CATAPULT Energy Systems

Fleet TCO Report

Robin Koerner – Systems Engineer (Transport)

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	Name	Position
Author	Robin Koerner	Systems Engineer
Reviewer(s)	Lowri Williams	Transport Practice Manager
Approver	Fiona Twisse	Advisor WS&N

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Contents

1. Executive Summary

The Future Fleet project supports the UK freight sector's transition to electric heavy goods vehicles (eHGVs) by developing a detailed understanding of how HGV operations drive charging demand and how this demand can be managed more efficiently. The investigation outlined in this report builds on work delivered by Energy Systems Catapult and Baringa within the Future Fleet consortium. The Catapult led the development of fleet, duty cycle and charging location archetypes for the UK Power Networks area[1], while Baringa used those outputs to define representative depot archetypes and assess smart energy management schemes and business models[2]. These findings are now translated into a total cost of ownership analysis for representative eHGV fleet archetypes.

The transition to eHGVs presents both a financial and network challenge. Depot charging can create concentrated electricity demand, particularly for medium and large fleets, and unmanaged charging may increase connection requirements, infrastructure costs and exposure to higher electricity prices. The analysis therefore considers how depot scale, vehicle duty cycle, charging window and smart energy interventions affect payback, cumulative cash flow and emissions outcomes. This investigation applies those inputs within the pre-feasibility eHGV financial assessment tool to compare:

- baseline depot charging
- smart charging
- smart charging with battery energy storage
- and smart charging with battery storage and solar PV

The analysis shows that depot electrification is financially sensitive to fleet scale, charging profile and connection requirements. All four baseline eHGV depot cases achieve positive cumulative cash flow within the seven-year vehicle lifetime, but payback varies by archetype. The medium overnight depot shows the strongest baseline eHGV payback, while the medium overnight plus handover and large depot cases face higher upfront costs due to larger connection and infrastructure requirements.

Smart charging provides a consistent but modest financial benefit by reducing electricity cost assumptions. The most material improvement occurs when battery energy storage is added, particularly for depots with concentrated charging peaks. In the modelled results, smart charging with BESS gives the shortest eHGV payback across all depot archetypes, with the greatest improvement in the medium overnight plus handover case. This suggests that flexibility assets are most valuable where they reduce import capacity requirements and unlock additional revenue streams.

Adding solar PV on top of BESS provides additional emissions and energy resilience benefits, but it does not materially improve payback in the current model outputs. The carbon analysis indicates that switching from diesel to electricity is the dominant emissions reduction mechanism, with baseline eHGV operation reducing fuel-related emissions by

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[1] 'Fleet and Charging Location Archetype' report, Energy Systems Catapult, 2026
[2] 'Smart energy management schemes and business models' report, Baringa, 2026

approximately 74–77% across the depot archetypes. Solar PV provides a secondary carbon benefit, with the strongest relative impact in the small depot case where solar supplies a higher share of total energy demand.

The purchasing model also has a material effect on transition affordability. Leasing eHGVs shortens payback by reducing the initial vehicle capital expenditure, but also changes the ownership model, creating additional commercial considerations around residual value, contract flexibility, vehicle specification and end-of-term decisions.

Overall, the findings broadly reinforce Baringa's conclusions, that Smart charging should be considered a minimum enabling capability for depot electrification, while BESS appears to be the most material near-term TCO lever where it can reduce connection requirements and access additional revenues. Solar PV is more strongly linked to emissions reduction, energy resilience and longer-term price stability than short-term payback. The results support a trial focus on constrained medium or large depots, especially those with short, high-power charging windows where smart charging and BESS can demonstrate operational, financial and network value.

2. Introduction

Future Fleet is a project designed to support the transition of the UK freight industry to electric heavy goods vehicles (eHGVs) by identifying the most efficient, cost-effective, and grid-friendly approaches to charging. As operators move towards Net Zero, the significant power demands of eHGV charging risk placing pressure on local electricity networks, potentially driving up costs and requiring major infrastructure upgrades. Building on insights from the eFREIGHT 2030 project, Future Fleet develops a detailed, evidence-based understanding of how logistics operators use vehicles, where and when charging demand arises, and how it can be managed more effectively.

The project brings together UK Power Networks, Energy Systems Catapult, Baringa, Voltempo, Maritime and Voltloader to test and model practical solutions such as smart charging, shared infrastructure models and on-site energy generation and storage. By combining real-world fleet data with detailed geospatial network analysis, it aims to identify where demand will grow and how to minimise peak loads to avoid unnecessary upgrades.

Energy Systems Catapult led an investigation into fleet, duty cycle and charging location archetypes for HGV operations in the UK Power Networks area[3]. This work used Traffic Commissioner licence data, eFREIGHT 2030 outputs, public datasets and partner insight to group operators by licence type, fleet size, vehicle mix, driver type and journey pattern. Baringa then used these fleet archetypes and duty-cycle outputs to assess smart energy management schemes and business models for eHGV sites[4]. This report focused on how levers such as smart charging, on-site battery storage and solar PV, dispersed charging and shared charging hubs could reduce connection requirements, manage network constraints and improve the deliverability of depot electrification.

