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ADR-W-22-006 Electric Vehicle Charging
Points Policy Proposals - Cost Benefit
Analysis - Assumptions Report

Prepared by Adroit Economics and PRP

For and on behalf of

Welsh Government

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1. Introduction

- 1.1 This document sets out the approach, methodology, assumptions and results of the cost-benefit modelling exercise.

2. Policy Objectives

2.1 The Task Request set out the following background and objectives.

Background

2.2 Llwybr Newydd, our Wales Transport Strategy published in 2021, sets out how we will address the impact that transport is having on our environment. The climate emergency is one of the biggest defining issues of our time and to achieve net zero by 2050 we need a radical change to the way we travel in Wales. We need fewer cars on our roads, and more people using public transport, walking or cycling and to implement our sustainable transport hierarchy.

2.3 Planning Policy Wales requires that development be directed towards sustainable locations and is designed to make it possible for everyone to make sustainable and healthy travel choices for their daily journeys.

2.4 Where cars are still necessary, we want to encourage the uptake of zero emission vehicles to reduce the impact on the environment and to improve the quality of that air we breathe. We published our Electric Vehicle Charging Strategy in 2021, setting out how we will work to meet the need for a significant increase in charging facilities across Wales to support the shift to zero emission vehicles.

2.5 We propose changes to the building regulations in Wales which will ensure that new homes and new non-residential buildings have the necessary charging points to support the shift to zero emission vehicles.

Proposals

2.6 We propose to require the following building types to install EV charge points, or cable routes.

The erection of new residential buildings

2.7 All new build homes must have electric vehicle charging facilities for each associated parking space that is equal to the total number of dwellings.

2.8 Where there are more than 10 dwellings, if there is more parking provision than dwellings then cable routes are to be installed in the spaces that do not have a charger.

Restrictions/limitations

2.9 The number of electric vehicle charge points that must be installed is the maximum number of electric vehicle charge points that it is possible to install at an average sum of £3600 or less for the connection cost of each electric vehicle charge point connection (“the £3600 cap”).

2.10 If the cost is set to exceed this on a dwelling, then cable routes for charge points must be installed in the associated parking spaces, but for the operation of the £3,600 cap.

- Where the new residential building has, or will have, associated parking that is situated within a covered car park, then cable routes for chargers must be installed
- Where there are fewer than ten dwellings, to the same number of corresponding dwellings
- Where there are more than ten dwellings, all spaces

Dwellings created by material change of use (COU)

2.11 All new dwellings created by COU with at least one associated parking space for the use of each such dwelling must have access to an electric vehicle charge point.

Restrictions/limitations

2.12 The COU must include work being done to

- a car park that is located within the site boundary of the building, where the nature of the work is such that it would be reasonable to expect that work to include enabling the requirements of paragraph S2 of Schedule 1 to be fulfilled;
- the electrical infrastructure of a car park or building, where that car park is located within the site boundary of the building
- The incoming electricity supply can accommodate the charge points. Where it cannot accommodate all charge points the maximum number that can be accommodated must be provided with cable routes for all other spaces.
- Where the new residential building has, or will have, associated parking that is situated within a covered car park, then cable routes for chargers must be installed
- Where there are fewer than ten dwellings, to the same number of corresponding dwellings
- Where there are more than ten dwellings, all spaces

Residential buildings undergoing major renovation work

2.13 Where a residential building undergoing major renovation will have more than 10 associated parking spaces after the major renovation is completed:

- at least one associated parking space for the use of each dwelling must have access to an electric vehicle charge point;
- cable routes for electric vehicle charge points must be installed in all additional associated parking space

Restrictions/limitations

2.14 The major renovation involves building work being done to a residential building which will have more than 10 associated parking spaces post renovation, which includes work being done to

- a car park that is located within the site boundary of the building, where the nature of the work is such that it would be reasonable to expect that work to include the EV charge points
- the electrical infrastructure of a car park, where the car park is located within the site boundary of the building;
- the electrical infrastructure of the building, where the car park is located inside the building
- where the required electric vehicle charge points cannot be accommodated within the incoming electrical supply to the building, the maximum number that can be accommodated and cable routes for electric vehicle charge points in all remaining associated parking spaces.
- the cost of installing all the required electric vehicle charge points and cable routes for electric vehicle charge points does not exceed 7% of the total cost of the major renovation

2.15 If the cost of installing the required electric vehicle charge points and cable routes for electric vehicle charge points exceeds 7% of the total cost of the major renovation cable routes for electric vehicle charge points must be installed in all associated parking spaces, except where the cost of that installation exceeds 7% of the total cost of the major renovation.

2.16 If the residential building is undergoing major renovation for the principal purpose of improving the fire safety of the external walls or roof of the building.

2.17 Where a residential building undergoing major renovation has, or will have more than 10 associated parking spaces, spaces outside of a covered car park must fulfil the requirements first and cable routes for electric vehicle charge points must be installed in all the associated parking spaces in the covered

car park. If all the associated parking spaces are situated in a covered car park, cable routes for electric vehicle charge points must be installed in all the parking spaces in the covered car park.

