suppliers and those which have made at least one claim.

12 suppliers were interviewed, of which 11 appeared in the top 31 list. Their history and coverage of UK workplace charging is given in Appendix C .

3.2 Supplier Business Models

Suppliers were asked about the ownership models that they offer their customers for workplace charging. The purpose of this was to understand the opportunity for businesses to avoid potentially large up-front capital costs (recognised as a barrier to deployment – see section 6.2).

3.2.1 Public Charging Ownership Models

For public charging, Cenex has identified four typical ownership models. These are differentiated by the division of costs and revenue between the landowner and the supplier. The values in Table 5 represent the percentage of costs and revenue retained by the landowner (the business in the context of workplace charging):

Ownership Model	Costs					Revenue
	Hardware	Groundworks	Back-office	Electricity	Maintenance	
Own and Operate	100%	100%	100%	100%	100%	100%

⁹ This number will likely be lower due to missing supplier names in OZEV's dataset 2.

Ownership Model	Costs					Revenue
	Hardware	Groundworks	Back-office	Electricity	Maintenance	
External Operator	100%	100%	0%	100%	100%	90% ¹⁰
Lease	0%	0%	0%	0%	0%	20% ¹⁰
Concession	0%	100%	0%	0%	0%	30% ¹⁰

Table 5: Public Charging Ownership Models

There are two additional factors affecting the business case to consider when comparing ownership models for workplace charging with those for public charging:

- Revenue – The suppliers interviewed all defer the decision on whether the users should pay to use the workplace charging network to their customers. Businesses are interested in providing free or subsidised EV charging to incentivise its staff and visitors to travel more sustainably. For fleet use, it is even more likely that a business will want the system to be free to use. If there is no payment at the point of use then there is no viability for a commercial operator to provide goods and services as part of a revenue-share ownership model (i.e. external operator, lease or concession).

It is possible to set up a system whereby some users (e.g. staff and visitors) pay to charge but others (e.g. fleets) do not. Such a system could work well if fleet vehicles use the infrastructure overnight and staff and visitors do so during the working day. However, in this mixed use-case there is still commercial risk for suppliers to provide a revenue share model. Careful management would be needed to prevent the situation where non-paying fleet and paying staff and visitors compete for use of the system.

- Accessibility – Workplace car parks and sites often have physical access limitations which can be controlled by the business itself or a third party. Likewise, even if the parking facility is fully accessible, the business may choose not to make the chargepoints accessible on a public network. If the infrastructure is only available at certain times and by certain users, then the commercial viability is reduced.

3.2.2 Own & Operate

From supplier interviews it is clear the ownership models that are frequently used for public charging infrastructure are not yet common for workplace charging. The most common ownership model, offered by all interviewed suppliers is the Own & Operate model, with the business paying all up-front capital costs (minus any grant funding) and operational costs (maintenance fees and back-office costs typically paid monthly or annually on a per socket or per device basis).

¹⁰ Revenue share percentages are for indication only and will vary depending on the commercial viability of the site and its use case.

3.2.3 Leasing¹¹ or Subscription Models

Two of the interviewed suppliers are investigating new models providing EV charging as a leasing or subscription service:

- [Elmtronics](#) offer a [workplace charging leasing option](#) by which the capital and operational costs are combined into a single fixed monthly payment starting from £80 per device per month for lease terms of 12-60 months. The customer is given the option to keep or upgrade the equipment at the end of their lease.
- [The Phoenix Works](#) currently offer a [subscription plan for the domestic charging market](#). On interview, they stated that they will be expanding this offering - which covers hardware supply, installation, maintenance, repair and replacement, customer support and their own CPMS – for a single subscription fee. The cost is £30 per month and can be cancelled anytime with a 30-day notice period.
- [The New Motion](#) are looking at a new subscription based model for the domestic market and stated that they may choose to offer this for the workplace market depending on “upcoming changes to legislation.”

Discussed further in 4.1, the average cost of a workplace charging installation is considerably higher than for a domestic installation and therefore the monthly subscription cost would likely be proportionally higher for workplace charging. However, a subscription model for workplace charging would offer businesses an interesting alternative where the up-front capital outlay prevents or restricts workplace charging deployments.

3.2.4 Third-Party Finance

The difference between this option and the subscription model is that although the third-party finance reduces or removes the up-front capital costs, the business still takes ownership of the hardware and installation. Two suppliers mentioned that they are exploring the option of providing workplace customers access to third-party funding:

- [Jorro](#) stated that in 2022 that they will offer their customers access to third-party finance.
- [Amp EV](#) has previously investigated working with a third-party finance partner to provide customers with a financed option but did not pursue the model further due to a lack of customer interest.

3.3 Supplier Approach

As part of the supplier interviews, questions were asked about the approach taken to workplace charging deployments, to understand the direction of the market.

3.3.1 Use Case, Customer and Scale

Suppliers were asked about the size of businesses and the use case they provide workplace charging for, and the typical type of charging infrastructure and scale deployed. For full interview results, refer to Appendix C .

All suppliers are catering for small and medium sized businesses, with the predominant deployment use case seemingly small deployments of approximately of four socket outlets for staff vehicles. However not only the larger suppliers, such as [Elmtronics](#) and [Swarco](#), but also most of the smaller suppliers interviewed are also doing less frequent but larger scale deployments for fleet vehicles. Interestingly [Anglia Car Charging](#), [Elmtronics](#), and [Ground Control](#) all reported that the scale of deployments is increasing.

¹¹ Note that a leasing service in this context refers to the customer leasing from the supplier whereas a “lease” ownership model for a public network refers to the landowner leasing the land to the chargepoint operator.

It is important to remember the types of suppliers interviewed; these businesses are leading the way in workplace charging installation in the UK and are engaged in helping to expand the industry. The WCS data (refer back to Figure 4) did not corroborate any recent increase in scale of deployments that is being reported by the interviewed suppliers.

Whilst some suppliers ([Amp EV](#), [Elmtronics](#), [EV Charging Solutions](#), [Ground Control](#), [Jorro](#) and [The Phoenix Works](#)) have provided DC charging infrastructure, the vast majority of workplace charging infrastructure is AC, with a mix of 7 kW and 22 kW devices with load management systems offered to customers to optimise the use of available power. The need for higher powered DC charging is driven by dwell time; the dominant use cases for workplaces – staff and fleet vehicles – have long enough dwell times for AC charging to be sufficient. Therefore, the limited number of DC semi-rapid or rapid charging installations are expected to have been installed for use by visitors, high mileage employees such as sales staff, or larger vehicle types such as electric refuse collection vehicles which have large batteries requiring higher charging power.

3.3.2 Future Proofing

Future proofing of an installation is the method of implementing wider system infrastructure, as part of the initial deployment, which facilitates the addition of more chargepoints at a later date (typically with rise in demand). This can include:

- Civil works: installing cable routes (such as ducts) to, or even chargepoint foundations for, future EV charging bays. Sometimes referred to as passive provision.
- Electricals: The use of cabling and distribution equipment that is oversized for the initial installation but allows more chargepoint circuits and/or greater loads to be added without the need for equipment to be upgraded.
- Load Management: The provision of load management systems allows the available power to be distributed between the charging infrastructure. This can increase the scale of the current and future deployment working within constraints of available power. Broadly, load management systems can be static or dynamic:
 - Static: The maximum power output of a chargepoint is reduced to ensure that supply constraints are not exceeded but the system does not respond to the real-time demand (from EV charging or other on-site loads).
 - Dynamic: The power is distributed in real-time between the in-use chargepoints, accounting for any other on-site loads.
- Power supply: In addition to electrical future proofing and load management systems, sites which require a new or upgraded DNO network connection can over specify the connection for the initial deployment to allow for more charging infrastructure to be connected in the future. An alternative means to this would be to use on-site energy generation and/or storage systems on site to increase the amount of charging infrastructure that can be supported.

The responses of the interviewed suppliers to the question on future proofing are given in Table 48 in Appendix C – Supplier Information. It can be concluded that the workplace charging supplier market is very proactive in offering customers future proofed deployments, although it appears that the uptake is variable, with some companies deciding not to future proof their installations due to the additional capital costs.

3.3.3 Summary

The key summary points from discussions with suppliers on workplace charging use case, scale and method are as follows:

- Historically customers would be interested in small-scale deployments to satisfy the recharging requirements of very early adopters or even as a box ticking exercise. The typical use case would be one or two chargepoints for management staff who have a private EV. However, customers are becoming more knowledgeable and enquiries for, and

implementation of, larger scale deployments for staff and fleet vehicles are becoming more common.

The observation that customers have predominantly deployed small-scale installations was evidenced by the WCS data in Figure 4. However, the supplier feedback that larger deployments are becoming increasingly common is not yet borne out by the data – it is possible that this is too recent a trend to observe from the WCS data or that larger scale deployments are not being supported by the grant scheme.

- Although larger deployments for both staff and fleet vehicle use cases are becoming more common, a greater proportion are for larger EV fleets at large businesses, which create a known demand (and operational need) for the infrastructure.
- EV charging at workplaces for visitor use is less common and is limited by the eligibility criteria of the scheme.
- Suppliers are proactive in offering customers future proof deployments. Whilst some customers are still unable to afford the additional up-front cost future proofing creates (or opt for more chargepoints to be deployed as part of the initial deployment), the number of future proofed workplace charging deployments is increasing. Larger businesses are more likely to think strategically and have the cash reserves to deploy future proofing.
- AC charging is the dominant technology. The decision on whether to deploy 7 kW or 22 kW, for which there is no significant cost premium (see 0), depends on the following factors:
 - Whether the available power supply is single or three phase.
 - The customer's use case; is higher charging power or a larger number of chargepoints preferred?
 - Whether a load management system is installed, for which suppliers are proactive in explaining the potential benefits for the right deployment.
- Higher powered DC charging has two potential use cases in a workplace charging environment:
 - Charging for visitors who may attend the workplace for a short period of time (<1 hour)
 - Charging of fleet vehicles to give operational flexibility. For example if a vehicle that is normally single-shifted needs to have a first turn-around for a second shift in unusual circumstances.

For these use cases, DC charging infrastructure is gaining in popularity. Workplaces are often interested in semi-rapid DC wallboxes (typically 20 – 50 kW) to avoid the high capital costs of DC rapid (50 kW+) infrastructure.

3.4 Progressive Customers Case Studies

In this section case studies of businesses who have been active with deployment of, and/or have ambitious plans for, workplace charging infrastructure are presented.

3.4.1 Case Study 1: Willmott Dixon (Interviewed)

Willmott Dixon is a UK based construction firm working across multiple sectors in the construction industry. As an EV100 member, the company has committed to “Transition its fleet of nearly 500 company cars to EV and install charging at its offices and construction sites to support EV uptake by staff by 2030”.

EV100 Member?	Business Size (Number of UK Employees)	Number of UK Locations
Yes	Large (2000)	100 construction sites and 20 offices

Table 6: Willmott Dixon Company Information

Plans and Progress Overview

As a construction business, Willmott Dixon has two distinct types of sites at which workplace charging is applicable: offices and construction sites. Whilst their 20 offices are typical locations for workplace charging, their construction sites are unique as the land use and potential target users for any charging infrastructure will change when the site is handed over to the customer.

Their intent is to install workplace charging infrastructure to support the electrification of all of their 2,000 fleet vehicles whilst assisting staff, alongside the “company’s car scheme¹²” to make the transition to EV. Currently, over 50% of their office locations have charging infrastructure installed and eventually all will have charging to meet their EV100 commitment. The company expects that these initiatives will reduce emissions by nearly 1,000 tCo2e¹².



Figure 12: Workplace charging installed at Willmott Dixon's Hitchin office¹²

Installation Specifications

A typical office installation to date has been two dual-socket 7 kW chargepoints (4 outlets) to support early adopters, however they have worked with suppliers to include future proofing measures to increase the number of chargepoints in line with demand. As staff dwell time at office locations is a standard working day (8 hours), they do not see a use case for rapid charging infrastructure.

The guidance given for construction sites (although not all construction sites have on-site parking) is for one socket outlet for every four or five vehicles. Some of these installations are temporary for the construction phase only, whilst for others Willmott Dixon liaise with the client to understand their EV charging requirements and then transfer ownership of the permanent charging infrastructure as part of the site handover. In either case, installation is dependent on a suitable power supply, which may not be provided until part way through the construction phase

Use case

- Construction sites – fleet vehicles
- Office locations – staff, visitors and fleet vehicles.

All charging is paid for on a p/kWh basis with access using the VendElectric app. Fleet vehicle drivers then claim back costs within their expenses. Office locations can also choose whether they also want to make their chargepoints publicly accessible to earn revenue from the general public

¹² [Willmott Dixon to provide electric vehicle charging points at over 100 sites | Willmott Dixon](#)

(although cross referencing between ZapMap and [Willmott Dixon's](#) locations map¹³ suggests that if any offices have implemented this then they are not yet publicising this).

Funding and Ownership Model

The Workplace Charging Scheme (WCS) has funded [Willmott Dixon's](#) installations. Two ownership models are available to locations for hardware. In either case the company pays the operational costs for software and maintenance.

1. [Willmott Dixon's](#) electrical partner purchase the hardware from supplier Rolec and then lease the equipment to [Willmott Dixon](#).
2. [Willmott Dixon](#) purchase the hardware directly from Rolec and assume ownership of the infrastructure.

3.4.2 Case Study 2: Tier 1 UK Local Authority (Interviewed)

EV100 Member?	Business Size (Number of UK Employees)	Number of UK Locations
No	Large (~2000)	"A main headquarters, a few other corporate locations and school sites".

Table 7: Tier 1 Local Authority Information

Plans and Progress Overview

The Tier 1 UK Local Authority interviewed has already installed some workplace EV charging installed but has plans for a significant expansion to support employees transitioning to EV alongside an EV salary sacrifice scheme. The deployment is being timed alongside a transition to a more hybrid working (mixture of office and home-based working) following the coronavirus pandemic.

Installation Specifications

Currently the council has one rapid DC chargepoint and four dual-socket 7 kW chargepoints at their main site. The rapid chargepoint and two of the 7 kW chargepoints are located in a car park which is accessible by staff and visitors whereas the remaining two 7 kW chargepoints are in a separate car park and designated for fleet use only.

The rapid chargepoint is to be removed to free up electrical capacity for the next deployment of 7 kW chargepoints. The council intends to install as many 7 kW chargepoints as possible, to match the typical staff and visitor dwell time of a few hours or more, with the spare capacity at the main site. As there are significant other building loads, dynamic load management will be key.

There are two other corporate sites for which the council has plans to install charging infrastructure. For the first, a trial is being planned to investigate different payment structures and access mechanisms. At the second, a site for which there is a long-term lease, the council is exploring installing infrastructure with the landlord. The scale will again depend on available power.

Use Case

- Separate charging infrastructure for staff and visitors, and for fleet use.
- The main site has barrier access with ANPR to prevent members of the public using the car park, as parking availability is limited. The council does not believe there would be a need to make the charging infrastructure fully publicly accessible as residents in the immediate area have access to off-street parking.

The charging infrastructure is commercially operated by BP Pulse and therefore charging is payable. The future deployments will also be payable, with the commercial operator to be appointed following a public procurement exercise.

Funding and Ownership Model

¹³ [Contact us | Willmott Dixon](#)

A review of the UK's workplace EV charging sector

The council will explore funding opportunities available for the new charging deployments. As a public authority the council would be eligible for WCS funding.

Three ownership models for the new charging infrastructure are being explored:

- i. Fixed rent lease – the council may choose to negotiate a fixed land rent in return for a fully funded solution from a commercial charging provider. No share of the charging revenue is expected.
- ii. Provision by energy supplier – the council is exploring including EV charging provision as part of the contract with their energy supplier.
- iii. Provision by salary sacrifice provider – the council may seek to include EV charging, both home charging for staff and workplace charging at corporate sites, within the scope of their salary sacrifice scheme.

3.4.3 Case Study 3: Landsec (Interviewed)

Landsec is a property business. Many of their sites are leased by businesses, such as retail organisations, whose car parks have a mixed use case and are therefore not uniquely workplace car parks. However, their approach as a landlord towards an EV100 commitment to “install charging at sites for customers and staff” is of interest and is therefore included within this study.

EV100 Member?	Business Size (Number of UK Employees)	Number of UK Locations
Yes	Medium (500 direct employees)	50

Table 8: Landsec Company Information

Plans and Progress Overview

Landsec have installed approximately 200 chargepoints across their sites, with aims to install a similar number in 2022.

Installation Specifications

The chargepoint specification and scale, with anything between zero and ten chargepoints, varies by site.

Use Case

- Staff of tenants' organisations and customers or users of their facilities. 95%+ of the sites are publicly accessible.

As mentioned, although charging infrastructure deployed at Landsec's sites will not solely be used as workplace charging, this case study highlights that businesses can consider making workplace charging infrastructure accessible to the general public; and likewise the needs of workplace use cases can be considered when deploying public charging infrastructure.

Most of Landsec's charging infrastructure is free to use currently, although this is being reviewed, and either “plug and play” or accessed using a mobile phone app.

Funding and Ownership Model

For all deployments to date, which are not eligible for any of the OZEV grant funds, Landsec have self-funded and taken ownership of the infrastructure. However, the company is looking at working with a commercial supplier as part of a lease or concession agreement. One motivation for this change is that a key barrier the company has experienced is power availability, and with a lease arrangement Landsec would want the chargepoint operator to also own the grid connection.

3.4.4 Case Study 4: EA Technology (Interviewed)

EA Technology is a UK-based provider of power engineering solutions.

EV100 Member?	Business Size (Number of UK Employees)	Number of UK Locations
No	Medium (201-500 employees)	1

Table 9: EA Technology Company Information

Plans and Progress Overview

The company already had a temporary installation of EV charging at their office in Cheshire as part of a previous research project. To keep pace with the EV transition and in line with company values, in September 2021 EA Technology completed a second installation of chargepoints, which the company has shared in a public case study¹⁴.

The EV charging expansion is part of a wider programme of projects to decarbonise the company's operations, including heat pumps, solar PV, and battery storage.

Installation Specifications

To understand the demand for workplace charging, the business conducted an internal survey, to which half of the workforce responded. This asked questions to understand employee attitudes towards electric vehicles and plans for adoption.

The six original 7 kW chargepoints, deployed on a temporary basis as part of a research project and soon to be decommissioned, have been supplemented with a further ten post-mounted 22 kW sockets (five dual outlet Alfen chargepoints) in response to the results of the survey. Originally more chargepoints were planned, but this was scaled back due to a greater proportion of home working since the start of the COVID-19 pandemic.

EA Technology opted for 22 kW hardware for the following reasons:

- Increasing battery sizes of new electric vehicles
- Lengthy commutes of some staff
- Swapping vehicles midway through the day allows each charging socket to deliver more charging than a 7 kW outlet that has one vehicle connected for the entire working day.

Due to EA Technology's background in electricity industry research and development, the site's existing network connection was sufficient for the sizeable expansion in charging infrastructure, although the system includes dynamic load management functionality. The civil works and cabling laid as part of this scheme will allow for additional chargepoints to be added in the future in line with demand.

¹⁴ https://www.linkedin.com/posts/ea-technology_ev-charge-case-study-activity-6877188377175724032-h3F6



Figure 13: EA Technology Workplace Charging Installation ¹⁴

Use Case

- Staff and visitors.

Charging is currently available free of charge. EA Technology stated that sharing the chargers for use with the general public would align with company values, but this is not possible due to the security arrangements on the industrial park. The Hubsta back-office system from Elmtronics gives control over access and payment.

Funding and Ownership Model

The deployment has benefited from matched funding from Cheshire and Warrington Local Enterprise Partnership (LEP)¹⁵ for approximately 50% of the capital costs. Feedback from EA Technology is that the company would not have been able to install infrastructure on this scale without the funding support. The WCS fund was not used due to the ineligible visitor use case and because the project had already received public funding via Cheshire and Warrington LEP.

