LONDON

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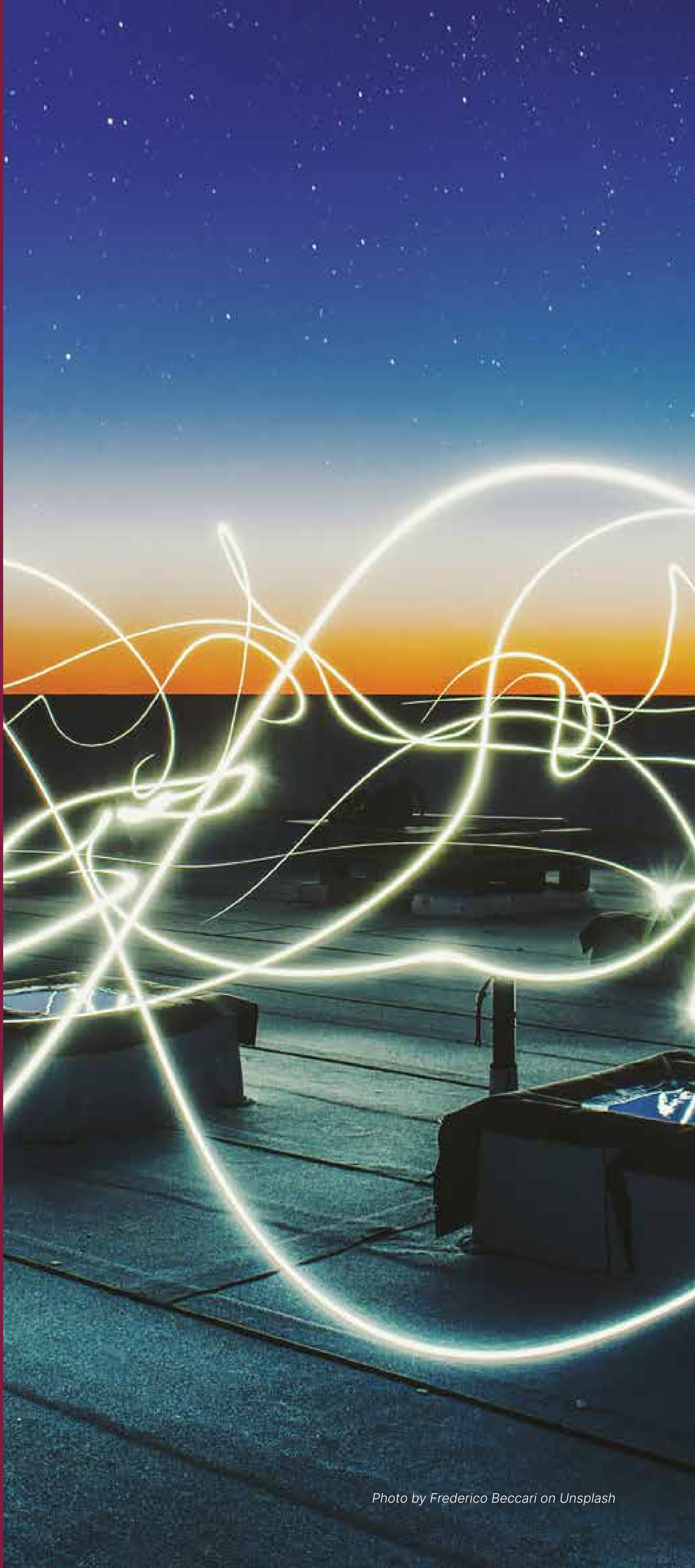
THE FUEL PROJECT

THE SHIFT:

DECARBONISING SUPPLIER TRANSPORT AND MOBILE POWER FOR LONDON'S FILM AND TELEVISION INDUSTRY

SEPTEMBER 2024



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The Shift:

Decarbonising Supplier Transport and Mobile Power for London's Film and Television Industry

A carbon footprint analysis of London's film and TV suppliers' transport and mobile power fleets, and a plan for its successful shift to low-carbon technologies.

The Fuel Project is a collaboration between **Creative Zero** and **Film London**.

Authors: Roxy Erickson, Laurence Johnson and Alexander Lewis-Jones.

Editor: Hunter Noel Vaughan, Minderoo Centre for Technology and Democracy, University of Cambridge.

Technical Review: Colin Smith and James Brown from the Energy Saving Trust provided a third-party review of the methodology and conclusions, while James Eade reviewed the assessment of mobile power.

Design: Jordan Constantinides from silentcolours.studio.

The Fuel Project aligns with the United Nations Sustainable Development Goals (SDGs) and works to support a number of key objectives. Particularly, this project focuses on six key interconnected SDGs.

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01 EXECUTIVE SUMMARY

The film and television (TV) industry has an environmental footprint[1] - a contribution to the climate crisis that scientists are, with consensus, warning us is on the verge of multiple tipping points with dangerous consequences for human and planetary well-being. This is particularly pronounced in global production hubs in high income and heavily industrialised contexts.

In London, one of the world's largest production hubs, home to studios and production companies of all sizes, reducing this impact is now becoming a key priority. Within this, the burning of fossil fuels for transport and power is the single greatest contributor to greenhouse gas emissions from London's film and TV industry[2].

The responsibility for burning these fuels is shared between commissioners, production companies and suppliers. The responsibility for a green transition is likewise shared, urgent, and possible. **The Fuel Project is committed to the decarbonisation of the London production sector by stopping the burning of fossil fuels for road transport and mobile power.** To this end, the study utilised the **Avoid-Improve-Shift** framework from the project's first report (2022), which summarised three processes the industry can utilise in tandem:

- **Avoid** activities that burn fuel and emit greenhouse gases
- **Improve** practices that support energy efficiency of the fleet
- **Shift** to technologies that offer a low-carbon alternative

Phase II of The Fuel Project, culminating in this report, takes an in-depth look at decarbonisation via the **Shift** part of this framework. Three key decarbonisation technologies for suppliers are considered for this: batteries, hydrogen and hydrotreated vegetable oil (HVO). This report explores how these technologies can reshape transport and mobile power fleets, both immediately and over the next decade, and the potential contribution this would make to mitigating the sector's footprint. The goal is to support the decarbonisation of assets owned by film and TV specific suppliers, rather than looking at all assets that are operating on productions.

The two primary partners on The Fuel Project, Film London and Creative Zero, carried out an ambitious data collection project via an industry-wide survey of London's film and TV production industry. This included the collation and analysis of current fleets and usage profiles of London suppliers' vehicles and mobile power units (MPUs). Data was processed and analysed to consider which low-carbon technologies should be selected when replacement of existing assets are due, within their normal investment cycles.

While The Fuel Project remains technology-agnostic, it is equally technology-pragmatic. Based on this report's research, **there is significant confidence within the industry that batteries generally offer the cleanest power delivery, at the greatest energy efficiency and at the most competitive price.** This research shows that any significant commercial use of hydrogen is unlikely until around 2030 and will likely start in specific high energy capacity applications. Within the decarbonisation models, all hydrogen technologies (and some future battery technologies) are considered as "next generation" solutions[I].

Through an assessment of suppliers' current investments, technology use cases and infrastructure capabilities, this report asserts that a 2029 end date for diesel and a 2031 end date for petrol is possible with the collective financing of the industry's transport and mobile power transformation. This Shift is presented here as the **Base Scenario**. The majority of all industry supplier vehicles have entered the fleet since 2022, suggesting that London's Ultra Low Emission Zone (ULEZ) policy may be positively affecting fleet choices, while the average investment cycle for a vehicle was reported as six years. The Base Scenario estimates that London's film and TV suppliers **could transition to a zero emission vehicle fleet entirely by 2033, achieving a 93% carbon emissions reduction by that year**. The Base Scenario for MPUs suggests that traditional generators could be retired from the fleet by 2036, but a significant number of hybrids would remain. **By 2030 this scenario achieves an 80% reduction in carbon emissions for MPUs.**

> By 2033, London's film and TV suppliers could reduce transport carbon emissions by 93% and by 2036 reduce MPU emissions by 91%.

This will require committed buy-in from all stakeholders, including substantial funding. But the results will be worth it, including a significant boost in environmental responsibility and increased sustainability - the former enhancing the industry's public image and the latter guaranteeing more resilient production practices and long-term financial savings. As Akshat Rathi writes, "It's now cheaper to save the world than destroy it"[II] – the energy transition is affordable, saves money in the long run, and contributes to the urgent need to mitigate the human and economic costs of the escalating climate crisis.

> By 2030 this scenario achieves an 80% reduction in carbon emissions for MPUs.

As with energy transitions in other sectors and at other scales, the technology is available - but **increasing motivation and commitment are now needed**. To address this, we have supplemented the technical study and recommendations with an analysis of the current mindset among stakeholders involved and provide recommendations for how the current status quo might also be transformed in order to help generate a broader shift to a cleaner, more responsible, and more resilient future.

I Whilst these technologies exist in alternative applications outside of the sector, limitations around their use for film and TV production mean they are not expected to be widely adopted in industry suppliers' next investment cycle.

II Akshat Rathi (2023) Climate Capitalism: Winning the Global Race to Zero Emissions. London: John Murray. p.1

KEY RECOMMENDATIONS FOR INDUSTRY ACTION

1 Finance the transition:

To decarbonise, the total cost of ownership (TCO) to London's suppliers would rise from £39 million in 2023, to £54 million in 2030, to £63 million in 2040. This is a £12.2m average additional annual spend across the fleet transition period. These costs cover the direct investment in the low-emission technology but further additional spend towards infrastructure and new facilities will also be needed. Likewise, the growth in the industry and in fleet size that suppliers are expecting is not factored in. However, some of this may be balanced out by Avoid and Improve actions, and require further research.

The costs involved mean decarbonisation is unlikely to happen if left to suppliers alone. The financing of the transition can come in a variety of ways but must be implemented immediately, as decisions made today will last the next full investment cycle (6-12 years).

> £12.2m average additional annual spend across the transition.

The sector should push for additional government support for asset and infrastructure investment. Internally, innovative sector-based grants, insetting, long-term lease agreements, loans between clients and suppliers, and/or increases in existing hire costs, may all offer potential solutions. Currently, expectations around existing production hire models which do not charge for these technologies, encourage discounts, and client-specific deals may be undermining investment. Ensuring production budget models value energy responsibly is necessary to create this change.

2 Plan for infrastructure:

> 64% of London's vehicle fleet could have on-site refuelling now.

London's vehicle and MPU fleets will need on-site refuelling and/ or recharging infrastructure to allow for the transition to battery and HVO. The majority of suppliers report having space for this infrastructure and should therefore be investing now. Suppliers without the ability to install infrastructure now should look to engage with necessary stakeholders and local communities to secure facilities that allow for the installation of decarbonisation infrastructure within the next 5 years. This may include substations, charging units, HVO tanks, etc. Engagement with external sectors, such as the electric vehicle charging sector, should be explored.

3 Electrification first, HVO second:

Nearly 20% of supplier vehicles could be electric by the end of 2025 without affecting investment cycles. Meanwhile, doubling up on battery MPUs would offer sufficient energy capacity for 98% of production use cases. This means that HVO should only be used when electrification isn't possible.

> Doubling the number of battery MPUs would cover 98% of production use cases.

4 Develop an individual fleet strategy:

While this report offers a guiding tool, each business must plot its own strategy for achieving decarbonisation within expected industry timelines. Such a strategy should be built on robust real-world data, such as those from telematics and power monitoring software, alongside engagement with workers.

> Use real-world data from telematics and power monitoring.

5 Explore new business models:

Collective industry action is needed, including new ways of working. The industry should consider:

- battery swapping models may offer a low-carbon, low pollution business opportunity.
- second-life batteries from the electric vehicle sector could offer lower prices and more circularity, reducing the negative impacts of mining and manufacturing.
- partnering with public electric vehicle charging to unlock MPU charging hubs.
- long-term lease agreements could give suppliers the investment confidence they need to choose low-carbon technologies.

> Collective industry action is needed.

GLOSSARY OF TERMS

Carbon footprint The amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organisation, or community. This report uses the term to refer to all greenhouse gases (CO_2e) from operating London film and TV supplier fleets.

CO_2e Carbon dioxide equivalent. Metric for standardising all greenhouse gases to one common factor for climate change impact, known as global warming potential (GWP).

Energy capacity Metric for how much energy can be stored in the asset. This could be the litre capacity of a fuel tank or the kWh capacity of a battery.

Greenhouse gases Emissions of gases that contribute to the "greenhouse effect" - the trapping of heat within the earth's atmosphere causing temperatures to rise.

HVO Hydrotreated Vegetable Oil. This is a renewable diesel which can be made from a variety of sources. This study focuses on HVO derived from Used Cooking Oil (UCO).

kVA Kilovolt-ampere. A unit of generation capacity (including battery storage), commonly used in the power sector to specify the theoretical maximum power capacity of generators. The kW value is more commonly used as the maximum practical capacity.

kW KiloWatt. A unit of energy, commonly used to describe how much energy an item of equipment will use, or the amount of energy a generator or battery can deliver.

kWh KiloWatt-hour. A unit of energy measurement, used in energy meters to measure consumption over a period of time. Also used to specify the capacity of a battery storage unit. This is a key metric to help calculate how many hours a battery unit will deliver a specified load in kW (generation), or to see how much energy is used over a set period (consumption).

LEZ Low Emission Zone

Load In power, this refers to the amount of power that electrical equipment is consuming at a particular time. Two "load" measures commonly used are:

- Average load: the average across a period (usually a "work day").
- Peak load: the highest recorded amount of power during a given period.

For transport, see "payload".

MPU Mobile power unit. This includes traditional generators, batteries, hybrids and hydrogen technologies.

MPG Miles Per Gallon. A measure of fuel economy for UK vehicles.

Next Generation The Fuel Project's term for batteries, hydrogen or alternative technologies that are not yet available but will offer the portability, affordability and energy demands needed by the industry. While these technologies often exist in alternative applications outside of the sector, limitations related to their use for film and TV production mean they are not expected to be widely adopted in industry suppliers' next investment cycle.

NRMM Non-Road Mobile Machinery

Over-specced When the available energy output of an MPU far exceeds its real world usage.

Payload In transport, this refers to the weight of cargo a vehicle can carry.

Power capacity How much power an MPU can deliver to a load.

SME Small and Medium-sized Enterprise

Traditional generator A catch all term for combustion engine generators manufactured to use fossil fuels and typically used in the film and TV production industry. Commonly referred to as "gennies" or "gensets".

TCO Total Cost of Ownership. This is a financial model used to calculate the financial cost of an asset across its lifespan, including purchase cost and cost of fuel/recharging. This allows the owner to make long-term decisions rather than upfront cost decisions. This does not include indirect costs such as those related to infrastructure investments.

ULEZ Ultra Low Emission Zone

UCO Used Cooking Oil. This is a key feedstock of HVO.

Well-to-Wheel This refers to the total emissions associated with the life cycle of a fuel, i.e. from the "well", oil extraction, through refining, distribution and ultimately burning in the engine when the driver is behind the "wheel". This phrase is used in transport emissions analysis, but is equally applicable to mobile power use cases.

INTRODUCTION

The coming years will witness an energy transition the likes of which has not been seen since the end of the 19th century. However, the timing and speed of the transition are yet to be determined.

For the film and TV industry, this will largely be shaped by the decisions the readers of this report make over the next few years.

The combustion of fossil fuels is the number one contributor to greenhouse gas emissions (GHGs) in the United Kingdom (UK) and globally[3], whilst also being a key driver of poor air quality[4] (road transport remains the leading cause of air pollution in the capital, contributing to premature deaths across both inner and outer London[5]). Within tentpole productions, 50% of production emissions come from the burning of fossil fuels for road transport (35%) and mobile power (15%)[6]. Therefore, ending fossil fuel use is the number one priority both to decarbonise and to do our part in creating cleaner air to breathe for Londoners.

This report aggregates vehicles and mobile power due both to their shared current use of fossil fuels for power and to their shared technological solutions for decarbonisation. In addition, they are typically owned by supply companies (predominantly small- and medium-sized enterprises, or SME's) which may not have large resources for investment. While broadcasters, streamers and studios largely control finance, the decarbonisation of supplier fleets will ultimately deliver their net zero commitments. The decarbonisation of both vehicles and MPUs, is not only a logical coupling but would have a large overall impact on the industry.

There is no "one-size-fits-all" when it comes to switching to battery, hydrogen or HVO. Every vehicle and MPU should be considered on its own merits. This report offers London's first macro level overview of what decarbonisation could look like in terms of technology, emissions and costs. By modelling real world data, it paints a picture of the challenges and opportunities that the film and TV industry will face in moving to new, less polluting technologies.

Previous analyses of the industry's climate impact has tended to assess emissions from the perspective of productions. This has commonly resulted in higher emissions figures for transport compared to mobile power. The Fuel Project takes a new perspective focused solely on **industry-based supplier emissions**. For this reason, it is expected that the findings may not align with assessments of production emissions which often include various stakeholders and assets which are either freelance-owned or part of other industries (such as logistics companies), and therefore, out of this industry's direct control.

The recommendations here aim to stimulate collective, industry-focussed actions and funding to ensure that film and TV suppliers offer the low-carbon technologies needed. By efficiently reducing emissions across the supply chain, all companies and productions within the industry can benefit.

While focusing on suppliers, the report does not represent a roadmap for any individual supplier, and therefore, does not make any recommendations for individual vehicles or MPUs. There is no "one-size-fits-all" when it comes to switching to battery, hydrogen or HVO. Every vehicle and MPU should be considered on its own merits and within its own fleet. Each business should use this as a guiding tool to understand the potential direction and speed of decarbonisation for the sector and use the results to inform their own decarbonisation strategies. It is hoped this will support industry alignment around dates and targets for emission reductions and technology shifts.

Ultimately, sector-wide decarbonisation is a collective responsibility which should not be left to a single group of stakeholders. It will be of particular value to suppliers who own and operate vehicles and mobile power units, producers and production companies, as well as broadcasters, streamers and major studios working to pursue net zero targets.

With coordination across the industry, the decarbonisation scenarios suggested in this report stand to assist and benefit all stakeholders regardless of the respective challenges they face in the transition to cleaner energy technologies.

With coordination across the industry, the decarbonisation scenarios suggested in this report stand to assist and benefit all stakeholders regardless of the respective challenges they face in the transition to cleaner energy technologies.

THE FUEL PROJECT

This partnership represents a series of projects developed to establish sector-wide action in tackling fossil fuel consumption in the capital, and has been envisioned according to three phases.

PHASE 1: HOW CAN WE DECARBONISE?	→	PHASE 2: WHAT WILL IT LOOK LIKE?	→	PHASE 3 AND BEYOND: TAKE ACTION

In October 2022, Phase I, 'The Supplier Guidance Report' was launched. The report highlighted advantages and challenges for decarbonisation whilst also myth-busting some of the concerns that may have been holding suppliers back from moving to these new technologies. Furthermore, the report proposed to suppliers a model to frame these actions:

- **Avoid** activities that burn fuel and emit greenhouse gases
- **Improve** practices that support energy efficiency of the fleet
- **Shift** to technologies that offer a low-carbon alternative

This follow-up report represents Phase II of the Project and focuses on the **Shift** component of the framework. The analysis herein largely proposes the wide scale replacement of fossil fuel technologies with low-carbon solutions of similar specification – essentially a *like for low-carbon-like* model of change (however, the report also makes suggestions for new alternative ways of working). This does not mean individual companies and the industry at large shouldn't consider **Avoid** and **Improve** as important steps to reduce emissions, or that these challenges have been solved or overcome. On the contrary, these actions are vital and should be considered alongside a shift to lower-emitting technologies.

The current report, 'The Shift', aims to calculate the emissions associated with current vehicles and mobile power; to map out what the existing film and TV industry fleets look like; and to design a decarbonisation timeline for the industry based on the transition to these new technologies. This study targets three technologies for displacing the use of fossil fuels in transport and mobile power today: batteries, hydrogen and hydrotreated vegetable oil (HVO). Like fossil fuels, each comes with their own benefits and challenges for the user and the sector, but unlike fossil fuels they offer routes to decarbonisation.