The erection of new buildings which are not residential buildings or mixed-use buildings.

- 2.18 Where a new building which is not a residential building or a mixed-use building has more than 10 parking spaces
- (a) one of those parking spaces must have access to one electric vehicle charge point; and
 - (b) cable routes for electric vehicle charge points must be installed in a minimum of one fifth of the total number of remaining parking spaces

Restrictions/limitations

- 2.19 If there are or will be any parking spaces situated in a position other than in a covered car park the requirements must first be applied in relation to those parking spaces first.
- 2.20 Then cable routes for electric vehicle charge points must be installed in a sufficient number of parking spaces in the covered car park in order to fulfil the requirements.
- 2.21 If all the parking spaces are situated in a covered car park, cable routes for electric vehicle charge points must be installed in a minimum of one fifth of the total number of those parking spaces.

Major renovation which are not residential buildings or mixed-use buildings.

- 2.22 If the building will have more than 10 parking spaces after the major renovation is completed, one of those parking spaces must have access to one electric vehicle charge point; and cable routes for electric vehicle charge points must be installed in a minimum of one fifth of the total number of remaining parking spaces

Restrictions/limitations

- 2.23 The major renovation involves building work being done to a residential building which will have more than 10 associated parking spaces post renovation, which includes work being done to
- 2.24 a car park that is located within the site boundary of the building, where the nature of the work is such that it would be reasonable to expect that work to include the EV charge points
- 2.25 the electrical infrastructure of a car park, where the car park is located within the site boundary of the building;
- 2.26 the electrical infrastructure of the building, where the car park is located inside the building
- 2.27 The cost of installing the required electric vehicle charge point and cable routes for electric vehicle charge points does not exceed 7% of the total cost of the major renovation. Where the costs exceed 7% cable routes for electric vehicle charge points must be installed in a minimum of one fifth of the total number of parking spaces, except where the cost of that installation exceeds 7% of the total cost of the major renovation.
- 2.28 If there are or will be any parking spaces situated in a position other than in a covered car park the requirements must first be applied in relation to those parking spaces first.
- 2.29 Then cable routes for electric vehicle charge points must be installed in a sufficient number of parking spaces in the covered car park in order to fulfil the requirements.
- 2.30 If all the parking spaces are situated in a covered car park, cable routes for electric vehicle charge points must be installed in a minimum of one fifth of the total number of those parking spaces.

Requirements

- 2.31 Preparing a green book compliant cost benefit analysis of the proposals.
- 2.32 Prepare a consultation and final impact assessment report

- 2.33 Costs and benefits should be estimated consistent with economic appraisal and RIA guidance and requirements. Where needed suitable sensitivity analysis should be conducted.
- 2.34 Comply with quality requirements and government guidance on modelling, including:
- The Green Book is guidance issued by HM Treasury on how to appraise policies, programmes and projects. The Green Book (2022) - GOV.UK (www.gov.uk)
 - Welsh Government Analysis and Modelling Guidelines document, based on HM Treasury’s “Aqua Book” <https://www.gov.uk/government/publications/the-aqua-book-guidance-on-producing-quality-analysis-for-government>; and
- 2.35 To complete the above the following may need to be considered/undertaken:
- Advising on/assisting with key inputs to the model, including:
 - Reviewing property types to be modelled
 - Completing technical specification work, for each option, where needed
 - Preparing/sourcing unit costs
 - Capital costs
 - Installation costs
 - Other adaptation costs
 - Operating costs (energy costs, maintenance costs)
 - Impact on replacement costs
 - Estimating and monetising benefits – e.g.
 - Energy savings.

3. Approach and Methodology

Overall approach

3.1 The overall objectives are to:

- identify, quantify and monetise the main costs of the policy proposals, to industry
- identify, quantify and monetise the main societal benefits
- to match the two together to identify if the benefits outweigh the costs, or if the policy is cost neutral, or if there is a net policy cost

3.2 This involves a two-step process:

- Estimating the costs and benefits for each element of the policy per dwelling type
- Scaling these per dwelling costs and benefits up, to the level of Wales and over the length of the appraisal period

Monetised Impacts Include

- Familiarisation costs, incurred by builders to familiarise themselves with the new processes for installing the relevant infrastructure.
- An expected cost saving (benefit) from requiring installation of charging infrastructure during construction at lower cost compared to retrofitting after construction.
- Material replacement costs, incurred by homeowners when components of the charging infrastructure require replacement.

Non monetised impacts include:

- Impacts on EV uptake and subsequent benefits – it is not possible to estimate exactly how many EV purchases will be brought forward as a result of implementing the policy, however evidence exists to suggest that availability and visibility of chargepoints contributes favourably to ULEV purchase decisions.
- Avoided disruption costs, which may be present during retrofit installations.

Policy Costs

3.3 The two policy proposals are costed separately, these are:

- EV charging points for residential buildings and change of use
- EV charging points for non-residential buildings

3.4 The analysis considers the cost of the policies on several different types of car parking space:

- Off street private parking
- Multi-occupancy – surface parking
- Multi-occupancy – underground parking
- Multi-occupancy – multi-storey

Appraisal period

3.5 The analysis considers the costs of a 10 year policy period – i.e. requiring new builds to install charging points for the next 10 years.