EA Technology owns the deployment and are responsible for ongoing operational costs.

3.4.5 Case Study 5: Aviva Perth Office (Internet Research)

Aviva is a large UK-based savings, retirement and insurance business. Its EV100 commitment is to “Transition its fleet of over 1,000 vehicles to EV by 2025 and install charging at core locations”.

EV100 Member?	Business Size (Number of UK Employees)	Number of UK Locations
Yes	Large (Total – Unknown; 1000 at Perth office)	Unknown

Table 10: Aviva Company Information

Plans and Progress Overview

This case study focusses on the publicised¹⁶ and significant solar carport and energy storage facilities installed at Aviva’s Perth office.

Progress and plans towards the wider EV100 commitment to install charging infrastructure at other offices are unknown.

¹⁵ [Cheshire & Warrington Local Enterprise Partnership - Cheshire and Warrington](#)

¹⁶ [Aviva opens one of the UK’s largest solar and energy storage initiatives - Aviva plc](#)

Installation Specifications

The Perth installation is comprised of a solar carport covering 342 parking spaces and integrates 50 EV chargepoints and a 1.8 MWh Tesla Powerpack battery energy storage system (BESS). The 3,283 solar PV panels generate 812,000 kWh annually. The power generated is first self-consumed by the EV charging or other site loads, secondly stored within the BESS if generation exceeds demand and finally exported to the grid if there is excess generation and the battery is fully charged.

The project was completed with environmental and social sustainability in mind; embedded carbon was minimised by using only UK manufacturing, 100% recycled steel, 60% of the project construction and maintenance completed by Scottish workers and an estimated 400 tonnes of carbon emissions saved each year.

Use Case

- Staff and visitors only.
- Although there are no physical access restrictions and the site is adjacent to the M90 motorway, it is believed that the chargepoints are fast chargepoints (7-22 kW) and would therefore not be suitable for the on-route public charging use case. Likewise, there is no nearby residential areas that could conveniently make use of the charging infrastructure out of hours.

It is not known whether staff and visitors pay to use the EV charging facilities and if and how access is controlled.

Funding and Ownership Model

The project made use of the WCS funding for this deployment, however it is believed that the remaining majority of costs Aviva has funded, having internally justified the long-term investment in the significant infrastructure.

3.4.6 Case Study Summary

The case studies presented demonstrate that scale workplace charging deployments are achievable when forward thinking businesses allocate budget and organise internal decision-making processes to enable significant infrastructure projects to go ahead.

However, it is notable that none of these projects reported issues to do with land ownership – indeed the Landsec case study is an example of a proactive landowner supplying charging to be used by its tenants. Additionally, with the exception of Landsec and EA Technology (who received matched funding from their LEP), these businesses are larger companies able to make significant up-front capital investments for long-term benefit.

Smaller and medium sized enterprises are much less likely to be able to devote budget or resources for these projects and are therefore more likely to benefit from support. Potential solutions to these barriers are discussed in section 6.

3.5 Public Workplace Charging

A business may wish to share workplace charging deployments with the general public in order to generate additional revenue or simply for societal benefit. In this section the methods available to do this are presented. Of course, the business would also need to ensure that there are no physical access restrictions or parking limitations that prevent public users from accessing the chargepoints.

The typical method by which a workplace can make its charging infrastructure open to the general public is to contract a commercial chargepoint operator. However, depending on the contractual terms and ownership model agreed, the business may relinquish some or all control of how the chargepoints are operated to the CPO.

There are new systems available to make workplace charging more publicly accessible:

A review of the UK's workplace EV charging sector

- Community charging systems – Companies such as Co-Charger¹⁷ and JustPark¹⁸ offer systems by which chargepoint “hosts” can rent out chargepoints to the general public. The host sets the payment and usage conditions, including available hours, and the system facilitates the transaction. This could allow workplaces to reserve chargepoints for staff and visitor use during business hours but open up availability to nearby residents who do not have access to off-street parking in the evening and overnight. These systems were first designed for domestic charging but are now being applied to workplace charging scenarios.
- Dedicated workplace charging networks – ZapMap has set up ZapWork¹⁹ to specifically advertise workplace chargepoints to the general public. Whilst this system does not facilitate bookings or payments, it does increase the visibility of workplace charging to other use cases.

¹⁷ [Co Charger - Neighbourhood EV charger sharing made easy \(co-charger.com\)](https://www.co-charger.com)

¹⁸ [Rent out your electric vehicle charger | JustPark](https://www.justpark.com)

¹⁹ [Zap-Work network - Zap-Map](https://www.zapmap.com)

4 Costs

4.1 WCS Data Cost Analysis

4.1.1 Summary

In this section the installation costs reported as part of the WCS grant claim are analysed. These represent the total capital costs of installing charging infrastructure (including hardware, civils, electricals, DNO connections/upgrades and labour) before the deduction of the grant fund.

The 21,417 sockets deployed using the WCS scheme (dataset 1) were installed at a total cost of £47,752,109.

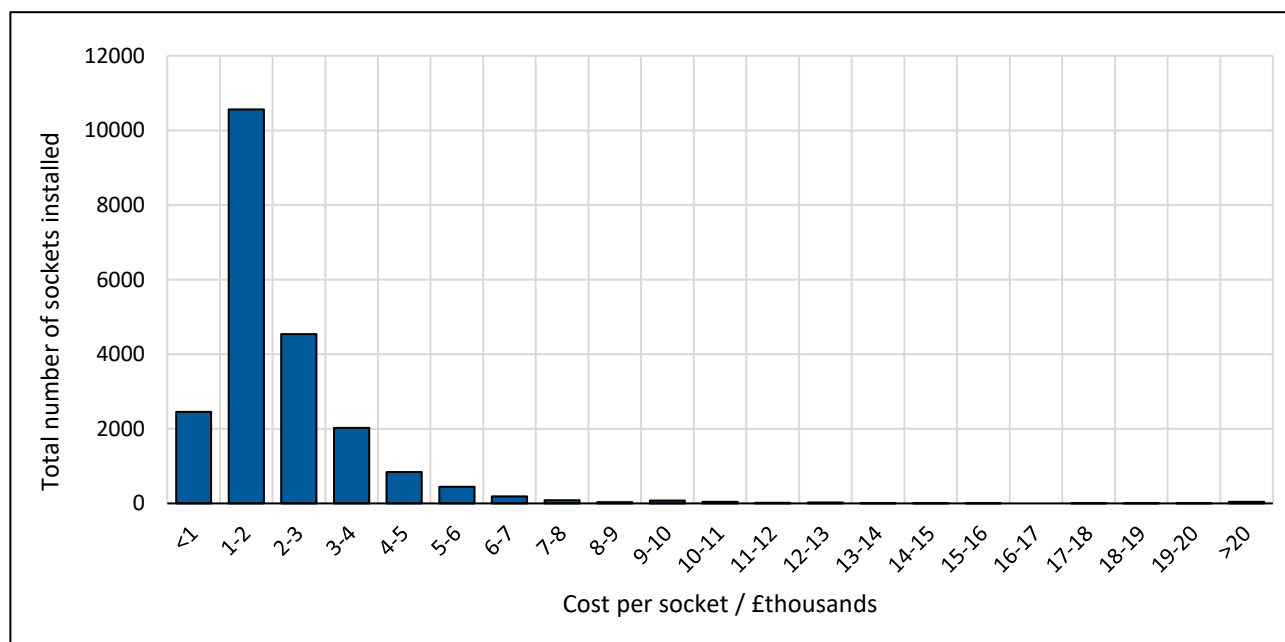


Figure 14: Total costs per socket

The mean cost is £2,232 per socket²⁰, however this value is skewed by a significant number of outliers in the data (147 sockets) where the cost per socket is greater than £10,000, likely due to either DNO connection or upgrade costs, extensive civil works requirements, or errors in the data.

Therefore, the median cost of £1,533 per socket is more indicative of a typical workplace charging install.

4.1.2 Costs per number of sockets

The total installation costs are reported per voucher which can include more than one location and it is not possible to distinguish the breakdown of costs per location. Therefore, to observe any economies of scale for deploying greater numbers of sockets at a single location, the vouchers that include one location only have been analysed in Figure 15.

²⁰ Removing the 13 vouchers from the dataset for which an installation cost was not reported in the OZEV data.

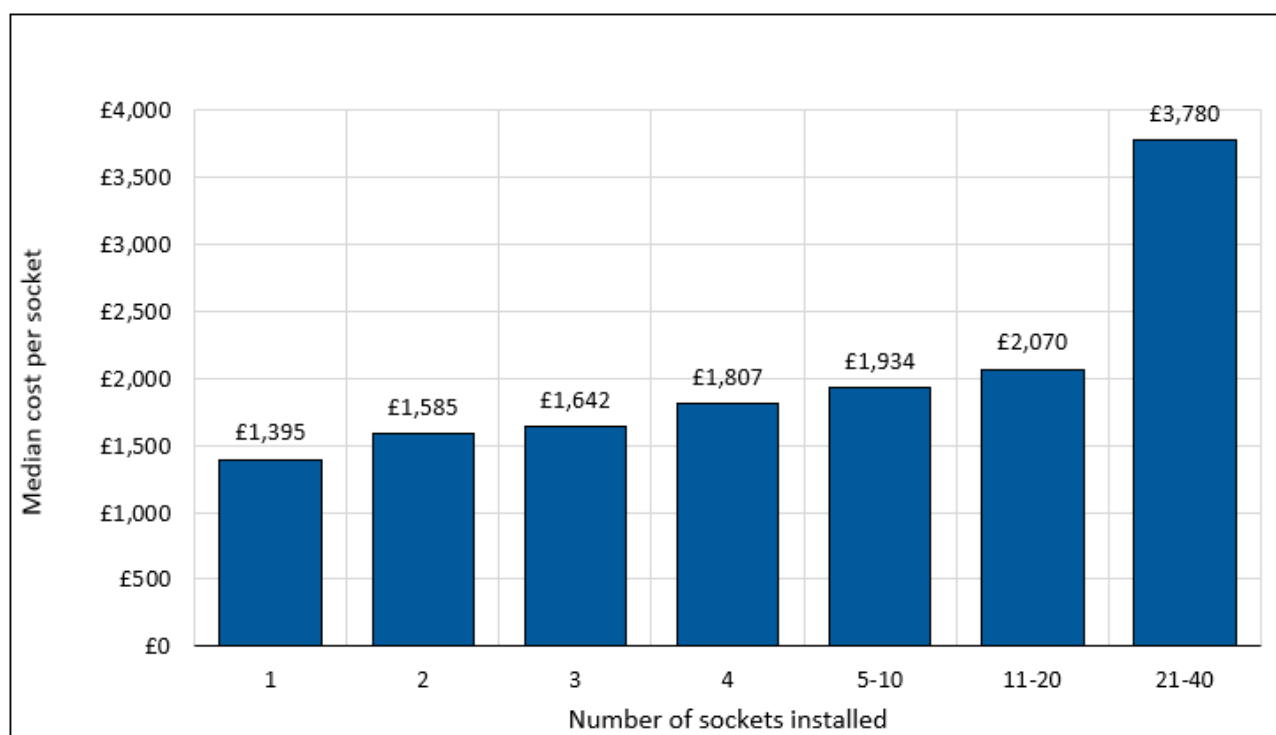


Figure 15: Average cost per socket by number of sockets per location

This shows the opposite impact to what you might expect with economies of scale. The data shows that as a workplace charging deployment increases in scale, the average cost per socket increases. This may be due to discrete increases in some costs – such as for electrical cabling, new distribution equipment, or civil works – with scale of the deployment or due to customers for larger deployments being more likely to specify additions to the design such as impact protection or parking bay marking at extra cost.

This effect is even more pronounced, albeit based on a smaller sample size (just 42 locations, representing 0.5% of all deployments), for installations with more than 20 sockets installed. It is likely that some of these installations required costly DNO connections or upgrades, or significant civil works, which inflated the total cost.

4.1.3 Costs history

Figure 16 shows that the median cost per socket for WCS installations has increased (by 10%) from 2017 to 2021. The numbers have been adjusted for inflation using the annual CPI rates from the ONS²¹.

²¹ [Consumer price inflation tables - Office for National Statistics](#)

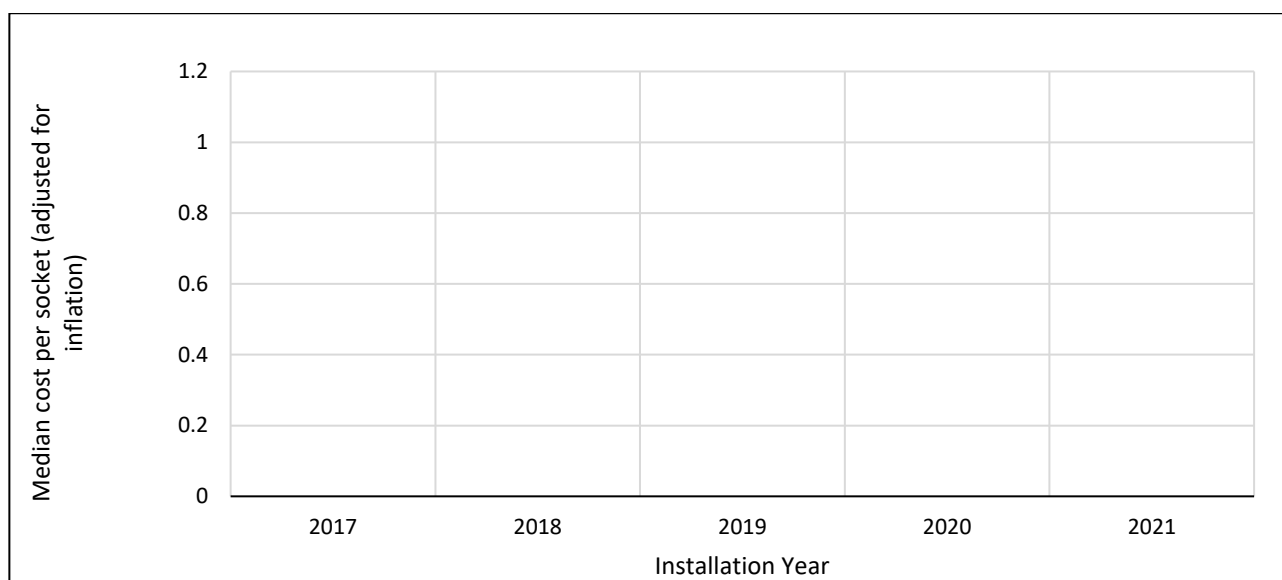


Figure 16: WCS Cost per socket history

This is the opposite effect to what might be expected for a maturing industry. Four explanations are presented for this trend. The timing of the 2nd and 3rd may explain the greatest year on year step change from 2018 to 2019.

1. Customers are becoming more receptive to the concept of future proofing, as evidenced by conversations with suppliers, and are willing to accept a greater capital expense to facilitate the addition of more charging infrastructure with demand in the future.
2. In January 2019 the installation requirements for EV chargepoint earthing and residual current device (RCD) protection were made more explicit within BS 7671 “The IET Wiring Regulations”. This may have added to the hardware and/or installation costs since this date.
3. From 1st July 2019, in line with the Automated and Electric Vehicles Act 2018, for a chargepoint to be eligible for the EVHS grant fund it was made mandatory, via OZEV’s minimum technical specification, for chargepoints to be “smart”. Although the same requirement was not applied within the minimum technical specification for WCS chargepoints, as many charging devices are used for both markets, this may have resulted in an increase in workplace chargepoint hardware costs which have been passed onto the end customer.
4. The COVID-19 pandemic increased the cost of many commodities including electrical equipment and materials required for civil works. This will likely have contributed to the increase in cost per socket from 2019 to 2020.

The effects of changes #2 and #3 in particular are evidenced by the data; there was a 13.7% increase (£189) from 2018 to 2019 coinciding with the updated to BS 7671 (#2) and a further increase of 7.4% (£116) in 2020 after the introduction of the smart metering requirement (#3) midway through 2019. The decrease in per socket cost from 2017 to 2018 and subsequently from 2020 to 2021 however are more typical of an expected reduction in costs for a maturing industry.

4.1.4 Comparison with the EVHS scheme

The latest data that Cenex has for the cost of domestic chargepoint installations funded by OZEV’s Electric Vehicle Homecharge Scheme (EVHS) is for the period September 2018 to April 2019. The mean cost of a single socket installation from this data was £952 before the deduction of the grant. It is expected that the equivalent cost at the end of 2021 would be less. Comparing this with the WCS costs data, the cost for a workplace charging socket is more than double the cost of a socket installed for domestic use on private off-street parking.

A review of the UK's workplace EV charging sector

This is to be expected – domestic installations rarely incur the additional costs of civil works, new or upgraded DNO connections, significant additional electrical equipment, or supplementary infrastructure such as bay marking, impact protection and signage.

4.2 Costs From Suppliers and Customers

Four of the interviewed suppliers provided indicative costs for some or all of four typical example workplace charging installations. The data has been anonymised to protect commercially sensitive information. EA Technology also provided costs for their case study (for full details see 3.4.4).

	Supplier 1	Supplier 2	Supplier 3	Supplier 4	EA Technology
Description	22 kW AC dual socket outlet	Indicative total cost for 4 x dual outlet 7 kW chargepoints, installed.	7 or 22 kW AC wall-mounted chargepoint. No cost premium for 22 kW over 7 kW. Additional costs provided for outdoor post-mounted chargepoint.	Costs for hardware only, dual outlet 2 x costs of single outlet.	Cost for five dual-outlet 22 kW AC chargepoints (10 sockets) Additional £1,000 cost for “smarter system” – presumed to be load management functionality.
Hardware	£2,500	Not specified	£950 +£250 for post mount	£750 - £1,000 (single outlet) £1,500 - £2,000 (dual outlet)	£12,500 + £1,000 (£1,350 per outlet)
Civils	£275	Not specified	+£350 for concrete mount +£700 for civils for 10 m cable run and reinstatement	Not specified	£43,500
Electricals	£900	Not specified	£600 – £1,100	Not specified	N/A
Labour	Not specified	Not specified		Not specified	£500
Total	£3,675	£12,000	£1,550 - £4,300	N/A	£58,000
Cost per socket	£1,837.50	£1,500	£1,550 - £2,150	N/A	£5,800

Table 11: Supplier and Customer Cost Examples

From Cenex's experience formed from a number of previous EV charging projects, the breakdown of costs for chargepoint installations are as follows:

CapEx/OpEx	Cost Category	Cost – indicative only.
Capital costs	Hardware	£800 - £2,000 for a single outlet chargepoint. No major cost premium for 22 kW over 7 kW. Dual outlets approximately double the cost of single outlet.
	Installation (Labour and	£500 - £3,000 per device. Costs increase with scale of civil works and

A review of the UK's workplace EV charging sector

	materials)	distance of cable runs from distribution equipment.
	DNO costs	<ul style="list-style-type: none"> £1,000 - £3,000 for a “small” 70 kVA connection Up to £75,000 for a “medium” connection up to 200 kVA.
Operating costs	Back office	£250 - £500 per device per year
	Maintenance	£250 per device per year

Table 12: Estimated Costs from Cenex Experience

The total typical capital costs of AC charging infrastructure are £1,500 to £3,000 per socket outlet, which is in line with the OZEV WCS data and supplier examples. This excludes any DNO upgrade costs which could add up to £1,000 per socket for smaller deployments or significantly more for larger scale projects. The scale of civil works required can significantly increase costs, as is shown by the EA Technology case study where the 75% of the total project cost was incurred by civil works.

In addition to this are ongoing operational costs, including back-office operation and maintenance, which are likely to cost between £500 - £750 per device per year. Assuming a 10-year lifetime for the charging infrastructure and a four-year linear amortisation for capital costs gives the overall costs per chargepoint as shown by Figure 17.