Building on the timelines in Phase I, this report delivers a techno-economic feasibility study of what decarbonisation could and should look like over the coming two decades. This report makes scenario recommendations for what the swift move away from fossil fuels can look like and offers a framework for joined up industry planning around decarbonisation of these technologies.

This phase - The Shift - seeks to achieve three key aims:

1. **Build** a carbon footprint and fleet assessment for the sector's current road transport and mobile power units;
2. **Create** just and equitable decarbonisation scenarios for these supplier-owned high carbon assets;
3. **Report** the state of mind and readiness for transition for key industry stakeholders.

Data was collected from surveys, fleet lists, telematics software and live generator readings. This was provided through the contribution of over 100 individuals and companies working in the film and TV production industry. By combining real world observations with diverse industry perspectives, this analysis offers a rich view of the decarbonisation challenge.

As with all innovative data-driven projects, Phase II has been an iterative process. It represents a moment in time: this research explored data from 2022 to early 2024 to build its analysis[I].

The Fuel Project believes that a successful decarbonisation strategy must be a just and equitable one for all stakeholders involved. While emissions may fall, costs may rise in the near-term and be burdened on suppliers who cannot afford it on their own. This report embeds just transition principles into the underlying model and narrative to help put figures to this challenge and make suggestions as to how the industry should holistically support its collective decarbonisation. And, while this is not the space for a broader social and environmental assessment, we acknowledge needed areas of further research and consideration, including the environmental and social impacts of raw material mining, the impacts of new infrastructure deployment on surrounding communities, worker's rights issues and the ongoing problems of energy access. In the long run, **the scenarios set forth intend to align the industry with a larger societal shift towards cleaner and more equitable transportation and energy**.

A successful decarbonisation strategy must be a just and equitable one for all stakeholders involved.

I The full methodology can be found at: https://filmlondon.org.uk/fuel-project-phase-ii/fuel-project-phase-ii-the-shift-methodology

02

THE BIG PICTURE: KEY FINDINGS

This section contains the key findings for Transport, Mobile Power and Sector Mindset.

More in-depth analysis follows, starting from chapter four.

Photo by Jakob Owens on Unsplash

TRANSPORT SUMMARY

London's film and TV suppliers' total annual carbon footprint for transport is estimated to be

50,000

tonnes of greenhouse gases (CO_2e).

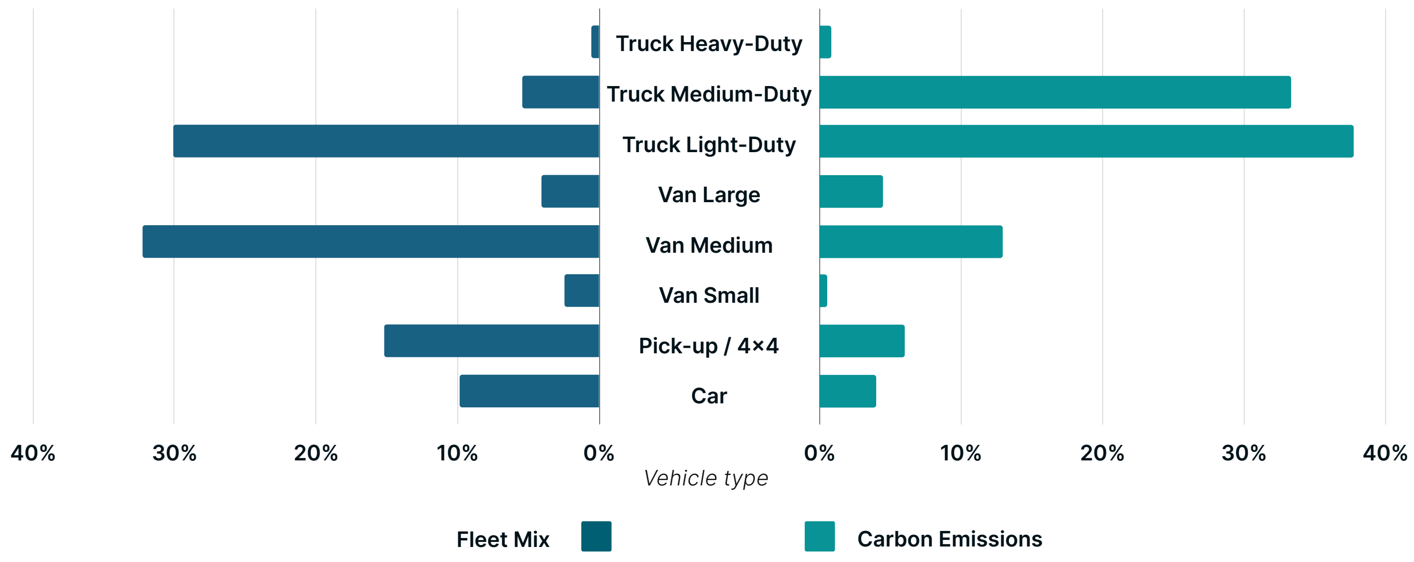
London's film and TV production suppliers use an estimated 3,200 operational vehicles, creating an estimated 50,000 tonnes of greenhouse gases (CO_2e). Due to the broad range of supplier services, the vehicle fleet is a large mix, and the type of vehicle, distance travelled, and services provided vary widely. The 3,200 vehicle fleet consists of mostly medium vans and light-duty trucks. 82% of these vehicles are manufactured for diesel use, compared to 4% that are electric. Cars and pick-ups/4×4s contribute just 10% of industry supplier owned vehicle emissions. While these vehicles are common on film and TV productions, the majority tend to be freelance-owned or part of non-film and TV industry fleets, and therefore, not included in this report. Medium-duty trucks on the other hand, represent just 5% of the supplier fleet but contribute 33% of emissions.

Light-duty trucks contribute 38% of emissions and some electrification options are already available, making trucks a key target for decarbonisation. It is notable that the majority of all vehicles have entered the fleet since 2022, suggesting that London's Ultra Low Emission Zone (ULEZ) policy may be affecting fleet choices.

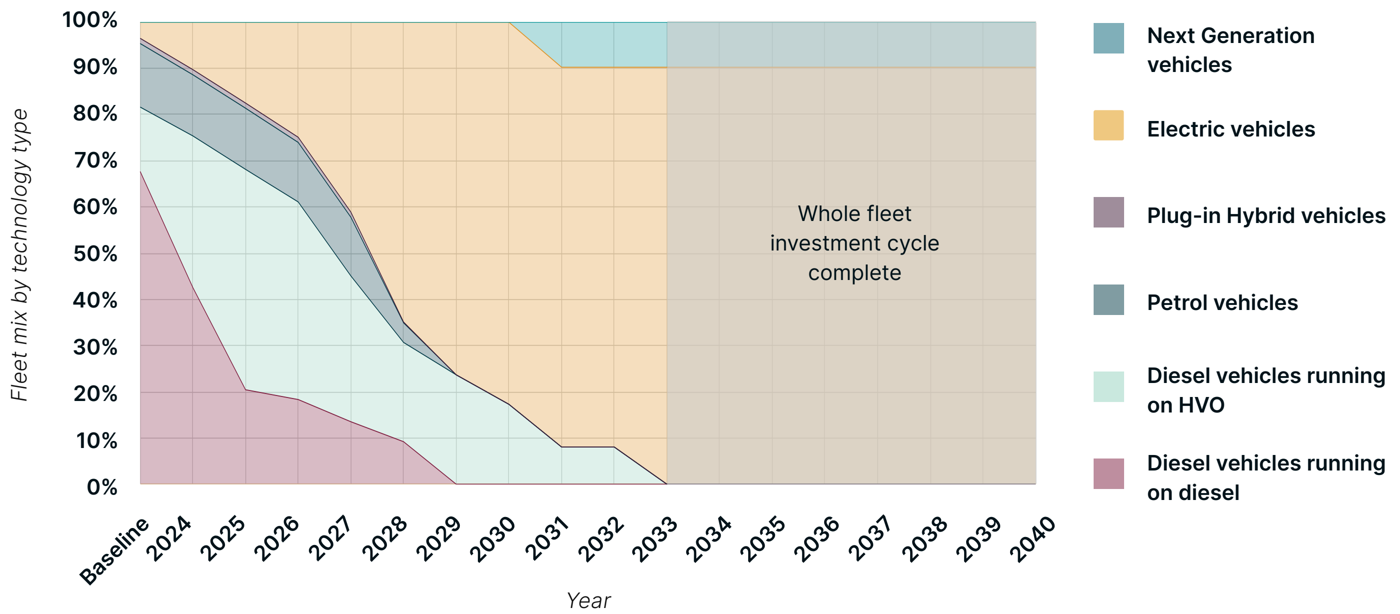
The fleet could switch away from fossil fuels by 2029 and HVO by 2033.

The Fuel Project's Base Scenario for vehicles suggests that the fleet could switch away from fossil fuels by 2029 and HVO by 2033, with 90% of the fleet running on electric vehicles by this end date. By combining battery use with HVO as a bridge fuel and other "next generation" technologies that have not yet reached commercial maturity (coming in around 2030), this scenario cuts greenhouse gas emissions by over 93% by 2033. However, to enable this, costs rise substantially. In 2033, the annual cost for the fleet is expected to be £11 million greater than the 2023 baseline.

London's film and TV production supplier vehicle fleet segmented by vehicle category (left) and respective percentage of total carbon emissions (right).
Figure EX_1



The Base Scenario for all vehicles operated by London's film and TV suppliers, presented in terms of technology mix.
Figure EX_2



MOBILE POWER SUMMARY

MPUs within London's supplier fleets produce

64,000

tonnes of greenhouse gases (CO_2e) annually.

The term mobile power unit (MPU) includes traditional 'generators' (those manufactured to use diesel or petrol) and 'batteries' (battery energy storage systems)[i]. There are an estimated 1,800 MPUs within London's supplier fleets, with the majority of these rented directly to productions. Collectively, these units produce 64,000 tonnes of greenhouse gases (CO_2e) annually. Most MPUs are traditional generators, however, **22% are already batteries** (of which the majority are 16-30 kVa units), demonstrating that decarbonisation technologies are already mainstream for low power applications. The average MPU has a lifespan of seven years, and most have been on the fleet for less than five years.

38% of traditional generators were reported as Stage IIIa, an emissions standard that is not compliant with London's Low Emission Zone (LEZ) for the construction sector[7]. Real world data from 190 generators from productions, shows they are significantly over-specced (i.e. the generator has a much greater potential energy output than needed for its actual use), with the vast majority (83%) never reaching 50% of the MPUs power capacity. This leads to additional fuel consumption, emissions and costs.

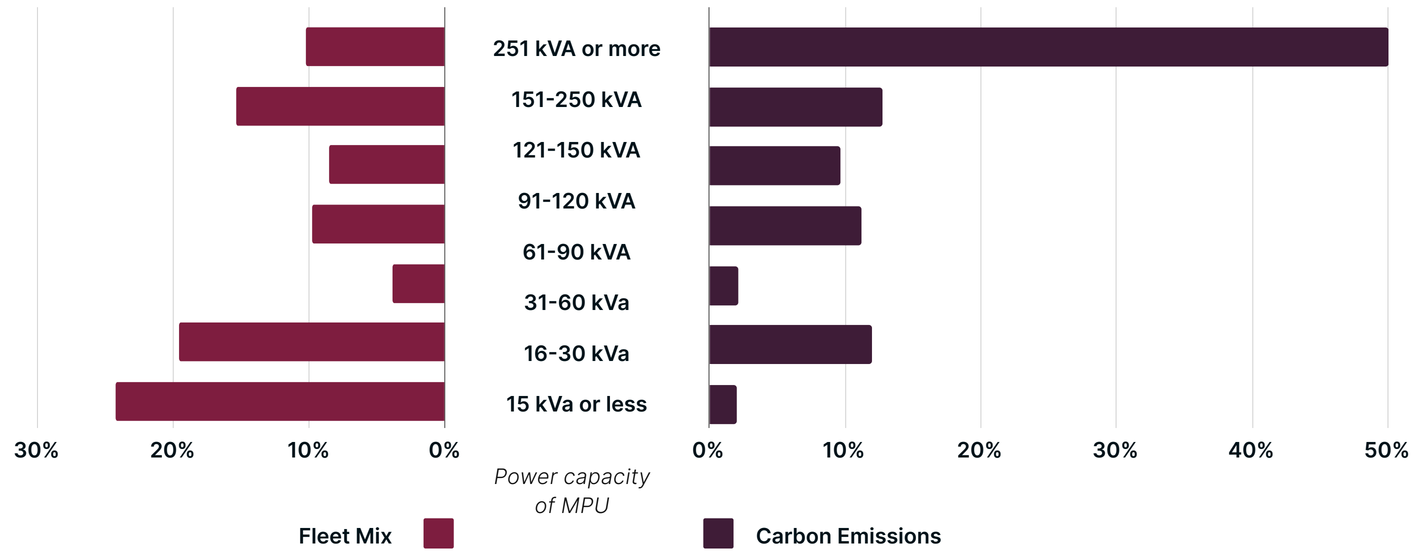
The Base Scenario for MPUs suggests that traditional generators could be retired from the fleet by 2036, based on the end of current investment cycles. A significant number of hybrids would remain. By that time, this scenario achieves a 91% reduction in carbon emissions, while annual costs rise from £13 million to £26 million across the period.

> Portable batteries available today have sufficient power output to cover 99% of production use cases.

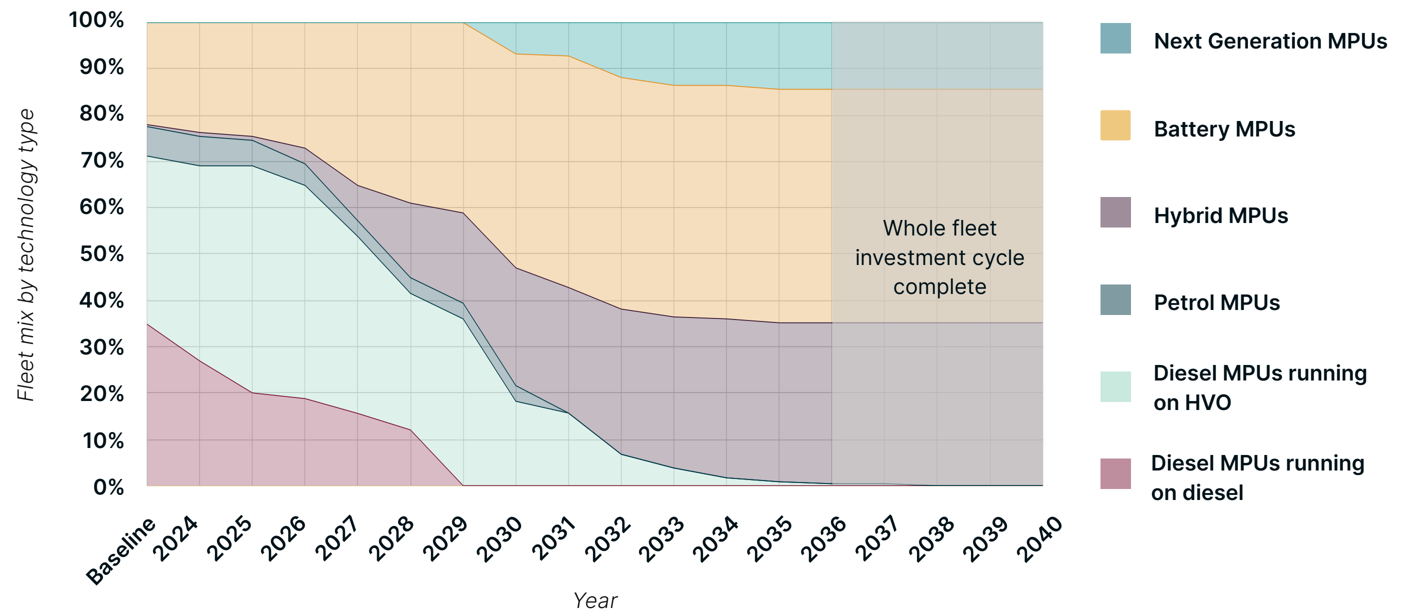
Portable batteries available today have sufficient power output to cover 99% of production use cases, however, they lack energy capacity. A scenario for additional batteries illustrates how hybrids could be avoided if batteries get swapped at least once per day, doubling energy capacity.

i Hydrogen technologies are also included in the definition but this analysis did not find any currently being owned or operated by suppliers meeting the scope of the study.

London's film and TV production supplier MPU fleet segmented by MPU category (left) and respective percentage of total carbon emissions (right).
Figure EX_3



The Base Scenario for all MPUs operated by London's film and TV suppliers, presented in terms of technology mix.
Figure EX_4



SECTOR MINDSET SUMMARY

60%

of MPU and 43% of vehicle fleet owners expect to retire fossil fuels by 2040 at the latest.

The scenarios set forth here will never be realised without a strong understanding within the industry about the need to adopt new technologies and ways of working, alongside investment in the transition. There are several opportunities to support such a shift and fortunately, current attitudes appear aligned on a low-carbon future.

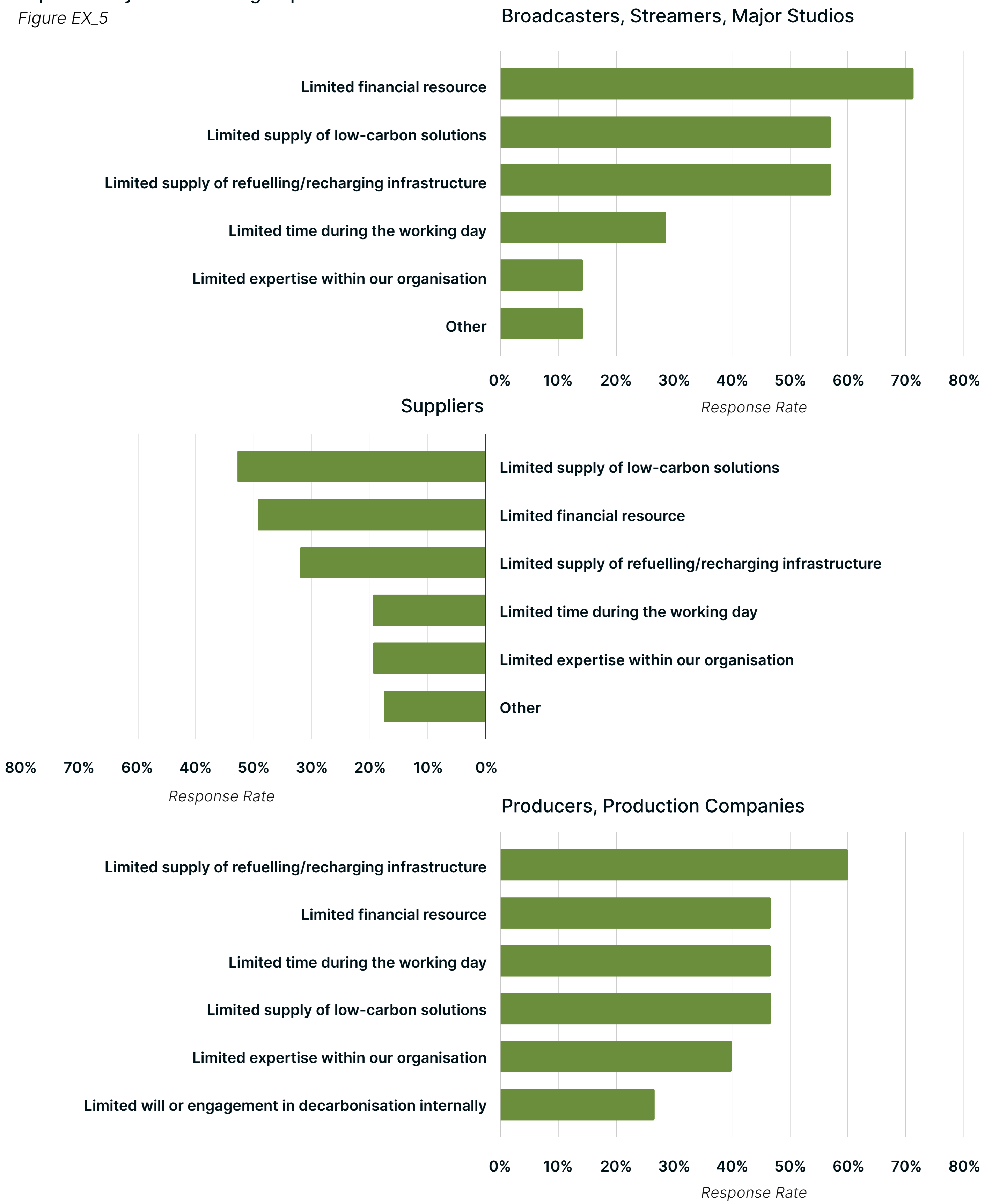
There is substantial confidence in batteries and HVO for both MPUs and vehicles already from companies across the industry. 88% of MPU fleets already include batteries, while 40% of vehicle fleets already include electric vehicles.