- 3.6 The appraisal period is 30 years to allow comparison with the counterfactual which models the cost of the voluntary retrofit of EV charging points by households which is expected to be a slower take-up.

Present value

- 3.7 All costs and benefits are presented in 2023 prices, in 2024 present values using discount rates for health and non-health impacts as set out in the Green Book.

4. Sequence of Calculations

4.1 Table 4.1 sets out the sequence of calculations undertaken and assumptions.

| Table 4.1: Cost Modelling Methodology | | | |
|---------------------------------------|----------------------------|---|--|
| Step 1 | Spec of buildings in scope | Agree buildings in scope | |
| Step 2 | | Agree new build and refurbishment rate per annum rates | |
| Step 3 | Appraisal period | Agree start date, price year, policy appraisal period and benefits appraisal period | 2024 start date, 30 year policy period |
| Step 4 | PV Discount rates | Health and non-health over 30-year period | As in Green Book |
| Step 5 | Building impacts | baseline specification for typical charging points | Taken from the England IA |
| Step 6 | | Estimate the proportion of dwellings with different types of car parking spaces | |
| Step 7 | | Define types of impacts on building design to be costed | Installation costs – uplift in component costs; new components Replacement costs Retrofit costs |
| Step 8 | | Unit costs | Taken from the England IA |
| Step 9 | | Define types of benefits to be assessed | Avoided retrofit costs – monetised Encourage electric car take-up – not quantified |
| Step 11 | Counterfactual | Estimate the proportion of buildings meeting requirements under the counterfactual and policy | Assume none install at point of build but gradually retrofitted by households |
| Step 12 | Transition | Agree transition assumptions | Standard assumptions for new-build housing |
| Step 13 | | Agree proportion of schemes that are exempt | none |
| Step 14 | | Familiarisation costs | |
| Step 15 | Scale up | See sequence of steps in 'Calcs_Mid Scenario' tab | |
| Step 16 | High and low scenarios | High/low estimates of benefits modelled | |

5. Assumptions – New Residential Dwellings

5.1 The proposals costed applies to new builds dwellings with associated car parking spaces. This has been calculated by estimating the number of new builds per annum, the type of dwellings and the proportion that have car parking spaces. These assumptions are set out below:

Number of new builds per annum

5.2 Table 5.1 shows the average number of new builds per annum in Wales over the 10 year period 2013-22. These figures have been used as the estimate of the number of new builds per annum throughout the policy period 2024-33

Table 5.1: Estimated Number of new builds p.a.

| | Annual new builds | Source |
|--------|-------------------|--|
| Houses | 4,720 | 10yr new build average (WG Statistics) |
| Flats | 1,245 | 10yr new build average (WG Statistics) |

5.3 In additional to new builds, the policy will also apply to new dwellings created as result of the change of use of an existing building. Statistics on change of use are not published in Wales, so the analysis applies the average rate as a % of new builds from English statistics.

Table 5.2: Estimated Change of Use Rates (as a % of new build p.a.)

| | Change of use | Source |
|---|---------------|----------------------------------|
| Number of dwellings created as 'change of use' as % of new buildings p.a. | 10% | England change of use statistics |

Dwelling Types

5.4 The type of new dwelling has an impact on the likelihood of the dwelling having a dedicated car parking space and the cost of installing EV charging point infrastructure. The analysis assumes that the proportion of new dwellings of each type is the same as the current stock profile, as set out below in Table 5.3.

Table 5.3: Dwelling types

| | Wales (all dwellings) |
|----------------------|-----------------------|
| Terrace | 25% |
| Semi detached | 21% |
| Detached | 32% |
| Flats | 23% |
| All Dwellings | 100% |

Source: Welsh Housing Conditions Survey

Types of car parking spaces

5.5 The analysis considers the costs of installing EV charging infrastructure for four different types of car parking space. Table 5.4 shows the car parking space types adopted for the cost modelling.

| Table 5.4: Car Parking Space Types |
|---------------------------------------|
| Off street private parking |
| Multi-occupancy – surface parking |
| Multi-occupancy – underground parking |
| Multi-occupancy – multi-storey |

5.6 The analysis uses data from the English Housing Survey to estimate the proportion of new dwellings with each type of car parking space. The data is set out in Table 5.5.

| Table 5.5: Proportion of Dwellings with Parking Space | | | | | | | |
|---|--------|------------------|---------------------------|-------------------------------|--------------------------------|------------|------|
| | Garage | other off-street | multi-occupancy - surface | multi-occupancy - underground | multi-occupancy - multi storey | No parking | |
| Terrace | 18% | 32% | n/a | n/a | n/a | 50% | 100% |
| Semi detached | 47% | 38% | n/a | n/a | n/a | 15% | 100% |
| Detached | 82% | 16% | n/a | n/a | n/a | 2% | 100% |
| Flats | 7% | 26% | 26% | 4% | 4% | 67% | 100% |

Source: English Housing survey 2018/19

6. Assumptions – Residential Charging Infrastructure Costs

Costs per Residential Parking Space

- 6.1 The analysis uses the costings produced by consultants, Steer, on behalf of DfT to estimate the infrastructure costs. Further details of the analysis can be found in the DfT Impact Assessment¹.
- 6.2 Costs were considered for different elements of the charging infrastructure.