This report provides an overview of how the Future Fleet operational archetypes and smart energy levers have been translated into a fleet level total cost of ownership analysis. It first introduces the pre-feasibility eHGV financial assessment tool and the key assumptions used in the modelling. It then summarises the fleet, duty cycle and depot archetypes used to define representative charging scenarios. Finally, it assesses how different charging scenarios, including baseline depot charging, smart charging, battery energy storage and solar PV, affect payback, cumulative cash flow and carbon emissions across the selected depot archetypes.

[3] 'Fleet and Charging Location Archetype' report, Energy Systems Catapult, 2026
[4] 'Smart energy management schemes and business models' report, Baringa, 2026

3. Methodology

3.1 Pre-feasibility eHGV financial assessment tool

The pre-feasibility eHGV financial assessment Excel-based tool has been developed as part of the eFREIGHT2030 project and further modified as part of Future Fleet to provide fleet operators and other stakeholders with a high-level, pre-feasibility estimate of costs associated with transitioning to eHGVs. Users can configure the model to reflect their current operations or future strategies, assess and analyse risk, supporting informed decision-making and planning. Figure 1 illustrates the tool's inputs, processes and outputs.

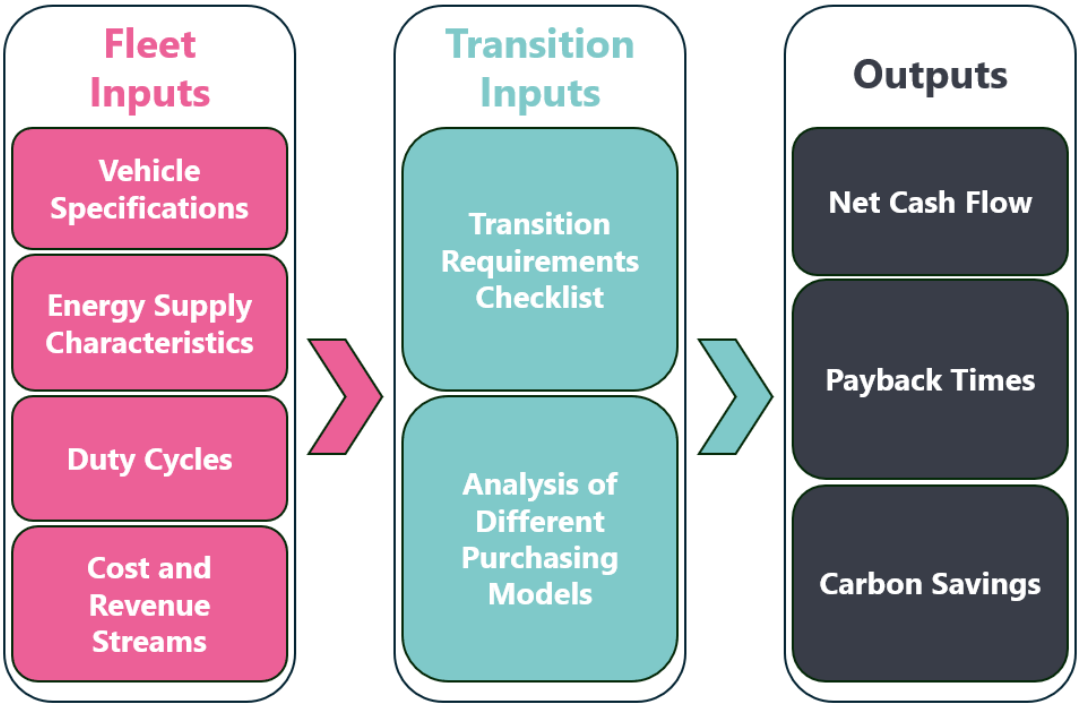

Figure 1. Pre-feasibility eHGV financial assessment tool: Inputs, processes, and outputs.

3.2 Fleet archetypes

The 'Fleet and Charging Location Archetype' investigation developed six fleet archetypes to represent the range of HGV operations expected in the UK Power Networks area. These archetypes provide the operational basis for the TCO analysis in this report, linking vehicle type, fleet size, driver type, journey pattern and likely charging behaviour to a set of representative depot scenarios.

The detailed modelling inputs behind these assumptions are provided in Appendix 5.1.

Journey types, also known as duty cycles, affect the financial case for electrification because they determine how intensively vehicles are used, when they are available to charge, and whether charging can be concentrated at the depot or must be spread across destination and en-route locations.

The fleet archetype analysis grouped HGV operations into four representative journey types, which are used in the financial model to estimate energy demand and charging behaviour. The report also highlights the implications for cost, revenue and operational flexibility depending on the duty cycles. Table 1 shows the revenue assumptions taken for the modelling.