But this early progress does not guarantee the transitions set out in the scenarios. Challenges must be overcome. The most commonly cited barriers to the shift mentioned by stakeholders are: **lack of available technologies, lack of infrastructure** to support them and, crucially, **lack of finances** to enable the transition.

In addition, there is a disconnect in the supply chain between commissioner, producer and supplier, as to what is believed to be requested, and what decarbonisation technology is actually being asked for and provided on productions. Establishing a more transparent and more consistent procurement framework guarantees the supplier can successfully transform their fleet, producers can access low-emission technologies and clients can be assured their productions are decarbonised.

The top five most common answers to the question "**Overall, what challenges does your organisation face in moving away from a reliance on fossil fuels?**" separated by stakeholder group.

Figure EX_5



Finance: a view through the lens

Finance is a key pillar of the transition and near-term investment is needed to drive the switch to new technologies, improving health and reducing damages from climate impacts. This will all directly support the economic health of the film and TV industry through increased crew wellbeing, as well as reductions in shoot day cancellations and infrastructure damage. Funding the transition requires joined up thinking, both within the industry, as well as at the governmental level.

This section demonstrates the relative cost comparison of decarbonisation, in relation to other industry and non-industry figures. By considering these figures relative to the 183 films and 172 high-end TV productions which began principal photography between April 2023 and March 2024, a more accurate perspective on the costs may be seen. In addition, funding this transition would support 142 SMEs across the capital.

<£10 million
cost of a low-budget feature film[10].

£12.2 million
the average annual cost increase to transition London's transport and MPU fleets[1].

£42.88-£157 million
the total estimated NHS and social care cost due to air pollution from PM2.5 and NO2 combined in 2017[15].

$226.4 million
average cost of the top ten most expensive films of 2023[17].

£985 million
2023's total box office earnings for the UK and Republic of Ireland[16].

£3.99 billion
UK film and high-end television production spend between April 2023 and March 2024[9].

£5.3-£18.6 billion
the total estimated NHS and social care cost due to air pollution from PM2.5 and NO2 by 2035[14].

£100 billion
planned UK investment in new energy sources in the next decade[13].

$1.5 trillion
global cost from extreme weather and climate impacts in the decade up to 2019[12].

$4.5 trillion
necessary global clean energy investments by 2030[8].

$44 trillion
amount of the global economy (>50%) that is moderately or highly reliant on nature and its services[11].

1 Based on the Base Scenarios.

METHODOLOGY & SCOPE

Methodology

A comprehensive methodology statement is available separate to this report[1].

To achieve its aims, this project conducted a feasibility study exploring five key research questions (RQs):

- **RQ1**: What does the transport and MPU fleet of London's film and TV supply industry look like?
- **RQ2**: What is the carbon footprint of transport and mobile power from London's film and TV suppliers?
- **RQ3**: When will the fleet's transition away from fossil fuels be possible?
- **RQ4**: How much will this transition cost?
- **RQ5**: What is the appetite for this transition within the industry, and how might it be increased and expedited?

1 Methodology statement: https://filmlondon.org.uk/fuel-project-phase-ii/fuel-project-phase-ii-the-shift-methodology

To answer these questions, The Fuel Project combined a series of data collection, analysis, and benchmarking methods:

DATA COLLECTION →	DATA ANALYSIS →	DATA BENCHMARKING
Sector-wide Survey 89 respondents	**Survey Analysis**	
Vehicle Data 21 vehicle fleet 10 telematics datasets	**Scenario Modelling**	**Literature Review**
MPU Data 13 MPU fleets 57 telematics datasets	**Sector-sizing Analysis**	

Industry data was collected between October 2023 and January 2024, with a temporal data boundary from January 2022 to January 2024. Businesses were asked to provide information about their operational fleet of vehicles and MPUs, including their technical specifications and how they are used, as well as organisations' mindsets and actions around sustainability. Data from previous productions was collected related to mobile power use. Finally, The Fuel Project collaborated with a number of industry stakeholders in the collection of new data for shoots in production. This was done with support from BBC Group, Calamity Films, Facilities by ADF, HOPs4Climate, IDE Systems, Location One, Neptune Sustainability, Netflix, NXTGENbps, Picture Zero, Sky, Playground Entertainment, Potboiler Productions, Pulse Films, Rebel Park Productions, SISTER and Wanderlands.

To address the five RQs, scenario modelling was used to convert real world data into transition scenarios for each vehicle and MPU in the fleet. These models were created using methodologies of previous reports and interactions with industry stakeholders.

A sector-sizing analysis was conducted to ensure the results are representative of London's whole industry. This analysis indicates that London's supplier network extends to 165 businesses. Of this 165, the extrapolation exercise found that:

- 116 businesses operate vehicle fleets
- 56 businesses operate MPU fleets

Scope

This research is limited to the fuel and energy use for vehicles and MPUs owned by London's film and TV production supplier network. It does not attempt to map all vehicles and MPUs operating on productions.

To be considered part of this network, businesses must:

- offer a film and TV production specific service (see figure S1);
- be based within the London area (see figure S2 for boundary);
- Conduct more than 50% of their business within the M25.

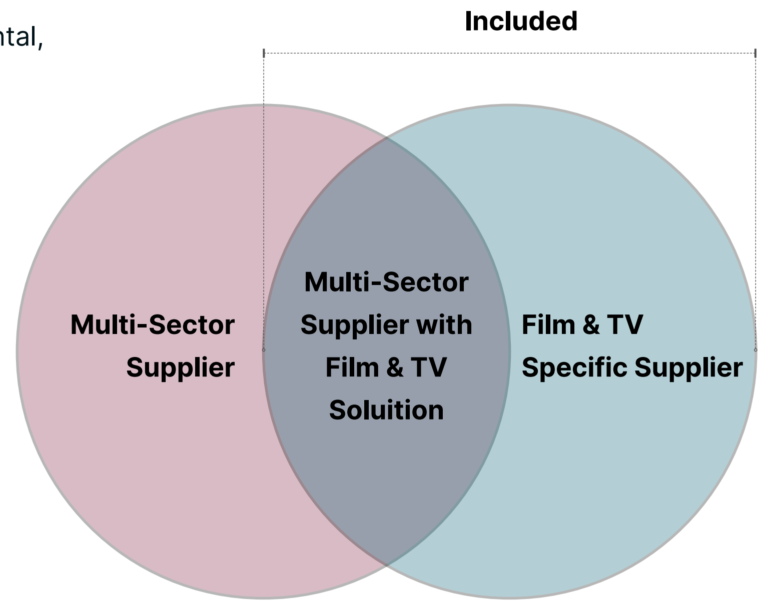
Examples of assets which are not included in this analysis are:

- Freelance-owned assets (such as unit driver vehicles and personal kit vans).
- Assets owned by multi-sector suppliers which do not have a specific focus on film and TV production (such as dry-hire, car/minibus rental, taxis and construction industry companies.

Whilst the Fuel Project team explored including these assets, challenges such as dry-hire and multi-sector suppliers lacking film & TV specific data, meant this was not possible. Tracking freelance owned assets would create a large pool of respondents, often with single assets, though could represent a further project.

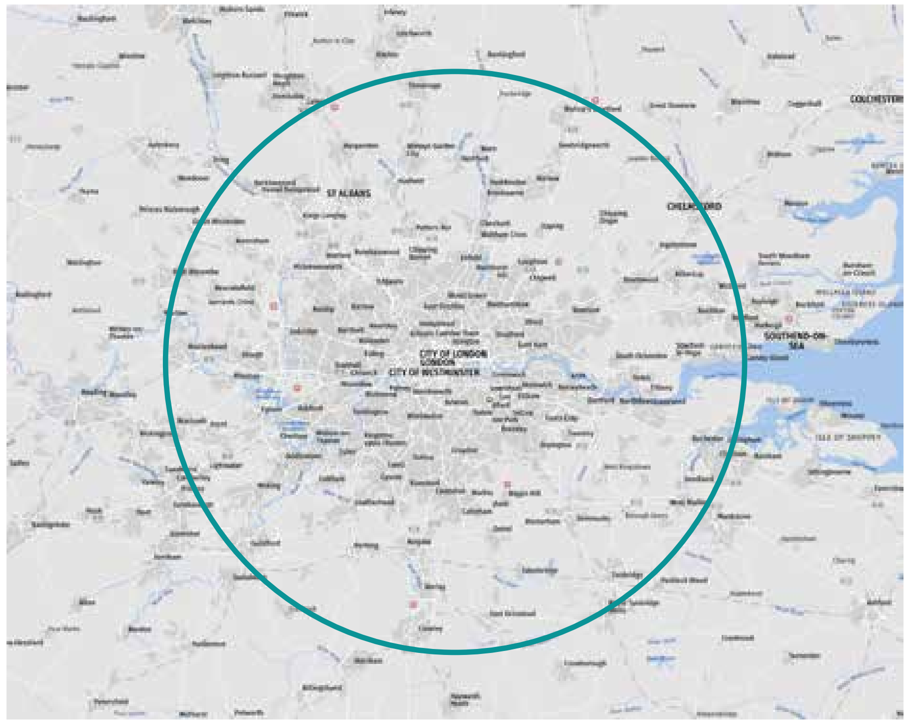
In terms of transport, the scope is focused exclusively on suppliers' operations fleets. Personal vehicles for commuting are not included as these may sit outside the control of the business.

MPUs can be categorised in terms of their mobility. This includes a range of portable units, ranging from those which can be moved by hand, to those requiring a forklift or larger vehicle to move them around. In addition, it includes units fixed into a vehicle. Handheld batteries including those with an energy capacity of 1kWh or less (e.g. a power bank) and units designed for single devices (e.g. an external battery for a camera), are not considered within the definition of MPU.



Definition of suppliers that are considered part of the film and TV industry.
Figure S1

This report's geographical area of analysis[i].
Figure S2



i Given the nature of depot locations which service London-based productions the geographical boundary for inclusion is broader than London's orbital road, the M25. The blue circle and the M25 were used as boundaries, with all those businesses based outside of the M25 but within the blue circle having to conduct over 50% of their business within London to be included in the research.

Ensuring a just transition

An established principle for embedding a just transition into a decarbonisation strategy, is supply chain engagement and understanding[i]. This project embeds this principle in the following ways:

- **Multi-stakeholder engagement:** The sector-wide survey engaged the whole supply chain for views on decarbonisation, from suppliers representing micro-businesses to multinational corporations;
- **Investment cycles:** The scenario modelling is built around the principle that assets are only replaced when the business would expect to be replacing them as usual, no sooner;
- **Stakeholder equity:** Elements of the analysis that raise equitable concerns are discussed within the report;
- **Solution funding:** The report suggests that solutions must be funded by the industry as a whole without burdening a particular stakeholder type inequitably.

i For further information regarding the involvement of the supply chain in the just transition, review the report for the finance sector: Curran B, Robins N, Muller S, Subramoni A and Tickell S (2022) Making Transition Plans Just: How to embed the just transition into financial sector net zero transition plans. London: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science. Available at: https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2022/10/Making-Transition-Plans-Just-2.pdf

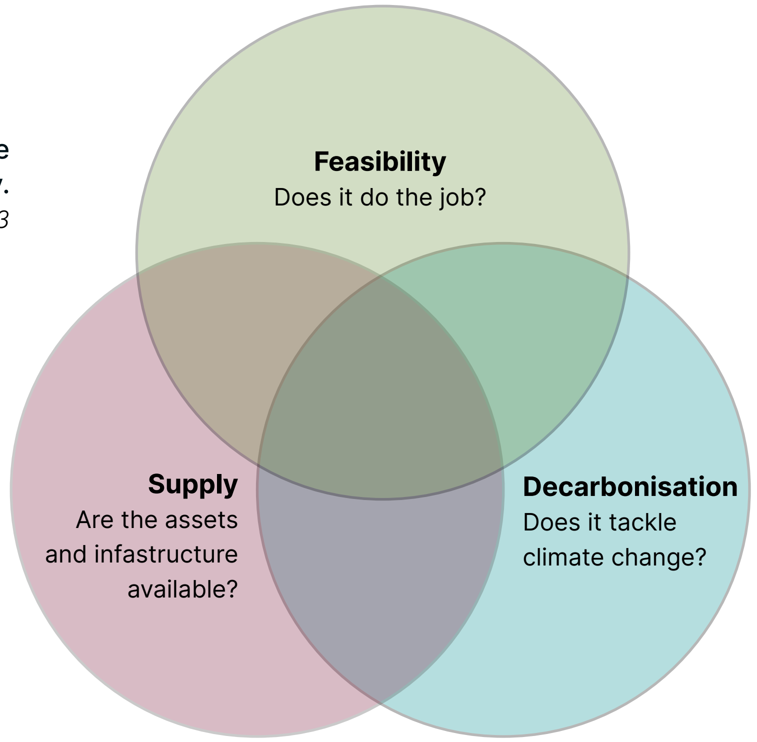
Hierarchy and assessment of technologies

There remains no evidence of a “silver bullet” technology today, and it is likely a mix of technologies will be adopted over the coming decades. Therefore, to understand what this mix should look like and when, this report utilises the following hierarchy:

1. When assets are ready to be replaced, **battery electric technology is prioritised**;
2. Those that cannot be replaced with batteries, **consider hybrid or a “next generation”** solution;
3. Ahead of unit replacement, all **diesel fuel should be switched to a sustainably-sourced HVO**.

To build the above hierarchy, three interconnected considerations are assessed: feasibility, supply and decarbonisation.

Three considerations for selecting the transition technology.
Figure S3



The following summary provides an assessment of the current state of the three predominant technologies considered in this report:

	Intended feedstock, fuel or energy source	Batteries	HVO	Hydrogen	HVO-Battery Hybrid
		Grid	Used Cooking Oil (UCO)	Green Hydrogren	UCO and Grid
Car, Pick-ups and 4×4	Feasibility	High	High	Medium	High
	Supply	Medium	Low	Low	Low
	Decarbonisation	High	Medium	High	Medium
Vans	Feasibility	High	High	High	High
	Supply	Medium	High	Low	Low
	Decarbonisation	High	Medium	High	Medium
Trucks	Feasibility	Medium	High	Medium	
	Supply	Low	High	Low	Low
	Decarbonisation	High	Medium	High	Medium
Mobile Power Units (MPUs)	Feasibility	Medium	High	Medium	High
	Supply	Medium	High	Medium	High
	Decarbonisation	High	Medium	High	Medium

High Confidence
Medium Confidence
Low Confidence

Decarbonisation and bridge technologies

WHY BATTERIES?

Based on the project’s interconnected considerations of decarbonisation technologies, the battery demonstrates the greatest promise for both transport and power solutions. Energy efficiency of battery systems is superior to other technologies – meaning the least amount of energy is required to power the vehicle or MPU, therefore reducing emissions.

While single batteries with capacities suitable for the largest production demands are available on the market, they are not portable and therefore not suitable for the industry at present. As such, battery-power is not recommended for all uses, as is laid out across the decarbonisation scenarios. However, increasingly suppliers are utilising second-life units from the EV industry to produce large capacity MPUs.

WHY IS HYDROGEN DELAYED?

Among "next generation" solutions, there is considerable speculation over the role of hydrogen-powered vehicles and MPUs. Based on the UK Government's green hydrogen strategy, it is only anticipated to be commercially available in the 2030s[18].

Predicting what will happen in the 2030s is a challenge. Breakthrough innovation is anticipated within hydrogen technologies, but so too with new battery chemistries. It is uncertain which will become commercially viable at the scale currently demonstrated by available battery electric technologies. Because of this current commercial uncertainty, this report labels hydrogen (as well as new battery breakthroughs) as a "next generation" solution. There is a risk that fossil fuel assets remain in the fleet for longer due to this technological uncertainty – therefore, **investment in innovation and experimentation is needed to ensure "next generation" technologies fulfil their promise**.

WHY ARE HYBRIDS CONSIDERED A BRIDGE TECHNOLOGY?

A hybrid is a combination of two technologies, such as a combustion engine and a battery unit. Hybrids offer an important alternative route as they unlock the opportunity to introduce low-carbon technologies without risking running out of charge and impacting work. The term hybrid is a very broad one. For the purpose of this report's analysis, a hybrid must be able to run only from a battery and electric motor drivetrain for a period of time, though it may be recharged by the attached combustion engine or via the electricity grid. For this report, the hybrid has been considered as a decarbonisation technology for MPUs only[I].

The benefits of hybrid technology are considerable; by introducing a zero-emission technology (i.e. the battery) efficiently, it minimises fossil and HVO fuel consumption without risking running out of power. However, they come with several caveats and uncertainties to consider:

- **Retrofit versus new:** by adding a battery to an existing generator, the manufacture of a new generator is avoided. However, this may be at the expense of running an older, less efficient unit for longer. This could result in greater emissions and air pollution than a hybrid using a newer generator, although the cost savings may allow the investment in the battery, lowering emissions sooner[II]. Further research is needed.

- **One unit or two:** By replacing a generator with a generator and a battery, there is a risk that the number of assets in the fleet doubles. This risks doubling the capital costs of the fleet and is a major consideration for the TCO calculation. Literature reviewed has not explored hybrid cost scenarios in detail, but the over-investment in hybrids could see the sector failing to achieve a return on investment.

Ultimately, hybrids still operate on fuel. As such, **The Fuel Project considers the hybrid as a bridge technology**, albeit a long-term one.

I At the time of writing, diesel-battery hybrid models are more prominent in the MPU market than within the various vehicle markets. Petrol-battery hybrid models (PHEVs) exist for cars and some larger categories but their market share is decreasing compared to fully electric models: https://alternative-fuels-observatory.ec.europa.eu/transport-mode/road/united-kingdom/vehicles-and-fleet.

II It is possible to retrofit a Stage III generator with the increased filtration system of a Stage V. This may offer a useful compromise.

WHY IS HVO ONLY A "BRIDGE FUEL"?

HVO is expected to be a key decarbonisation technology for the coming decade and may be vital to unlocking a mindset shift away from fossil diesel. However, it is a contentious technology. A number of concerns around HVO use mean it is only considered to be a bridging solution which must not be used to delay a move towards alternative low-carbon technologies. The Phase I report offered some detail on the benefits and drawbacks of this fuel[19]. **The Shift** contains updates based on the latest research:

- **A quick win:** HVO remains a near immediate decarbonisation solution for the sector[20]. At 2024 prices, it is a relatively inexpensive decarbonisation solution and, as a drop-in fuel, can be used in existing assets.

- **Used Cooking Oil:** The preferred and predominant fuel stock for HVO is Used Cooking Oil (UCO). As a waste product of biological origin (plants), its use avoids adding carbon emissions from fossil sources.

- **Is UCO use a good thing?**: UCO for biofuel production is known to reduce the illegal disposal of UCO, a practice with serious environmental and human health impacts[21].

- **Is it a bad thing?**: In many countries, UCO is already used for other purposes. Increasing demand for UCO for HVO production may reduce supply of UCO within these existing practices. While this is often a positive from a health perspective, the knock-on effect could be indirect land use change for the farming of alternative crops, increasing emissions[22].

- **Constrained by cooking**: A major challenge is guaranteeing a supply of UCO for HVO. UCO, by definition, has a limited supply due to its waste status. While this could theoretically increase with a growing global population and improved collection[23], there is ultimately a finite supply entering the market each year.

- **Competition for supply**: Increasing demand for UCO, not only between nations[24], but also across sectors[25], is creating supply uncertainty. This creates a risk that sourcing UCO-based HVO may be constrained in the future. HVO-reliant users in Europe and North America may be left with stranded assets, or forced to resume consumption of fossil diesel and/or less sustainable HVO until they shift to battery or "next generation" technologies.