Table 6.1: Elements of Charging infrastructure

| |
|----------------|
| Ducting |
| Cabling |
| Charging Point |

- 6.3 Costs are considered for both new build and retrofit. Low and High costs have been estimated for most of the costs. These costs are presented in 2023 prices.

Cost Assumptions – Ducting

- 6.4 Ducting is the conduit for routing cabling from the power supply to the charge point. These are either cable trays or subsurface trenches.
- 6.5 The difference in the cost between the low and high estimates is largely due to the amount of ducting required as a result of the distance from the power supply to the charge point.

Table 6.2: Cost to install Ducting per parking space – New Build

| | Low estimate | High estimate |
|--------------------------------|--------------|---------------|
| off street private | £38 | £192 |
| multi-occupancy - surface | £215 | £689 |
| multi-occupancy - underground | £77 | £230 |
| multi-occupancy - multi storey | £77 | £230 |

- 6.6 The main reason for the higher costs for retrofit, compared with new build, is the cost of civil works in surface car parks to trench and resurface. For other types of car parks lower cost options are available such as wall/ceiling mounted cabling.

Table 6.3: Cost to install Ducting per parking space – Retrofit

| | Low estimate | High estimate |
|--------------------------------|--------------|---------------|
| off street private | £38 | £192 |
| multi-occupancy - surface | £537 | £2,873 |
| multi-occupancy - underground | £192 | £575 |
| multi-occupancy - multi storey | £192 | £575 |

¹https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/104025/5/residential-charging-infrastructure-provision-final-impact-assessment.pdf

Cost Assumptions – Cabling

- 6.7 The cabling cost includes the cost of connecting the cable to the distribution board and the length of cable to the changing point.
- 6.8 The main cost differences for the cable between the power supply and the charge point is the length of cable and the electrical equipment required.
- 6.9 For off-street private parking that analysis assumes that only a single miniature circuit breaker in an existing distribution board is required. However, for multiple connections installed together multiple moulded case circuit breakers of different current ratings are required.
- 6.10 Grid connection costs can vary significantly by location. For multi-occupancy car parks, the low estimate is based on a larger transformer being required and the high estimate is for an additional transformer being installed.

Table 6.4: Cost to install Cabling per parking space – New Build

| | Low estimate | High estimate |
|--------------------------------|--------------|---------------|
| off street private | £77 | £498 |
| multi-occupancy – surface | £213 | £2,004 |
| multi-occupancy – underground | £245 | £2,206 |
| multi-occupancy - multi storey | £245 | £2,206 |

- 6.11 The high estimate for multi-occupancy car parks is based on a transformer needed to be replaced or an additional one built. For off-street private parking the analysis assumes that there is sufficient existing power capacity to supply the charge point.

Table 6.5: Cost to install Cabling per parking space – Retrofit

| | Low estimate | High estimate |
|--------------------------------|--------------|---------------|
| off street private | £499 | £1,991 |
| multi-occupancy – surface | £475 | £5,010 |
| multi-occupancy – underground | £555 | £5,516 |
| multi-occupancy - multi storey | £555 | £5,516 |

Cost Assumptions – Charging Point

- 6.12 The charge point hardware costs are based on a 7kW smart charge point.
- 6.13 Surface car parking is assumed to require a ground mounted charge point and other carparking is assumed to require a wall mounted charge point.

Table 6.6: Cost to install Charging Point per parking space – New Build

| | Low estimate | High estimate |
|-------------------------------|--------------|---------------|
| off street private | £592 | £592 |
| multi-occupancy - surface | £693 | £693 |
| multi-occupancy - underground | £611 | £611 |

| | | |
|--------------------------------|------|------|
| multi-occupancy - multi storey | £611 | £611 |
|--------------------------------|------|------|

6.14 The main reason for the higher cost of the retrofit charging points compared to new build in multi-occupancy parking is that economies of scale cannot be achieved through bulk buying hardware.

Table 6.7: Cost to install Charging Point per parking space – Retrofit

| | Low estimate | High estimate |
|--------------------------------|--------------|---------------|
| off street private | £592 | £592 |
| multi-occupancy - surface | £1,551 | £1,551 |
| multi-occupancy - underground | £1,138 | £1,138 |
| multi-occupancy - multi storey | £1,138 | £1,138 |

Replacement Costs

6.15 The costs and benefits of the policy proposals have been considered over a 30 year appraisal period. Replacement costs have been included to allow for on-going costs of the infrastructure. For the purpose of this analysis, replacement costs are assumed to be the same as the new build cost estimates.

Table 6.8: Frequency of replacement of EV charging infrastructure

| | lifespan of components |
|-------------------|------------------------|
| Ducting | 30 years |
| Cabling | 30 years |
| EV charging point | 10 years |

Source: generalised assumptions based on information provided in England IA

6.16 The running costs (e.g. electricity costs) have not been included because these costs will be associated with the charging of electric cars and the impact of the policy on electric car take-up has not been included due to a lack of evidence on the potential impact.