Table 1. Revenue assumptions based on journey type

Journey type	Revenue assumption	Reasoning
Shunting	£3.00 per km	Reflecting short, repeated movements between known sites.
Round trip	£3.00 per km	Vehicles complete a loaded outbound and return movement.
One-way trip	£1.55 per km	Lower rate reflects the assumption that the vehicle returns empty.
Multi-drop	£3.00 per km	Reflecting delivery routes with multiple customer stops.

The revenue assumptions described above are meant to represent the total earning over the total distance driven by the vehicle including empty. They are based on indicative haulage rate information[5] of transporting goods in the UK. The value taken was £2.5 per mile, which translates to £1.55 per km for the least efficient journey type. A reasonable assumption is made for the revenue for the other journey types, as they travel fewer empty miles. These values are intended to provide a consistent modelling basis rather than a quoted commercial rate.

[5] https://www.roadhaulageservices.com/haulage-rates/

3.3 Depot archetypes

The depot archetypes used in this analysis were developed by Baringa and presented in the 'Smart energy management schemes and business models' report. Baringa's modelling used representative depot archetypes to compare conventional depot charging with smart charging, battery storage and solar PV options.

For this TCO analysis, the Baringa depot archetypes are used in combination with the operational fleet archetypes described in the previous section and the scenarios described later in the report. Four representative cases, varying by fleet size, charger mix and charging window were created, allowing the analysis to compare how depot scale and operating pattern affect infrastructure costs, energy costs, connection requirements and the value of smart energy interventions. These are shown in Table 2.

Table 2. Depot archetypes modelled by Baringa

Depot type	Fleet & charger mix	Duty / charging cycle
Small overnight	**5 vehicles** 5 x 50kW overnight charges	Overnight charging 17:00–05:00
Medium overnight	**80 vehicles** 80 x 50 overnight chargers	Overnight charging 17:00–05:00
Medium overnight + handover	**80 vehicles** 65 × 50 kW overnight 15 × 200 kW handover	Overnight: 17:00–05:00 Handover: 02:00–03:00 and 17:00–18:00
Large overnight	**200 vehicles** 200 × 50 kW overnight chargers	Overnight charging 17:00–05:00

3.4 Fleet to depot matching

The fleet archetypes represent real-world fleet sizes, while the Baringa depot archetypes define simplified depot cases used for financial modelling. As these do not align exactly, the fleet sizes have been scaled to match the Baringa depot sizes to make it possible to use the pre-feasibility eHGV financial assessment tool. Table 3 summarises this mapping and shows how representative fleet sizes translate into the modelled depot cases.

Table 3. Depot archetype to fleet archetype matching with a multiplication factor

Depot Archetype	Multiple x Fleet Archetype	Reasoning
Small depot	2.5 x Restricted One-Man Band	Small operators are aggregated to match the minimum depot size used in the modelling, ensuring a representative small depot case with 5 vehicles.
Medium overnight	6.66 x Restricted SME	SME fleets have mostly day drivers, meaning that only overnight chargers are required
Medium overnight + handover	1 x Standard National Large Fleet	Direct alignment with fleet size and duty cycles, representing larger mixed operations with both overnight and handover charging, as they have a larger percentage of day and night drivers
Large overnight	2 x Standard International Large Fleet	Larger fleets are scaled to a high-capacity depot to test high-demand charging and connection requirements.

3.5 Smart energy levers

The smart energy levers described in this chapter are drawn from the same report from Baringa, to show how different interventions could change the cost or deliverability of depot electrification, while the scenarios define how these interventions are applied to the depot archetypes in the model.

3.5.1 Smart charging

Smart charging changes when and how vehicles charge, while still meeting operational requirements. In practice, this means shifting charging away from expensive or constrained periods, smoothing site demand, and managing charger output so that vehicles are ready when needed without creating unnecessary peaks.

For the TCO analysis, smart charging primarily affects electricity costs. It can reduce exposure to higher priced periods and may in some cases reduce the maximum import capacity needed at the depot. However, its value depends on the available charging window: depots with long overnight dwell periods have more scope to shift charging than operations with short handover windows.

3.5.2 On-site energy assets

On-site energy assets include battery energy storage systems and solar PV. These assets can reduce the amount of power imported from the grid during charging peaks and can help a depot operate within a lower connection capacity.

For the TCO analysis, on-site assets introduce additional capital expenditure, but may reduce connection costs, electricity costs and exposure to peak prices. Their financial case is therefore not based only on energy savings. Additionally, it could create extra revenue streams from export or offering flexibility services to the grid.

3.5.3 Shared or third-party charging

Shared or third-party charging represents charging that is not delivered solely through the operator's own depot connection. This could include shared depot infrastructure, access to another operator's site, charging at a logistics hub, or use of third-party charging locations.

This lever can reduce upfront infrastructure requirements for a fleet operator and may improve utilisation of charging assets across multiple users. However, it can also introduce new costs and operational risks, including third-party electricity pricing, access agreements, charger availability and reduced control over when and where vehicles charge. For this reason, shared charging is considered separately from depot-based smart charging and on-site energy scenarios.