04

TRANSPORT

Top transport action recommendations

This section lays the groundwork for the following key transport recommendations:

1

DEVELOP A FLEET STRATEGY:

Suppliers should not be planning a simple "like for like" vehicle replacement for their next investment. Telemetry data and the Avoid-Improve-Shift model should be used to build a transition strategy for each vehicle in the fleet[I].

I Support for this exists. Sustainable transport analysts can help suppliers review their fleets.

2

PLAN FOR INFRASTRUCTURE:

70% of suppliers report having space for on-site recharging infrastructure and HVO storage; those companies should pursue installation as a priority. Others should plan to acquire the space needed to install and provide these facilities over the next five years.

3

IDENTIFY THE "LOW HANGING FRUIT":

Smaller vehicles – including cars, 4×4s and small vans – have an opportunity to transition to electric sooner and more affordably than other vehicles.

4

BUILD AND SHARE KNOWLEDGE:

The electric truck market is establishing itself today. Engage with trials and learn from other vehicle operators who have already invested. Plan now for trialling and introducing new technologies in their fleet.

POSSIBLE DECARBONISATION TIMELINE

Today	2025	2029	2033	2040+
The vehicle fleet is mostly 2022 and 2023 registered vehicles. Over 40% of suppliers already operate electric vehicles.	**17% of vehicles are fully electric,** beginning with the smaller vehicles doing shorter distances.	**Entire fleet fossil fuel-free.** By the end of the year petrol vehicles are no longer used and the remaining diesel fleet is HVO-only[I].	The **last diesel vehicles operating on HVO are retired** from the fleet.	The fleet is a diverse mix of electric and next generation vehicles, including batteries and hydrogen.

I Decarbonisation could be expedited if HVO fuelling and electric vehicle charging infrastructure is installed sooner.

TAKEAWAYS FROM THE FLEET TODAY

- 50,000 tonnes CO_2e emitted per year by vehicles;
- 3,200 vehicles operated by London's film and TV suppliers;
- 82% of vehicles use diesel while 4% are electric;
- £26 million per year spent by suppliers on vehicles.

TAKEAWAYS FROM THE FUTURE SCENARIO[I]

- 90% reduction in emissions by 2033 possible;
- 40% increase in cost (TCO) necessary;
- £6.2 million per year average additional cost of vehicle fleet decarbonisation;
- £34 million per year transport cost to suppliers in 2030;
- £37 million per year transport cost to suppliers in 2040.

I Figures taken from the Base Scenario.

The carbon footprint of London's transport fleet

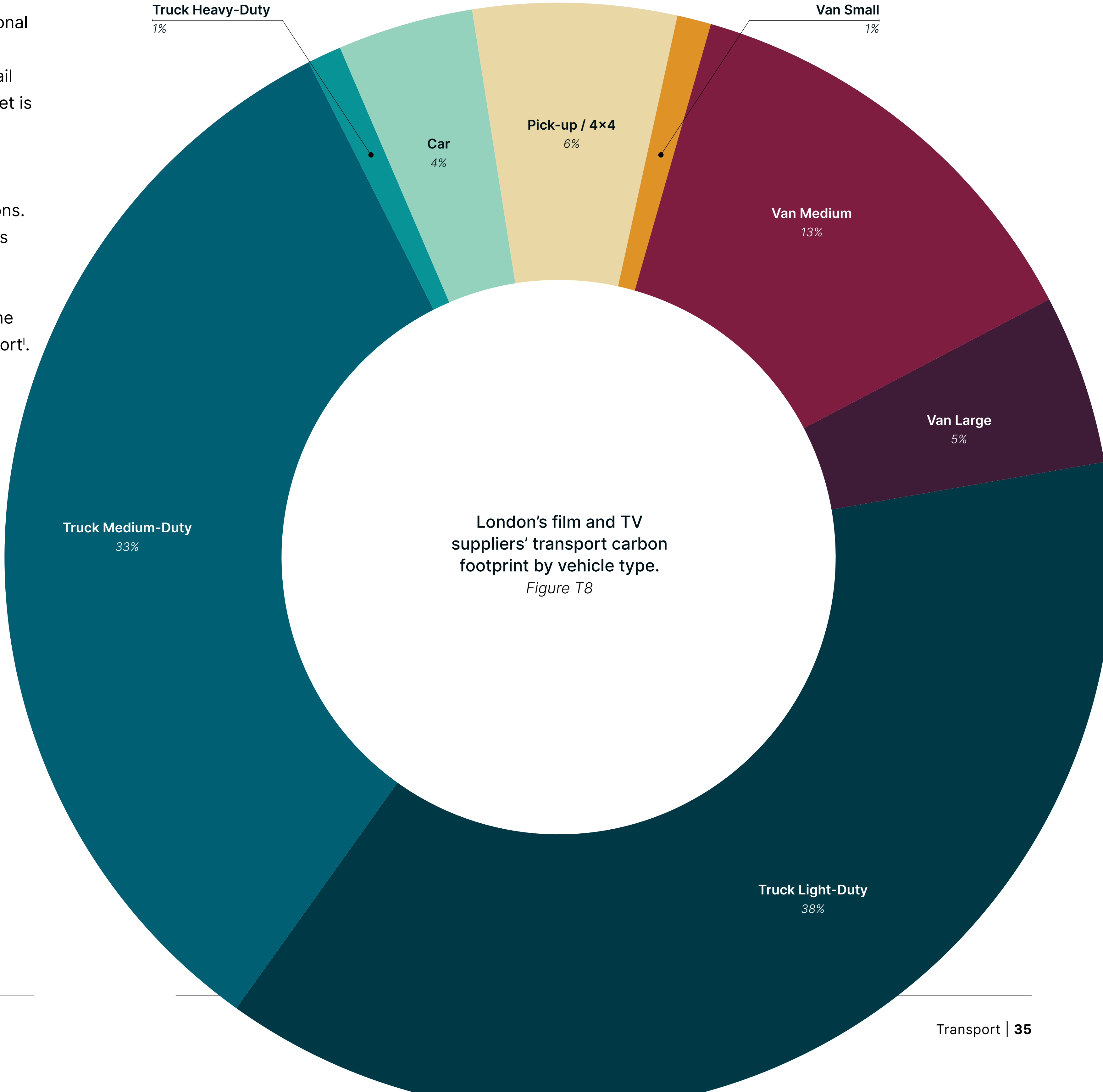
The total annual carbon footprint of supplier transport is estimated to be 50,000 tonnes of greenhouse gas emissions (CO_2e). This is from the "Well-to-Wheel" impacts of extracting, processing and burning fuels in vehicles, as well as from producing and distributing grid electricity for electric vehicle charging.

The highest emitting vehicle group are trucks (72% of emissions) despite representing a smaller proportion of the fleet (36%). This is to be expected. Trucks were also responsible for greater mileage, averaging 19,000 miles per year, while vans averaged 15,000 miles per year. This additional mileage, likely combined with carrying greater weights and auxiliary power demands (such as tail lifts), means the energy required for the truck fleet is substantially greater than smaller vehicles.

The operators of these fleets are generally responsible for all fuel and vehicle choice decisions. Unlike MPUs, refuelling of supplier vehicles is less likely to be a job of a production. Suppliers have an array of solutions for decarbonisation to meet the specialist needs of their fleet in addition to the decarbonisation technologies outlined in this report[1].

1 The first The Fuel Project report for further information.

VEHICLES	**CARS**		Car
			4×4 / Pick-up
	VANS		Small Van (<3.5t)
			Medium Van (3.5t)
			Large Van (>3.5t)
	TRUCKS		Light Duty Truck (7.5-18t)
			Medium Duty Truck (20-36t)
			Heavy Duty Truck (>40t)



London's film and TV suppliers' transport carbon footprint by vehicle type.
Figure T8

London's Vehicle Fleet

The following section summarises findings from the survey and the fleet data analysis. In total, the research collated data on 568 vehicles.

There are an **estimated 3,200 operations vehicles working for 116 film and TV production supplier businesses across London**. Just over half of these are used for transport and logistics (*Figure T1*), 13% are operated by camera and grip companies, 13% by set construction and the remaining 23% by a range of other suppliers.

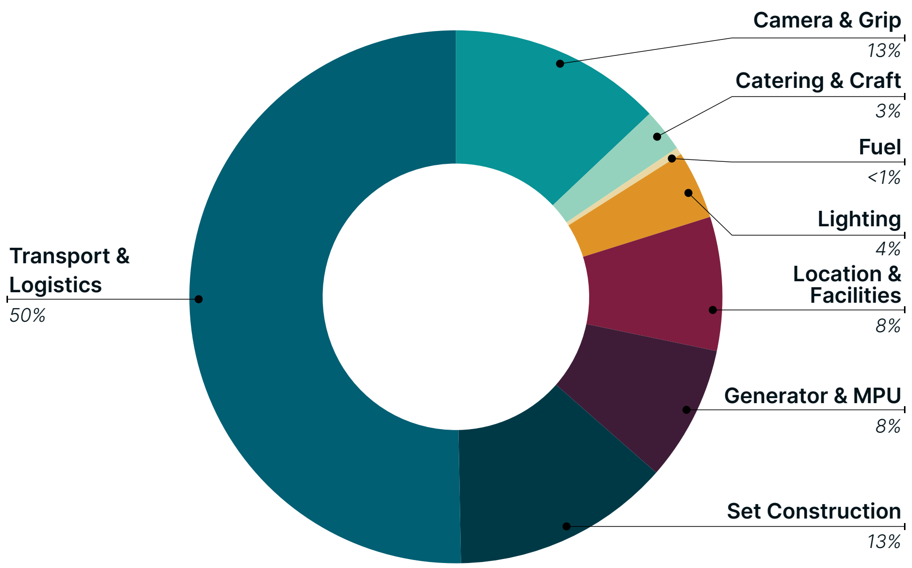
FILM AND TV PRODUCTION DEMANDS A HIGHLY DIVERSE FLEET

Due to the broad range of supplier services, the **vehicle fleet is largely diverse**. The type of vehicle, distance travelled and service provided varies widely. *Figure T2* shows the light-duty truck and the medium-sized van are the most common categories. Not every vehicle type known to be used in the industry was captured in the survey, such as mini-buses, unit drivers and cargo bikes.

Sector-wide Survey	**Vehicle Data**
89 respondents	21 vehicle fleets 10 telematics datasets

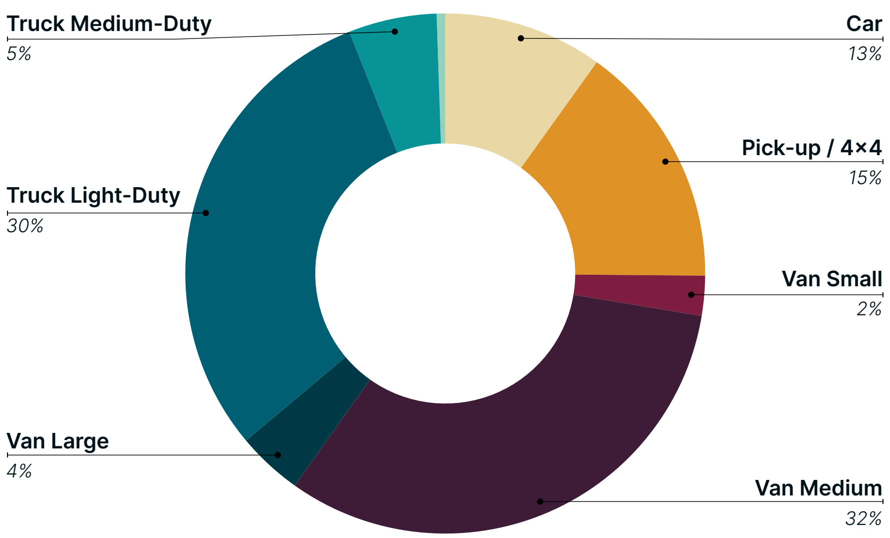
London's film and TV production supplier vehicle fleet, separated by supplier type. Based on responses to the sector-wide survey.

Figure T1



London's film and TV suppliers transport fleet separated by vehicle types.

Figure T2



DIESEL DOMINATES THE FLEET

At 82%, **diesel vehicles are dominant today** (Figure T3). Petrol vehicles represent 13% of the fleet, being the preferred fuel type for cars. Electric vehicles totalled 4% and plug-in hybrids make up the remaining 1%. No survey respondents report having vehicles powered by alternative fuel sources (such as hydrogen or liquefied petroleum gas).

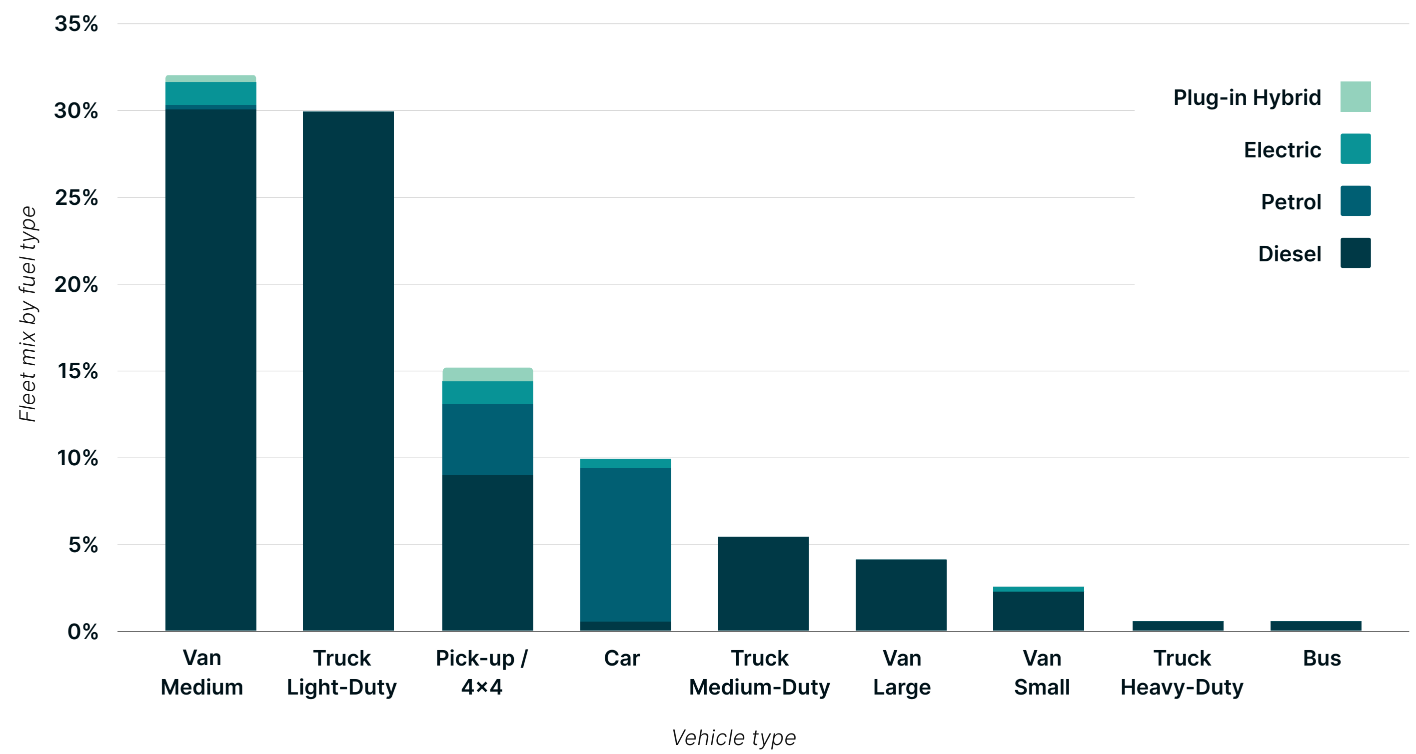
> Only 14% of diesel vehicles are fuelled with HVO.

While renewable fuels are becoming adopted in the sector, this is still limited. While all diesel vehicles in this fleet could adopt it, only 14% of diesel vehicles are currently fuelled with HVO. 22% of plug-in hybrid and electric vehicles report recharging on renewable electricity[I].

I It is not known whether this is directly from on-site renewables or using a renewable energy tariff.

Transport fleet by vehicle group and fuel type.

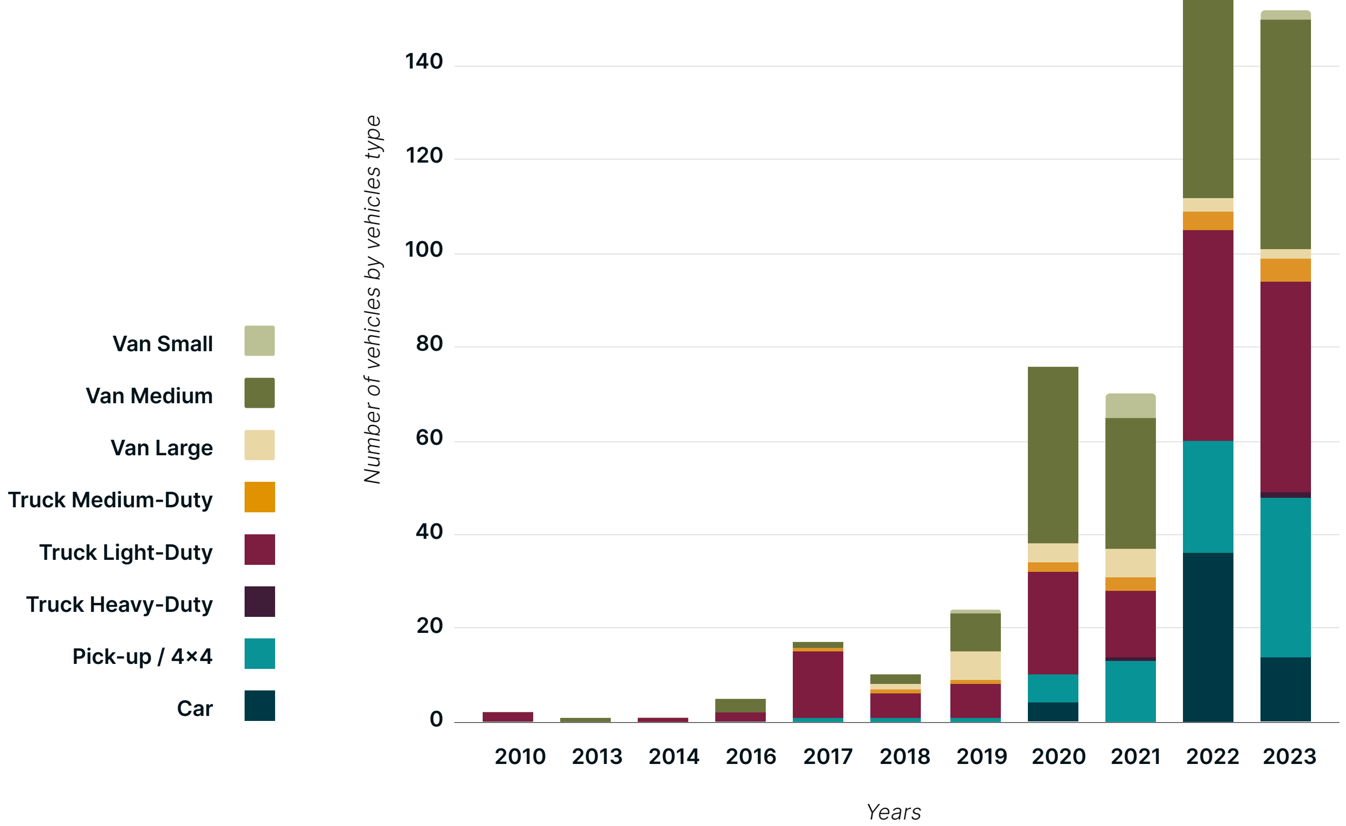
Figure T3



FLEETS ARE RELATIVELY YOUNG

The **fleet is mostly very young**. As shown in *Figure T4*, most vehicles have been acquired within the last two years. Older vehicles are likely to be for specialist use cases. This trend could be an indicator of the growth the sector has observed over the last few years. However, it is likely to also relate to LEZ and ULEZ compliance, with Euro 6/VI diesel vehicles replacing older, non-compliant versions. A positive impact on air pollution in London is already being reported as a result of these policies[26].