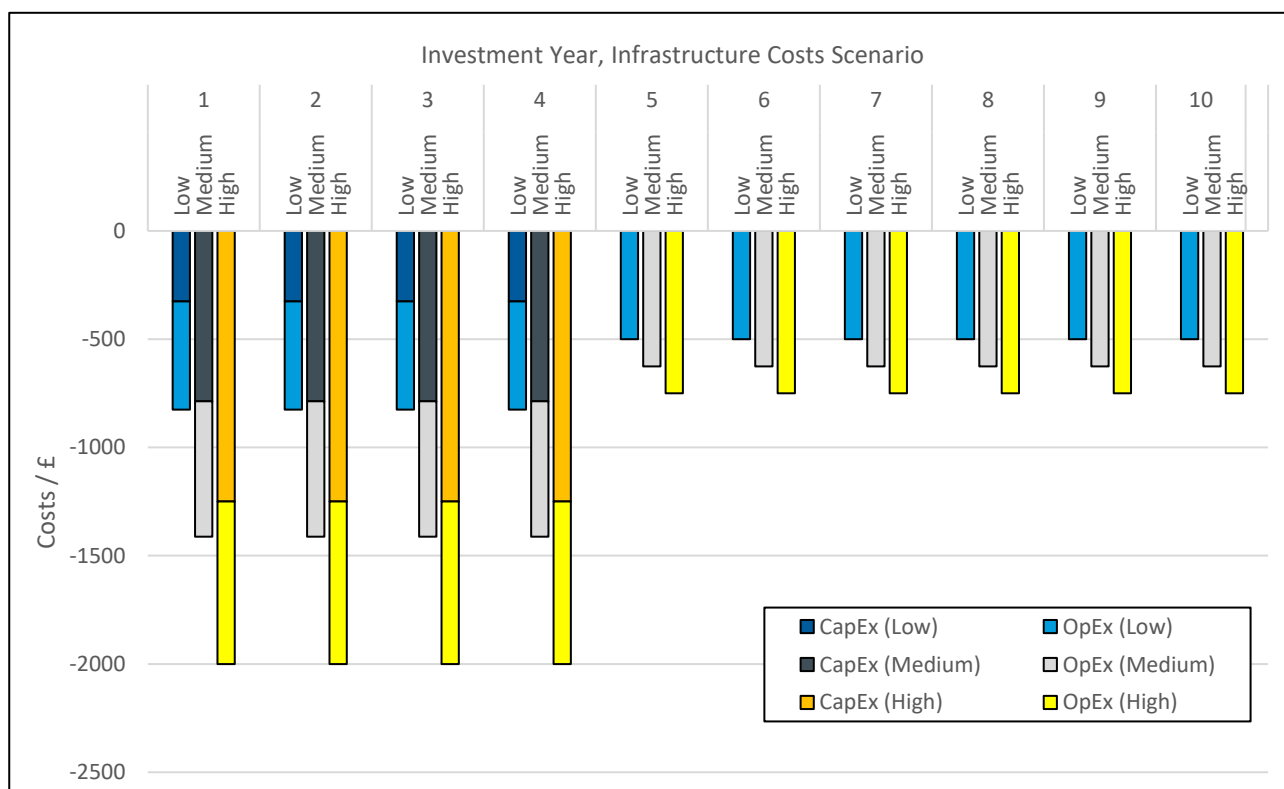


Figure 17: Infrastructure Costs

The total cost of ownership (TCO) ranges from £6,300 to £12,000 per socket outlet for the high scenario. This does not account for DNO costs due to the discrete nature of how these can increase with the scale of the deployment and local network proximity and capacity.

4.3 Investment Scenarios

The total cost of ownership to a business providing workplace charging is not limited to the costs of deploying chargepoints, however. In this section a comparison will be made between the TCO for

different use cases: installing charging infrastructure to support its own on-site electric fleet; and providing charging for staff and visitors.

4.3.1 Cost-Benefit Comparison

Before analysing quantitatively, it is important to observe how costs and benefits are apportioned to different stakeholders for these two use-cases.

As for both use cases the capital and operational costs are incurred by the business, the difference in overall TCO for the business is the difference between the potential vehicle TCO savings made from operating an electric fleet (relative to an equivalent internal combustion engine vehicle) and revenue earned from billing staff and visitors for their charging. This comparison is shown by Table 13.

Use case	Infrastructure costs (CapEx and OpEx)	Vehicle costs, including potential reduced TCO from lower operational costs	Charging revenue
Fleet vehicles	The business	The business	None
Staff and visitors	The business	Staff and visitors	The business

Table 13: Cost-Benefit Comparison

The business case for each of these use cases will be investigated in the following sub-sections. A full list of the assumptions used is given in Appendix D – Workplace Charging TCO Assumptions.

4.3.2 Fleet Charging Infrastructure TCO

Variables:

- Vehicles: Medium Car (e.g. Ford Focus); Medium Van (e.g. Transit Custom); Large Van (e.g. Mercedes Sprinter);
- Annual mileage: 5,000 (low); 15,000 (medium); 25,000 (high);
- Energy cost (per kWh): £0.10, £0.15; £0.20; £0.25.

Figure 18 shows the TCO saving of replacing a diesel fleet vehicle with the equivalent EV on a seven-year ownership period. The results demonstrate that for medium cars and vans, the lower operating costs savings expected – a combination of fuel, maintenance and taxation - are sufficient to cover the cost of the charging infrastructure. For these vehicles, the TCO inclusive of the charging infrastructure costs is lower than their diesel equivalents for all mileages and electricity cost scenarios. Savings are made from year 1 (assuming capital costs amortised linearly over four years) and total savings range from approximately £5,000 up to £37,000 for the seven-year period. Note that although small vans are not modelled, however the TCO will be superior to medium cars given similar capital and operational costs and greater applicable funding (£5,000 for small van compared to £1,500 for medium car).

The business case for large vans is more challenging, particularly for low mileages. This is due to the significantly higher purchase cost of these lower-maturity vehicles; the upfront cost of a BEV large van is 184% of the equivalent diesel vehicle after grant funding is applied. For medium vans and medium cars, the premium is just 119% and 130% respectively. Despite this, for medium mileages the TCO for EV is only marginally less attractive than for diesel, and for high mileages savings can still be expected for the lower electricity cost scenarios.

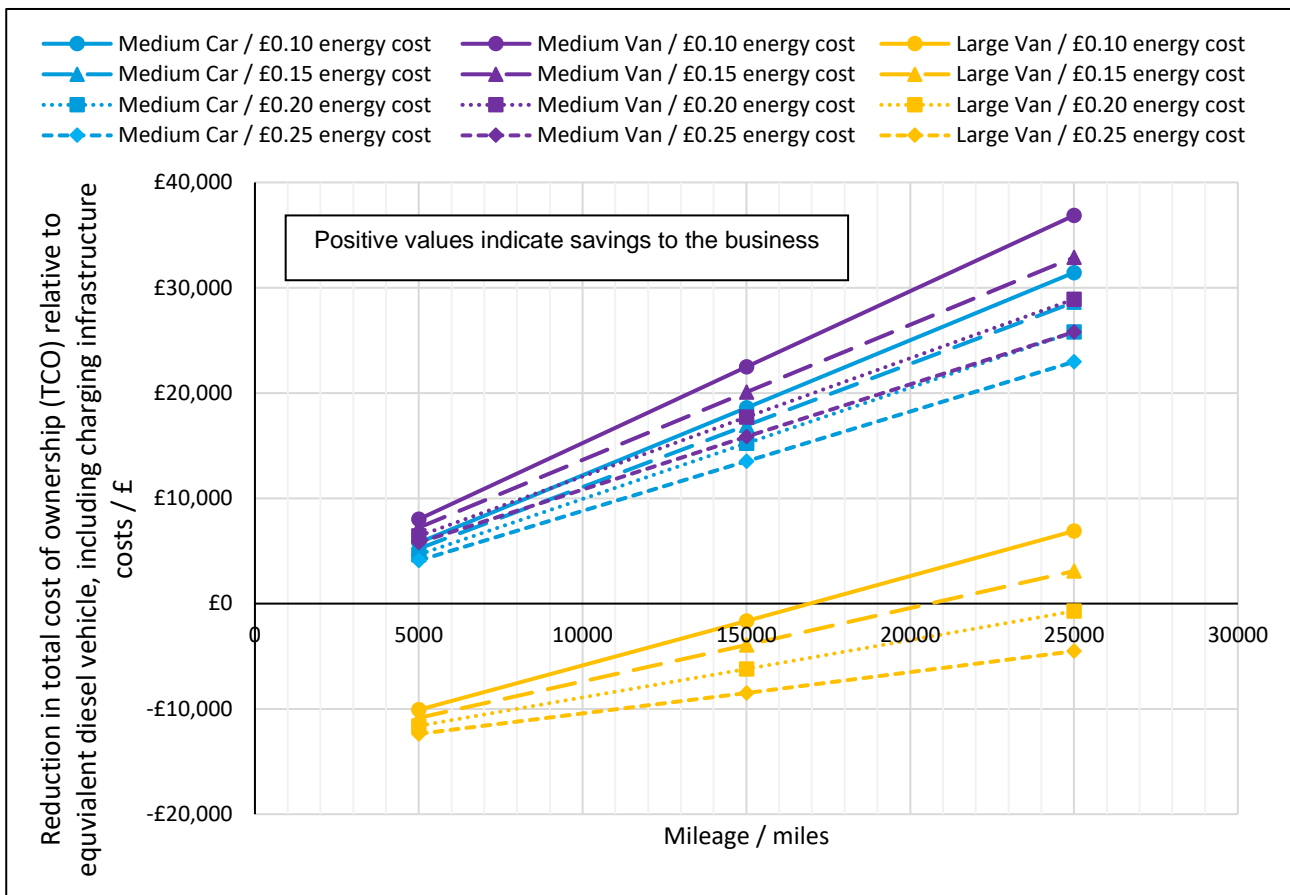


Figure 18: Fleet Charging Infrastructure Business Case per Chargepoint, Vehicle

4.3.3 Staff and Visitors Charging Infrastructure Business Case

Variables:

- Lifetime average utilisation over accessible hours (08:00 – 18:00, five days a week): 33%, 50%; 75%
- Energy cost (per kWh): £0.10; £0.15; £0.20, £0.25.
- Charging tariff (per kWh): £0.20; £0.25; £0.30, £0.35

Figure 19 shows the expected business cases for the staff and visitor workplace charging use case scenarios. This shows that the business case relies on a high utilisation, high charging tariff or low energy costs (to the business) for the charging system to pay for itself over a 10-year lifetime.

The utilisation scenarios assume the chargepoint delivers an average of 7 kW for an available period of 10 hours from 08:00 – 18:00, five days a week. In reality, good user behaviour to only charge when a significant charge is needed and to unplug when charging is finished, or an overstay enforcement system (which may come additional cost to the business) would be required to achieve 75% utilisation.

Additionally, £0.10/kWh energy costs, even for businesses, are unlikely to remain relevant in today's market of increasing energy prices. Therefore, the scenarios with energy costs of £0.15/kWh or greater are more representative of future business cases for staff and visitor workplace charging.

In most scenarios, the charging infrastructure costs the business money over its lifetime.

A review of the UK's workplace EV charging sector

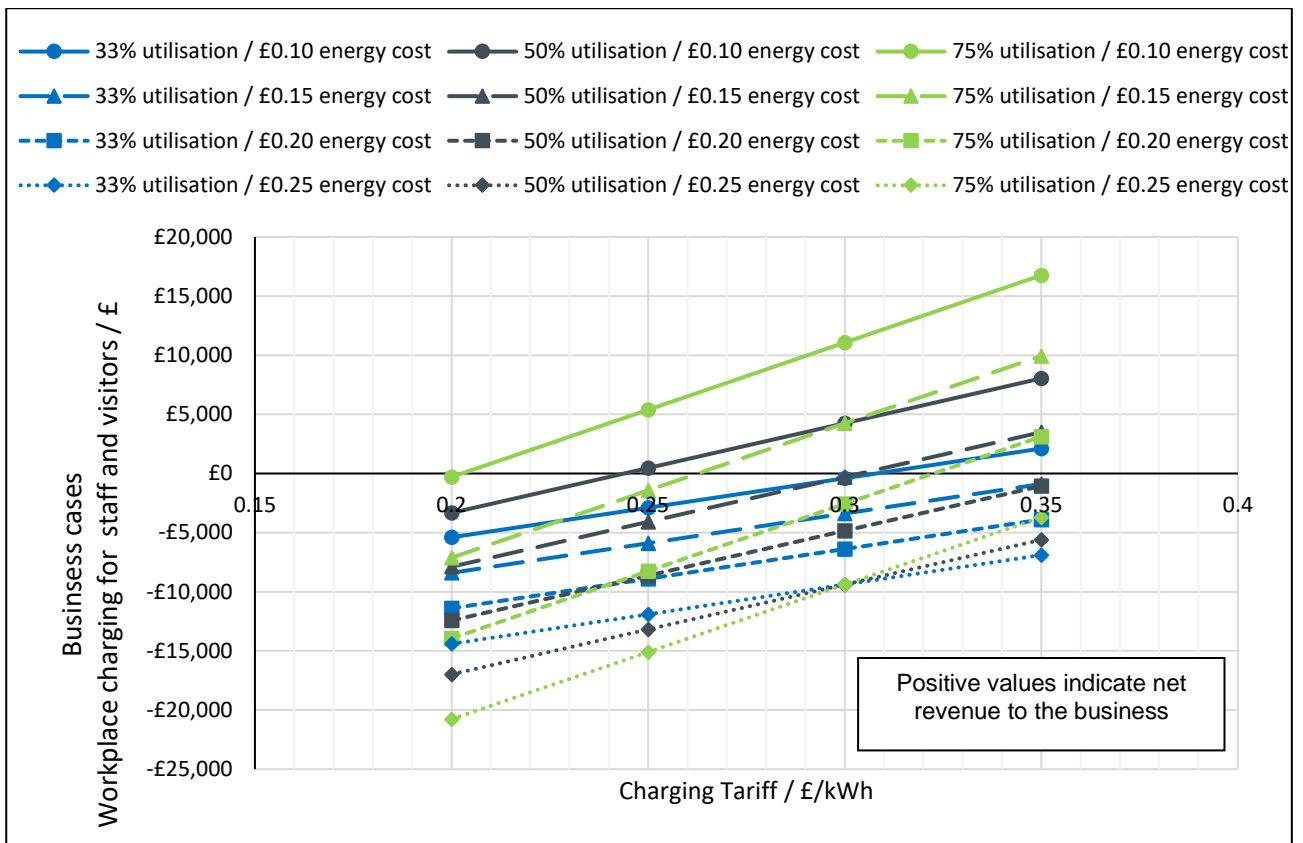


Figure 19: Business cases for staff and visitor charging use case

4.3.4 Discussion

This analysis has shown that for businesses with their own fleets – and especially those that do high mileage – deploying workplace charging to facilitate electrifying the fleet is an easy decision. Not only will it save the business money, but the air quality and carbon emissions (67-74% well-to-wheel CO_{2e} estimated) can also be claimed by the business. If these businesses' operations are suitable to combine the staff/visitor and fleet use cases making use of the same chargepoints – most likely restricting usage for fleets to charge overnight but making the infrastructure available to staff and visitors during the day – then the overall business case can be even more attractive.

However, for businesses without their own on-site fleets, deploying workplace charging is not expected to be justifiable economically unless utilisation and the difference between the cost of energy and the charging tariff is optimistically high.

5 Parking Policies

In this section, guidance and policy which recommend or mandate the provision of EV charging infrastructure in non-residential car parking facilities (including workplace parking) are presented.

5.1 Statutory National Parking Policies

5.2 The UK and its devolved administrations have been working to implement statutory policies for the minimum amount of active and passive chargepoint provision in non-residential car parks, which includes workplace car parks. A summary of known current positions is given in Table 14. For full details of the policies refer to Appendix D – Workplace Charging TCO Assumptions

5.2.1 Assumptions common to both use cases:

- Medium infrastructure costs scenario (mid-point values from Table 12, excluding any DNO costs)

5.2.2 Fleet use case assumptions:

- 7-year vehicle life replacement cycle;
- Costs:

	Medium Car		Medium Van		Large Van	
	Diesel	BEV	Diesel	BEV	Diesel	BEV
Purchase Cost (excluding grant)	£22,548	£30,750	£30,510	£41,344	£35,628	£70,680
Grant	£0	£1,500	£0	£5,000	£0	£5,000
Predicted residual value						
5,000 miles per year	£5,298	£9,703	£6,957	£6,801	£5,772	£13,677
15,000 miles per year	£4,209	£7,770	£5,328	£5,551	£4,590	£10,720
25,000 miles per year	£3,151	£5,874	£3,808	£4,298	£3,439	£7,886
Maintenance (annual)						
5,000 miles per year	£1,537	£929	£1,731	£1,220	£1,668	£1,591
15,000 miles per year	£4,610	£2,786	£5,193	£3,660	£5,003	£4,773
25,000 miles per year	£7,684	£4,644	£8,654	£6,099	£8,338	£7,955
Vehicle Excise Duty (annual)	£1,110	£0	£1,925	£0	£1,925	£0

Table 50: Fleet vehicle costs, diesel and BEV

- Vehicle efficiencies (accounting for charging losses): 3.1 miles/kWh (medium car); 2.3 miles/kWh (medium and large van). All based on data captured from Cenex research and consultancy projects, accounting for charging losses.
- Diesel fuel cost £1.13 per litre (ex-VAT, 12-month average price);
- Assumes one vehicle per chargepoint.

5.2.3 Staff/visitor fixed value assumptions:

- 10-year product lifetime;
- Charging infrastructure available 10 hours per day (e.g. 08:00-18:00), five days per week;

A review of the UK's workplace EV charging sector

- Average charging power delivered 7 kW (this is an assumed average value - accounts for mixed use with 22 kW chargepoint usage by newer EVs with three-phase 11 kW charging capability and lower power (~3 kW) charging of PHEVs)

Appendix E – Parking Policies Full Information.

	New/Major Renovations of Non-residential developments	Existing residential non-developments with more than 20 parking spaces	Source
EU EPBD 2018	Minimum of one active chargepoint, passive provision for one in five spaces. (10+ space car parks)	Member states to specify minimum provision by Jan 2025.	Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency
EU EPBD 2021 (Proposed)	Minimum of one active chargepoint (one in ten spaces for office buildings), passive provision for every remaining space. (5+ space car parks)	An active chargepoint for one in ten spaces by Jan 2027, passive provision for one in two spaces for buildings owned or occupied by public authorities by Jan 2033.	Proposal for a Directive of the European Parliament and of the Council on the energy performance of buildings (recast)
England ²²	Minimum of one active chargepoint, passive provision for one in five spaces. (10+ space car parks)	Originally proposed one active chargepoint by Jan 2025, however following consultation the policy for existing buildings was removed and an alternative policy is being developed.	DfT - Consultation Response: EV Charge points in Residential and Non-residential Buildings
Scotland (Proposed)	Minimum of one active chargepoint, passive provision for one in two spaces. (10+ space car parks)	Proposed minimum of one in ten spaces to have an active chargepoint, passive provision for one in two spaces by Jan 2025.	Building regulations - energy standards and associated topics - proposed changes: consultation

Table 14: Statutory guidance for EV Charging infrastructure provision at non-residential sites in the EU, England and Scotland

5.2.4 Impact Assessment

The following three scenarios have been developed to project how many chargepoints might be implemented in workplaces across the whole of the UK depending on paths followed by Government.

Scenario 1 – England's Confirmed Policy

This scenario considers what might be expected to happen if the whole of the UK adopted England's policy for new and major renovations of non-residential buildings but brought in no legislative requirement for existing buildings.