The levers are not mutually exclusive. A depot could use smart charging alongside battery storage, solar PV and external charging access. The scenarios in the next section therefore test selected combinations of levers rather than treating each lever as a standalone option.

3.6 Scenarios

The scenarios apply the smart energy levers to the depot archetypes described in Section 3.3. They do not represent a full optimisation of every possible charging strategy; instead, they provide a consistent set of cases that can be compared across depot sizes. The input data found in Appendix 5.1 shows that the main input variables changed across scenarios are electricity price, connection capacity, BESS size, solar PV size and revenue assumptions.

3.6.1 Baseline depot charging

The baseline scenario represents depot electrification without additional smart energy interventions. Vehicles are assumed to charge at the depot using the charger mix and charging windows defined for each depot archetype. This provides the reference case against which smart charging, on-site battery storage and solar generation are compared.

The baseline is important because it shows the financial case for electrification if the operator installs the required depot charging infrastructure and relies primarily on grid electricity. The baseline cases use the full depot charging requirement, with connection capacity increasing from 300 kW for the small depot to 12 MW for the large depot. The baseline therefore provides a useful reference point for understanding how depot scale drives infrastructure requirements before any smart energy intervention is applied.

3.6.2 Smart charging (SC) scenario

The smart charging scenario applies managed charging to the depot. The aim is to reduce the cost of charging and smooth the depot demand profile while still ensuring vehicles are charged within their available dwell windows. This scenario is most relevant for depot archetypes with predictable overnight charging, where charging can be shifted within a longer window without affecting vehicle availability.

In the TCO model, this scenario affects operating costs through lower electricity costs, but does not reduce the assumed connection capacity by itself. The smart charging case keeps the same connection capacity as the baseline for each depot archetype, while reducing the electricity price assumption across all four depot cases.

3.6.3 Smart charging with battery storage (SC + BESS) scenario

Smart charging, accompanied with battery storage means that the battery is used as a behind-the-meter asset to support vehicle charging when site demand would otherwise exceed the available import capacity. It can therefore act as a bridge between the charging requirement and a lower grid connection.

The scenario introduces additional capital expenditure, but can improve the financial case where it reduces connection costs, decreases grid-imported energy, or provides additional revenue. The BESS is used to materially reduce connection capacity: the small depot falls from 300 kW to 100 kW, the medium depot from 5 MW to 3.5 MW, the medium overnight plus handover depot from 7 MW to 4 MW, and the large depot from 12 MW to 9 MW. The BESS sizing is largest for the medium overnight plus handover case, reflecting the short, concentrated charging peaks created by handover charging.

3.6.4 Smart charging with battery storage and solar PV (SC + BESS + PV) scenario

The final scenario builds on the battery storage case by adding solar PV. Solar generation can reduce grid electricity consumption and provide additional value where generation aligns with depot demand, battery charging or export opportunities. However, the benefit depends on the size of the solar installation, available site space and how well generation can be used by the depot.

For the TCO analysis, this scenario tests whether the additional capital cost of solar PV is offset by lower electricity costs and improved use of on-site energy. The solar contribution to supply is relatively modest for the larger depots, but it provides additional value through reduced electricity price assumptions and solar export revenue. In the small depot case, where solar energy is assumed to provide a higher share of supply than in the medium and large depot cases.

4. Analysis

4.1 Baseline cash flow and payback across depot archetypes

This section compares the modelled financial performance of the four depot archetypes under the capital purchase assumption. The analysis draws on the net cash flow and payback outputs the pre-feasibility eHGV financial assessment tool. Figure 2 shows cumulative net cash flow for the baseline eHGV case across the small, medium, medium overnight plus handover, and large depot archetypes.