Submitted fleet data separated by vehicle group and first year in the fleet.
Figure T4



Fleet life cycles vary. A life cycle of four years is most common but the average was six years[I]. The larger the vehicle, the longer it tends to be in the fleet (*Figure T5*). Few vehicles are expected to stay in the fleet longer than 10 years[II].

Most fleet **vehicles are owned directly by the supplier**. Just over 50% of those suppliers surveyed indicate they own their whole fleet, while 38% used a mix of ownership and leasing.

It is encouraging to see that **over two thirds of fleets use some form of fleet management software;** this software, most common in company's where the fleet is 10 or more vehicles, will support fleet managers' accurate decision-making. However, this also suggests that smaller businesses may be less supported in their decision-making.

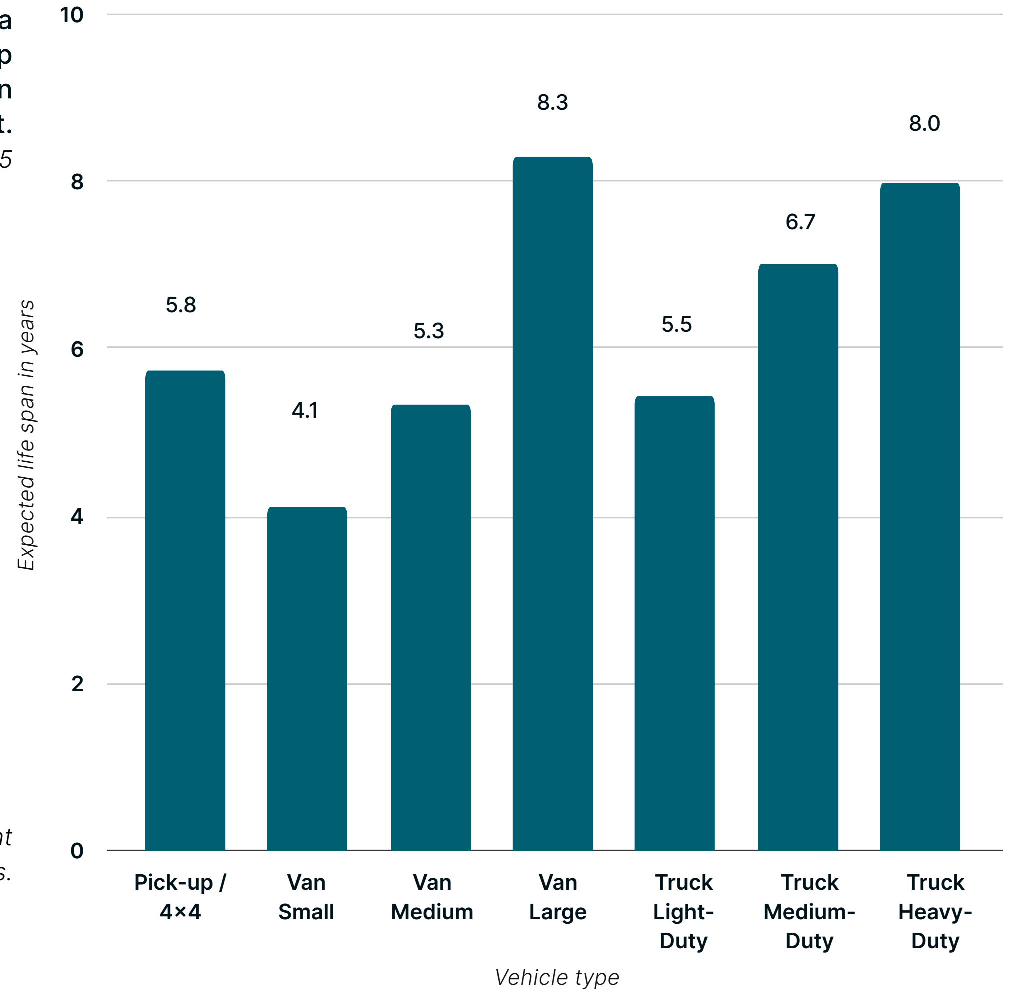
Almost all vehicles are parked at a company depot or work facility. Less than 1% of vehicles (including cars) are kept at employee homes, meaning concern around home charging infrastructure is likely not warranted. However, 68% of vehicles report using shared parking rather than parking facilities exclusive to that fleet, as seen in *Figure T6*. These are mainly cars and medium vans. This is not the case for larger vehicles. The

I The mean average was 5.7 years, rounded up to 6 for the purpose of future analysis.

II If a replacement date was not provided in the fleet data, this study uses these category-specific averages to predict when vehicles will be replaced.

Submitted fleet data separated by vehicle group and expected lifespan in fleet.
Figure T5

Note: there was insufficient data on cars for analysis.

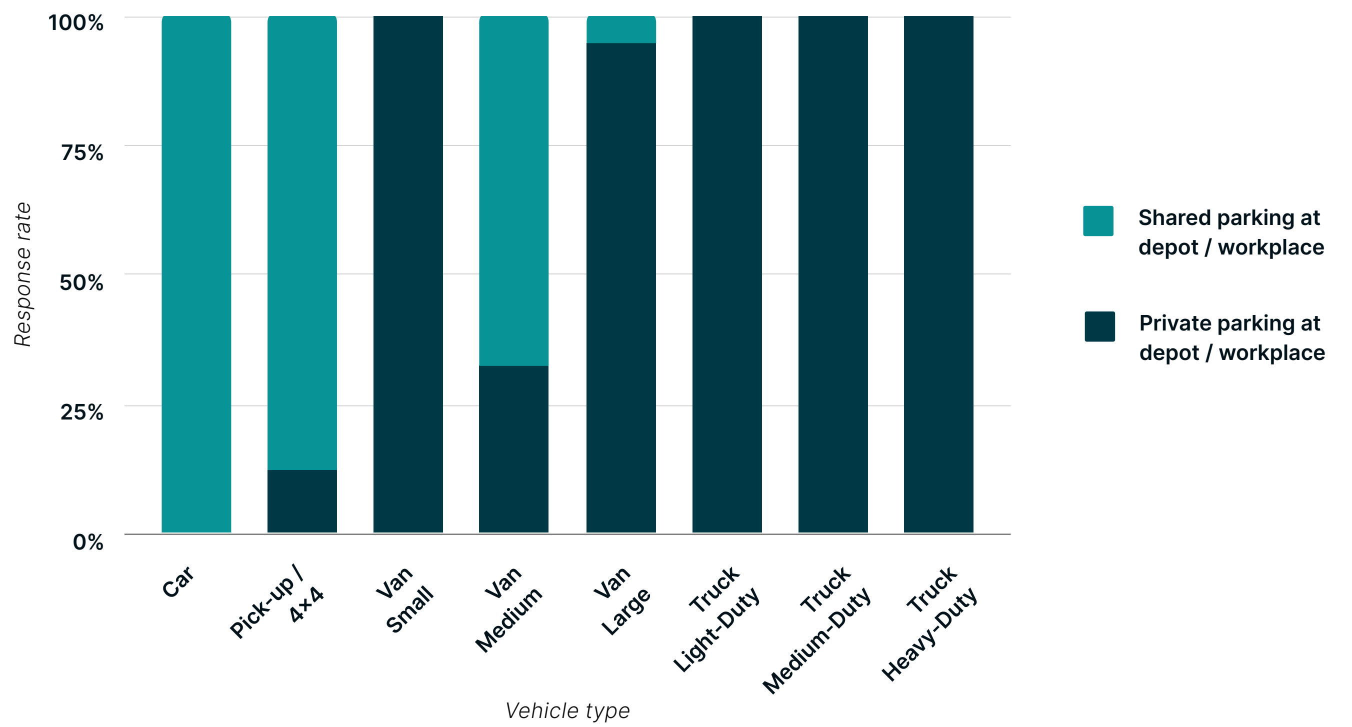


ability to install refuelling or recharging infrastructure such as charging units, fuel tanks and/or substations (if needed) is important to consider when transitioning to low-carbon technologies.

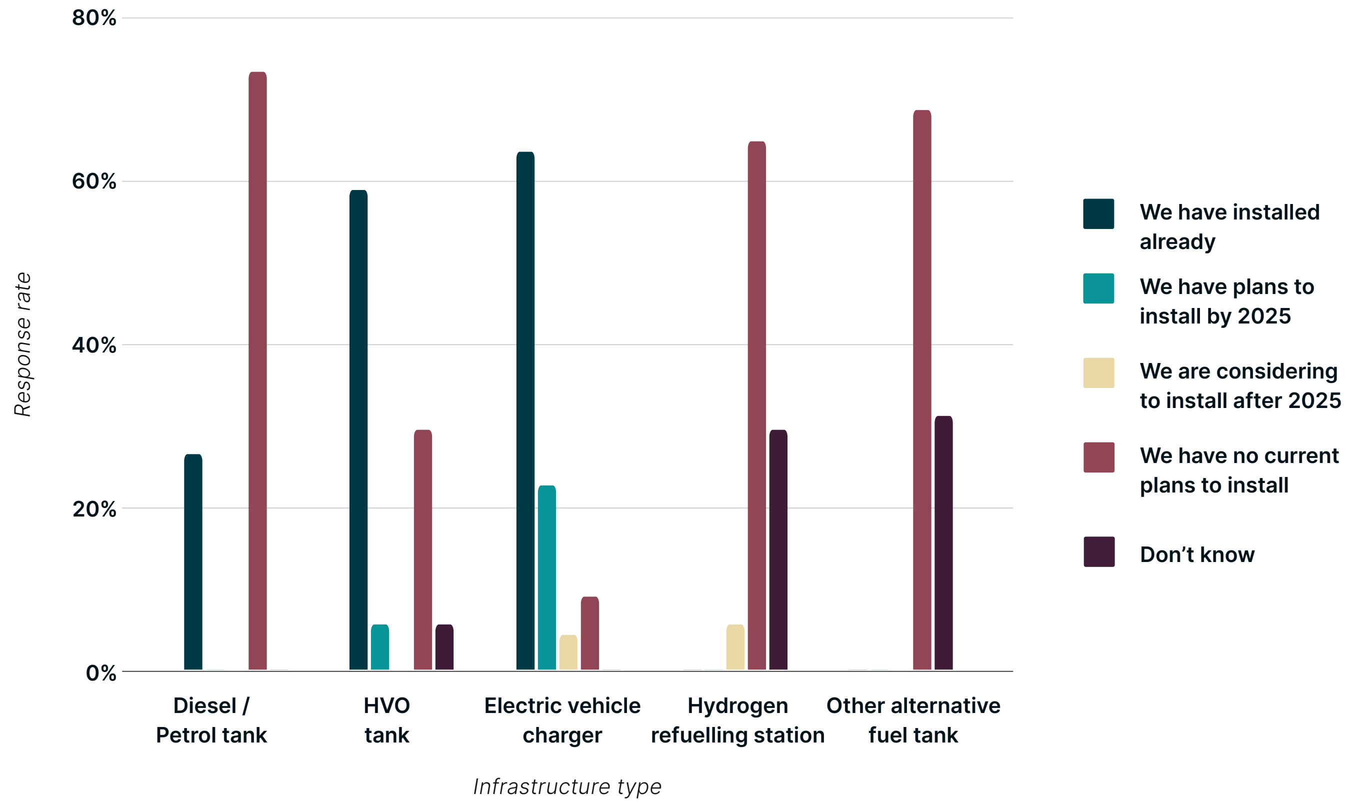
As shown in *Figure T7*, **a majority of suppliers already have electric vehicle chargers and HVO tanks**. 70% of respondents reported available space for infrastructure. While this means the majority of the fleet can house complementary infrastructure for decarbonisation, coordination with managers of shared parking facilities may complicate the transition for the remaining third of the fleet.

70%
of respondents reported available space for infrastructure at their parking

Submitted fleet data separated by vehicle group and depot parking location.
Figure T6



Survey responses to "Do you have any of the following installed at your operational facility?"
Figure T7



DECARBONISATION SCENARIOS

The following section uses data from the survey, telemetry and fleet data to create scenarios for decarbonisation.

Sector-wide Survey
89 respondents

Vehicle Data
21 vehicle fleets
10 telematics datasets

Three scenarios have been produced to explore how the vehicle fleet could decarbonise:

A) BASE SCENARIO (RECOMMENDED)

Assumes decarbonisation will happen at the pace that technology and investment cycles allow.

B) LIMITED VEHICLES SCENARIO

Explores how the Base Scenario would be constrained due to a limited supply of decarbonisation technologies.

C) LIMITED INFRASTRUCTURE SCENARIO

Explores how the Base Scenario would be constrained due to a delay to infrastructure installation projects.

Key Factors

The following four assumptions have been made across all scenarios:

VEHICLE REPLACEMENT CYCLES

All scenarios assume that current vehicles are only replaced at the end of their investment cycles - when a business expects to renew the fleet anyway. The Base Scenario creates a rapid transition to electric or "next generation" around the year 2030. This is because the fleet data indicated that a significant proportion of vehicles would be retired and replaced in this year. A faster transition could happen if there were an effort to retire internal combustion engine vehicles sooner. However, enhanced investment cycles may impact a just transition within the supply chain if pressure is applied to move faster without funding from other stakeholders.

VEHICLE AVAILABILITY

The vehicles likely to transition immediately are those with the greatest commercially available stock, such as cars and medium-sized vans. Trucks are in the early stages of commercialisation which may cause stock bottlenecks for certain models. The Base Scenario assumes that where the electric vehicle model is already commercially available, the supplier/purchaser can receive it immediately. Many electric vehicle models are now available for delivery in 2024 and 2025.

INFRASTRUCTURE AVAILABILITY

Low-carbon fuels and zero emission vehicles can only be adopted if there is the infrastructure to support it. The Base Scenario assumes that infrastructure installations will be possible at all operational facilities, and where the vast majority of vehicles are stored[I]. This includes both fuel bunkering for HVO and/or recharging infrastructure for electric vehicles. For those businesses that report the feasibility to install refuelling infrastructure, the model assumes this would lead to a switch to HVO by end of 2025. A five-year delay to transition to low-carbon tech is assumed for the remaining businesses. This five-year delay also allows for the establishment of quality public charging infrastructure for commercial vehicles.

I This is because the data suggests 70% of suppliers with vehicle fleets have facilities that can support the transition.

DECARBONISATION TECHNOLOGIES

While electric vehicles are suitable for many current uses, they are not suitable for all. It is assumed that incremental improvements in battery energy capacity would take place between 2024 and 2033, in line with current developments[I]. However, this still does not meet the demands of vehicles requiring the highest levels of energy use.

I This assumption is based on the historic trend of lithium-ion battery prices which have been decreasing over the last decade. This is a widely reported trend: https://cleantechnica.com/2020/02/19/bloombergnef-lithium-ion-battery-cell-densities-have-almost-tripled-since-2010/)

RECOMMENDED SCENARIO

The Base Scenario

Phase out date: All diesel & petrol vehicles retired from the fleet	**2033**
Carbon footprint reduction by 2030 compared to 2023	**91%**
Total carbon emissions avoided by 2030	**244,000 tones CO_2e**
Average cost increase by 2030 compared to 2023	**£5 million per year**
Average cost increase between 2030 and phase out date, compared to 2023	**£11 million per year**
Average annual cost increase, year on year, until phase out date	**4%**

A) The BASE SCENARIO assumes decarbonisation will happen at the pace that technology and investment cycles allow.

To understand technical feasibility, the study uses available telematics data to estimate the daily energy consumption for each vehicle. By comparing these results with the specification of the decarbonisation technologies, the model creates a "best case" scenario that does not consider potential barriers to adoption. **This Base Scenario estimates that London's film and TV suppliers could transition to a zero emission vehicle fleet entirely by 2033, achieving a 93% carbon emissions reduction by that year[I].**

In this scenario, all diesel vehicles switch to HVO, but over differing time horizons. From the baseline of 14% using HVO, this increases to **70% using HVO by 2025**, a change responsible for the large initial drop in carbon emissions over the first two years on *Figure T_S1*. The remaining 30% that indicated they did not have infrastructure capacity are expected to switch to HVO by the end of 2029. These suppliers have an additional hurdle to face: they may need to quickly move facilities or work with landlords to create the infrastructure space needed for decarbonisation[II].

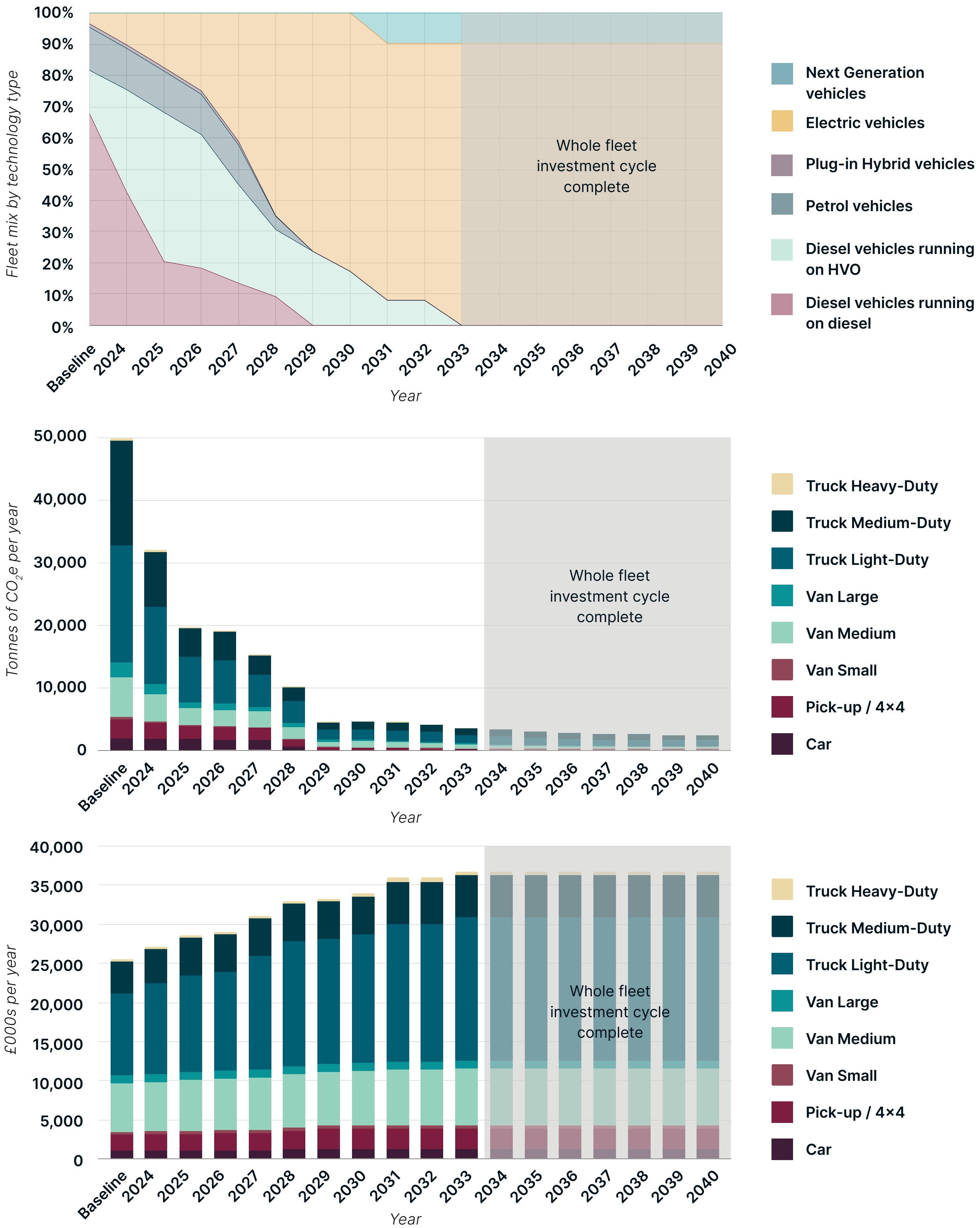
By immediately targeting the "low-hanging fruit" for electrification, the industry could electrify an additional 7% of its fleet in 2024 based on expected investment cycles. This means that over 10% of the fleet could be electric in 2025. Electric models of cars and vans are largely available now. Newly available models of pick-ups and rigid light-duty trucks, should be considered for trials in the coming year. **For all of these vehicle categories, the industry should be preparing to invest in electric as current investment cycles come to an end.**

However, this scenario comes with a substantial increase in costs. By the end of the investment cycle in 2033, costs are forecast to have increased by an average of 27% from the 2023 baseline. This amounts to an average additional cost of £7 million per year across the transition on buying, using and maintaining the decarbonised fleet. However, the total cost of ownership (TCO) for zero emission vehicles is predicted to fall in the future and be cheaper than fossil fuels due to lower operational costs.