Scenario 2 – Scotland's Proposed Policies

²² In the absence of any formal position, it is expected that Wales and Northern Ireland will implement the same policies as England.

This scenario considers what might be expected to happen if the whole of the UK adopted the policies proposed by Scotland for both new and major renovations of non-residential buildings as well as for existing buildings.

Scenario 3 – EU Energy Performance of Buildings Directive (EPBD) 2021 Proposed Policies

This scenario considers what might be expected to happen if the whole of the UK adopted the policies proposed by the European Commission in December 2021 in the recast of the EPBD for both new and major renovations of non-residential buildings as well as for existing buildings.

The impact of these projections is plotted in Figure 20 for active provision and Figure 21 for passive provision, with the projected number of parking spaces with charging provided by 2035 shown. Included for comparison for the active provision scenarios is a “business as usual” projection with no policy intervention for non-residential parking. This is calculated by using the historic WCS data, which shows the number of grant-funded sockets stabilising at 3,000 per quarter which when extrapolated to account for non-funded sockets results in approximately 18,500 sockets per year. Of course, this exact rate would be affected by a number of variables but gives a good basis for comparison to the policy scenarios.

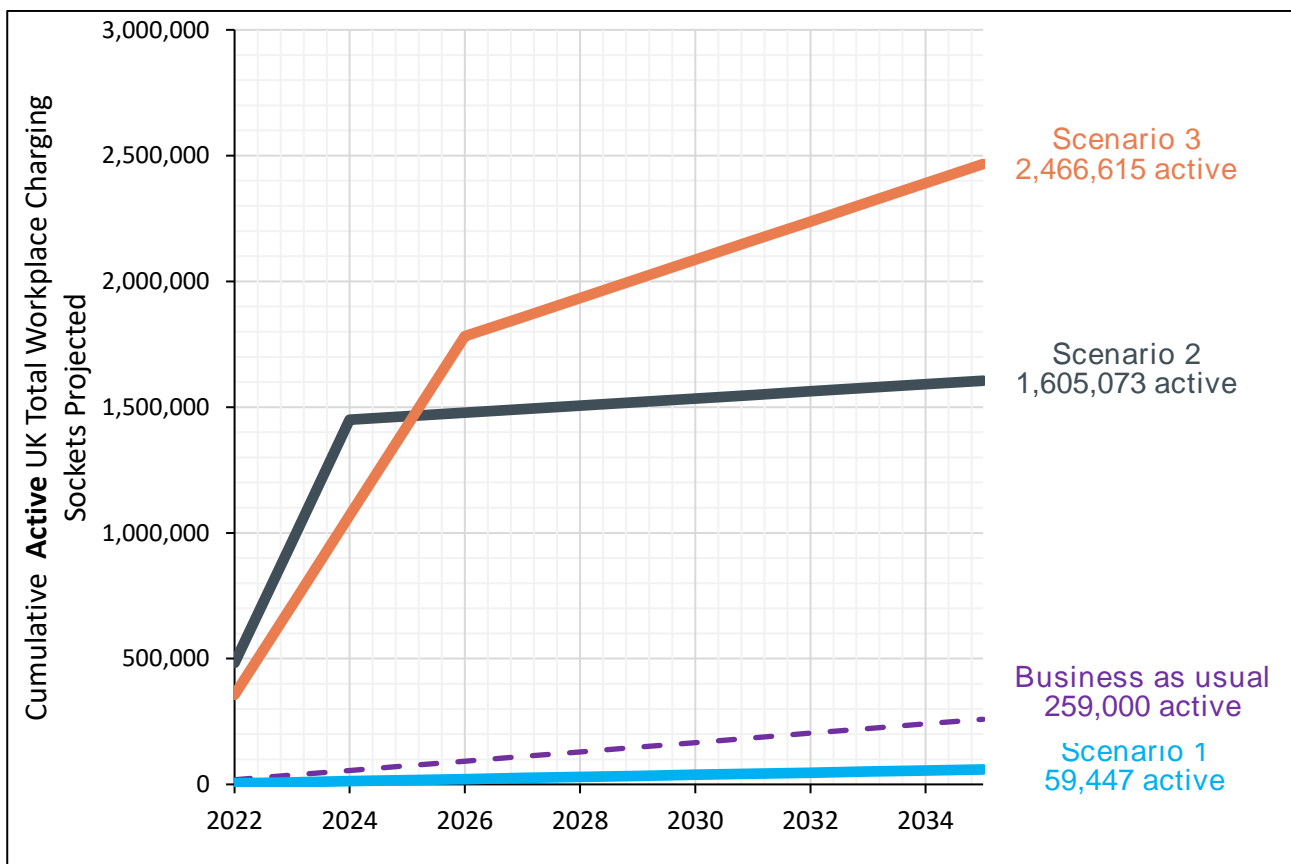


Figure 20: Active workplace charging provision projections by scenario

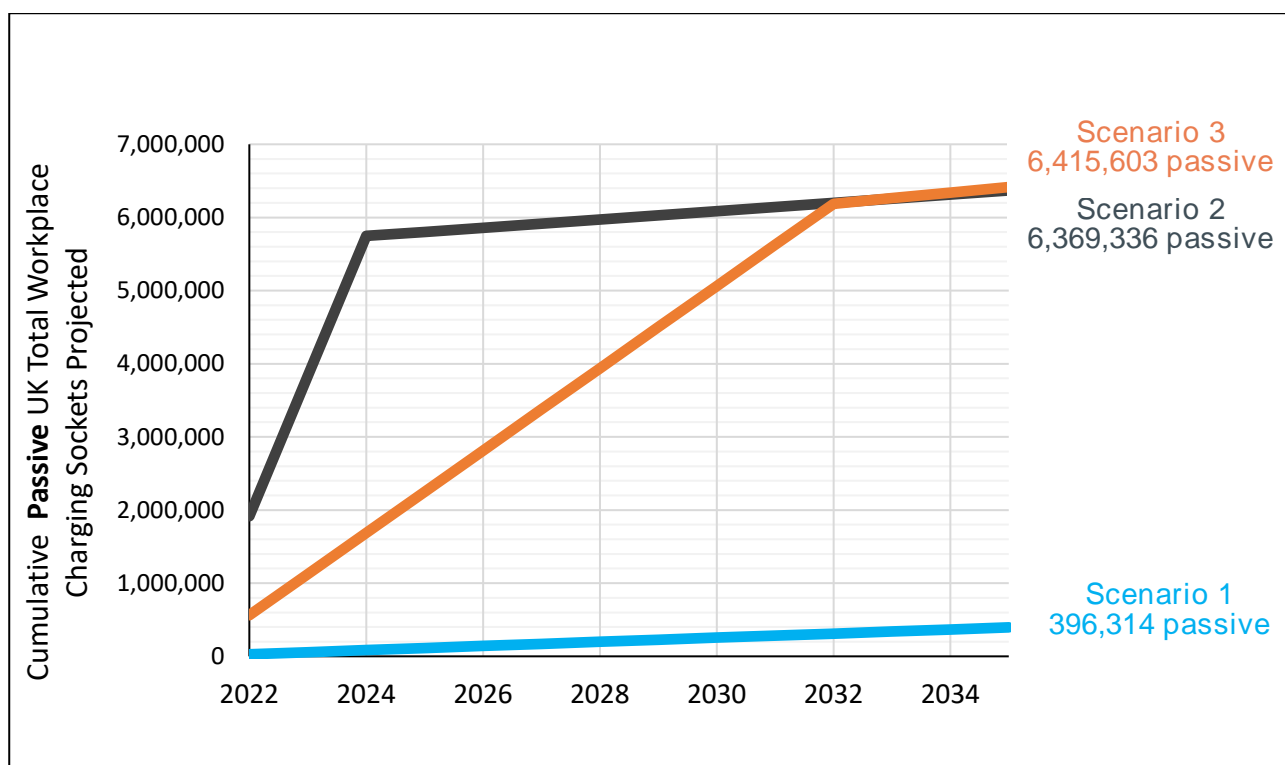


Figure 21: Passive workplace charging provision projections by scenario

5.2.5 Discussion

5.3 It is important to note that the numbers presented are approximations only due to the lack of workplace parking data available (refer to Appendix D – Workplace Charging TCO Assumptions)

5.3.1 Assumptions common to both use cases:

- Medium infrastructure costs scenario (mid-point values from Table 12, excluding any DNO costs)

5.3.2 Fleet use case assumptions:

- 7-year vehicle life replacement cycle;
- Costs:

	Medium Car		Medium Van		Large Van	
	Diesel	BEV	Diesel	BEV	Diesel	BEV
Purchase Cost (excluding grant)	£22,548	£30,750	£30,510	£41,344	£35,628	£70,680
Grant	£0	£1,500	£0	£5,000	£0	£5,000
Predicted residual value						
5,000 miles per year	£5,298	£9,703	£6,957	£6,801	£5,772	£13,677
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25,000 miles per year	£7,684	£4,644	£8,654	£6,099	£8,338	£7,955

A review of the UK's workplace EV charging sector

Vehicle Excise Duty (annual)	£1,110	£0	£1,925	£0	£1,925	£0
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Table 50: Fleet vehicle costs, diesel and BEV

- Vehicle efficiencies (accounting for charging losses): 3.1 miles/kWh (medium car); 2.3 miles/kWh (medium and large van). All based on data captured from Cenex research and consultancy projects, accounting for charging losses.
- Diesel fuel cost £1.13 per litre (ex-VAT, 12-month average price);
- Assumes one vehicle per chargepoint.

5.3.3 Staff/visitor fixed value assumptions:

- 10-year product lifetime;
- Charging infrastructure available 10 hours per day (e.g. 08:00-18:00), five days per week;
- Average charging power delivered 7 kW (this is an assumed average value - accounts for mixed use with 22 kW chargepoint usage by newer EVs with three-phase 11 kW charging capability and lower power (~3 kW) charging of PHEVs)

Appendix E – Parking Policies Full Information) and should therefore be used for indication only.

Figure 20 and Figure 21 highlight the enormous impact that England renegeing on the original policy position for existing non-residential car parks could have on workplace charging provision. Unless a new policy is created (as is currently under development) then the predicted impact is appreciably less than the numbers that are conservatively predicted from an unregulated market (23% of “business as usual” scenario).

The results from scenarios 2 and 3 show the impact of including existing buildings in the policy, with the numbers of parking bays provided with active and passive workplace charging both reaching into the millions. As discussed, this infrastructure could have a huge effect by accelerating the transition to EVs for those who commute to work and are unable to charge at home, as well as for fleet vehicles.

However, it is important to understand the cost of deploying infrastructure at this scale. Using the £1,500 to £3,000 per socket for applicable AC charging systems from 4.2, the total estimated costs for the active workplace charging sockets for each scenario is as follows. This is before additional costs for substantial civil works or DNO upgrades are even accounted for.

	Total number of active sockets deployed by 2035	Low capital cost scenario (£1,500 per socket)	High capital cost scenario (£3,000 per socket)
Scenario 1	59,447	£89m	£178m
Business as usual	259,000	£389m	£777m
Scenario 2	1,605,073	£2.41b	£4.82b
Scenario 3	2,466,615	£3.70b	£7.40b

Table 15: Parking policy scenario costs (active workplace charging provision)

5.4 Other Parking Policies

5.4.1 Non-Statutory Policies

England

Alongside regulation, individual councils have developed their own guidance documents, which in some cases may go further than the existing regulations. The non-statutory guidance document “The London Plan” for example, has acted as a framework for the 32 individual London Boroughs to shape their planning policies since its inception in 2004, with several updated versions released since.

[The London Plan 2016](#) gave specific planning guidance with regards to charging provision for any development or major refurbishment for employment use. It was stated that they must provide:

- Chargepoints at 20% of spaces (active provision)
- Cabling at 10% of spaces, for future installation of a chargepoint (passive provision).

However, [The London Plan 2021](#) has since updated the planning guidance for the Boroughs.

While Policy T6.1 attests that new residential developments require 20% of spaces to have active charging facilities and passive provision for the remainder of spaces, regulations for planning of non-residential developments are less prescriptive on the requirements for chargepoint provision.

New office and industrial developments are covered by Policy T6.2. This focuses on minimising parking requirements to encourage use of public transport and active travel for commuting in the first instance, with operational parking requirements considered on a case-by-case basis. Where operational parking is approved, the policy states that “it must provide infrastructure for electric or other Ultra-Low Emission vehicles, including active charging points for all taxi spaces”.

The same wording is used in Policy T6.4, regarding parking at new developments for Hotel and Leisure; whereas new retail sites (Policy T6.3) can be distinguished from these as this policy refers to higher power charging requirements, stating that “provision for rapid electric vehicle charging should be made.”

Scotland

Similarly to The London Plan in England, Scotland's capital has its equivalent non-statutory planning guidance document, the [Edinburgh Design Guidance](#) which was last updated in January 2020.

Its guidance on chargepoint infrastructure relevant to new developments of workplaces is as follows:

- Non-residential developments with ten or more parking spaces will require a chargepoint socket at one in every six parking spaces.

5.4.2 Workplace Parking Levies

A Workplace Parking Levy (WPL) imposes an annual charge on the parking of commuting vehicles at city centre workplaces. It tends to be determined on a per space basis and the cost can either be absorbed directly by the employer or passed onto employees.

The logic of WPLs is twofold. Firstly, it aims to encourage workers to shift their commuting behaviour to a mode which is both less polluting and contributes less to road congestion, such as public transport, active travel or car sharing. Secondly, any revenue generated can be ringfenced to directly contribute to improving a city's sustainable transport infrastructure.

[Nottingham City Council](#) has been a leader in this regard, introducing their WPL back in 2012. They currently charge £428 per space, raising upwards of £9M per year. This has supported expansion of the city's tram network and redevelopment of the main train station. With [20%](#) of previous car commuters now taking the tram, there is reduced congestion and the city's clean air goals have been met ahead of schedule. Other cities proposed to follow include London, Leicester, Oxford, Bristol and Glasgow.

A guidance document from [London's Mayor on developing a WPL](#) was released in 2020 to support TfL and individual boroughs in implementing these schemes. It suggests giving due consideration to potential discounts or exemptions to the levy. Among these, it makes specific reference to parking reserved for electric vehicles as a possible exemption category.

Although this lever has not been pulled in Nottingham's long-running scheme, it remains an incentive option which councils across the UK could offer to employers residing in their locality. In doing so, it may encourage workplaces to install EV charging infrastructure for their employees.

6 Barriers & Solutions

6.1 WCS Barriers

The limitations of the WCS scheme are identified in this section, with reference to suppliers who cited these barriers when asked for feedback on the scheme.

Generally, all suppliers were supportive of the scheme. Suppliers did not identify any limitations and/or offered endorsement for the current process and eligibility criteria.

The following tables contain potential WCS barriers, with evidence from interviewed suppliers. The barriers are scored from low to high based on the WCS data and evidence from supplier interviews.

WCS Barrier 1	WCS socket limit	Score:	Low
<p>Hypothesis: The limit on the total number of sockets that can be claimed by each business restricts the scale of WCS funded workplace installations.</p> <p>Discussion: The spike in the number of businesses claiming 20 sockets in Figure 7 suggests that this was previously a barrier until the claim limit was raised to 40 sockets in April 2020. Since then, only nine businesses have claimed for the maximum 40 sockets²³, suggesting that there is very little demand for a single business to claim for more. The counter argument to this is that organisations wishing to install more than 40 chargepoints across one or more locations may decide that the £14,000 grant funding they would receive is not worth the additional effort. These organisations may simply choose to avoid the grant fund altogether rather than to install 40 sockets with the grant fund and the remainder non-funded.</p> <p>Supplier feedback: The New Motion cited that very few of their installations (WCS funded or otherwise) have reached the 40-socket limit. However, Ground Control recommended an increase to the 40-socket limit.</p>			

Table 16: WCS Barrier 1

WCS Barrier 2	Funding amount	Score:	Low
<p>Hypothesis: Businesses decide that the £350 funding per socket outlet is not a sufficient incentive to install workplace charging and/or is not worth the administrative burden to claim the grant</p> <p>Discussion: The evidence from Figure 1 shows that there was a drop in the number of WCS installations after the grant fund was reduced from £500 per socket to £350 per socket in April 2020. However, it is concluded that this is coincidental and most likely caused by the arrival of the coronavirus pandemic in the UK rather than the grant reduction. The increasing numbers of installations that have occurred since supports this conclusion and validates OZEV's decision to reduce the grant fund per socket whilst expanding the number of eligible sockets.</p> <p>Supplier feedback: Responses from suppliers were mixed. The Phoenix Works suggested that the grant fund is not significant unless a business is claiming for a small number of sockets, however this is not supported by the evidence in Figure 7. On the other hand, Ecology explicitly fed back that they feel the grant fund is appropriate and no other suppliers cited the funding amount as a barrier.</p>			

Table 17: WCS Barrier 2

WCS Barrier 3	Requirement for data feedback to OZEV	Score:	Medium
<p>Hypothesis: The system (and associated cost) required to deliver the required operational data to OZEV deters businesses from using the WCS.</p> <p>Discussion: Within the eligibility criteria of the scheme is the requirement to supply OZEV with a</p>			

²³ Note that one business has successfully claimed 46 sockets according to the OZEV data

A review of the UK's workplace EV charging sector

minimum of 3 years of usage data following installation. This requires the business to procure a chargepoint management system (CPMS) for their workplace charging. From Cenex's experience this can cost in the region of £300-£500 per chargepoint per year. If the business plans to bill users then this is a cost that would need to be paid irrespective of the OZEV requirement. However, for workplaces wanting to provide their staff, fleet or visitors with free-to-use charging infrastructure – which can simplify the system as no access mechanism is required – using the grant fund is likely to result in a greater total lifecycle cost for the business.

Supplier feedback: [The Phoenix Works](#) cited this barrier, stating that some customers do not want to pay the costs of having a more intelligent charging system.

Table 18: WCS Barrier 3

WCS Barrier 4	Charging for visitors and the public not eligible	Score:	Medium
<p>Hypothesis: Businesses want to deploy charging infrastructure at their locations that can be used by visitors, which is not eligible for WCS funding.</p> <p>Discussion: For a site to be eligible for the WCS, it must have designated off-street parking facilities with spaces dedicated for staff and/or fleet use. Therefore, installations that can be accessed by visitors or the general public (even if the main use case is for staff or fleets) are not eligible. Many businesses, particularly smaller organisations, are unlikely to have a formal division of parking spaces for these different users and therefore are less likely to use the grant to install workplace charging.</p> <p>Supplier feedback: EV Charging Solutions cited this as a barrier, stating that they have had WCS claims rejected for this reason. The Phoenix Works fed back that some customers have a more mixed use case with visitors or even public use, that this eligibility criterion is a barrier for smaller sites and some claims have even been rejected on this basis. Elecology also identified not being able to claim for visitor charging as a barrier and Swarco mentioned that the eligibility criteria for the scheme is unclear to customers.</p>			

Table 19: WCS Barrier 4

WCS Barrier 5	Administrative burden of the scheme to smaller suppliers	Score:	Low
<p>Hypothesis: The WCS grant is less accessible to smaller suppliers.</p> <p>Discussion: As the WCS grant is claimed retrospectively by the supplier rather than the customer, the supplier will be out of pocket until the grant is paid by OZEV. The effect on cash flow is felt more significantly by smaller suppliers, as is the admin overhead of the claim process.</p> <p>Supplier feedback: Elmtronics cited that smaller suppliers, who often do work on a sub-contract basis, struggle with the cash-flow and administrative burden of the WCS claim process. However, Elecology stated that the claim process and payment is quick.</p>			

Table 20: WCS Barrier 5

6.2 General Workplace Charging Barriers

General Workplace Charging Barrier 1	Costs	Score:	High
<p>Hypothesis: The up-front capital costs of EV charging infrastructure and the ongoing operational costs for a well-maintained and well-supported system are still prohibitive for a significant number of businesses.</p> <p>Discussion: The capital and operational costs of an EV charging system was cited as a barrier to many customers in supplier interviews. Where the business has its own fleet, installing charging infrastructure and transitioning to EV can give a Total Cost of Ownership (TCO) benefit to the business with EVs offering lower operational costs than their ICE equivalents. However, where the use case is for private staff vehicles or visitors, even if the business receives revenue from use of the charging infrastructure, the TCO saving is made by the private individuals and not the business. This can make the business case for installing EV charging less favourable,</p>			

and more uncertain.