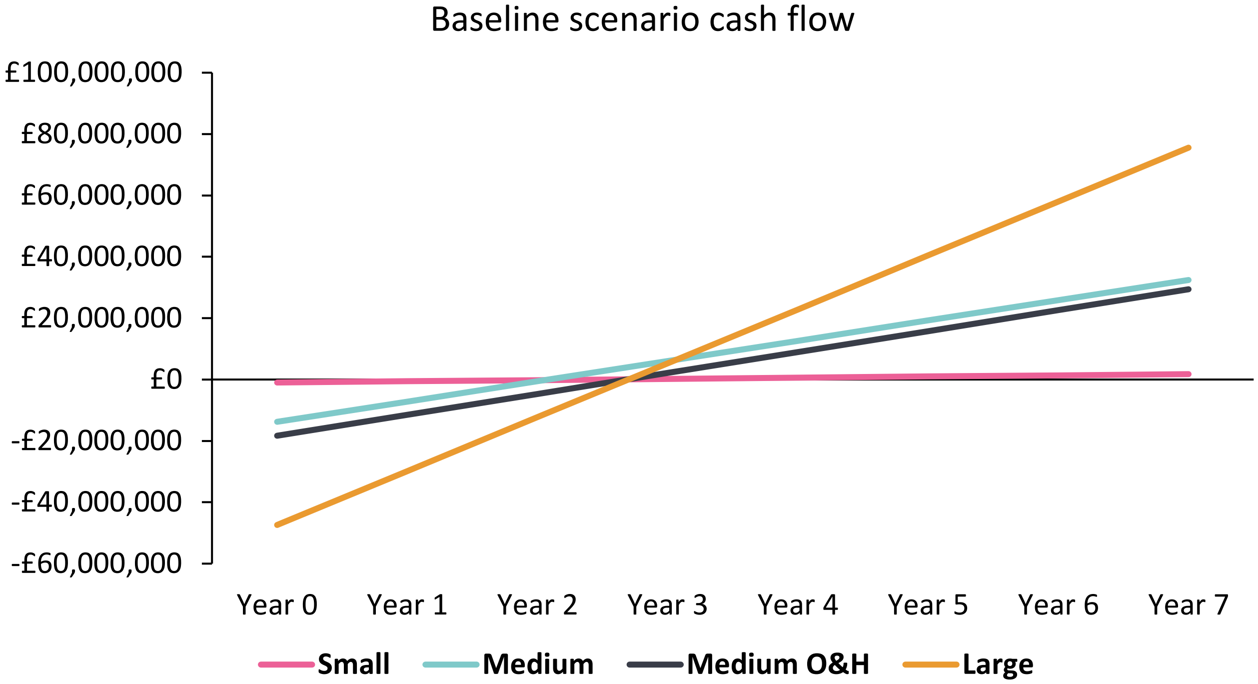

Figure 2. Cash flow of depot archetypes in the baseline scenario

The baseline cash flow profile shows the effect of depot scale on both upfront investment and recovery. Larger depots require substantially higher initial capital expenditure for vehicles and depot charging infrastructure, but they also generate larger annual cash inflows once operational. In all four baseline cases, cumulative cash flow turns positive within the seven-year vehicle lifetime.

The small depot has the lowest absolute upfront investment, but it also has the weakest ability to spread infrastructure costs across a larger fleet. This is reflected in its baseline payback period, which is longer than the medium depot case despite the smaller total investment. The medium depot shows the shortest baseline eHGV payback of the four depot archetypes, suggesting that this scale provides a stronger balance between infrastructure cost and fleet utilisation.

The medium overnight plus handover and large depot cases have higher initial costs and longer baseline payback periods. This reflects the additional infrastructure required for high-power handover charging. In the large depot case, the higher vehicle count and connection requirement increase upfront cost, even though larger depots generate stronger cumulative cash flow over time.

4.2 Payback period across different scenarios

The baseline scenario payback period can be compared with smart charging, smart charging with BESS, and smart charging with BESS and solar PV scenario results, as shown on Figure 3. ICE HGVs are also shown as a reference case. Across the eHGV scenarios, smart charging alone produces only a small improvement in payback because it reduces electricity cost assumptions but does not reduce connection capacity in the current model inputs. The larger payback improvement occurs when BESS is added, as this combines reduced connection capacity with additional revenue streams.

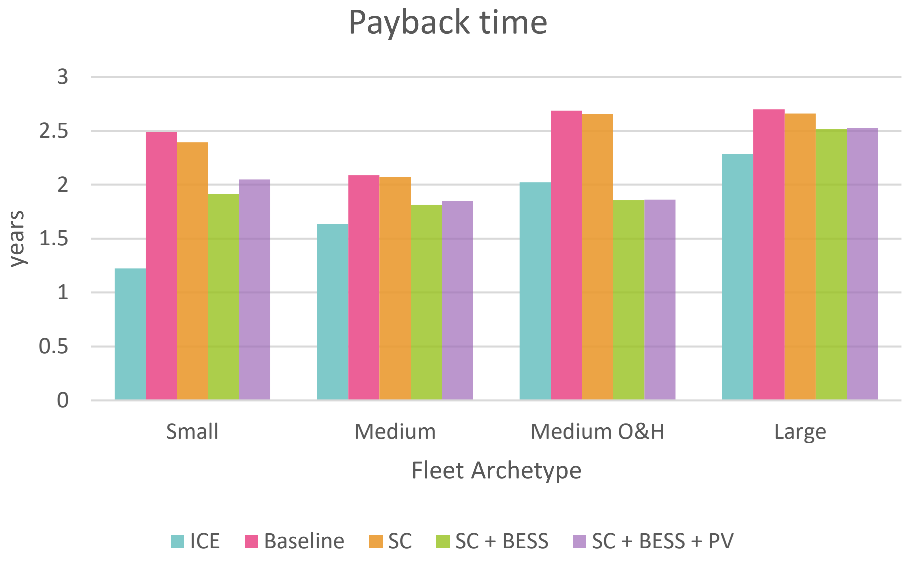

Figure 3. Payback time across modelled fleet archetypes

For every depot archetype, the smart charging plus BESS scenario gives the shortest eHGV payback period. The improvement is most pronounced for the medium overnight plus handover case, where payback falls from around 2.7 years in the baseline and smart charging cases to around 1.9 years with BESS. This is due to the fact that the handover case uses the largest BESS and strongly benefits from the highest associated ancillary services and capacity mechanism revenue assumptions.