I How can a zero emission vehicle only achieve 95% carbon footprint reduction? This is because a "zero emission vehicle" refers to the vehicle itself (known as Tank-to-Wheel emissions), not the source of the energy (known as Well-to-Tank emissions). This analysis includes the source of energy emissions and assumes that grid electricity/future energy sources will not be fully decarbonised in the 2030s.

II The Fuel Project acknowledges this scenario relies on a change that may be viewed as an inequitable (perhaps due to speed of change suggested) burden on a third of suppliers. However, given that two thirds of suppliers have said they can make this change now, it was important to make this scenario the central one so as not to hold back the transition.

The Base Scenario for all vehicles operated by London's film and TV suppliers presented in terms of technology mix, carbon footprint and total cost of ownership. *Figure T_S1*



Limited Vehicles Scenario

Phase out date: All diesel & petrol vehicles retired from the fleet	**2035**
Carbon footprint reduction by 2030 compared to 2023	**84%**
Total carbon emissions avoided by 2030	**228,000 tones CO_2e**
Average cost increase by 2030 compared to 2023	**£4 million per year**
Average cost increase between 2030 and phase out date, compared to 2023	**£10 million per year**
Average annual cost increase, year on year, until phase out date	**3%**

B) The LIMITED VEHICLES SCENARIO explores how the Base Scenario would be constrained due to a limited supply of decarbonisation technologies.

A limited supply and range of vehicle models has been a commonly cited barrier to the adoption of electric cars and vans in the previous five years. These barriers can be especially challenging for smaller businesses that have less purchase power but require specialist models. While such supply issues have largely been resolved for certain vehicle categories, this challenge has not gone away.

> This scenario results in a slowing of the transition by three years in comparison with the Base Scenario.

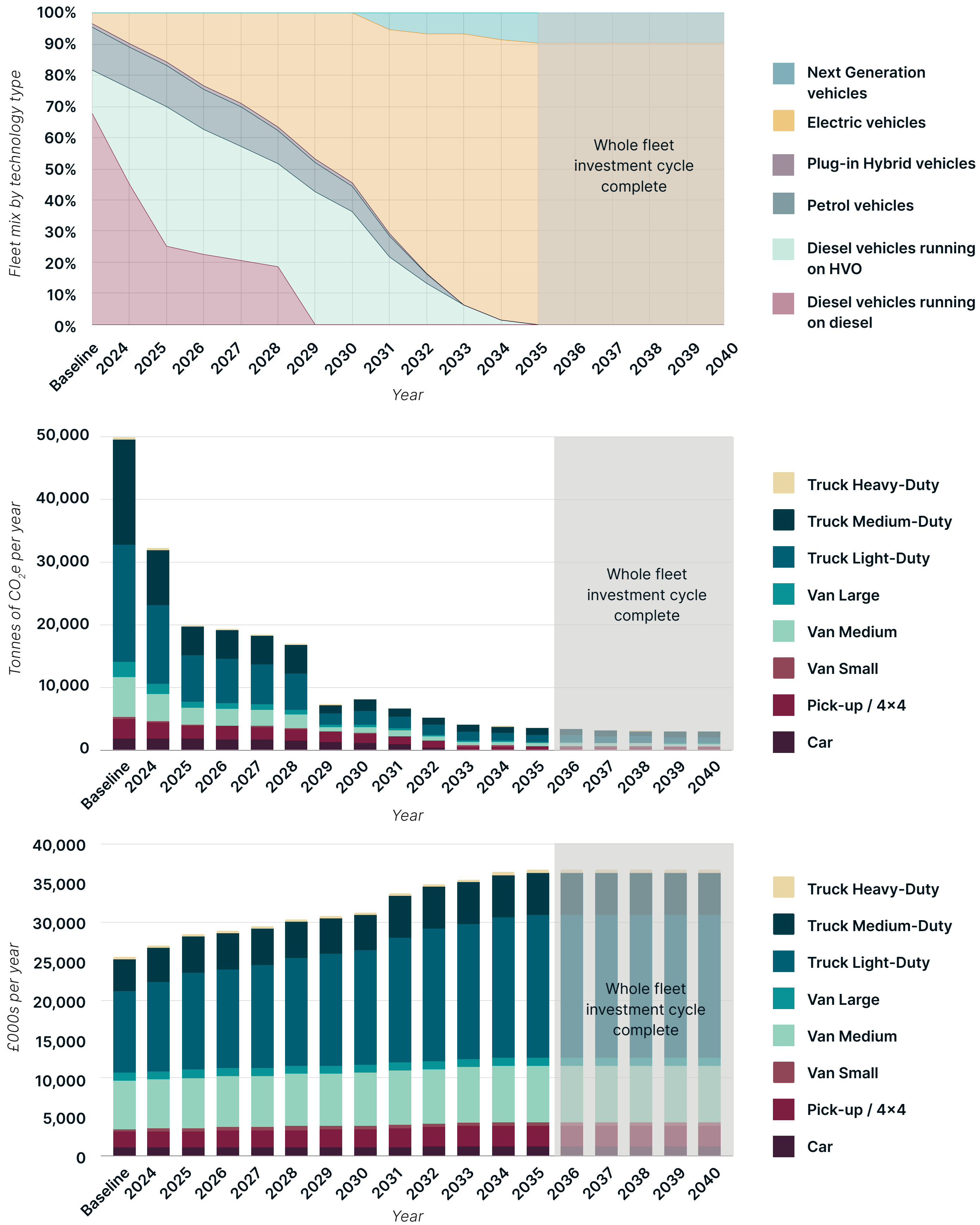
To create this Limited Vehicles Scenario, the model caps the number of electric vehicles that can enter the collective fleet each year. Any additional vehicles ready to switch to electric get delayed until a year where there is available supply, resulting in diesel vans and trucks staying on the fleet longer than necessary. This annual limit remains until all vehicles have transitioned and the investment cycle is completed. The car category was not impacted by these delays[i].

> This leads to an additional 21,000 tonnes of greenhouse gas emissions by 2035.

This scenario results in a **slowing of the Shift by three years in comparison with the Base Scenario.** This avoids costs of £14m over the next decade across all fleets but leads to an additional 21,000 tonnes of greenhouse gas emissions by 2035. Ultimately, the decarbonisation impacts of the delay are not heavily impacted. The annual carbon footprint is expected to reduce 93% by 2035. While vehicles have not been able to transition to electric as quickly as possible, the diesel vehicles would still benefit from the transition to HVO.

I At the time of writing, the maturity of the electric car market suggested that the same delay would not be realistic.

The Limited Vehicles Scenario for all vehicles operated by London's film and TV suppliers presented in terms of technology mix, carbon footprint and total cost of ownership. *Figure T_S2*



Limited Infrastructure Scenario

Phase out date: All diesel & petrol vehicles retired from the fleet	**2038**
Carbon footprint reduction by 2030 compared to 2023	**83%**
Total carbon emissions avoided by 2030	**229,000 tonnes CO_2e**
Average cost increase by 2030 compared to 2023	**£4 million per year**
Average cost increase between 2030 and phase out date, compared to 2023	**£10 million per year**
Average annual cost increase, year on year, until phase out date	**3%**

C) The LIMITED INFRASTRUCTURE SCENARIO explores how the Base Scenario would be constrained due to a delay to infrastructure installation projects.

A lack of infrastructure is another common barrier to the adoption of decarbonisation technologies. To run electric vehicles, the sector requires chargers and, to run on HVO, fuel tanks at depots. Infrastructure is vital for supply of these renewable energies.

Greater London boasts the most advanced electric vehicle charging networks in the UK[27], but this does not necessarily suggest that infrastructure is ready for commercial vehicles and depot-based charging. Common reasons for the delay of vehicle electrification projects include a lack of grid capacity, lack of landlord approval and a lack of alternative locations.

> This scenario creates an additional 25,000 tonnes CO_2e.

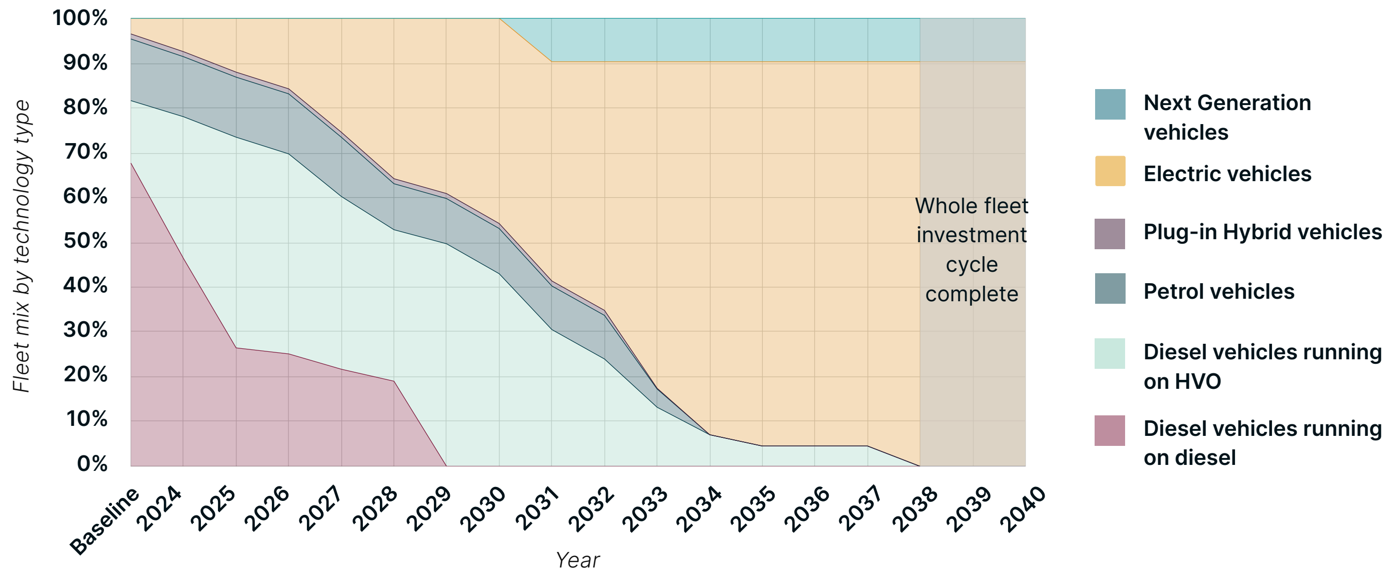
The Limited Infrastructure Scenario assumes there is a limit to how much new infrastructure can be installed each year. Regardless of whether businesses report capacity to install, a significant minority of projects get delayed by five years or more. This delays the vehicle transition too.

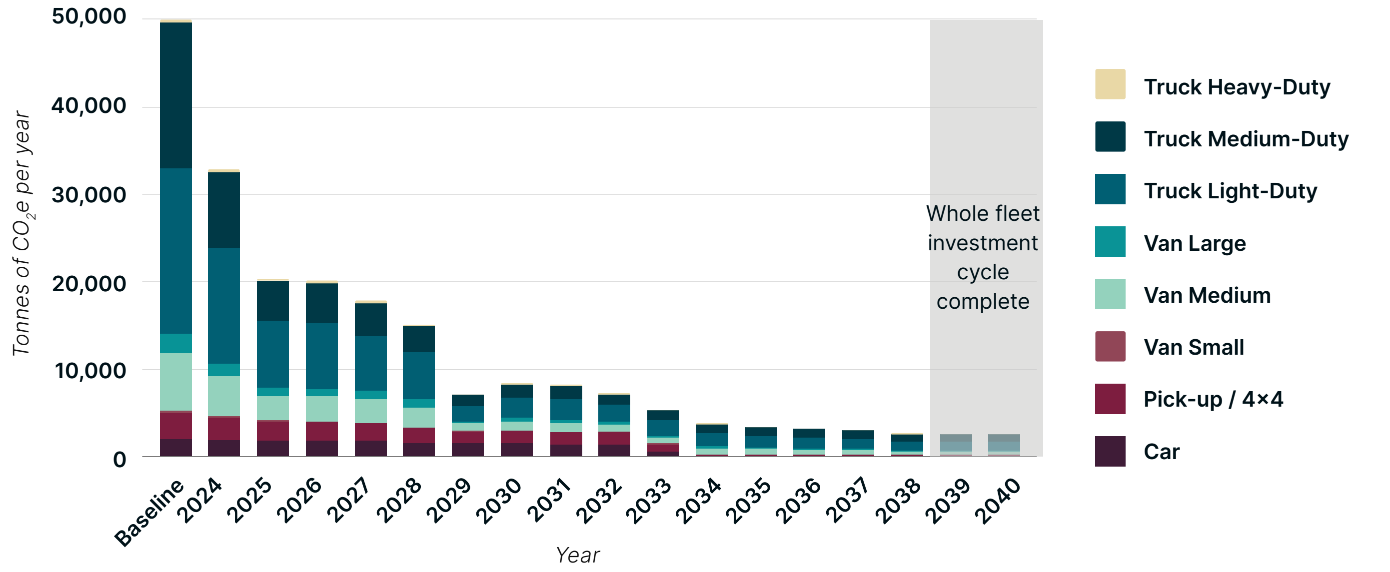
> 95% emission reduction by 2038.

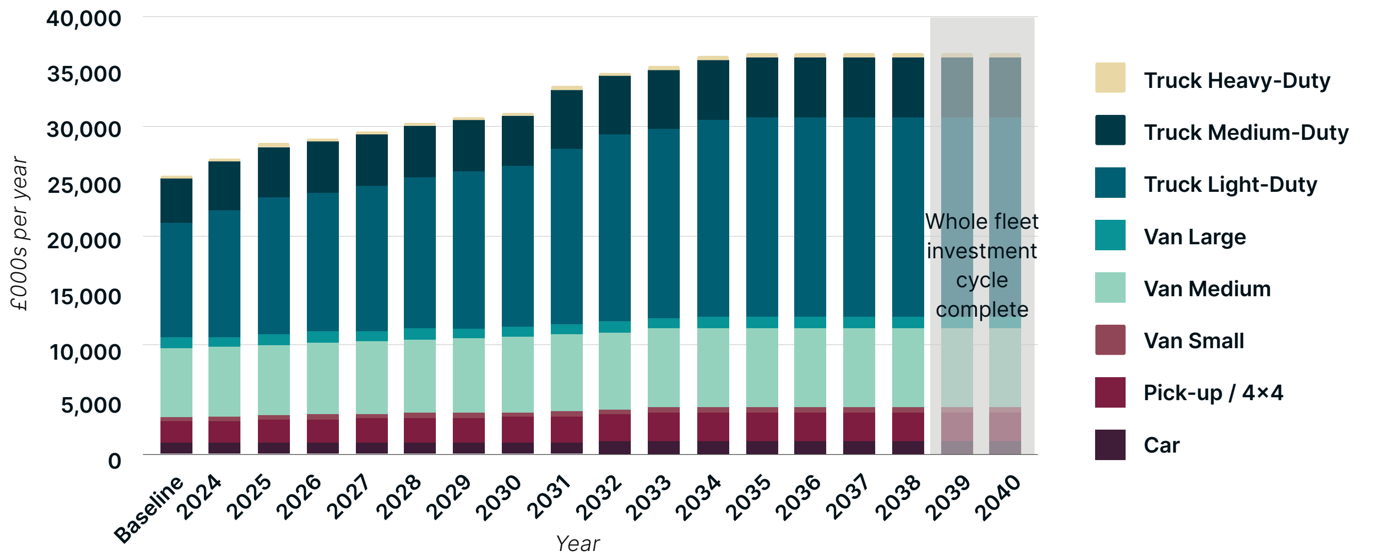
This scenario would result in a longer transition, with internal combustion engine vehicles only being fully retired in 2038 - **five years later than the Base Scenario**. The delay represents a substantial decrease in the financial burden over the coming decade, avoiding a cumulative £14 million by 2038 at an environmental cost of an additional 25,000 tonnes CO_2e that could have been avoided. Ultimately, carbon emissions reach a 95% reduction in 2038, similar to other scenarios.

This scenario highlights the importance of planning infrastructure for any vehicle transition and how strategies for business facilities need to align with business fleets.

A Limited Infrastructure Scenario for all vehicles operated by London's film and TV suppliers presented in terms of technology mix, carbon footprint and total cost of ownership. *Figure T_S3*







Reducing Costs

Electric and hydrogen vehicles are both forecast to be significantly more expensive to purchase than their diesel equivalent (*Figure T9*). This is even with existing purchase grants made available by the UK Government.

Electric vehicles should decrease in price as the market grows, but prices remain uncertain. New models of car, pick-up and van are demonstrating significant price decreases. For trucks there is further uncertainty as their commercial viability has only been shown in the last few years. Many policy recommendations are being made to bridge this price gap for trucks[28].

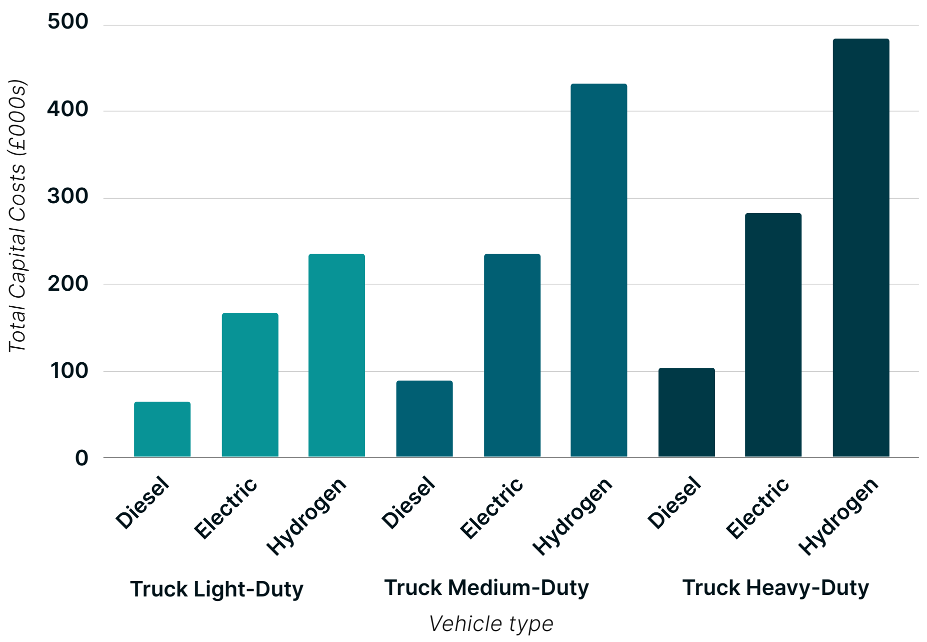
A key challenge is the relatively low mileage of the fleet. Low mileage is a good thing: it leads to low energy consumption, emissions and a greater ability to switch to an electric equivalent[I]. However, as the financial benefit for electric vehicles only comes "per mile", fewer miles delays the opportunity for price parity with fossil fuels. This will be reached sooner for vehicles travelling longer distances annually[II].

An opportunity for cost reduction may exist in the investment cycle. By extending the investment cycle of an electric vehicle, the upfront cost of the vehicle can be spread across more years. This has the effect of reducing TCO. There is confidence that an electric drivetrain can last; batteries may be warrantied for more years than the typical investment cycle for this industry.

Installation of solar photovoltaics and batteries to power recharging infrastructure for electric vehicles would not only reduce carbon emissions, but also reduce the long-term cost of operation. However, as a large investment, this increases up-front costs.