The costs of an appropriate and well-maintained deployment can also have an indirect effect. As the market is flooded with suppliers, this can lead to customers opting for installations of insufficient scale or poor quality. This is evidenced by supplier feedback below.

Supplier feedback:

- *“The customer is ill-informed as to the expected cost, especially when groundworks increase the costs.”*
- *“Competition in the market - undercutting by a competitor who just wants to deploy the simple solution which isn't future proofed or manageable.”*
- *“Competition from non-specialists in the industry [who do not provide an equivalent system and therefore customers are not comparing a like-for-like cost].”* Customers enquire to understand the problem and then do the work themselves, potentially not doing the work properly (e.g. not notifying the relevant DNO). [There is] a lack of understanding from the customer of the complexity and value of ongoing support.”
- *“Customers think EV charging is a glorified socket and do not budget appropriately for the costs for a proper system and implement a couple of chargers for least cost to “do what we need to do now and worry about things later.”*
- *“Large customers have engaged multiple suppliers and then [we] often get undercut by new market entrants. Customers do not like or understand the ongoing OpEx costs.”*
- *“Other suppliers undercutting with poor quality hardware. Other suppliers that do not follow DNO connection process can undercut more diligent suppliers.”*
- *“Market is flooded with a lot of choice, huge amount of competition. Sometimes customers opt for the cheapest available solution.”*
- *“Customers do not know what costs to expect and therefore ask for quotes and then go cold. CapEx can be prohibitive - not the EV charger but the civils can add significant costs.”*

Table 21: General Workplace Charging Barrier 1

General Workplace Charging Barrier 2	Power	Score:	High
<p>Hypothesis: There is not always sufficient spare capacity available for the intended deployment or the costs of new or upgraded connections is prohibitive.</p> <p>Discussion: For many smaller businesses the power required to supply even a modest number of EV chargepoints will exceed other on-site loads. For bigger businesses with a DNO connection to support higher existing loads there may still be limitations on available capacity, particularly for larger scale deployments that may be necessary to support larger staff numbers or fleets. Dynamic load management techniques can help in some situations, but this can only use the available power intelligently. In many cases new connections or upgrades will be required to provide the capacity needed.</p> <p>This barrier is already being addressed (to an extent). On 24th January 2022 Ofgem updated their minded positions on the Access and Forward-looking Charges Significant Code Review (SCR)²⁴. Currently, customers connecting to the DNO network are responsible for the “costs of new assets needed to connect to the existing network, and a contribution towards the reinforcement of existing shared network assets.” What this means is that customers currently contribute to the costs of reinforcing the network at one voltage level above the connection voltage.</p> <p>The SCR proposes that “reducing the contribution to reinforcement within the upfront connection</p>			

²⁴ [Access and Forward-Looking Charges Significant Code Review – Updates to our Minded-to Positions | Ofgem](#)

charge... completely for demand” will work in the best interest of consumers. Essentially, this means that reinforcement costs for shared DNO assets will not be payable by the customer who will only be liable for paying for costs associated with their specific network connection. Additionally, the proposal is to increase network rights; this is designed to give customers greater access to non-firm connections, an initiative that some DNOs are already implementing.

This barrier is scored as high until the SCR proposals are implemented in April 2023. Even then, the connection and upgrade process will still incur additional costs and time and is not well understood by the average customer. It is therefore still likely that deployments will be reduced in scale or even stopped where it is necessary to involve the DNO.

Feedback: The majority of suppliers listed barriers associated with power availability, costs and process within their feedback.

Supplier feedback:

- “Inadequate electrical supplies at sites [is a barrier to deployment].”
- “Available DNO capacity [is a barrier].”
- “Power availability on site - costs of upgrading destroys the business case for going EV.”
- “Power is always a difficulty and is not something customers understand well.”
- “Limitations on power [is a barrier].”
- “Large customers are less likely to deploy due to [power] supply issues and the scale of the proposed deployment.”
- “DNO connection process - some are better than others. For example [for one project we spent] 3 months waiting for a response. Customers also don't understand the process.”

Customer feedback:

- “Deployments haven't been too difficult yet, but the ongoing challenge will be an adequate power supply.”
- “TBS (Temporary builders supply) take a long time to be put in and EV charging can compete with the loads of the construction work and can *increase costs unacceptably.*”

Table 22: General Workplace Charging Barrier 2

General Workplace Charging Barrier 3	Lack of understanding of the benefits and needs of EVs and workplace EV charging	Score:	Medium
Hypothesis: Businesses do not understand the direct benefits of transitioning vehicles to EV or the indirect benefits of providing charging infrastructure.			
Discussion:			
There are a number of benefits of electric vehicles:			
<ul style="list-style-type: none"> ○ Lifecycle costs – despite higher purchase prices, the total cost of ownership (TCO) of electric vehicles is often lower than the equivalent ICE vehicle when fuel, maintenance and depreciation are correctly accounted for. ○ Environmental –Even when accounting for higher embedded emissions during manufacture, EVs have lower lifetime CO₂ emissions than equivalent ICE vehicles, and the saving is improved when increasing amounts of renewable energy is used in both the manufacturing and for charging²⁵. 			

²⁵ [Lifecycle assessment: Carbon footprint of Polestar 2](#)

A review of the UK's workplace EV charging sector

- Social - Often overlooked, EVs have zero tailpipe emissions and therefore offer immediate benefits to local air quality which have a benefit on public health (poor air quality is now the largest environmental risk to UK public health²⁶)

Whether providing charging infrastructure for staff or visitors, or for a business's own fleet, businesses can facilitate these benefits by providing workplace charging. For some businesses these benefits are well understood but for others the topic is difficult to understand, especially with the prevalence of misinformation surrounding the benefits. For workplace EV charging specifically, businesses may not understand how, by providing charging infrastructure, they are helping their staff and visitors transition to EV.

Additionally, if the business so wishes, workplace charging can provide a source of ongoing revenue for a business. The majority response from suppliers when asked about whether their customers set a tariff for workplace charging, is that it is the customer's decision. As workplace charging is typically owned and operated by the business and not a commercial operator, the opportunity for revenue generation is likely not implemented or even understood by most businesses.

Supplier feedback:

- *"Some deployments fall down because the environmental benefit of providing charging is not well enough understood. The overall EV proposition is too hard to understand for the decision maker (cost, tax, environment, enjoyment of EV driving)"*
- *"[A lack of] education of the other benefits of EVs and the different types of vehicles that can be electrified, and education of the benefit of being able to charge at work."*
- *"Customers not aware of the potential source of revenue generation."*

Table 23: General Workplace Charging Barrier 3

General Workplace Charging Barrier 4	Lack of knowledge of EV charging infrastructure and systems	Score:	Low
<p>Hypothesis: The complexity of EV charging systems prevents businesses from deploying workplace charging.</p> <p>Discussion: As EV charging is a relatively new technology, it is not necessarily well understood by the average business. There are many complex concepts for the customer to understand, from AC vs DC charging, kW and kWh, DNO connections and load management through to whether RFID cards, apps or contactless cards are most appropriate for their application.</p> <p>However, there are an increasing number of diligent suppliers – as demonstrated by the engagement in this study - that can ably guide customers through the EV charging journey and ensure that a customer's requirements are met.</p> <p>Feedback:</p> <p>Supplier feedback:</p> <ul style="list-style-type: none"> ○ <i>"A percentage of sales are information gathering rather than actually interested in deploying."</i> ○ <i>"Some customers have made the move to electric and do not think about the infrastructure required to support it."</i> ○ <i>"We spend a lot of time talking to people and educating the customer. A lot of enquiries are information finding exercises."</i> <p>Customer feedback:</p> <ul style="list-style-type: none"> ○ <i>"The user experience of how to actually access chargepoints is confusing."</i> 			

Table 24: General Workplace Charging Barrier 4

²⁶ [Health matters: air pollution - GOV.UK \(www.gov.uk\)](https://www.gov.uk/health-matters/air-pollution)

A review of the UK's workplace EV charging sector

General Workplace Charging Barrier 5	Responsibilities and decision making	Score:	Medium
<p>Hypothesis: The internal organisational structures of businesses are not suited to deploying EV charging.</p> <p>Discussion:</p> <p>Workplaces often have fleet managers, energy managers and facilities managers. EV charging sits at the interface between each of these roles and therefore accountability and decision making often falls through the gaps. The most proactive businesses will likely have a person, who may not be formally accountable for EV charging, that champions the need for workplace charging and hence drives projects. Businesses that do not have such a person may find it more difficult to implement workplace charging. This is particular true for staff and visitor use cases where there is not an operational need, unlike with a fleet which is converting to EV for economic or environmental reasons.</p> <p>Supplier feedback:</p> <ul style="list-style-type: none"> ○ “There is not the internal pressure from employees to push decision makers to provide EVs, charging.” ○ “<i>For large customers internal decision making and budgeting is a barrier.</i>” ○ “<i>Decision can take a while to be made by businesses and can rely on the perception of one key decision maker within the business.</i>” 			

Table 25: General Workplace Charging Barrier 5

General Workplace Charging Barrier 6	Business Leases	Score:	High
<p>Hypothesis: A significant proportion of businesses lease their buildings and parking and require the landlord's cooperation to deploy workplace charging. Cenex sought the advice of a property expert who estimated that as the proportion of all UK businesses that lease their premises could be as high as 80%.</p> <p>Discussion: Where the business leases the property and parking, they will not be able to install charging infrastructure without the support of the landlord. The solution is either for the landlord to provide the charging infrastructure in response to request(s) from its leaseholders or for the leaseholder, potentially requiring complicated contracts, to deploy the chargepoint with permission from the landlord.</p> <p>Irrespective of who pays, the lease arrangement creates uncertainty:</p> <ul style="list-style-type: none"> ○ If the landlord pays for the installation and looks to recoup costs by setting a tariff for users, the business case is at risk from leases changing and the new tenants having less demand for the infrastructure. ○ The leaseholder may be willing to spend the capital expenditure, but it is prevented from doing so as they are unsure whether they will continue the property long term. <p>Feedback:</p> <p>Supplier feedback:</p> <ul style="list-style-type: none"> ○ “There can be a land ownership issue [where the workplace is a tenant].” <p>Customer feedback:</p> <ul style="list-style-type: none"> ○ “<i>The majority of our offices are leased and some are shared with other tenants so persuading the landlord to make the investment is difficult.</i>” 			

Table 26: General Workplace Charging Barrier 6

General Workplace Charging Barrier 7	(Perceived) Lack of or Uncertain Demand	Score:	Medium
<p>Hypothesis: Workplaces are hesitant to install EV charging infrastructure in advance of</p>			

<p>demand, especially at locations with high competition for parking spaces.</p> <p>Discussion: The deployment of charging infrastructure and the uptake of EVs is a classic cause and effect situation whereby without one you cannot have the other. For businesses that do not have a clear indication of demand, investing in charging infrastructure with only a hypothetical business case or benefits is difficult to justify. For businesses with an electric fleet strategy or employee salary sacrifice scheme the demand is more certain. However other businesses may not understand if or when their employees will transition to EVs and will therefore be nervous of investing in under-utilised assets.</p> <p>Supplier Feedback:</p> <ul style="list-style-type: none"> ○ <i>“Some fleets are not able to go EV because they don't know whether the vehicles will be able to charge at home. Other fleets do not have an appropriate electric replacement yet.”</i>

Table 27: General Workplace Charging Barrier 7

General Workplace Charging Barrier 8	Historic “Generation 1” Installations	Score:	Low
<p>Hypothesis: Workplaces have implemented poor quality “generation 1” deployments which are barriers to future expansion.</p> <p>Discussion: Many suppliers spoke about workplaces which have installed small numbers of chargepoints (1 or 2) as a box-ticking exercise or to satisfy very early demand which have reliability issues or have not been in installed considering a longer-term strategy. These businesses, if not put off the topic of EV charging completely by the initial experience, will often incur greater cost for the new supplier to upgrade the existing deployment.</p> <p>Supplier feedback:</p> <ul style="list-style-type: none"> ○ <i>“One customer has low satisfaction because the app-based system provided by another supplier is too complicated and is considering replacing the system.”</i> ○ <i>“[We are often] dealing with these types of customers who are realising that a small rollout is not fit for purpose longer term.”</i> 			

Table 28: General Workplace Charging Barrier 8

General Workplace Charging Barrier 9	Competition for Parking	Score:	Medium
<p>Hypothesis: Workplaces have limited car parking space and are therefore unwilling to dedicate spaces for EV charging only.</p> <p>Discussion: It is good practice to dedicate parking spaces that are intended to be used for EV charging as for “Electric Vehicle recharging only” to prevent non-EVs or even EVs that are not charging from using the spaces. In a workplace context, this would give greater confidence to users that the charging infrastructure will be accessible as and when they need it.</p> <p>Customer feedback:</p> <ul style="list-style-type: none"> ○ <i>“Our main site has limited on-site parking and on busy days there will be no free spaces and staff will have to park off-site. Dedicating further spaces for EV charging will be potentially contentious with non-EV drivers.”</i> 			

Table 29: General Workplace Charging Barrier 9

6.3 Solutions

This section covers solutions to the workplace charging barriers previously discussed. This includes relevant measures that are already proposed at the time of writing as well as new recommendations.

6.3.1 Existing Proposed Solutions

There are three existing solutions that will impact one or more of the identified barriers:

A review of the UK's workplace EV charging sector

	Lead stakeholder	Title	Relevant barriers
Existing Solution 1	Ofgem	Significant Code Review	<ul style="list-style-type: none"> • General 2: Power

Table 30: Existing Solution 1

On 30th June 2021 Ofgem published their minded positions on the Access and Forward-looking Charges Significant Code Review (SCR) for consultation²⁷, which was subsequently updated on 24th January 2022²⁸.

Currently, customers connecting the DNO network are responsible for the “costs of new assets needed to connect to the existing network, and a contribution towards the reinforcement of existing shared network assets.” What this means is that customers currently contribute to the costs of reinforcing the network at one voltage level above the connection voltage.

The SCR proposes that “reducing the contribution to reinforcement within the upfront connection charge for generation and removing it completely for demand” will work in the best interest of consumers. Essentially, this means that reinforcement costs for shared DNO assets will not be payable by the customer who will only be liable for paying for costs associated with their specific network connection. If this change is implemented, then a locationally dependent upfront cost barrier to deploying EV charging at workplaces would be reduced.

If implemented, this change to DNO connection costs would have a significant impact on the costs, and therefore the business case, for deploying workplace EV charging infrastructure.

	Lead stakeholder	Title	Relevant barriers
Existing Solution 2	OZEV	WCS reforms 2022	<ul style="list-style-type: none"> • General 1: Costs • WCS 4: Visitor/public charging eligibility • General 6: Business leases • WCS 3: Data Commitment • WCS2: Funding Amount • General 8: Generation 1 Installations • WCS5: Administrative Burden

Table 31: Existing Solution 2

In October 2021, following up on a proposal originally announced in February 2021²⁹, The Office for Zero Emission Vehicles announced that the Workplace Charging Scheme (WCS) will be reformed at the beginning of the 2022/23 financial year. Although the final details of the reforms are yet to be released, the most significant change will be to expand the eligibility to include SMEs, charity organisations and small accommodation businesses (such as B&Bs and campsites).

It is expected that as part of this change the current eligibility restriction on providing EV charging for visitor use at workplaces (**WCS 4:** Visitor/public charging accessibility) may be removed. However, this widening of eligibility criteria may not go so far as to fund fully publicly accessible charging infrastructure.

²⁷ [Access and Forward-looking Charges Significant Code Review - Consultation on Minded to Positions | Ofgem](#)

²⁸ [Access and Forward-Looking Charges Significant Code Review – Updates to our Minded-to Positions | Ofgem](#)

²⁹ [Support for small businesses, landlords and leaseholders: government charges up the electric vehicle revolution with £50 million boost - GOV.UK \(www.gov.uk\)](#)

A review of the UK's workplace EV charging sector

In addition, the WCS scheme will also become available to commercial landlords to provide charging infrastructure for current and future tenants³⁰ (**General 6: Business leases**), although the charging infrastructure will need to be installed in private parking.

Whilst the current grant limit of £350 per socket for up to 40 sockets will remain for larger businesses, from currently available information it seems that the support being made available to SMEs (less than 250 employees) may be assessed on a case-by-case basis with the grant up to a maximum of £15,000 depending on the provision needed³⁰. (**General 1: Costs**, **WCS2: Funding Amount**). Additionally, there will be no limit on how many chargepoints are installed at SMEs, but there will be a minimum amount of provision for five bays – i.e. cable routes - with at least one to have a working chargepoint. This will provide significant future proofing to allow deployments to be expanded more easily at a later date (**General 8: Generation 1 Installations**).

Finally, the WCS (along with OZEV's other charging infrastructure grant scheme) will be delivered via a new online platform, which should ease the administrative burden of applications, claims and reporting (**WCS 3: Data Commitment**, **WCS5: Administrative Burden**).

	Lead stakeholder	Title	Relevant barriers
Existing Solution 3	Department for Transport	EV Charging Parking Policy	<ul style="list-style-type: none"> • General 6: Business leases • General 5: Responsibilities and Decision Making

Table 32: Existing Solution 3

There are existing proposed policies to require owners of non-residential car parks, including workplace car parks, to install a minimum amount of EV charging. For full detail on the proposals refer to section 5.

A legal requirement for landowners to install EV charging could have a significant impact. Firstly, in helping to indirectly overcome the barriers associated with internal business motivation and decision making (**General 5: Responsibilities and Decision Making**), but moreover by overcoming the business leases barrier (**General 6: Business leases**) by placing the onus on the landlord.

6.3.2 Recommended Solutions

Additional solutions recommended by Cenex are included in this section, with supporting evidence from workplace charging suppliers and customers as applicable³¹.

Recommended Solution 1	Financial Recommendations	Relevant barriers: (In addition to the impact of the existing WCS reform proposals)	<ul style="list-style-type: none"> • WCS 4: Visitor/public charging eligibility • General 1: Costs
<p>Recommendation: A number of potential financial solutions are proposed:</p> <ul style="list-style-type: none"> - Workplace Charging Scheme reforms - The full details of the WCS reforms for the 2022/23 financial year have not yet been confirmed. Cenex welcomes the changes to allow SMEs, charity organisations and small accommodation businesses to access the grant. It is recommended that, at the same time, installation of EV charging at workplaces that is accessible for use by visitors and the general public, as well as staff and fleet 			

³⁰ [changes-coming-to-ev-home-and-workplace-charging-schemes \(pendragonvehiclemanagement.co.uk\)](https://www.pendragonvehiclemanagement.co.uk/changes-coming-to-ev-home-and-workplace-charging-schemes)

³¹ Note that suppliers and customers were not asked directly for feedback on these solutions; supporting evidence was taken from more general feedback and recommendations volunteered during interviews.

vehicles, is made eligible.