Being mindful of the decreasing cost of PV and BESS in the last years, the current cost assumptions indicate that adding solar PV on top of BESS does not materially improve payback in these modelled cases. The solar scenario has a slightly longer payback than the BESS-only case for each depot archetype, indicating that the additional solar capital cost is not fully offset by the lower electricity costs. Solar may still provide longer-term cost stability or emissions benefits, but this does not appear to be the primary payback driver in the model results.

Overall, the results suggest that the strongest near-term financial case is not simply linked to depot size, but to whether the depot has a charging profile that can make effective use of flexibility assets. BESS has the greatest impact where it can reduce connection requirements and access additional revenue, while smart charging alone delivers a smaller but consistent operating-cost benefit.

4.3 Effect of vehicle leasing on payback

The results above are based on a capital purchase model, where the full vehicle cost is incurred upfront. This section considers an alternative business model where the eHGVs are leased instead. The vehicle is one of the largest cost components in the transition to eHGVs, so changing it from upfront capital expenditure to an annual operating cost has a significant effect on the calculated payback period. Some of the operating costs like servicing, maintenance and repair of the vehicles are also now covered by the lessor.

For ICE vehicles, there is no longer any capital expenditure, and therefore have no payback period, as the revenue is larger than costs in the first year. However, in the case of eHGVs, leasing does not remove the need to fund the wider transition costs. Charging infrastructure, connection works, battery storage and solar PV still need to be recovered.

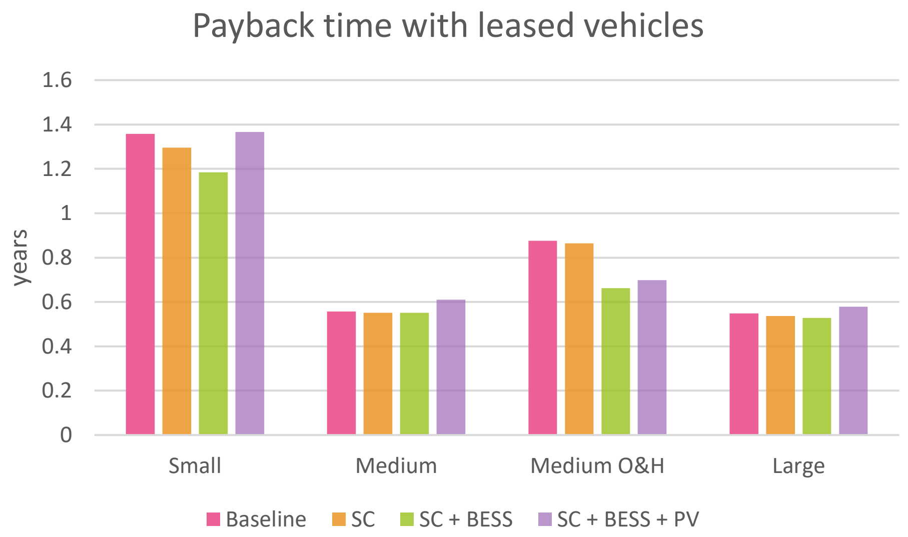

Figure 4. Payback time with leased vehicles

This effect is visible in the payback results. Under capital purchase, eHGV payback periods range from around 1.8 to 2.7 years depending on the depot archetype and scenario. Under leasing, the eHGV payback periods are materially shorter, decreasing around 40% for small depot and up 80% for large ones, to between 0.5 to 1.4 years, where the medium and large depot cases typically below one year across the modelled scenarios. The small depot remains the most challenging case because the transition and infrastructure costs are spread across a smaller number of vehicles operating.

The comparison therefore shows that leasing can improve short-term cash flow and reduce the upfront funding barrier, but it changes the cost profile rather than eliminating cost. It does however change the ownership model. Leased vehicles are not owned by the fleet operator in this case, and there may be additional implications for residual value, contract flexibility, vehicle specification, modification rights and end-of-term decisions. For fleets with limited access to capital, leasing could make eHGV deployment more achievable, even where infrastructure and connection costs remain material, but these commercial and operational implications should be considered alongside the payback benefit.

4.4 Carbon emissions impact across depot archetypes

This section compares the estimated annual fuel-related emissions for ICE HGVs and eHGVs across the four depot archetypes. Figure 5 below compares ICE emissions with baseline eHGV emissions and the eHGV case with on-site solar energy generation (assumptions in Appendix 5.1).