6.17 It is possible that the price of some EV charging points may fall over time as the product becomes more mature and more producers enter the market. However, the research has not identified any evidence specific to the charging points indicating that a reduction in price is likely. Therefore, we have assumed that the price remains constant throughout the appraisal period.

7. Assumptions – Counterfactual (Residential)

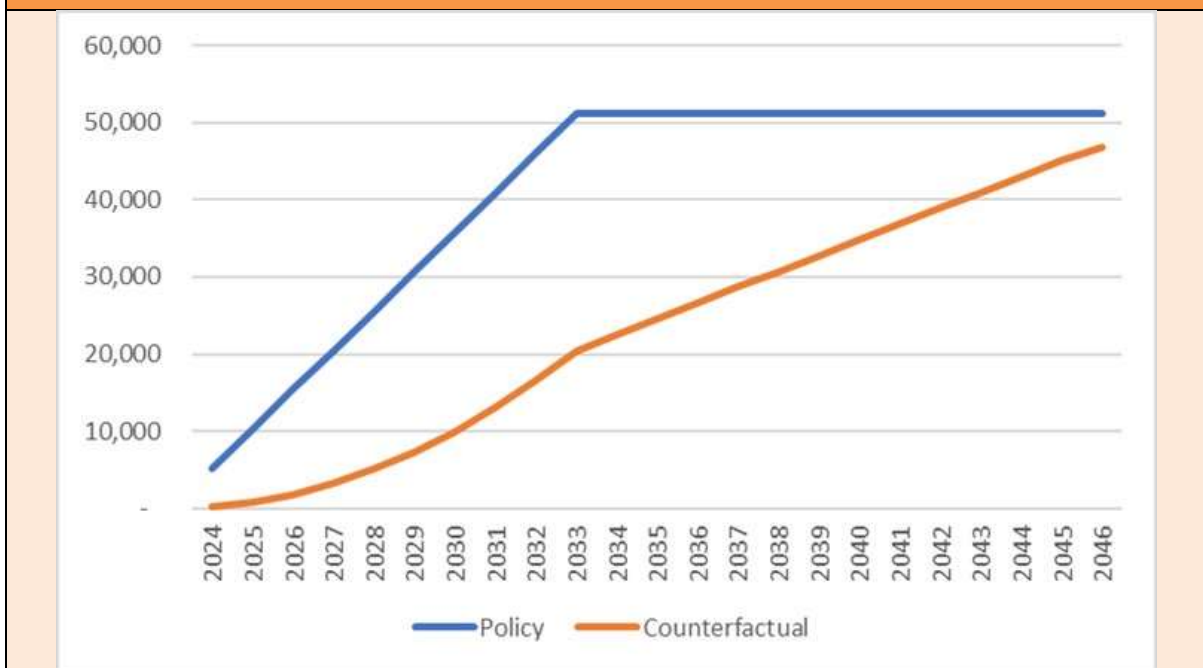
- 7.1 The analysis assumes that leaseholders, homeowners or building owners will retrofit charging points at an increasing rate over the next 30 years reflecting the increasing take-up of electric vehicles.
- 7.2 For residential charging points, the proportion of parking spaces retrofitted with charging units is capped at 91.5% to reflect the proportion of households that do not have a car and therefore will not need to retrofit a charging point.

Table 7.1: Counterfactual Assumptions – EV Charging Points

| | |
|--|--------|
| Proportion installing EV charging point as part of initial build | 0% |
| annual increase in proportion of new builds retrofitting EV charging units | 4% |
| cap on % of parking spaces retrofitted with EV charging units | 91.50% |

- 7.3 Figure 7.2 shows the estimated increase in the number of new car spaces installed with ducting, under the counterfactual and under policy, where the installations happen as part of the initial build.

Figure 7.2: Number of new car spaces installed with ducting – under the counterfactual and under policy



8. Assumptions - Familiarisation Costs (Residential)

8.1 Familiarisation costs are estimated using the same assumptions as used in the England IA and applying these to the estimated number of relevant employees in Wales.

| Table 8.1: Construction Professionals | | |
|--|-----|----|
| % architects, engineers, and construction managers read guidance | 10% | |
| Familiarisation time per person | 8 | hr |

| Table 8.2: Charge Point Installers | | |
|---|------|----|
| Charge Point Installers - % read guidance | 100% | |
| Familiarisation time | 2 | hr |

| Table 8.3: Employee Number and Average Hourly rates | | |
|--|------------------------------|-----------------------|
| | Number of employees in Wales | ASHE Hourly Rate 2021 |
| 2451 : Architects | 900 | £ 21.13 |
| 2455 : Construction project managers and related professionals | 2,600 | £ 17.59 |
| 3114 : Building and civil engineering technicians | 600 | £ 14.57 |
| Charge point installers | 100 | £ 15.15 |

Source: Annual Survey of Hours and Earnings (ONS); Annual Population Survey (ONS)

| Table 8.4: Employment On-Costs as a % of Salary | | |
|---|----------------|------------------------|
| | As % of salary | |
| On Costs | 18.20% | Source: ONS Statistics |

| Table 8.5: GDP Deflator | |
|-----------------------------------|--------------|
| | GDP Deflator |
| Adjust prices to 2019 (from 2021) | 0.944 |
| Adjust prices to 2023 (from 2019) | 1.149 |

Source: HMT GDP Deflator

9. Assumptions – Non-Domestic Buildings

9.1 The proposed policy applies to new and refurbished nondomestic buildings with more than 10 car parking spaces.

9.2 The number of new car parks associated with non-domestic buildings has been estimated using data about car ownership in Wales and applying an assumption based on the number of car parks per 1000 cars derived from data collected in England.