- Case-by-case assessed grant funding - Furthermore, Cenex welcomes the change to allow the support for SMEs to be assessed on a case-by-case basis such that grant funding is given where it is most needed. This approach could be taken for all WCS applications, to align and the grant with the system used for the On-Street Residential Charging Scheme (ORCS) and the Transport Scotland fund for business chargepoints (2.2.1). To avoid the costs of administrating the scheme reducing its overall benefit, the grant funding could be combined with the existing ORCS Energy Saving Trust administration system.
- Local Enterprise Partnerships - The WCS funding is beneficial and allows OZEV to support a large number of businesses. However, the evidence presented in 2.1 suggests that many businesses, particularly small and medium enterprises, are not able to invest in larger scale deployments. The success of the matched funding provided by the Local Enterprise Partnership to **EA Technology** in facilitating a more ambitious deployment shows what can be done with more significant funding. Therefore, providing greater funding via LEPs, which could also provide strategy and education support to workplaces, could be another means by which greater funding is made available to businesses that are proactive in installing workplace charging.
- Access to affordable finance: The creation of new affordable loan schemes available to businesses wanting to install workplace charging but unable to make the capital investment. For example, such loans could be implemented by institutions such as the British Business Bank and be funded by government backed Green Savings Bonds. As per the recommendation for grant funding, interest rates could be tiered to provide the most affordable finance to smaller businesses in greater need of financial support.
- Taxation: The inclusion of workplace charging investments within tax relief legislation such as Enhanced Capital Allowances to reduce the capital cost to the business. Additionally, the reduction of taxation of electricity metered at public chargepoints to 5% to align with domestic charging, as supported by the FairCharge campaign³², to make EV charging more equitable is recommended. This policy change should include workplace charging, which should also remain Benefit-in-Kind (BIK) exempt. All of these measures will improve the overall business case, and therefore incentivise, workplace charging deployments, particularly where the primary use case is staff and/or visitors.

Support:

Supplier support:

- *“£350 per socket is appropriate, this should not be reduced any further. [We would welcome] a support mechanism by which preferential rates are given for those who actually need it, for social benefit.”*
- *“[Although] the proportion of total costs funded by the WCS is less than the EVHS, businesses have more money to spend [than householders] and therefore the current funding level is appropriate.”*
- *“If the uptake of the reformed EVHS grant fund is less than popular than anticipated then the budget could be transferred to the WCS.”*
- *“The eligibility criteria of the WCS should be relaxed [as part of the proposed reforms].”*

Customer support:

- *“[We are in] support of the continuation of workplace charging funding.”*
- *“We would not have been able to deploy infrastructure at this scale without*

³² [FairCharge campaign to tackle 'illogical' VAT policy on EV charging \(fleetworld.co.uk\)](https://fleetworld.co.uk/faircharge-campaign-to-tackle-illogical-vat-policy-on-ev-charging)

funding from the Local Enterprise *Partnership*.”

Table 33: Recommended Solution 1

Recommended Solution 2	National and Local Parking Policies	Relevant barriers:	<ul style="list-style-type: none"> • General 6: Business Leases • General 5: Responsibilities and Decision Making • General 9: Competition for Parking
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<p>Recommendation:</p> <p>National Policy</p> <p>The analysis shown in 5.1 shows the impact of not mandating EV charging to be deployed in existing workplace car parks but also showed the scale of costs that will be incurred by UK landowners, and subsequently the businesses which lease their premises, to do so.</p> <p>Cenex is supportive of a policy that is inclusive of existing car parks, as this will be hugely powerful at overcoming the barrier experienced by businesses that would like to deploy EV charging but are restricted by the fact they lease their workplace. However, as per Cenex's policy consultation return, care needs to be taken to avoid forcing landowners to deploy assets with limited or no use case. This risk is likely to be more probable for public settings – where the deployment of low power AC charging in car parks with short dwell times will have no benefit, for example – but also applies to workplaces.</p> <p>There will be workplaces which do not have a fleet to electrify and are located in areas where staff predominantly have access to off-street parking (and therefore charging) at home. An alternative measure is proposed in recommendation 3; require businesses to complete an audit to assess their own use case and deploy infrastructure depending on the outcome. Yet, administering such a scheme would also come at cost. A middle ground could be to implement a mandatory policy to deploy with an exemption for businesses that are able to prove their lack of use case by an approved method. This order of priority would create a default position for businesses to deploy.</p> <p>Local Policy</p> <p>At a local level, Cenex recommends that Local Authorities explore incentivising workplace charging within local policies as part of wider measures to discourage single-occupancy private car usage in favour of active travel and public transport. One way in which this can be done is to include exemptions to local workplace parking levies when EV charging is provided. This could be implemented as part of a wider policy to encourage modal shift away from the car to public and active transport for commuting. The approach has been explored by Nottingham City Council, although the exemption has not yet been implemented.</p> <p>Leicester City Council is also investigating introducing a workplace parking levy³³, although whilst EV charging was mentioned in the ongoing consultation, no detail is given on exemptions for businesses providing workplace charging.</p> <p>Doing this would impact upon businesses operational costs. This would better incentivise internal business structures and decision making to respond to workplace charging investments with demonstrable business cases for all use cases, not just charging for fleets.</p> <p>Additionally, the policy could be designed to place the responsibility on parking providers which would help businesses that lease their premises or use shared parking to benefit from workplace charging.</p>

Table 34: Recommended Solution 2

Recommended	Auditing scheme	Relevant barriers:	<ul style="list-style-type: none"> • General 3: Lack of
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³³ [Workplace Parking Levy \(leicester.gov.uk\)](http://Workplace Parking Levy (leicester.gov.uk))

A review of the UK's workplace EV charging sector

Solution 3	and/or strategy support	understanding of the benefits <ul style="list-style-type: none"> • General 5: Responsibilities and decision making • General 7: (Perceived) Lack of Demand • General 9: Competition for Parking
<p>Recommendation: Not all businesses are motivated to install workplace charging. EV charging systems are not yet well understood, nor are the potential benefits and many businesses do not have internal roles created which are responsible for delivery of workplace charging. The UK government could exert pressure on businesses by creating a workplace charging auditing scheme which is mandatory for eligible businesses.</p> <p>There is precedent for such schemes: the Energy Savings Opportunity Scheme (ESOS), administered by the Environment Agency, requires qualifying businesses to carry out assessments every four years. A requirement for businesses to assess the demand for workplace charging, and deploy infrastructure in response to the results, could be included within future ESOS or a separate scheme.</p> <p>If such a scheme was implemented, care would be needed to ensure that audits do not become a box-ticking exercise delivering no real benefit. This could be controlled to some extent by the requirements of the assessment. However, as EV charging is a specialist subject, many businesses may require additional support to ensure quality of their assessments and resulting strategies. To control quality, the UK Government could fund a framework of approved independent contractors to create workplace charging strategies free of charge for businesses. These assessments would need to highlight the importance and benefit of workplace charging to the business.</p> <p>Follow up would be required to ensure that businesses act on the strategy recommendations, with appropriate exemption criteria.</p> <p>Any audit or support scheme would need to account for the new requirements for EV Charging in car parks proposed by Existing Solution 3: Parking Policy and the upcoming £90m Local EV Infrastructure (LEVI) fund³⁴ if this is to include strategy support for workplaces.</p> <p>Supplier and customer support:</p> <ul style="list-style-type: none"> • Suppliers were asked for their feedback on the proposed requirements of Existing Solution 3: Parking Policy and the majority were supportive of measures that promote the deployment of EV charging, including workplace charging. • One customer explicitly expressed support “for a mandatory requirement for <i>chargepoints to be installed</i>”. 		

Table 35: Recommended Solution 3

Recommended Solution 4	Education	Relevant barriers:	<ul style="list-style-type: none"> • General 3: Lack of understanding of the benefits • General 5: Responsibilities and decision making • General 4: Lack of knowledge of EV charging infrastructure
<p>Recommendation:</p> <p>EV charging is new to many businesses and therefore the technology, need and benefits of</p>			

³⁴ [Transitioning to zero emission cars and vans: 2035 delivery plan \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)

workplace charging are not well understood.

Cenex is working with the Institution of Engineering and Technology (IET) to deliver an EV Charging Infrastructure Guide for Local Authorities. Much of this content will be relevant to workplaces (in fact charging at depots and council buildings for staff and fleets are explicitly covered) and therefore as a minimum the guide should be made publicly available for all to use. Additionally, OZEV could sponsor the authorship of a second guidance document which provides focussed guidance for workplaces. A key part of this guidance would be information on business models available to workplaces that can reduce capital and operational costs (see sections 3.2 and 3.5)

There are already some good examples of suppliers releasing educational material on workplace charging – for example an article on workplace charging strategy from [Smart Cities Connections Limited](#)³⁵.

As part of this initiative, it would be imperative to ensure that any guidance is well marketed to ensure that it reaches as many businesses as possible.

Supplier support:

Many suppliers mentioned that much of their time is spent educating customers:

- “Education of businesses to help *them understand the benefit [is important].*”
- “*User education of the benefit of being able to charge at work [is required].*”
- “*Education for customers [is required].*”
- “*Visibility of what government and local authorities are doing about charging for those who cannot charge at home would be useful. This would help workplaces understand the need for workplace charging.*”
- “*Education and marketing is needed to demonstrate the benefit of workplace charging to employers and employees to encourage uptake of EVs for those that cannot charge at home.*”

Table 36: Recommended Solution 4

Recommended Solution 5	Additional support for DNO costs	Relevant barriers:	<ul style="list-style-type: none"> • General 2: Power
------------------------	----------------------------------	--------------------	----------------------------------------------------------------------

Recommendation: Whilst Ofgem’s Significant Code Review will reduce the costs of new and upgraded DNO connections, it will not remove them. Therefore, this source of uncertainty, often referred to as a “postcode lottery”, for EV charging projects will remain.

The UK Government could provide funding to support workplaces with new power connections or upgrades. Rather than being a fixed amount, funding could be given for costs above a certain threshold to help equalise costs for different customers. The risk with such a measure is that it could create a race for funding, with businesses deliberately oversizing their deployments in order to access DNO connection funding before the budget is exhausted.

This funding could be delivered through the WCS. There is precedent for funding of power connections for EV charging; the funding for ORCS was increased in April 2021 to account for deployments with high electrical connection costs.

Support:

Supplier support:

- “[We are supportive of] measures to support the costs of upgrading power *supplies*”

³⁵ [A guide on how to implement a robust workplace charging strategy | LinkedIn](#)

A review of the UK's workplace EV charging sector

- “[We are supportive of] funding for network connections. Separating the “EV” supply from the workplace supply makes things a lot easier for the supplier.”

Customer support:

- “[We are supportive of measures which help] removal of the power delivery barrier”
- “We support measures to overcome DNO capacity upgrade costs.”

Table 37: Recommended Solution 5

Recommended Solution 6	Standard Contractual Templates for Landlords and Tenants	Relevant barriers:	• General 6: Business Leases
<p>Recommendation:</p> <p>Part of the barrier experienced by workplaces that lease their premises is the challenge of legal agreements when the charging deployment involves a tenant, landlord and a supplier.</p> <p>This recommendation is for a legal professional body such as The Law Society to produce contractual templates that can be used by these stakeholders as a starting point for contractual discussions. If constructed diligently, these templates could reduce the legal costs for each individual workplace charging project and give project landlords and tenants confidence that they are working to best practice.</p>			

Table 38: Recommended Solution 6

Other recommendations proposed by suppliers included:

- VAT reduction of EV charging for commuters at workplaces to 5% to align with taxation of domestic EV charging.
- The creation of a regulatory body for EV charging to ensure deployments are delivering value for money to the customer. This could be delivered as part of the REA's EV Consumer Code.

Additionally, there are many measures, such as grant schemes and BIK rates for EVs, that can be taken to incentivise vehicle uptake. These clearly have an indirect impact of increasing demand for charging infrastructure deployments but are outside the scope of this report.

6.4 Solutions and Barriers Summary

Table 39 summarises the barriers that each of the six recommended solutions is intended to overcome. Combined, these recommendations target all of the barriers evaluated as “High” or “Medium”.

	Title	1 – Financial Support	2 – Parking Policies	3 – Audit and support schemes	4 - Education	5 – Support for DNO costs	6 – Standard Contract Templates
General 1	Costs						
General 6	Business Leases						
General 2	Power						

A review of the UK's workplace EV charging sector

	Title	1 – Financial Support	2 – Parking Policies	3 – Audit and support schemes	4 - Education	5 – Support for DNO costs	6 – Standard Contract Templates
WCS 4	Visitor/public charging eligibility						
General 3	Lack of understanding of the benefits						
General 5	Responsibilities and Decision Making						
General 7	(Perceived) Lack of Demand						
WCS 3	Data commitment						
General 9	Competition for parking						
General 4	Lack of knowledge of EV charging infrastructure						
General 8	Generation 1 Installations						
WCS 1	Socket limit						
WCS 2	Funding amount						
WCS 5	Administrative Burden						

Table 39: Solutions Summary

7 Conclusions and Recommendations

The rate of uptake of electric vehicles in the UK continues to increase. December 2021 was a record month for BEV registrations, with a 25.5% market share. 2021 overall saw a market share of 11.6%, up 5% from 2020³⁶.

Against this backdrop of rising popularity in EVs, there is an ongoing debate within the industry about the required scale and locations needed for charging infrastructure, in particular to support those who are unable to charge at home on a private driveway. Public charging options such as rapid charging hubs and on-street charging are often discussed as solutions, but workplace charging is often overlooked.

It is imperative to remember that the scale of the overall UK charging network is much more significant than the public charging network alone. By the end of Q3 2021 almost 21,500 workplace charging sockets have been supported by OZEV's Workplace Charging Scheme (WCS). This analysis estimates that the UK's total workplace charging network comprises between 27,000 - 43,000 sockets, which is of similar magnitude to the public network. As 35.4% of all car and van miles³⁷ are for commuting or business purposes, workplace charging is key to support and accelerate the electric transition.

At an average of three sockets per business, the existing workplace charging network has been implemented by only an estimated 9,500 businesses. There were 2.77 million VAT and/or PAYE businesses in the UK as of March 2021³⁸. Whilst many of these will not have formal workplace premises, be home-based, or have no demand for charging from fleet, staff, or visitor vehicles, the car is still the primary mode of transport for commuting in the UK, with an estimated 21.7 million commuting vehicles³⁹ in 2021. Therefore, although it is important not to ignore the existing workplace charging network when evaluating the UK's overall charging network, clearly there is more to be done to support the electric transition of commuting staff vehicles, as well as fleet vehicles.

The EA Technology and Aviva case studies presented in this report show examples of progressive organisations deploying workplace charging ahead of demand. The use of an internal survey by EA Technology is an excellent example of a progressive business devising a strategy for workplace charging to support its staff to make the electric transition. The lack of knowledge of EV charging and its benefits were identified as barriers by EV charging suppliers. EA Technology, as providers of consultancy services to the energy and mobility sectors, are far more knowledgeable and experienced on the subject than the average business. Their case study is therefore an example of what could be achieved more widely if better education was available to UK businesses.

The Workplace Charging Scheme (WCS) statistics suggest that scale deployments implemented by EA Technology and Aviva are in the minority; on average businesses, that have installed chargepoints, have each installed just three sockets. Feedback from suppliers suggested that interest in larger scale deployments for both fleet and staff vehicle use cases is increasing, nonetheless this is not yet shown by the statistics; deployments of one or two sockets still represented 78% of all sockets installed in 2021. Although for micro-sized businesses this could be appropriate, this shows a general lack of ambition to invest in future-proof infrastructure. Additionally, the WCS statistics show a regional disparity in the deployment of workplace charging with the ratio of number of registered BEVs to workplace sockets ranging from 5.1 (North-East England, 1st) to 24.7 (South-East England, 11th).

³⁶ [New UK EV and AFV Registrations - SMMT monthly data](#)

³⁷ In England, from the [2019 National Travel Survey](#).

³⁸ [Activity, size and location - Office for National Statistics \(ons.gov.uk\)](#)

³⁹ [Modal comparisons \(TSGB01\) - GOV.UK \(www.gov.uk\)](#)

A review of the UK's workplace EV charging sector

A major barrier to larger scale workplace deployments becoming more commonplace, in addition to a lack of understanding of the potential benefits, is costs. The cost of EV charging hardware is predictable. However, costs associated with civil works, electricals and perhaps most importantly new or upgraded DNO connections, where there is not sufficient power available, are highly variable. Moreover, there are no economies of scale, and evidence shows that the cost per socket increases with scale of the deployment as projects run into greater civils, materials and DNO costs.

Scenarios were created to compare the Total Cost of Ownership (TCO) for businesses providing workplace charging for their own fleets and those installing infrastructure for use by staff and visitors. There is a clear difference; in the majority of permutations the cost savings of operating electric fleets as opposed to diesel is sufficient to not only overcome the additional vehicle cost, but also to pay for the charging infrastructure. On the other hand, the business case for staff and visitor charging is poor and does not break even in most scenarios. This is additional evidence to support expanding eligibility of future funding schemes to include all potential users.

Feedback from suppliers suggests that costs are the main reason why customer enquiries do not progress to installation, or proposals are downscaled. Larger businesses may have sufficient cash reserves for EV charging projects but costs, particularly capital costs, can be prohibitive for smaller businesses. This is supported by the WCS evidence which shows that larger businesses are disproportionately likely to install EV charging.

There are limited innovative business models available for workplace charging. The default supplier model is for businesses to own and operate the charging infrastructure. Although this model gives the customer the greatest control over how the infrastructure is used, it also exposes it to the greatest amount of risk. A few suppliers are implementing new subscription or finance offerings to remove the up-front cost barrier – it will be interesting to observe the popularity of these new models.

Cenex supports the upcoming revisions to WCS funding. Additional recommendations are made to pivot funding schemes to be more means-assessed, providing greater support to businesses where deployment costs are higher. Alternatively, improving access to affordable finance or reviewing the taxation of workplace charging could help to reduce the up-front capital cost barrier and improve the business case of workplace charging deployed for staff, visitor, and public use cases.

The reduction of DNO connections and upgrades from changes proposed by Ofgem's SCR are welcomed if the results serve to remove locational variation in costs. However, some industry stakeholders, such as the Renewable Energy Association (REA), have voiced support for a reduction in costs but stated that the proposed changes are at odds with previous market signalling of the benefit of on-site behind the meter flexibility solutions (such as load management and on-site generation and storage) to avoid upgrade costs.

The scenarios presented in this analysis have shown the impact of excluding existing car parks from national policies requiring EV charging to be implemented in non-residential car parks. This policy has the potential to help overcome a key barrier experienced by the many businesses (thought to be as high as 80% of all businesses) which lease their workplaces and make use of shared car parks, by pushing the accountability on to the landowner of the car park. Therefore, Cenex recommends that existing car parks are included in policies. However, at the same time policy makers must design the requirements carefully to avoid forcing landowners to incur costs where the use case for workplace chargepoints is limited. Policies can also be implemented to encourage workplace charging at a local level. For example, including EV charging infrastructure as an exemption within existing and future workplace parking levies.

In summary, the UK's workplace charging network needs to continue to develop at an accelerating rate, working alongside the public and domestic charging networks to enable the electric transition. The evidence provided in this report – statistics from the WCS and feedback from suppliers and customers – show that workplaces still encounter major barriers when deploying charging.

A review of the UK's workplace EV charging sector

Therefore, the following six recommended solutions should be investigated by decision makers to assist the market to move at the required pace to help meet the UK's environmental commitments:

1. Financial – Grant schemes, access to affordable finance, and tax reforms.
2. Parking policies – Mandating the installation of EV charging in new and existing non-residential car parks.
3. Audit and support schemes – Require businesses to assess their own needs for EV charging and act upon the results.
4. Education – Provide more comprehensive guidance to businesses on workplace charging.
5. Support for DNO costs – Target funding for schemes with significant network connection costs.
6. Contracts for landlords and tenants – Help landlords and their tenants agree terms to install workplace charging in a standardised manner.

Appendices

7.1 Appendix A - Sources of Data & Information

Cenex has made use of the following sources of data and evidence in this report.