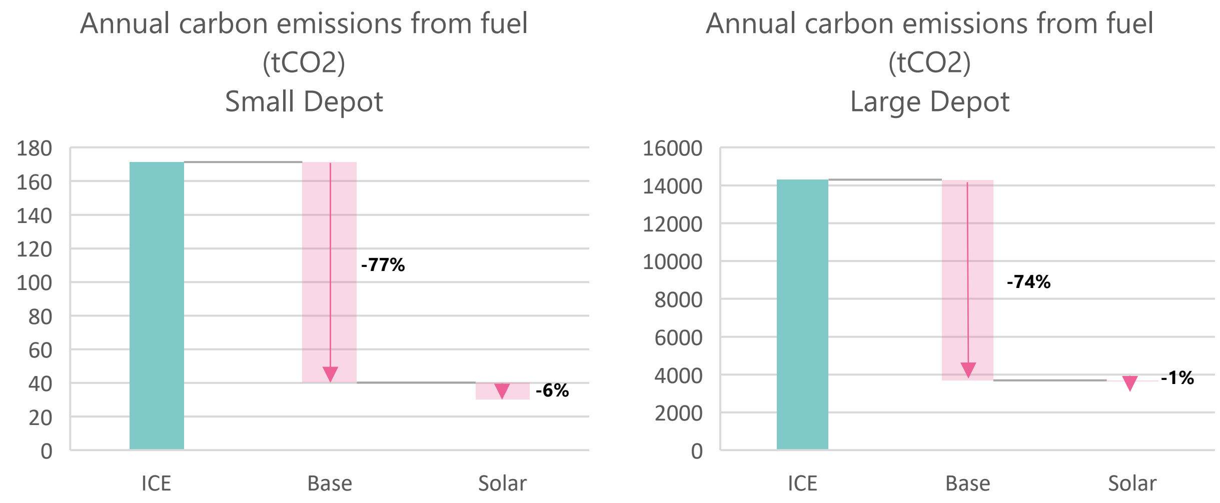

Figure 5. Annual carbon savings for small and large depots

Using a grid carbon intensity of 124 gCO_2/kWh[6], the results show that the percentage emissions saving from moving from ICE to baseline eHGV operation is broadly consistent across the depot archetypes, ranging from approximately 74% to 77%.

Despite the larger absolute savings from the larger depots, the small depot shows the largest relative solar benefit, with solar reducing emissions by a further 6% compared with the baseline eHGV case. For the medium, medium overnight plus handover and large depot archetypes, the additional solar saving is closer to 1%. This aligns with the modelling inputs, where solar energy represents a larger share of supply for the small depot than for the larger depot cases.

Overall, the results suggest that the main emissions benefit comes from electrification itself, while solar PV provides a secondary benefit under the current scenario assumptions. The implication for fleet operators is that eHGV adoption delivers the dominant carbon reduction, whereas on-site solar is more relevant for improving longer-term energy cost stability, reducing grid exposure and marginally improving emissions performance where sufficient site space is available.

[6] DESNZ, NESO and Carbon Brief analysis, 2024

4.5 Conclusions and comparison with Baringa recommendations

Baringa's 'Smart energy management schemes and business models' report detailed a set of recommendations for how smart charging, battery storage, solar PV and shared charging approaches could support eHGV depot electrification.

This section compares those recommendations with the findings from the fleet TCO analysis in this report. The aim is to identify where the financial results support Baringa's wider smart energy conclusions, where the TCO model adds nuance, and what this means for selecting future trial sites and priority interventions.

4.5.1 Areas of alignment

The main common finding is that smart charging should be treated as a baseline capability for depot electrification. In the fleet TCO results, smart charging alone improves payback only modestly, but it consistently reduces operating costs by lowering the assumed electricity price. This supports the Baringa's conclusion that smart charging is a scalable and commercially mature intervention that should be embedded in most depot-led eHGV charging strategies.

The analysis also supports Baringa's conclusion that BESS and solar create value primarily by changing the infrastructure and connection case, rather than simply reducing electricity costs. In this report's analysis, the largest payback improvement occurs when BESS is added to smart charging. This is because BESS reduces assumed connection capacity and introduces additional revenue streams, including ancillary services, BESS export and capacity mechanism revenues.

Both analyses also show that fleet characteristics matter as much as depot size. The strongest improvement in this report is seen in the medium overnight plus handover case, where concentrated charging demand makes BESS particularly valuable. This aligns with the Baringa's view that sites with concentrated charging peaks are more likely to benefit from flexibility assets than sites where charging is already spread across a long overnight window.

4.5.2 Differences

There are some differences between the two analyses. In some of the financial metrics, the root of these differences is likely to be the fact that the pre-feasibility eHGV financial assessment tool only spans over the lifetime of an eHGV (7 years) and treats investments as a capital expenditure in Year 0, while the modelling from Baringa spreads costs over a 20 year period.

Baringa identifies smart charging as the lowest-cost solution across archetypes, while this fleet TCO analysis shows that smart charging alone is not the strongest payback case. In the fleet TCO results, the shortest eHGV payback is delivered by smart charging with BESS across all four depot archetypes.

The role of solar PV is also more limited in the fleet TCO analysis than the broader conclusions might imply. In the modelled payback results, adding solar PV on top of BESS slightly increases payback across all depot archetypes. Solar still provides emissions and energy-cost benefits, particularly for the small depot where it supplies a higher share of demand, but it is not the main driver of near-term financial performance in the current fleet TCO results.