Table 9.1: Average Car Parking Size and parking spaces per 1000 cars

| | Average Car Park Size | Car Parking Spaces per 1,000 cars |
|-------------------|-----------------------|-----------------------------------|
| Private Car Parks | 50 | 435 |
| Public car parks | 171 | 92 |

Source: DfT England IA

9.3 Latest car ownership data indicates that there are 1,601,000 cars owned in Wales. Applying the metrics in the table above to car ownership levels in Wales indicates the following:

Table 9.2: Estimated number of car parks and car parking spaces in Wales

| | Car parking spaces | Car Parks |
|-------------------|--------------------|---------------|
| Private Car Parks | 696,832 | 13,937 |
| Public car parks | 146,506 | 857 |
| Total | 843,338 | 14,793 |

Source: Consultants Calculations

9.4 Assuming an annual increase of 1% p.a. indicates

Table 9.3: Estimated New Car Parks and Car Parking Spaces in Wales p.a.

| | Number of new/refurbished car parks |
|--------------------|-------------------------------------|
| Car Parks | 148 |
| Car Parking Spaces | 8,433 |

Source: Consultants Calculations

9.5 The number of charging points and ducting installations have been estimated based on the policy requirements of:

- 1 charging point per car park
- 20% of parking spaces to have ducting

Table 9.4: Estimated number of charging points and ducting required by policy p.a.

| | Number of new/refurbished car parks |
|-----------------|-------------------------------------|
| Charging points | 148 |
| ducting | 1,687 |

10. Assumptions - Costs per Non-Residential Parking Space

10.1 The analysis uses the costings produced by consultants, Steer, on behalf of DfT to estimate the infrastructure costs. High and Low estimates of costs for both installation at new build and retrofit of the infrastructure are included. Further details of the analysis can be found in the DfT Impact Assessment².

- The analysis assumes that new car parks are multi-occupied surface car parks.
- The cost of installing a charging point also includes cabling as well as a potential grid connection.
- The cost of cabling and ducting will vary depending on the distance between the charge point and the electricity supply.
- The range in the cost for grid connection depends on location and whether additional a larger transformer is required.

| Table 10.1: Cost per ducting and charging point installed (New Build) | | |
|---|--------------|---------------|
| | New Build | New Build |
| | Low Estimate | High Estimate |
| Ducting | £77 | £689 |
| Charging Point | £1,358 | £7,427 |

Source: Steer/DfT from England IA

10.2 The largest cost variation for ducting is due to the cost of trenching and for retrofitting (the cost of having to dig up and resurface roads).

| Table 10.2: Cost per ducting and charging point installed (Retrofit) | | |
|--|--------------|---------------|
| | Retrofit | Retrofit |
| | Low Estimate | High Estimate |
| Ducting | £192 | £2,873 |
| Charging Point | £1,885 | £9,434 |

Source: Steer/DfT from England IA

Replacement Costs

10.3 The costs and benefits of the policy proposals have been considered over a 30 year appraisal period. Replacement costs have been included to allow for on-going costs of the infrastructure. For the purpose of this analysis, replacement costs are assumed to be the same as the new build cost estimates.

| Table 10.3: Frequency of replacement of EV charging infrastructure | |
|--|------------------------|
| | lifespan of components |
| Ducting | 30 years |
| EV charging point | 10 years |

Source: generalised assumptions based on information provided in England IA

² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040263/Non-residential-charging-infrastructure-provision-final-impact-assessment.pdf

11. Assumptions – Counterfactual (Non Residential)

11.1 The analysis assumes that businesses will retrofit charging points at an increasing rate over the next 30 years reflecting the increasing take-up of electric vehicles.