7.1.1 OZEV Workplace Charging Scheme (WCS) Data

The Office for Zero Emission Vehicles (OZEV) runs multiple grant schemes funding the installation of electric vehicle charging infrastructure. One of these is the Workplace Charging Scheme (WCS) which is available to businesses installing EV charging infrastructure to be used by staff or fleet vehicles.

The total number of sockets eligible for the WCS grant scheme and the amount funded for each has evolved over its five-year history:

- From December 2016: £300 per socket, up to 20 sockets
- From August 2018: £500 per socket, up to 20 sockets
- From April 2020: £350 per socket, up to 40 sockets

The WCS is a voucher-based scheme. The datasets provided were:

1. Dataset 1 - Installations Database. The installation date; customer; number of sockets installed; chargepoint types (model and kW rating); and total installation cost for each location for each voucher. Dataset 2 was provided for December 2016 to end of September 2021.
2. Dataset 2 – Grant Payment Database. The supplier claim list, giving the name and code (a unique identifier) for the redeeming supplier; the number of sockets; the claim month; and the grant amount claimed for each voucher. Dataset 1 provided for December 2016 to November 2021.

It was necessary to cross reference dataset 1 with dataset 2 to identify the supplier claiming the grant.

Comparison to Official OZEV Statistics

The WCS dataset 1 provided by OZEV and used in this study does not perfectly match the official statistics for the same period⁴⁰ (up until end September 2021). The official number is 19,054, which is 2,363 (11%) less than the 21,417 included in dataset 1.

A likely cause of the discrepancy is that some of the installed sockets were not eventually claimed for, potentially due to a supplier ceasing to trade, administration issues on the supplier's side, or the installation failing to meet the scheme's eligibility criteria. This theory is supported by the number of sockets within dataset 2 up until the end of September 2021 - 19,454 - which is a closer match to OZEV's official statistics (2% difference).

For the statistical analysis workplace charging (Section 2) only the vouchers present in Dataset 1 were used. Although some of these sockets may have eventually not been funded by the WCS and despite being less up to date, this dataset includes the installations that have been confirmed as completed with full information available. This is a total of 7,833 vouchers and 21,417 sockets.

7.1.2 Supplier Interviews

Although only the 7,833 vouchers from Dataset 1 are included in the analysis in section 2, the voucher list from Dataset 2 was used (as it gives the most complete and most up to date, including claims dated October and November 2021, list of supplier activity) to identify the suppliers which have been the most active with WCS grant fund.

68% of the 7,798 vouchers present in Dataset 2 listed an associated supplier. This left 4,553 vouchers from which to identify the top WCS suppliers. This was done by collating a top 20 list by three different metrics:

⁴⁰ [Electric vehicle charging device grant scheme statistics: October 2021 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/statistics/electric-vehicle-charging-device-grant-scheme-statistics-october-2021)

- Number of sockets installed
- Number of vouchers redeemed (to show the number of customers each supplier has installed WCS-funded workplace chargers for)
- Sum of grant funding paid by OZEV (to account for the change in the WCS fund amount)

The three resulting top 20 lists, and a consolidated list of the 31 suppliers which appear in at least one of the three top 20s, are shown in Appendix B – WCS Top Supplier ListsError! Not a valid bookmark self-reference..

Each of these 31 suppliers was then contacted and invited to a short interview to give information on their involvement with workplace charging in the UK and feedback on how the industry could be supported. The questions that were asked of each supplier are given in Appendix B.

7.1.3 Customer Research

To identify “progressive” companies that have been deploying workplace charging (Question 3) at their business location, two methods were used:

1. Reviewing the [EV100 list](#)⁴¹ to search for companies which have included workplace charging within their commitment. An attempt was made to contact these companies directly as well as through The Climate Group’s EV100 lead.
2. An internet search for news articles on workplace charging installations.

The customers that were interviewed were:

- Willmott Dixon
- Landsec
- A Tier 1 UK Local Authority⁴²

Information for two further customers was gathered from Internet searches:

- Aviva
- EA Technology

7.1.4 Workplace Parking Data

The original approach followed to understand the impact of the expected policies for charging infrastructure in car parks was to find the best available parking dataset which included workplace parking. This dataset was requested from six organisations, but each had limitations in quality or cost. Therefore, the analysis was done using the methodology described in 7.6.

7.1.5 Use of Data

The applicability of the sources used to each of the six questions answered in this report is shown in Table 40:

	OZEV WCS Data	Supplier Interviews	Customer Research
Q1 – Scale of workplace	Used to identify the scale of WCS funded workplace charging and, in	Used in conjunction with the WCS data to estimate the total scale of UK	

⁴¹ EV100 is a global initiative bringing together 120 member companies committed to switching their owned and contracted fleets to electric vehicles and installing charging infrastructure for employees and customers by 2030.

⁴² The Local Authority requested to be kept anonymous due to the political sensitivity of EV charging.

A review of the UK's workplace EV charging sector

charging	conjunction with information provided by suppliers (7.1.2) estimate the total amount of UK workplace charging.	workplace charging. WCS limitations cited by suppliers used to evaluate the scale of workplace charging not covered by the scheme.	
Q2 – Suppliers and business models	Used to identify the top 31 WCS suppliers and invite them to interview – see 7.1.2.	The interviewed suppliers were asked about the business models they offer as part of the interview.	
Q3 – Progressive companies			Information about customers' plans and deployments, and whether the infrastructure has been made more widely accessible, was gathered by interview and Internet searches.
Q4 - Barriers		The question about barriers to workplace charging deployments was asked during supplier interviews.	
Q5 – Costs	The WCS data includes total installation costs which was used to answer this question.	Some cost data of typical installations was shared by suppliers.	EA Technology's publicly available case study included costs.
Q6 – Parking Policy Impact		Although the purpose of this question is to understand the impact of the proposed new standards for charging provision in car parks.	

Table 40: Data and source information use

7.2 Appendix B – WCS Top Supplier Lists

Table 41 shows the top 20 suppliers by socket count from the OZEV WCS data (December 2016 to November 2021):

	Supplier Name	Sum of Socket count
1	Elmtronics Ltd	382
2	POD Point	270
3	BP Pulse	172
4	The New Motion EVSE Ltd T/A The New Motion	165
5	EV Charging Solutions	147
6	McNally Electrical Yorkshire (LTD)	146
7	Phoenix Renewables Limited T/A The Phoenix Works	140
8	Swarco UK Limited	136
9	ChargePoint Services Ltd	132
10	API Electrical Ltd	114

A review of the UK's workplace EV charging sector

11	Juuce Ltd ta EO Charging	113
12	Actemium	105
13	Amelio Electrics LTD T/A EV Camel	103
14	Jorro Ltd	99
15	Amp EV LTD	93
16	Hybrid Energy Solutions Ltd ta Charged EV	90
17	SRG Electrical Ltd	89
18	Earth Electrical (Southern)	84
19	Joju Ltd	83
20	Nest Property Ltd	82

Table 41: Top 20 WCS Suppliers by Number of Sockets Installed

Table 42 shows the top 20 suppliers by number of vouchers claimed from the OZEV WCS data (December 2016 to November 2021):

	Supplier Name	Count of Voucher code
1	POD Point	74
2	Elmtronics Ltd	69
3	API Electrical Ltd	56
4	McNally Electrical Yorkshire (LTD)	54
5	Jorro Ltd	40
6	Muller EV t/a Anderson EV	39
7	EV Charging Solutions	37
8	Stratford Energy Solutions	37
9	Elecology Ltd	34
10	BAIRD ELECTRICAL CONTRACTORS LTD	33
11	Hybrid Energy Solutions Ltd ta Charged EV	32
12	BP Pulse	32
13	Phoenix Renewables Limited T/A The Phoenix Works	31
14	Armstrong Renewables	31
15	Earth Electrical (Southern)	30
16	Head on Electrical	30
17	Mr Charger Ltd	30
18	Workplace Charging Ltd t/a Anglia Car Charging	29
19	Plug It In Group LTD	29
20	Amp EV LTD	29

Table 42: Top 20 WCS Suppliers by Number of Vouchers Redeemed

Table 43 shows the top 20 suppliers by total grant payable from the OZEV WCS data (December 2016 to November 2021). Note that there seems to be some error in these figures as for some claims the grant payable was greater than the product of the number of sockets installed and the eligible grant per socket.

	Supplier Name	Sum of Total payable
1	POD Point	£1,410,350
2	Elmtronics Ltd	£566,600
3	McNally Electrical Yorkshire (LTD)	£265,401.26
4	BP Pulse	£137,550
5	EV Charging Solutions	£134,050
6	Jorro Ltd	£122,050
7	The New Motion EVSE Ltd T/A The New Motion	£119,100
8	API Electrical Ltd	£112,600

A review of the UK's workplace EV charging sector

9	Hybrid Energy Solutions Ltd ta Charged EV	£99,064.74
10	ChargePoint Services Ltd	£94,600
11	Ground Control	£84,250
12	Nest Property Ltd	£77,900
13	System Automation Monitoring Limited	£76,200
14	Juuce Ltd ta EO Charging	£75,050
15	Phoenix Renewables Limited T/A The Phoenix Works	£73,650
16	Workplace Charging Ltd t/a Anglia Car Charging	£71,750
17	Swarco UK Limited	£67,100
18	BAIRD ELECTRICAL CONTRACTORS LTD	£61,600
19	Amp EV LTD	£58,750
20	Joju Ltd	£58,150

Table 43: Top 20 WCS Suppliers by Total Grant Fund Payable

The top 31 WCS suppliers identified in one or more of the top 20 lists (sockets, vouchers, grant funding) are listed in Table 44 with the three main products and services that they provide:

	Supplier Name	Chargepoint Manufacturer	Install and Maintenance	Proprietary CPMS Provider	Total Sockets Installed (OZEV dataset 2)	% of all sockets installed (OZEV dataset 2)	Interviewed?
1	<i>Actemium</i>	X	✓	X	105	0.9%	No
2	<i>Amelio Electrics LTD T/A EV Camel</i>	X	✓	X	103	0.8%	No
3	<i>Amp EV LTD</i>	X	✓	✓	93	0.8%	Yes
4	<i>API Electrical Ltd</i>	X	✓	X	114	0.9%	No
5	<i>Armstrong Renewables</i>	X	✓	X	62	0.5%	Yes
6	<i>BAIRD ELECTRICAL CONTRACTORS LTD</i>	X	✓	X	81	0.7%	No
7	<i>BP Pulse</i>	✓	✓	✓	172	1.4%	No
8	<i>ChargePoint Services Ltd (Engie)</i>	X	✓	✓	132	1.1%	No
9	<i>Earth Electrical (Southern)</i>	X	✓	X	84	0.7%	Yes
10	<i>Elecology Ltd</i>	X	✓	X	66	0.5%	Yes
11	<i>Elmtronics Ltd</i>	X	✓	✓	382	3.1%	Yes
12	<i>EV Charging Solutions</i>	X	✓	X	147	1.2%	Yes
13	<i>Ground Control</i>	X	✓	X	78	0.6%	Yes
14	<i>Head on Electrical</i>	X	✓	X	50	0.4%	No
15	<i>Hybrid Energy Solutions Ltd ta Charged EV</i>	X	✓	X	90	0.7%	No
16	<i>Joju Ltd</i>	X	✓	X	83	0.7%	No
17	<i>Jorro Ltd</i>	X	✓	X	99	0.8%	Yes
18	<i>Juuce Ltd ta EO Charging</i>	✓	✓	✓	113	0.9%	No
19	<i>McNally Electrical Yorkshire (LTD)</i>	X	✓	X	146	1.2%	No
20	<i>Mr Charger Ltd</i>	X	✓	X	54	0.4%	No
21	<i>Muller EV t/a Anderson EV</i>	✓	✓	✓	47	0.4%	No
22	<i>Nest Property Ltd</i>	X	✓	X	82	0.7%	No
23	<i>Phoenix Renewables Limited T/A The Phoenix Works</i>	X	✓	✓	140	1.1%	Yes
24	<i>Plug It In Group LTD</i>	X	✓	X	73	0.6%	No

A review of the UK's workplace EV charging sector

25	<i>POD Point</i>	✓	✓	✓		270	2.2%	No
26	<i>SRG Electrical Ltd</i>	X	✓	✓		89	0.7%	No
27	<i>Stratford Energy Solutions</i>	X	✓	X		63	0.5%	No
28	<i>Swarco UK Limited</i>	✓	✓	✓		136	1.1%	Yes
29	<i>System Automation Monitoring Limited</i>	X	✓	X		51	0.4%	No
30	<i>The New Motion EVSE Ltd T/A The New Motion</i>	✓	✓	✓		165	1.3%	Yes
31	<i>Workplace Charging Ltd t/a Anglia Car Charging</i>	X	✓	X		70	0.6%	Yes
Totals		6	31	11		3440	28%	13

Table 44: Top 31 suppliers invited to interview

7.3 Appendix C – Supplier Information

7.3.1 Supplier History and Coverage

	Active in UK Workplace Charging Since	UK Coverage
Amp EV	2017	UK wide
Anglia Car Charging	2018	East of England
Clenergy EV ⁴³	Early 2020	UK wide
Earth Electrical (Southern)	2015	South of England
Elecology	2018	Mostly England, although minority of sites in Scotland and Wales, no NI.
Elmtronics	2016	UK wide
EV Charging Solutions	2014	England and Wales
Ground Control	2018	UK wide
Jorro	2017	Scotland
Swarco	2016	UK wide
The New Motion	Late 2017	Yes
The Phoenix Works	2017	England, Scotland, Wales

Table 45: Interviewed suppliers - coverage and history

7.3.2 Supplier Interview Questions

The following list gives the interview questions asked of suppliers. At the outset the interviewee was reminded to answer for the company's workplace charging activities only.

- Company information:
 - Company name
 - Active UK regions
 - Date active since
- Install statistics:
 - Are you able to share statistics of installations? Preferably number of sockets, locations, customers year on year.
 - Can you estimate the number of installations (sockets, locations, customers) which have been funded by the Workplace Charging Scheme?
 - Do you have any data or can you estimate the percentage of parking spaces that you provide workplace charging infrastructure for? Give a range or an average if possible. Does this vary between WCS funded and non-funded installations?
- Implementation:

⁴³ Note that Clenergy EV were not one of the top 31 suppliers but volunteered for interview in response to an open invitation from Cenex on LinkedIn.

A review of the UK's workplace EV charging sector

- Do you provide future proofing for your installations?
- What charging hardware do you install? (AC/DC; 7 kW, 22 kW, 50 kW+)
- Do you provide load management systems with your deployments?
- Customer and use case:
 - What is the typical use case for your customers installations? (The term “workplace” charging can cover charging for fleet vehicles, staff vehicles and visitors)
 - What size businesses are your customers? Give a proportion of each if possible. (Small <100 employees; Medium 100-900 employees; Large > 1000 employees)
- Commercial
 - What is the standard business model you offer your customers, and do you offer any alternative models?
 - Are you able to provide data on costs for your installations, giving indicative costs (a range and average) for hardware; civils; electricals; labour; DNO costs if possible?
- Feedback:
 - Are there any limitations of the WCS scheme that you would like to feedback on?
 - What are the barriers to workplace charging deployments?
 - Do you have any general suggestions on measures that could be implemented to support workplace charging deployments?
 - What do you think of the upcoming changes to regulation for a minimum amount of charging infrastructure in car parks?

7.3.3 Supplier Responses

Supplier responses on number of workplace charging installs is given in Table 46:

Source	Total workplace Installations	WCS installations	% of installations that are WCS funded		
	Supplier data	OZEV dataset 1, extrapolated ⁴⁴ .	Estimated from data ⁴⁵	Supplier estimate	Final estimate
Amp EV	285	168	59%	N/A	59%
Anglia Car Charging	Not provided	120	N/A	Not estimated	N/A
Clenergy EV ⁴⁶	Data not provided				
Earth Electrical (Southern)	Not provided	122	N/A	Not estimated	N/A
Elecology	Not provided	113	N/A	"Insignificant number of installs not WCS funded". (i.e. ~100%)	100%
Elmtronics	1259	672	53%	75%	53%
EV Charging Solutions	Not provided	250	N/A	95%	95%
Ground Control	Not provided	142	N/A	80-90% are WCS funded.	85%
Jorro	240 workplace chargepoints since start in 2017 to November 2021	175 sockets	49% ⁴⁷	75%	49%
Swarco	Not provided	248	N/A	Not estimated	N/A
The New Motion	250 in 2021.	11 sockets in 2021. 301 sockets overall.	2021 numbers not representative of The New Motion WCS sockets for all years (estimated number 301) and therefore not estimated.	Unsure	N/A
The Phoenix Works	Estimate of 731 sockets up to end of	188 sockets	26%	Not estimated as good data	28%

⁴⁴ Of the 21,417 sockets in dataset 1, 9,683 (45%) either did not appear in dataset 2 at all or did not have a supplier attributed in dataset 2. Therefore, the traceable socket numbers from dataset 1 are extrapolated to estimate the number installed by a particular supplier.

⁴⁵ Where the supplier has given data on number of chargepoint devices rather than sockets, an assumption of 1.5 sockets per device is made unless further information is given as to the proportion of single and twin outlet chargepoints installed (e.g. The New Motion install their own equipment which is all single socket)

⁴⁶ Note that Clenergy EV were not one of the top 31 suppliers but volunteered for interview in response to an open invitation from Cenex on LinkedIn.

⁴⁷ Assuming 1.5 sockets per installation.

A review of the UK's workplace EV charging sector

Source	Total workplace Installations	WCS installations	% of installations that are WCS funded		
	Supplier data	OZEV dataset 1, extrapolated ⁴⁴ .	Estimated from data ⁴⁵	Supplier estimate	Final estimate
	September 2021			provided	

Table 46: Supplier Workplace Charging Installation Data

Supplier responses on customer type and use case; typical infrastructure and scale for workplace charging is shown in Table 47.