4.5.3 Implications for trial focus

The combined findings support a trial focus on constrained medium or large depots, particularly where charging demand is concentrated and where connection capacity is likely to be a barrier to electrification. These are the cases where smart charging and BESS are most likely to demonstrate value by reducing required import capacity, improving connection deliverability and maintaining vehicle readiness.

The medium overnight plus handover archetype appears particularly relevant for demonstration. It combines a large fleet scale with short, high-power charging windows, making it a strong test case for whether BESS can substitute for a portion of firm network capacity without compromising operational requirements. This reflects both Baringa's recommendation and the fleet TCO result that BESS has the greatest payback impact where charging peaks are concentrated.

Overall, the findings from this report broadly reinforce the Baringa's conclusions, but add a financial interpretation of which levers appear to have the strongest benefits for fleets. Smart charging should be considered a minimum enabling capability, BESS appears to be the most material near-term financial lever where it reduces connection requirements and accesses additional revenue, and solar PV provides a secondary benefit that is more strongly linked to emissions reduction and energy resilience than short-term payback.

5. Appendix

5.1 Modelling Input Data

Fleet to depot matching

Index	Fleet archetype equivalent	Depot archetype	Multiplier
Small	2.5*R_OMB	Small	1
Medium	6.66*R_SME	Medium	1
Medium O&H	SN_LF	Medium O&H	1
Large	2*SI_LF	Large	1

Fleet vehicle numbers

Index	2 axle rigid	3 axle rigid	4 axle rigid	2 axle artic	3 axle artic	Total
Small	5	0	0	0	0	5
Medium	46	13	7	7	7	80
Medium O&H	19	5	8	7	41	80
Large	0	0	0	0	200	200

Charging location fractions

Index	Operators depot	Destination	Dedicated en-route
Small	0.9	0.05	0.05
Medium	0.8	0.1	0.1
Medium O&H	0.6	0.2	0.2
Large	0.4	0.3	0.3

Fleet driver type fractions

Index	Day drivers	Day + night drivers	Long haul trampers
Small	1	0	0
Medium	0.97	0.03	0
Medium O&H	0.73	0.18	0.09
Large	0.52	0.29	0.18

Fleet journey type fractions

Index	Shunting	Short to medium round trip	One-way trips	Multi-drops
Small	0.1	0.28	0.15	0.47
Medium	0.1	0.32	0.18	0.4
Medium O&H	0.09	0.38	0.33	0.19
Large	0.09	0.41	0.45	0.05

Fleet charger numbers

Index	50 kW overnight chargers	200 kW handover chargers
Small	5	0
Medium	80	0
Medium O&H	65	15
Large	200	0

Energy parameters for different scenarios

The electricity prices were aligned with the outputs from Baringa, and represent a normal grid connection with an average energy mix. Alternatively, green energy could be procured, which would lead to higher emission savings, but also result in a higher price. This is not modelled in this case, but an interesting avenue to explore in the future.

Baseline scenario energy parameters

Index	Electricity price (p/kWh)	Connection capacity (kW)
Small	15.92	300
Medium	12.94	5000
Medium O&H	13.21	7000
Large	12.94	12000

Smart Charging scenario energy parameters

Index	Electricity price (p/kWh)	Connection capacity (kW)	BESS size (kW)	BESS size (kWh)	Solar size (kW)
Small	10.47	300	0	0	0
Medium	11.99	5000	0	0	0
Medium O&H	12.33	7000	0	0	0
Large	11.99	12000	0	0	0

Smart Charging + BESS scenario energy parameters

Index	Electricity price (p/kWh)	Connection capacity (kW)	BESS size (kW)	BESS size (kWh)	Solar size (kW)
Small	11.91	100	200	400	0
Medium	12.61	3500	1000	3000	0
Medium O&H	12.17	4000	3000	6000	0
Large	12.53	9000	1000	4000	0

Index	Ancillary services (£)	BESS export (£)	Solar export (£)	Capacity mechanism (£)
Small	150176	6084	0	63200
Medium	1025618	36934	0	316000
Medium O&H	2704446	101827	0	948000
Large	1016229	36268	0	316000

Smart Charging + BESS + Solar scenario energy parameters

Index	Electricity price (p/kWh)	Connection capacity (kW)	BESS size (kW)	BESS size (kWh)	Solar size (kW)	Solar energy as % of supply
Small	9.94	100	200	400	100	0.25
Medium	12.37	3500	1000	3000	500	0.03
Medium O&H	11.96	4000	3000	6000	500	0.03
Large	12.35	9000	1000	4000	1000	0.02

Index	Ancillary services (£)	BESS export (£)	Solar export (£)	Capacity mechanism (£)
Small	150977	11794	14926	63200
Medium	1017692	67327	57431	316000
Medium O&H	2781389	170735	43410	948000
Large	1024487	81420	166724	316000

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Energy Systems Catapult
7th Floor, Cannon House
18 Priory Queensway
Birmingham
B4 6BS

es.catapult.org.uk