It is important to note that this report excludes any potential future policy developments, such as tax incentives and updates to ULEZ and LEZ, which may lower costs for the transition. Existing ULEZ and LEZ charges are broadly not applicable to the current fleet, as the vast majority of the vehicles are compliant today[III]. Non-compliant vehicles would make operational cost savings from the transition, but, at less than 1% of the vehicle fleet, these savings were considered to be insignificant to the analysis.

Total capital costs of three categories of truck available in the UK. Source: GFI (2023).
Figure T9



I This report focuses on "Well-to-Wheel" greenhouse gas emissions. Every business should be cautious about adopting electric vehicles for ultra low mileages as the carbon emissions cost of the battery becomes a much more significant consideration. This is outside of the scope of this report.

II Freight and logistics vehicles may expect to run annual mileages of between 60,000 and 150,000 miles. This was not observed in this sector.

III See the methodology statement for a full breakdown of what is and is not included in the TCO model.

HVO as a vehicle bridge fuel

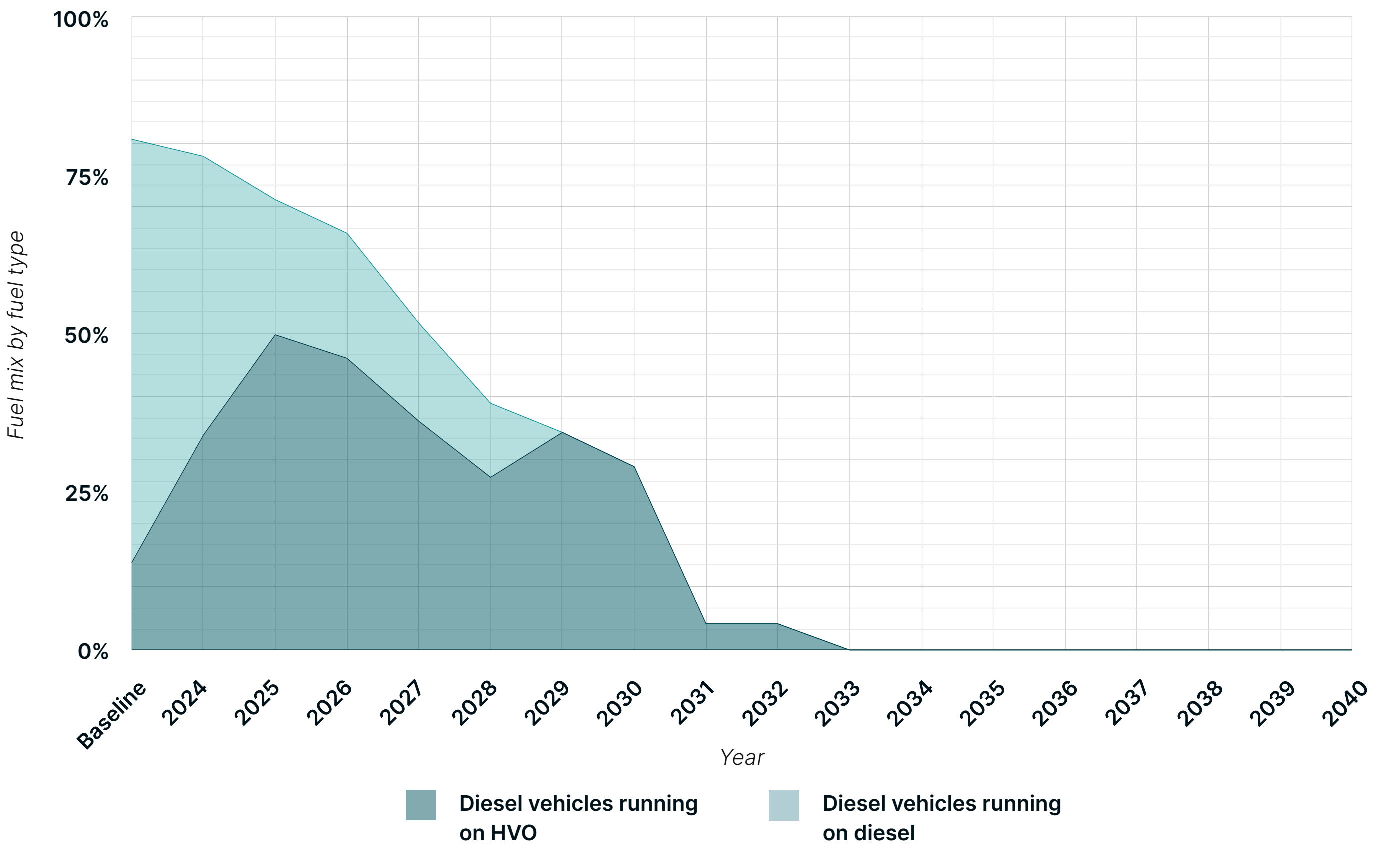
HVO is not widely available at public forecourts (i.e. petrol stations) in the UK today. Fuel retailers have suggested that a network of HVO refuelling stations will exist by 2030 but this remains speculative at the early stages of the market[29]. Therefore, supplier depot infrastructure investment is required. Fortunately two-thirds of suppliers report space to do this now.

On the other hand, 30% of suppliers with vehicle fleets indicate that they cannot currently install necessary infrastructure for HVO refuelling. These suppliers will need time to move facilities or likewise make arrangements for tanks (and/or vehicle charging). Because of this, this report assumes that a total phase out of fossil diesel is unlikely until 2029. This is still a swift transition date which shows the power HVO holds to rapidly remove fossil reliance.

Figure T_S4 illustrates the phase in and out of HVO according to the Base Scenario. **Note that the maximum HVO use in 2029 is less than the HVO peak in 2025.** This is due to the increase in fleet electrification in the four years in between.

> 30% of suppliers with vehicle fleets indicate that they cannot currently install necessary infrastructure for HVO refuelling.

The Base Scenario for fuel transition from fossil diesel to HVO
Figure T_S4



Cars, Pick-ups and 4×4s

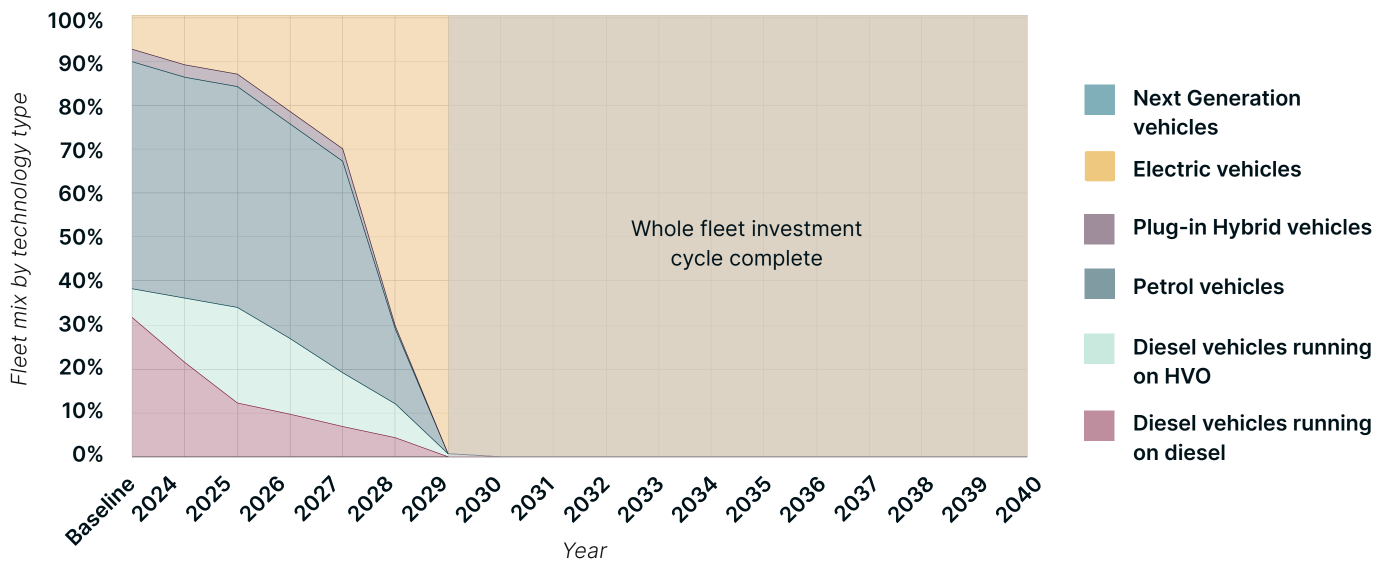
Percentage of total fleet	**25%**
Earliest date all diesel & petrol vehicles could be retired from the fleet	**2029**
Percentage of fleet electric by 2030	**100%**
Carbon footprint reduction by 2030 compared to 2023	**93%**

Based on fleet and survey data, most cars already have electric models available for adoption today. However, a key challenge in 2024 is the limited choice of electric pick-ups, with only one model currently available and it lacks the four-wheel-drive technology needed for off-road locations. Despite this, 9% of pick-ups in the supplier fleet are already electric. Fleets may consider large SUV models, which often have four-wheel-drive and towing capabilities, as replacements for pick-ups.

The transition timeline for cars, pick-ups, and 4×4s is driven by the investment cycle, with shorter cycles allowing a faster transition. Usage data for these vehicles is less known due to limited telematics, but this may improve with technological advances. These vehicles typically have lower annual mileages and lighter payloads compared to trucks and vans, reducing energy demand and making overnight charging at operational facilities feasible. If sharing parking facilities, access to charging can be managed with booking software and Greater London's public charging network is already suitable for these vehicles.

While towing and heavy loads were once barriers to battery electric vehicle adoption, several electric SUV options are now commercially available in 2024. Vehicle-mounted generators may require longer investment cycles than other 4×4s and pick-ups, but this is not seen as a barrier to the transition.

The Base Transition scenario for cars, pick-ups and 4×4s.
Figure T_S5



Vans

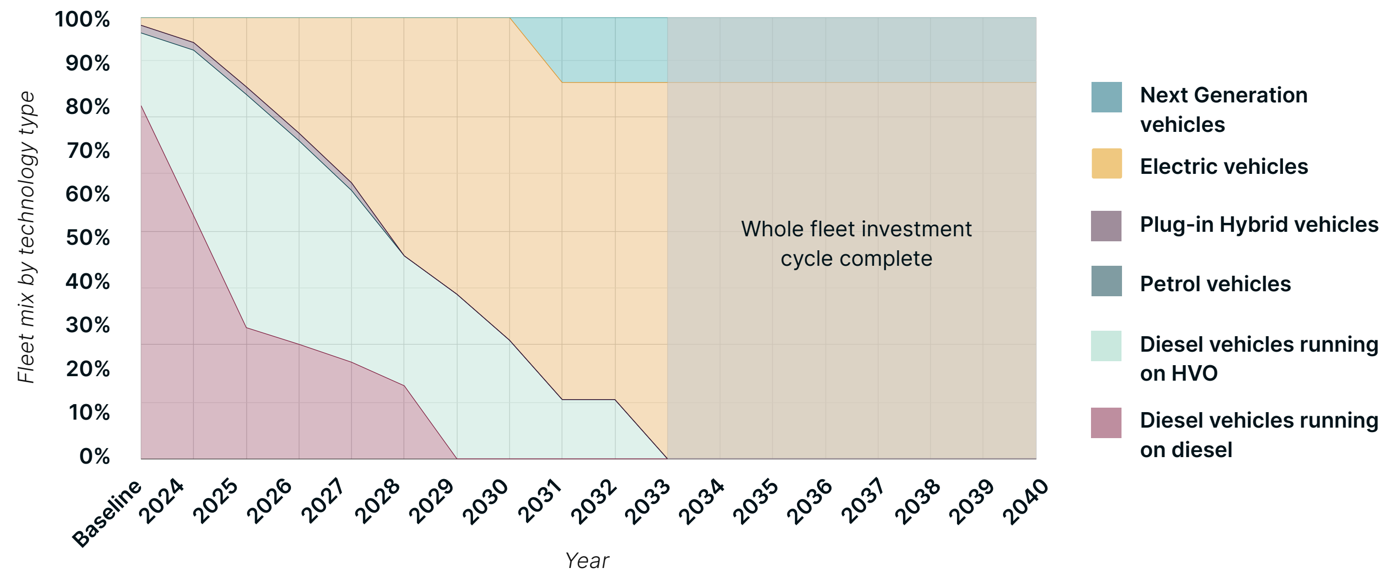
Percentage of total fleet	**39%**
Phase out date: All diesel & petrol vehicles retired from the fleet	**2033**
Percentage of fleet electric by 2030	**73%**
Carbon footprint reduction by 2030 compared to 2023	**87%**

Van fleets are the most likely to have telematics tracking, largely linked to GPS systems for transport management. This makes it easier to consider which vehicles are suitable for the quickest transition to electric.

All van fleets that can install HVO refuelling infrastructure at operational facilities could use the fuel by 2025, delivering a rapid decarbonisation by the end of this year. The transition to electric vans is slowed by the use case of medium sized vans. Many vans are found regularly to operate long days with high mileage and lack a regular time window to recharge between shifts. This might be due to vehicles travelling to locations across the country. These vehicles are considered for transition to a next generation technology in the 2030s.

Large and small vans were less numerous and running more local routes. It is expected that fleet owners will find it easier to transition these vehicles to electric models. While van size is a useful method of categorising vehicles for the transition, ultimately, the duty cycle (urban, intercity) will be the way a supplier can decide when and how to transition to electric.

A Base Transition Scenario for vans.
Figure T_S6



Trucks

Percentage of total fleet	**36%**
Phase out date: All diesel & petrol vehicles retired from the fleet	**2033**
Percentage of fleet electric by 2030	**81%**
Carbon footprint reduction by 2030 compared to 2023	**91%**

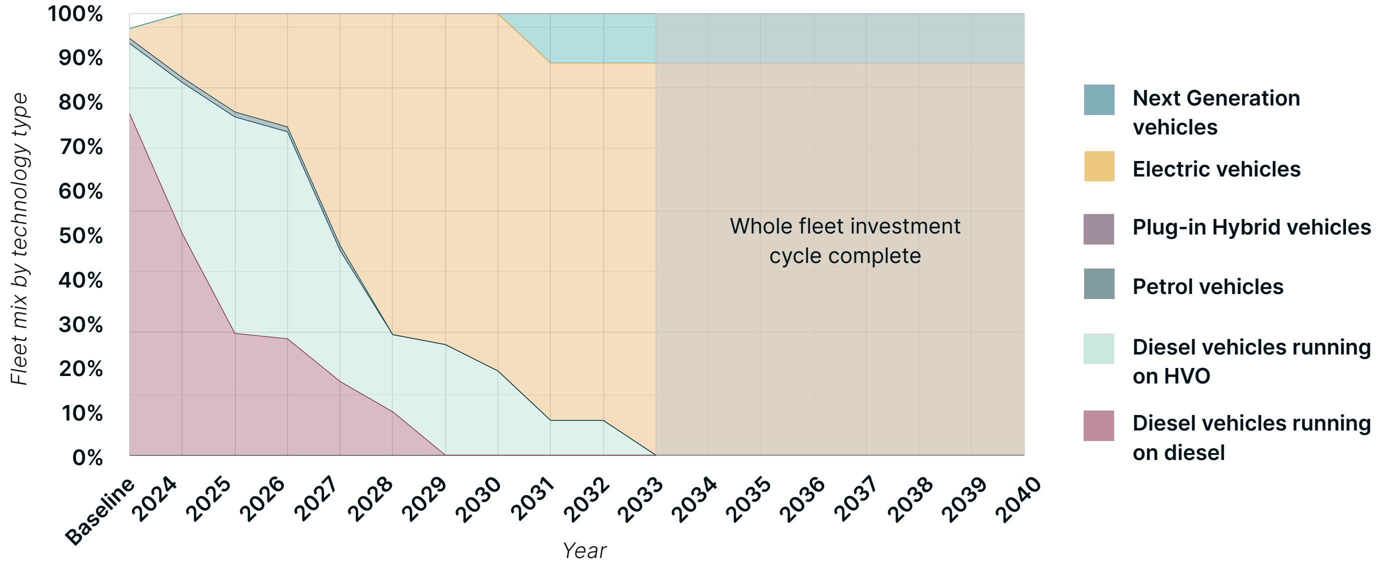
It is especially important for every truck to be considered individually for a transition to electric.

Like van fleets, telematics systems are found to be common in trucks. Despite electric trucks being much more in their commercial infancy, this report finds an easier path for electrification of some trucks than for certain van categories in the industry. This is largely due to certain use cases for light-duty trucks which operate shorter distances and more predictable routes with return-to-depot routines. While technically more easy, this does not make transitioning trucks more financially viable than vans.

As the market is young, there is great uncertainty around the availability of electric truck models.

Trucks are much more likely to have auxiliary uses of power, e.g. power-take-offs for operating cranes. There are limited trial results to demonstrate their viability at this stage of the market[30]. It is especially important for every truck to be considered individually for a transition to electric.

A Base Transition Scenario for trucks.
Figure T_S7



05

MOBILE POWER

Top mobile power action recommendations

1

ENSURE CORRECT MPU SIZING:

Many MPUs are over-specced. Planning for accurate power access and sizing MPUs accordingly, is a necessary step. New power monitoring technologies would support this and should be standard on productions.

2

CREATE GRID ACCESS FOR PRODUCTION POWER AND BATTERY CHARGING:

The biggest consumers of fuel are the highest power MPUs and are often in use at studios where grid should be available. Therefore, ensuring sufficient grid capacity and mandatory usage at studios is needed. Finding grid connections at permanent filming locations means fewer mobile power units will be needed. Increased grid access will also support charging of battery MPUs.

3

CONSIDER VOLUNTARY LEZ COMPLIANCE:

While mostly impacting air quality (as opposed to greenhouse gas emissions), retiring Stage IIIa generators from the fleet will allow the sector to achieve London's LEZ requirements for generators within this sector, protecting public health.

4

STANDARDISE AND SHARE USAGE DATA:

Create industry-wide standards for MPU data collection and share through an industry database. This will help inform decision making as to which MPUs will work for each production[I].

5

PRIORITISE HVO ON ALL PRODUCTIONS:

While only a bridging fuel, HVO should replace all diesel fuelling needs for current assets where infrastructure is possible.

6

DEVELOP TRAINING AND TRIALS TO OVERCOME BATTERY CAPACITY ANXIETIES:

Long-term co-ordinated trials combined with best practice guidance will build knowledge and trust across the industry.

7

EXPLORE NEW BUSINESS MODELS:

Collective industry action is needed, including new ways of working. For example, a battery swapping model may offer a low-carbon, low pollution business opportunity. Second-life batteries from the electric vehicle sector could offer lower prices and more circularity, reducing the negative impacts of raw material mining and manufacturing. Ensuring public electric vehicle charging allows for MPU charging could broaden the reach. Long-term lease agreements could give suppliers the investment confidence they need to choose low-carbon technologies.

I This data should include factors such as production department usage (unit base, lighting, catering, etc), total daily consumption, total run time, daily average/ peak power, generator size and stage, total daily fuel consumption and fuel type. There should also be consistency in measurement units for easy comparison. Existing calculators could be broadened to support this, or another shared space for energy consumption could be created and accessed directly by suppliers, generator operators and those with direct access to MPUs.

POSSIBLE DECARBONISATION TIMELINE

Today	2025	2031	2036	2040+
The MPU fleet is **78% traditional generators and 22% batteries**.	**49% of all mobile power units are generators running on HVO** due to availability of refuelling capacity.	**Batteries become the dominant power solution** alongside significant growth in hybrid MPUs filling the larger demands in the fleet. **Entire fleet fossil-fuel free** by the end of this year, earlier in the Additional Battery Scenario.	The **last traditional generators (operating on HVO) are retired** from the fleet.	Battery and "next generation" technologies dominate. Hybrid MPUs phased out in future investment cycles.

TAKEAWAYS FROM THE FLEET TODAY

- 64,000 tonnes CO_2e emitted per year by MPUs;
- 1,800 MPUs operated by London's supplier network;
- £13 million per year spent by suppliers on MPUs in 2023;
- 98% of MPUs are over-specced. 83% never reach 50% capacity usage;
- 99% of current usage (peak and average power) cases could be met using batteries now;
- Hybrids are vital for decarbonisation, however, further research is needed.