	Customer Type and Use Case	Charging Infrastructure	Scale
Amp EV	<p>Equal split between small, medium and large businesses.</p> <p>Estimated 45% of installations for staff vehicles, 45% for home-based fleet vehicles and 10% for depot-based fleet vehicles.</p>	<p>Vast majority is AC, with 80% 7 kW and 20% 22 kW.</p> <p>The cost increment for DC puts customers off.</p>	Typically three dual socket 7 kW outlets.
Anglia Car Charging	Mainly deploying for SMEs, use case not specified	Mostly 7 kW AC chargepoints	2-4% of parking spaces but increasing.
Clenergy EV	A mixture of all use cases for all business sizes	AC only, typically 22 kW	6-10 sockets typically
Earth Electrical (Southern)	Staff charging for small businesses	AC only, combination of 7 and 22 kW	2 sockets only typically
Elecology	<p>Two distinct customers;</p> <ul style="list-style-type: none"> Small businesses (majority) Some larger deployments for large corporates. <p>Staff vehicle charging for both cases.</p>	AC only, 22 kW by default but 7 kW if power is limited	<p>Depends on customer:</p> <ul style="list-style-type: none"> 1 or 2 chargepoints for small businesses Large numbers for large customers.
Elmtronics	<p>Split internally into two businesses:</p> <ul style="list-style-type: none"> SMEs (all fleet, staff and visitor use cases) Large customers (public sector and logistics) – fleet use case. 	<p>AC charging only for staff, predominantly for fleets and visitors</p> <p>Some DC charging for visitor use case and fleets for operational flexibility.</p>	<p>History:</p> <ul style="list-style-type: none"> Start (2014) – 1 chargepoint typical 2 years ago – 3 to 5 chargepoints more typical Present – 5-10 normal, running into power supply limitations.
EV Charging	Mainly charging	Majority is AC (7 or	Typically 4 sockets but

A review of the UK's workplace EV charging sector

	Customer Type and Use Case	Charging Infrastructure	Scale
Solutions	infrastructure for management staff and a small number of fleet installations.	22 kW depending on site power supply, prefer to do 22 kW and load balance if possible.	range is 1-10.
Ground Control	<ul style="list-style-type: none"> All three use cases (staff, visitors, fleet) 50% medium businesses, 20% large, 30% small. 	Majority is AC but DC starting to gain more interest from larger workplaces, especially for commercial fleet vehicles.	From 2 sockets up to 56 sockets. On average 4-6 sockets per site but increasing interest for larger installations.
Jorro	Not answered	Mostly 7 kW AC, but some semi-rapid DC (22-40 kW)	Max 10% of parking places are provided with EV charging.
Swarco	<ul style="list-style-type: none"> Combination of use cases Estimated 40% small; 30% medium; 30% large companies. Greater number of large customer enquiries fall through. 	Almost entirely 7 or 22 kW AC. 7 kW typically more appropriate.	Between 4 and 8 sockets typically.
The Motion New	Customers are often looking at provision for staff, visitors and fleets as well as home-based charging with compensation.	AC only. 7 or 22 kW depending on whether the supply is single or three phase.	<p>Average of 2-4 chargepoints mostly but transitioning to more major deployments.</p> <p>Customers are becoming more intelligent and looking to fulfil the business's requirements for electrification rather than just "ticking a box".</p>
The Phoenix Works	<ul style="list-style-type: none"> 85% small to medium businesses. Primary use case is staff vehicles, but also doing some fleet deployments. 	<p>Majority AC – 7 or 22 kW depending on customer requirements.</p> <p>Small numbers of DC semi-rapid wallboxes deployed.</p>	<p>Historically an average of 4 sockets per site. Recent enquiries are considering larger deployments.</p> <p>Lower numbers of sockets tend to be staff/visitors whereas bigger installs tend to be for fleets.</p>

Table 47: Suppliers' use case, technology and scale

Supplier responses on approaches to future proofing are given in Table 48:

Supplier Approach to Future Proofing	
Amp EV	"We provide a software-based load management system included

		Supplier Approach to Future Proofing
		as a standard feature with the platform. Dynamic load <i>management is possible.</i> "
Anglia Car Charging		"The discussion [about future proofing] is always had with customer. Future proofing for civils is common but less so for distribution equipment. <i>Load management is essential.</i> "
Clenergy EV ⁴⁸		"[The approach to future proofing] really depends on the customer. Larger customers are more aware of the need [to] consider a longer term strategy. Load management is offered and explained to the customer."
Earth (Southern)	Electrical	"Depends on customer's interest and budget. Would discuss this normally with customer." Load management not discussed.
Elecology		"We offer [future proofing] to all commercial customers as a consultative process. Customers often opt for a larger distribution board which can support more chargers in the future but passive provision for civils is less common. Do not upgrade or provide new DNO connections. Load management is offered and depends on the customer's requirements. Becoming increasingly more important, especially when DNO approval is going to be a barrier."
Elmtronics		"Yes, future proofing is a core message and is achieved by use of OCPP chargepoints, load balancing (all offered hardware is capable of load balancing), civils and electricals as part of a wider <i>consultancy service.</i> "
EV Solutions	Charging	"Yes. We ask for day 1 requirements and plans for the future and oversize supply and electrical distribution as well as civils if necessary. More commonly taken up by larger customers with larger sites."
Ground Control		"Yes we offer future proofing. Some customers want a 3-phase deployment. Examples include oversizing supplies to boards for future; terminating duct runs with drawpits and even full civil passive provision. Can also support upgrading power supply from DNO. <i>Load management is also offered and depends on the customer's needs.</i> "
Jorro		"Yes, future proofing is offered. 95% of installations are using existing power supplies. Static load management is used where necessary and dynamic is becoming increasingly common, currently used in 10-20% of installations"
Swarco		"Yes. We look at the electrical supply and work with the customer define their strategy if possible. Becoming more and more relevant. Load management is offered, Q4 2021 has seen a significant

⁴⁸ Note that [Clenergy EV](#) were not one of the top 31 suppliers, but volunteered for interview in response to an open invitation from Cenex on LinkedIn.

Supplier Approach to Future Proofing	
	increase in the demand for load management.”
The New Motion	<p>“Often have long discussions with customers, both for electrical supply and infrastructure. With customers now doing larger deployments on day 1, the discussion becomes less relevant.</p> <p>The New Motion equipment is capable of static load management as standard, a few customers do opt for dynamic load management and this is increasingly the case.”</p>
The Phoenix Works	<p>“The idea is often initiated by TPW, although it is not all that common that customers opt for future proofing, although it is becoming something that is done more commonly. Larger corporations thinking about this when they have a planned strategy for fleet electrification.</p> <p><i>95% of deployments have dynamic load management.</i>”</p>

Table 48: Supplier Future Proofing Responses

7.3.4 Supplier WCS Feedback

Supplier feedback on the WCS scheme are included in Table 49:

	Support for WCS
Anglia Car Charging	No limitations identified
Clenergy EV	No limitations identified
Earth Electrical (Southern)	No limitations identified
Elecology	<p>“Broadly works well, easy to claim for the supplier as most of the onus is on the customer. Acceptance for payment is quick.</p> <p>Happy with grant amount and number of sockets that can be claimed, especially given that umbrella organisations can use their lower level companies to access their own 40 sockets.”</p>
EV Charging Solutions	<i>“The application and claim process works well.”</i>
The New Motion	No limitations identified

Table 49: Supplier support for WCS

7.4 Appendix D – Workplace Charging TCO Assumptions

7.4.1 Assumptions common to both use cases:

- Medium infrastructure costs scenario (mid-point values from Table 12, excluding any DNO costs)

7.4.2 Fleet use case assumptions:

- 7-year vehicle life replacement cycle;
- Costs:

	Medium Car		Medium Van		Large Van	
	Diesel	BEV	Diesel	BEV	Diesel	BEV
Purchase Cost (excluding grant)	£22,548	£30,750	£30,510	£41,344	£35,628	£70,680
Grant	£0	£1,500	£0	£5,000	£0	£5,000
Predicted residual value						
5,000 miles per year	£5,298	£9,703	£6,957	£6,801	£5,772	£13,677
15,000 miles per year	£4,209	£7,770	£5,328	£5,551	£4,590	£10,720
25,000 miles per year	£3,151	£5,874	£3,808	£4,298	£3,439	£7,886
Maintenance (annual)						
5,000 miles per year	£1,537	£929	£1,731	£1,220	£1,668	£1,591
15,000 miles per year	£4,610	£2,786	£5,193	£3,660	£5,003	£4,773
25,000 miles per year	£7,684	£4,644	£8,654	£6,099	£8,338	£7,955
Vehicle Excise Duty (annual)	£1,110	£0	£1,925	£0	£1,925	£0

Table 50: Fleet vehicle costs, diesel and BEV

- Vehicle efficiencies (accounting for charging losses): 3.1 miles/kWh (medium car); 2.3 miles/kWh (medium and large van). All based on data captured from Cenex research and consultancy projects, accounting for charging losses.
- Diesel fuel cost £1.13 per litre (ex-VAT, 12-month average price⁴⁹);
- Assumes one vehicle per chargepoint.

7.4.3 Staff/visitor fixed value assumptions:

- 10-year product lifetime;
- Charging infrastructure available 10 hours per day (e.g. 08:00-18:00), five days per week;
- Average charging power delivered 7 kW (this is an assumed average value - accounts for mixed use with 22 kW chargepoint usage by newer EVs with three-phase 11 kW charging capability and lower power (~3 kW) charging of PHEVs)

⁴⁹ [Compare latest petrol and diesel fuel prices | The AA](#)

7.5 Appendix E – Parking Policies Full Information

7.5.1 EU

EPBD 2018

In July 2018, the revised EU Energy Performance of Buildings Directive (EPBD) ([EU directive 2018/844](#)) came into force. This sets minimum requirements for electric vehicle charging infrastructure for car parks associated with both residential and non-residential buildings, whether they are classed as new developments or major renovations, or as existing stock. Although the UK has since left the EU, both the UK and Scottish governments have stated that it is in the national interest to follow the EU's approach to legislation and policy on this matter in order to support the transition to EVs.

With regards to new or major renovations of non-residential buildings with more than 10 parking spaces, this mandates that:

“Member States shall ensure the installation of at least one recharging point... and ducting infrastructure, namely conduits for electric cables, for at least one in every five parking spaces to enable the installation at a later stage of recharging points for electric vehicles where:

(a) the car park is located inside the building, and, for major renovations, renovation measures include the car park or the electrical infrastructure of the building; or

(b) the car park is physically adjacent to the building, and, for major renovations, renovation measures include the car park or the electrical infrastructure of the car park.”

With regards to existing non-residential buildings, it mandates that: “Member States shall lay down requirements for the installation of a minimum number of recharging points for all non-residential buildings with more than twenty parking spaces, by 1 January 2025.”

EPBD Draft Proposal 2021

On 15th December 2021, a new proposal was released for a revision to the EPBD. This was as part of the EU's “Fit for 55” package, a series of legislative proposals to make its policies fit for delivering the updated 2030 greenhouse gas emissions net reduction target of 55% below 1990 levels, as set out in the 2030 Climate Target Plan and written into the European Climate Law.

Within Article 12 on infrastructure for sustainable mobility, it proposes more ambitious requirements for chargepoint provision in the car parks of non-residential buildings than the 2018 version.

With regard to new non-residential buildings and non-residential buildings undergoing major renovation, with more than five parking spaces,

“Member States shall ensure:

(a) the installation of at least one recharging point;

(b) the installation of pre-cabling for every parking space to enable the installation at a later stage of recharging points for electric vehicles;

and (c) at least one bicycle parking space for every car parking space;

Where the car park is physically adjacent to the building, and, for major renovations, renovation measures include the car park or the electrical infrastructure of the car park.

Member States shall ensure that the pre-cabling is dimensioned so as to enable the simultaneous use of the expected number of recharging points.

By way of derogation from the first subparagraph, point (a):

For new office buildings and office buildings undergoing major renovation, with more than five parking spaces, Member States shall ensure the installation of at least one recharging point for every two parking spaces.”

And the scope for existing buildings, i.e. All non-residential buildings with more than twenty parking spaces:

“Member States shall ensure:

The installation of at least one recharging point for every ten parking spaces, and at least one bicycle parking space for every car parking space, by 1 January 2027.

In case of buildings owned or occupied by public authorities, Member States shall ensure pre-cabling for at least one in two parking spaces by 1 January 2033.”

7.5.2 England

From July to October 2019, HM Government ran a consultation titled [“Electric vehicle charging in residential and non-residential buildings”](#) to gather feedback on proposed changes to the national building regulations. In November 2021, DfT released a [consultation response](#) to this piece, addressing responses to questions proposed in the initial consultation and outlining the regulations to be passed as legislation in 2022.

The confirmed policy position for minimum provisions relevant to workplace charging are shown below:

- New non-residential buildings with more than 10 parking spaces within the site boundary of the building to have a minimum of one chargepoint and in addition, cable routes for electric vehicle chargepoints in one in five of the total number of spaces.
- Every non-residential building undergoing a major renovation, with more than 10 parking spaces within the site boundary of the building after the renovation is complete, to have a minimum of one chargepoint and in addition, cable routes for electric vehicle chargepoints in one in five of the total number of spaces.

This is in line with the EPBD 2018 requirements.

As a minimum, council planning policy specific to EVs must follow these planning requirements when they are passed into law. However, these requirements are a baseline that workplaces can work from.

There will be an adjustment period of no less than six months where if properties which have their initial building notices or full plans deposited will not be legally required to meet the new regulations. Properties that have their plans submitted in this period must start building works no later than 12 months after the legislation comes into force.

There are two main stated exemptions to be introduced for this policy, which are:

- Where the cost of installing EV infrastructure exceeds 7% of the total cost of the major renovation of the building.
- For enclosed or open-sided car parks (e.g., basements, those below buildings and multi-stories), the chargepoint requirements do not apply, however cable route requirements should still be met.

For existing non-residential parking, within the same consultation the Government had proposed the following policy position:

- One chargepoint in existing non-residential buildings with more than 20 parking spaces.

However, an alternative policy is under development due to concerns raised in the consultation about how its blanket approach would disproportionately impact charities and small businesses; whilst not being ambitious enough for larger sites.

As a result, England does not currently have a confirmed (or even proposed) legislative position for minimum charging infrastructure requirements in existing non-residential buildings with 20+ spaces. As such, in this regard England is out of step with the EPBD 2018.

7.5.3 Scotland

On 23rd July 2021, the Scottish Government launched its 12-week consultation titled "[Building regulations - energy standards and associated topics - proposed changes: consultation](#)". This proposed several amendments to the existing regulations set out in "The Building (Scotland) Regulations 2004", and those of most relevance to workplace charging are set out in Part 7 – Electric Vehicle Charging Infrastructure. Changes arising from proposals in this section are stated as being subject to further development and implementation during 2022.

If the proposed changes do become enshrined in law, new non-residential buildings or non-residential buildings undergoing major renovations, with ten or more parking spaces will require:

- One in two parking spaces to have ducting for future chargepoint installation
- One in ten spaces to have a chargepoint socket (min 7 kW).

An exemption will apply if the cost of installing recharging and ducting infrastructure exceeds 7% of total major renovation cost.

This is more ambitious than the EPBD 2018 minimum requirements for these classes of buildings. Scotland has also outlined a proposed position as the EPBD 2018 asked of its member states for existing buildings with more than 20 spaces.

By 1 January 2025, the same requirements as above will also apply to existing buildings, but only those with more than 20 non-residential car parking spaces, i.e.:

- One in two parking spaces to have ducting for future chargepoint installation
- One in ten spaces to have a chargepoint socket (min 7 kW).

These requirements are due to have the same applicability as the 2018 EU directive:

- The car park is located inside the building and, for major renovations, renovation measures include the car park or the electrical infrastructure of the building; or
- The car park is physically adjacent to the building, on land under the same ownership and, for major renovations, renovation measures include the car park or the electrical infrastructure of the car park.

7.6 Appendix F – Parking Policy Impact Methodology

To assess the impact of the proposed regulations for non-residential buildings throughout the UK, the methodology laid out in the [DfT's Impact Assessment \(IA\) for new developments and major renovations in England](#) has been followed to determine the number of workplace car parks that could be impacted by the proposed regulations. From this, numbers of chargepoints (active provision) and spaces with cable routing (passive provision) could be estimated.

'Workplace car parks' for the purpose of this IA are non-publicly accessible car parks attached to workplace buildings.

The number of chargepoint installations is estimated using the following steps:

- (a) Estimating the number and sizes of workplace car parks in the UK.
- (b) Determining the proportion of these which are in England, Scotland, Wales and Northern Ireland.
- (c) Estimating the proportion of these which are attached to a building.
- (d) Assuming an annual percentage of these which will be converted to a new development or undergo a major renovation.
- (e) Estimating the number of chargepoint installations and spaces with ducting installed for new/majorly renovated workplace car parks across the UK based on the relevant regulation for scenarios 1, 2 and 3.
- (f) Estimating the number of chargepoint installations and spaces with ducting installed for existing workplace car parks across the UK based on the relevant regulation for scenarios 2 and 3.

- (g) Determining the impact through to 2035 for scenario 1 from (e) and for scenarios 2 and 3 by summing the annual installation tallies for (e) and (f).

To determine (a) and (b), the following assumptions are taken from the DfT IA unless otherwise stated:

- The number of workplace car parks in each nation can be determined from:
 - Assuming single person vehicle occupancy.
 - Calculating number of car commuters by nation from employment/commuter data for England, Scotland and Wales from the [National Travel Survey](#).
 - Calculating number of car commuters in Northern Ireland from employment/commuter data from [2011 Census/ Travel Survey for Northern Ireland](#).
 - 70% of car commuters park in a workplace car park.
 - 93% of workplace car parks have 10 or more spaces and consequently, 7% have fewer than 10 spaces.
 - Each workplace car park of 10 or more spaces has exactly 50 spaces.
 - Each workplace car park of 10 or fewer spaces has exactly 6 spaces.

To determine (c), the following assumption is made:

- All workplace car parks have an attached building, i.e., the workplace itself.

To determine (d), the following assumption is made:

- 1% of the car park stock would be new/majorly renovated each year.

To determine (e), the following assumptions are made:

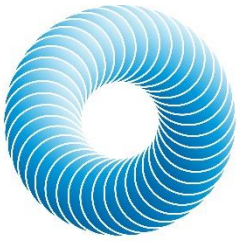
- New/major renovation regulations are in place for 2022 and apply each year through to 2035
- For all three scenarios, the policy requires a minimum of one active chargepoint rather than a minimum number of spaces. Therefore, the previously applied assumption that businesses will deploy an equal number of single and dual-outlet chargepoints (due to insignificant incremental cost for dual outlets), resulting in 1.5 sockets per chargepoint, has been used.
- Scenario 1
 - All new and major renovations of non-residential buildings, with more than 10 parking spaces within the site boundary of the building, to have a minimum of one charge point and in addition to this, cable routes for one in five of the total number of spaces.
 - It is assumed in this instance that the one active chargepoint space is in addition to any passive spaces.
 - Workplace car parks of 50 spaces following this regulation would require provision of one active chargepoint and ten spaces with passive provision.
- Scenario 2
 - For buildings with more than 10 non-residential car parking spaces, 1 in every 2 non-residential parking spaces to have ducting installed and 1 in every 10 non-residential parking spaces to provide an EV charge point socket with minimum 7kW output power rating.
 - It is assumed in this instance (and in all instances hereafter) that the active provision is included within the number of spaces with ducting installed.
 - Workplace car parks of 50 spaces following this regulation would require provision of five active chargepoints and 20 spaces with passive provision.

A review of the UK's workplace EV charging sector

- Scenario 3
 - For new office buildings and office buildings undergoing major renovation, with more than five parking spaces, Member States shall ensure the installation of at least one recharging point for every two parking spaces. As well as the installation of pre-cabling for every parking space to enable the installation at a later stage of recharging points for electric vehicles.
 - All workplaces are assumed to be office buildings.
 - Workplace car parks of 50 spaces following this regulation would require provision of 25 active chargepoints and 25 spaces with passive provision.
 - Workplace car parks of 6 spaces following this regulation would require provision of three active chargepoints and three spaces with passive provision.

To determine (f), the following assumptions are made:

- Scenario 2
 - By 1 January 2025, for buildings with more than 20 non-residential car parking spaces, 1 in every 2 non-residential parking space to have ducting installed and 1 in every 10 non-residential parking space to provide an EV charge point socket with minimum 7kW output power rating.
 - Workplace car parks following this regulation would require provision of five active chargepoints and 20 spaces with passive provision.
- Scenario 3
 - All non-residential buildings with more than twenty parking spaces require installation of at least one recharging point for every ten parking spaces... by 1 January 2027. In case of buildings owned or occupied by public authorities... shall ensure pre-cabling for at least one in two parking spaces by 1 January 2033.
 - For the purposes of this analysis, this pre-cabling requirement is applied to all workplace car parks of sufficient size (20+ spaces). This was deemed to be reasonable since it is a similar requirement as proposed for Scotland, i.e., applied in scenario 2.
 - Workplace car parks of 50 spaces following this regulation would require provision of five active chargepoints and 20 spaces with passive provision.
- In the lead up to the year of mandate for these proposed existing building regulations, X years' worth of 1% new and major renovations of buildings (from (d)) will have replaced existing buildings. These have been discounted from the tally of chargepoint provisions for existing non-residential buildings.
- Adherence to the existing building regulations is applied linearly from 2022 up until the year of mandate, e.g., if by 2025, X buildings must conform then X/3 buildings will achieve compliance by installing the required infrastructure for each of the three years leading up to this (2022, 2023 and 2024).



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