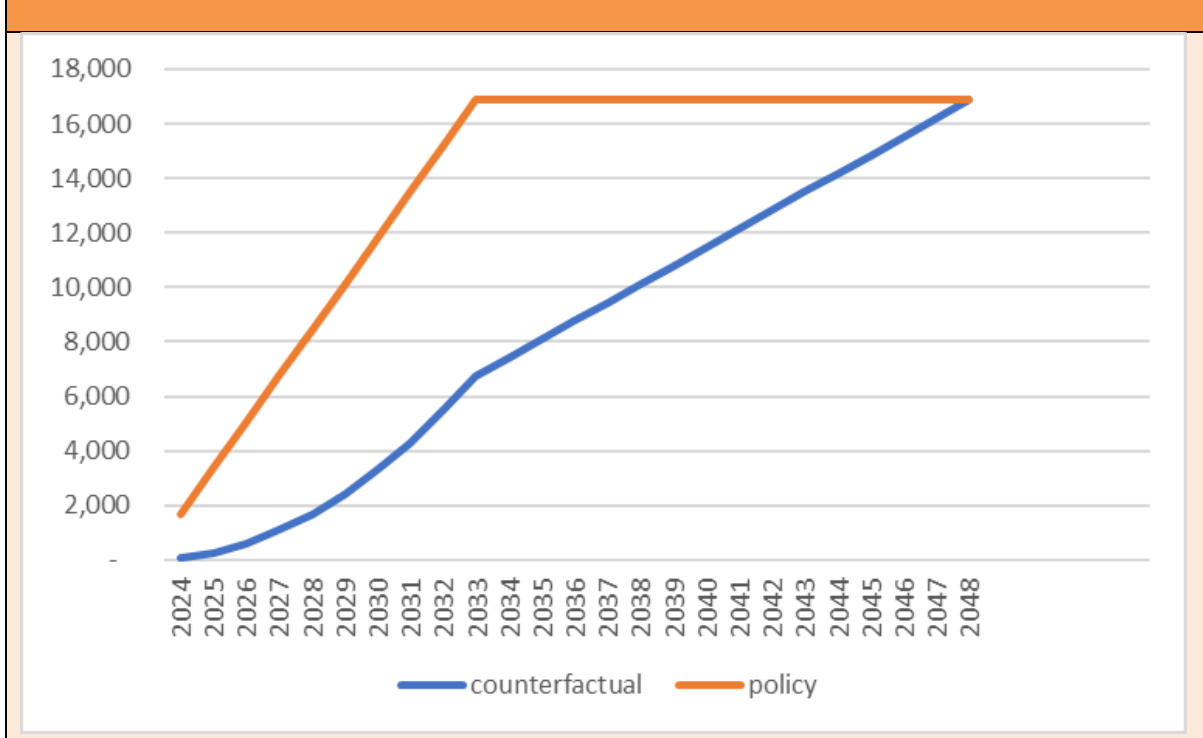
Table 11.1: Counterfactual Assumptions – EV Charging Points

| | |
|--|------|
| Proportion installing EV charging point as part of initial build | 0% |
| annual increase in proportion of new builds retrofitting EV charging units | 4% |
| cap on % of parking spaces retrofitted with EV charging units | 100% |

Source: England IA

11.2 Figure 7.2 shows the estimated increase in the number of new car spaces installed with ducting, under the counterfactual and under policy, where the installations happen as part of the initial build.

Figure 11.2: Number of new car spaces installed with ducting – under the counterfactual and under policy



12. Assumptions - Familiarisation Costs (Non-Residential)

| 12.1. Construction Professionals Familiarisation time | | |
|--|-----|----|
| % architects, engineers, and construction managers read guidance | 10% | |
| Familiarisation time per person | 3 | hr |

| 12.2: Charge Point Installers Familiarisation Time | | |
|--|------|----|
| Car Park Owners - % read guidance | 100% | |
| Familiarisation time | 2 | hr |

Source: England IA

| 12.3: Number of employees in Wales and Average Hourly Rate | | |
|--|------------------------------|-----------------------|
| | Number of employees in Wales | ASHE Hourly Rate 2021 |
| SOC 2451 : Architects | 900 | £ 21.13 |
| SOC 2455 : Construction project managers and related professionals | 2,600 | £ 17.59 |
| SOC 3114 : Building and civil engineering technicians | 600 | £ 14.57 |
| New Car Park Owners (assume same as annual new build) | 148 | £ 15.15 |

Source: Annual Survey of Hours and Earnings (ONS); Annual Population Survey (ONS)

| 12.4: On Costs as a % of salary rates | | |
|---------------------------------------|----------------|------------------------|
| | As % of salary | |
| On Costs | 18.20% | Source: ONS Statistics |

Source: Annual Survey of Hours and Earnings (ONS)

| 12.5: GDP Deflator to adjust prices from 2021 to 2019 | |
|---|--------------|
| | GDP Deflator |
| Adjust prices to 2019 (from 2021) | 0.944 |
| Adjust prices to 2023 (from 2019) | 1.149 |

Source: HMT GDP Deflator

13. Aggregate Costs

Residential

13.1 The central estimate is that the policy will result in a net policy benefit of £16.71m over a 30 year appraisal period.

| Table 13.1 | £m | £m | £m |
|-----------------------------------|---------|---------|----------|
| Costs | Low | Central | High |
| | 30yr PV | 30yr PV | 30yr PV |
| Familiarisation costs | £0.04m | £0.08m | £0.12m |
| Counterfactual installation costs | £45.92m | £76.75m | £107.59m |
| Policy installation costs | £45.03m | £59.97m | £74.90m |
| Net policy benefit | £0.84m | £16.71m | £32.57m |

Non-Residential

13.2 The central estimate is that the policy will result in a net policy benefit of £10.14m over a 30 year appraisal period.

| Table 13.2 | £m | £m | £m |
|-----------------------------------|---------|---------|---------|
| Costs | Low | Central | High |
| | 30yr PV | 30yr PV | 30yr PV |
| Familiarisation costs | £0.02m | £0.03m | £0.05m |
| Counterfactual installation costs | £4.80m | £25.30m | £45.80m |
| Policy installation costs | £4.07m | £15.12m | £26.17m |
| Net policy benefit | £0.71m | £10.14m | £19.58m |

14. Sensitivity Analysis

14.1 The policy option returns a positive NPV under each of the low, medium and high-cost scenarios. This analysis has assessed the sensitivity of the NPV of the policy option to two assumptions related to the future of charging points.

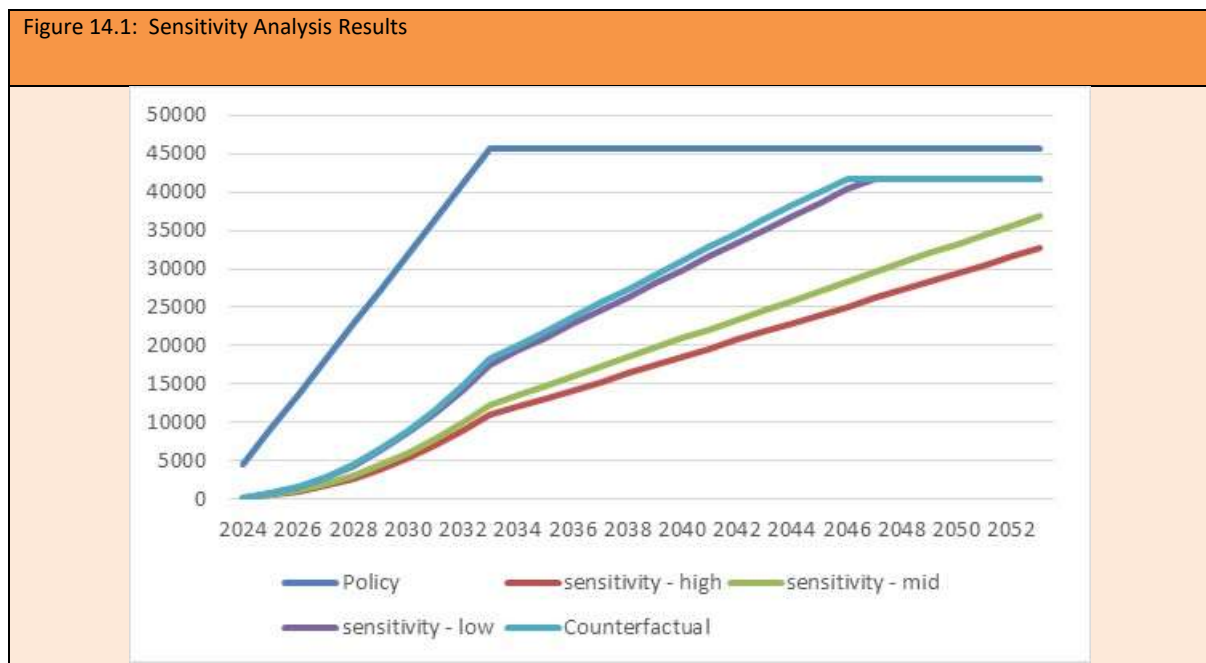
- The anticipated rate of retrofitted charging points under the counterfactual
- The potential reduction in the cost of installing charging points

14.2 The rate at which electric vehicles ownership increases over the next 10-20 years will dictate how many EV domestic charging points are installed. Slower adoption of charging points under the counterfactual would push costs further into the future and reduce the net present cost of installations.

14.3 The sensitivity analysis tests the reduction in the rate of increase required for the policy proposals to become cost neutral. The results are presented below.

- Counterfactual Assumption: assuming 92% of households will have installed EV charging points by 2046 (an annual increase of 4%)
- Low scenario – cost neutral. The low scenario would be cost neutral when the analysis assumes a one-year delay in reaching maximum deployment (92%) under the counterfactual (an annual increase of 3.85%)
- Mid scenario – cost neutral. The mid scenario becomes cost neutral when the analysis assumes 10% fewer homes will have installed EV charging points by the end of the appraisal period in 2053 (an annual increase of 2.7%)
- High scenario – cost neutral. The high scenario becomes cost neutral when the analysis assumes 20% fewer homes will have installed charging points by the end of the appraisal period in 2053 (an annual increase of 2.39%)

Figure 14.1: Sensitivity Analysis Results



14.4 The central assumption is that EV charging points have a fixed constant price over the appraisal period. The analysis has not found any direct references to the potential reduction in the price of installing EV

charging points. However, EV charging points are a relatively new technology with new products being introduced in recent years. Typically, as the market for new products mature, the prices can fall as more manufacturers enter the market and sales volumes increase.

- 14.5 As a result of this uncertainty we have tested the sensitivity of NPV to a 25% reduction in the price of EV charging points over the first 5 years of the appraisal period. Under this assumption, the NPV of the central option increases by 5%.