TAKEAWAYS FROM THE FUTURE SCENARIOS

- 2036 end of traditional generators;
- 95% emissions reductions by 2036;
- £6 million per year average additional cost of decarbonisation (roughly double 2023 costs);
- £20 million per year mobile power cost to suppliers in 2030;
- £26 million per year mobile power cost to suppliers in 2040.

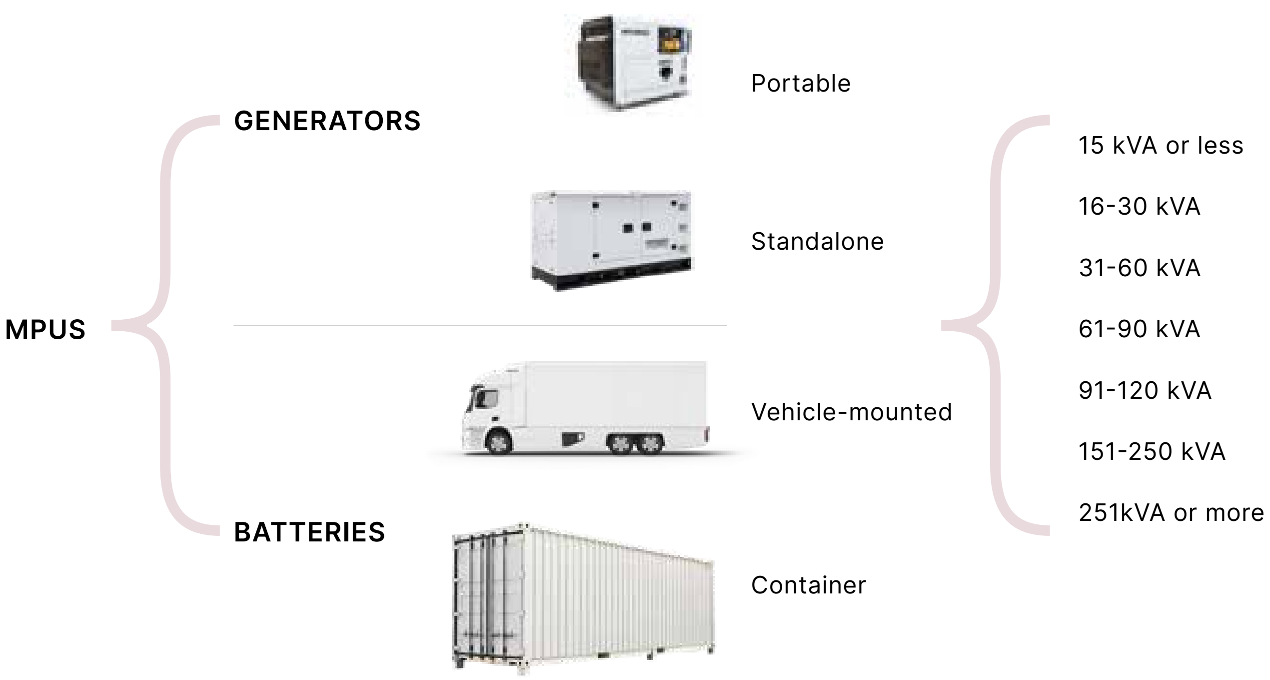
The carbon footprint of London's MPU fleet

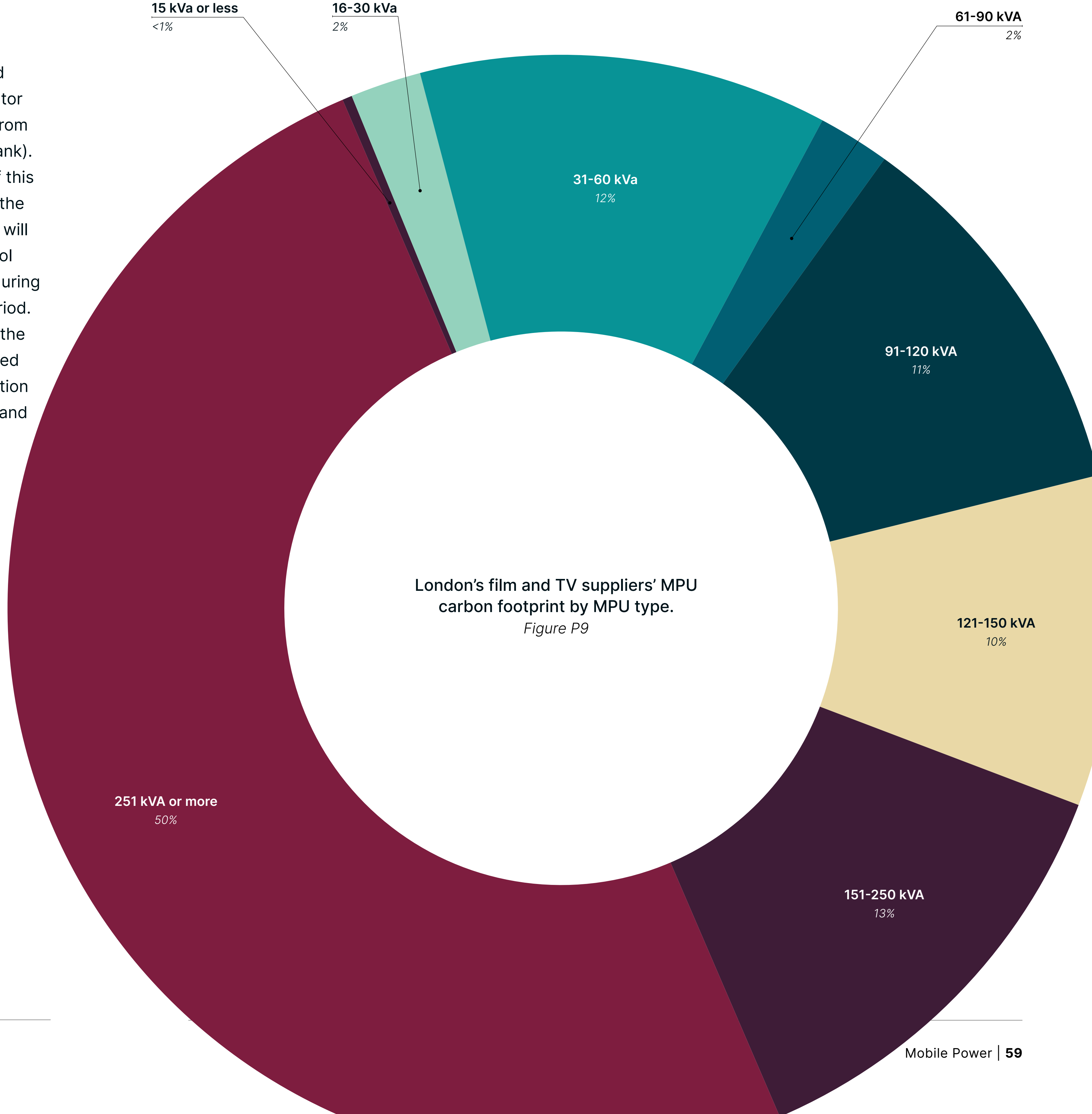
The total annual carbon footprint of supplier MPUs is estimated to be 64,000 tonnes of greenhouse gas emissions (CO_2e). This is from the "Well-to-Wheel" impacts of extracting and burning fuels in generators and from grid electricity.

The category of the largest MPUs, those over 250 kVA, account for half of MPU emissions. This is due to the high fuel burn of diesel generators included in this category. Survey results found that these generators were often working at permanent sites, such as studios, where suitable grid electricity could be expected and MPUs should not be allowed – a potential site of intervention for decarbonisation. **Studios should ensure suitable grid power alongside a fair price for grid energy and ban traditional generators from site.**

> The total annual carbon footprint of supplier MPUs is estimated to be 64,000 tonnes of greenhouse gas emissions (CO_2e).

Calculating the emissions of MPUs is complicated because multiple parties are often in control of fuel supply. The supplier has control of the start of the use period (for example, filling a generator with HVO from their fuel tank). However, if this is a rental, the production will likely control refuelling during the use period. Therefore, the overall emissions are impacted by both supplier and production decisions around MPU type and fuel use.





London's film and TV suppliers' MPU carbon footprint by MPU type.
Figure P9

London's MPU Fleet

Sector-wide Survey
89 respondents

MPU Data
13 MPU fleets
57 production datasets

The following section summarises findings from the survey and the fleet data analysis.

There are an estimated 1,800 MPUs operated by 56 London film and TV production suppliers. 58% of these are owned by businesses that offer MPU rental exclusively, leaving the remaining 42% owned by businesses that work across a range of supplier categories beyond MPU rental (*Figure P1*).

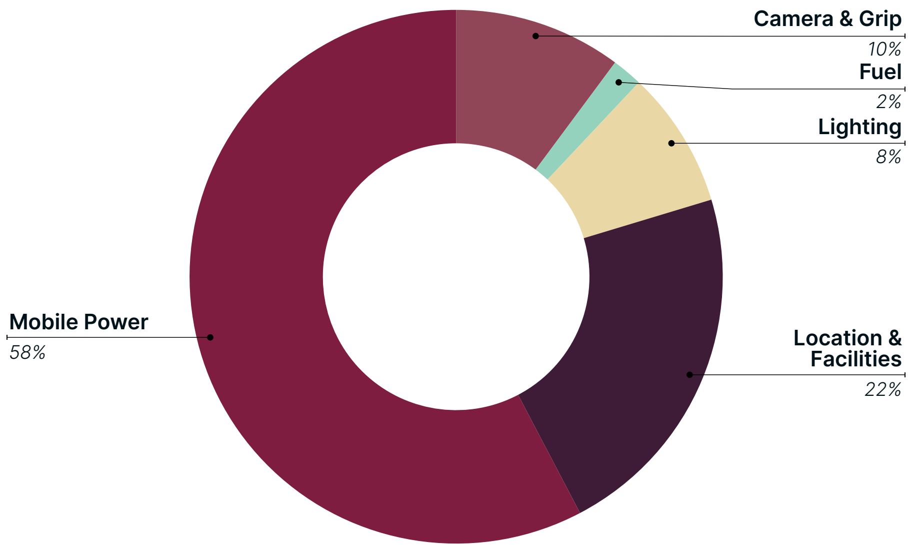
MPUs can be categorised in terms of their power capacity. Power capacity is commonly measured in kVA and indicates how much electrical power an MPU can generate. The greater the kVA, the greater the amount of power a customer can use at any one time[I]. 52% of MPUs are rated at 60 kVA output or lower, with the 16-30 kVA category being the most common. *Figure P2* separates the MPU fleet into two broad categories: traditional generators and batteries. While 78% are traditional generators, it is notable that battery MPUs are already widely available for lower power outputs. Traditional generators represent a much broader range, from 15 kVA or less, through to those exceeding 250 kVA. No hydrogen MPUs are currently within the assessed fleet[II].

Given that the majority of MPUs are traditional generators, it is unsurprising that diesel units make up the majority of the fleet (*Figure P3*), representing 71% of assets. Petrol generators, at 6%, tend to represent lower power units only. Petrol creates fewer emissions per litre than diesel and running a lower power generator consumes fewer litres of fuel. While it is understood that the there is a growth in hybrid MPUs in the market, **this analysis does not show that the hybrid MPU is commonplace yet**[III].

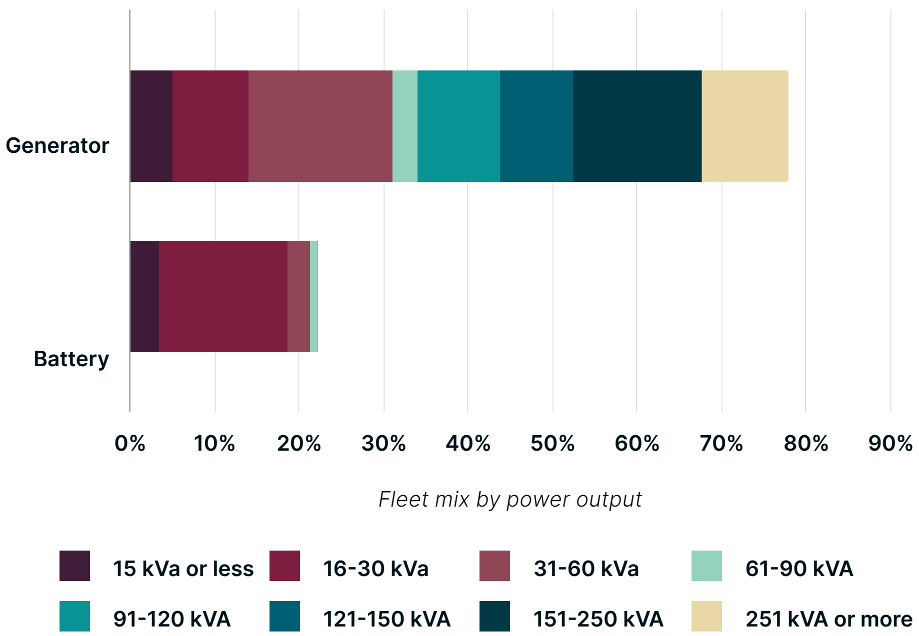
Every diesel generator was reported as being able to use HVO as their fuel and this practice is common. Suppliers report 57% of diesel generators are being sent out fuelled with HVO. For batteries, **all suppliers reported recharging batteries on renewable electricity between uses**.With MPUs commonly rented directly to productions, these units are often refuelled or recharged by the client during its use, so renewable energy use cannot be guaranteed[IV].

Figure P4 shows that the MPU fleet has a wide variation in ages, up to around a decade in operation. Low power MPUs are likely to be younger than the larger, high power MPUs. Those that have been in the fleet the longest are likely to have a weaker emissions standard and, therefore, a worse emissions performance. However, more recent MPUs do not translate to improved emissions standards. MPUs are not necessarily new when entering the fleet[V] for the first time, and older models remain widely available. **Batteries are a very recent addition to the fleet** with most being introduced in the previous 12 months[VI].

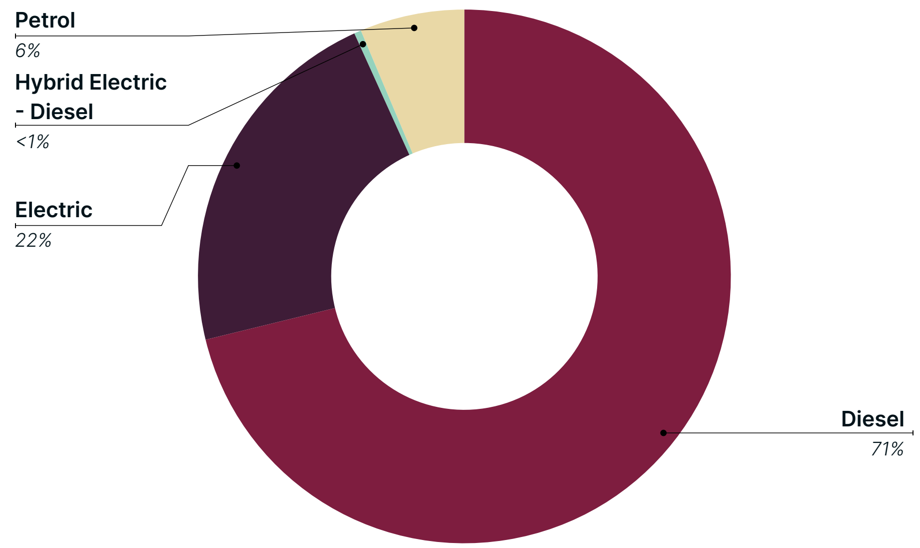
Ownership of London's film and TV MPU fleet, separated by the category of supplier.
Figure P1



The total MPU fleet separated into generators and batteries. These are separated further based on power output.
Figure P2



The MPU fleet separated by fuel type.
Figure P3



I Both kVA and kW units are used in the industry. For detailed information on power capacity, see the Glossary of Terms.

II This is not to say hydrogen MPUs are not in use - hydrogen fuel cell and combustion MPUs are in operation among film and TV productions today, leased by a small number of hydrogen-specific suppliers. These are not represented as these businesses do not meet the report scope for London's supplier network.

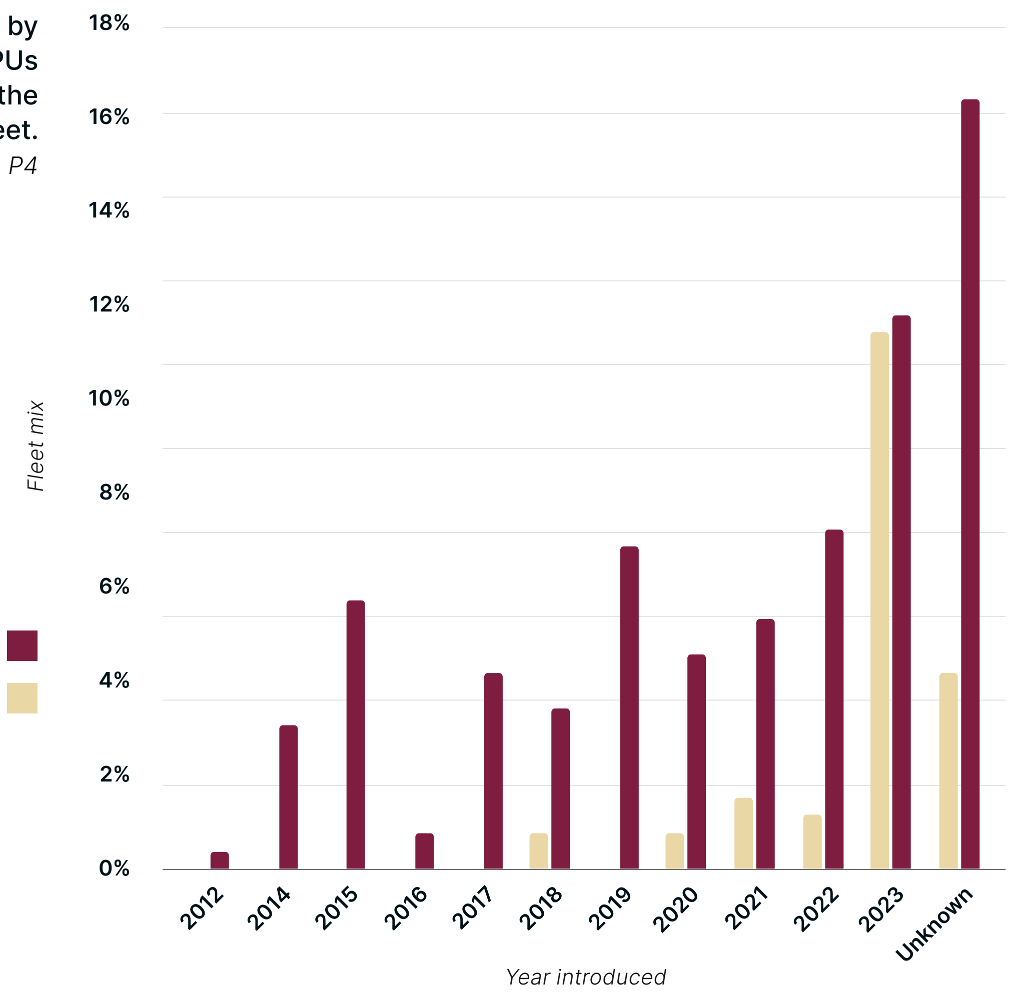
III This analysis recognises a limitation in the survey data. Some respondents may have registered a battery and generator system separately even though some of them may be combined as a hybrid MPU.

IV Due to producers and production teams controlling the fuel choice of MPUs once on set, it is vital that productions also prioritise low-carbon fuels. Some suppliers require that only HVO is used to refill their MPUs.

V Regulations state that you cannot buy a new Stage IIIa after 2015, yet the survey findings state that 17 Stage IIIa generators were "first on fleet" between 2016 and 2022.

VI This may indicate the growing availability of second life electric vehicle batteries becoming available for the mobile power sector.

The MPU fleet separated by category and the year MPUs were first introduced to the fleet.
Figure P4

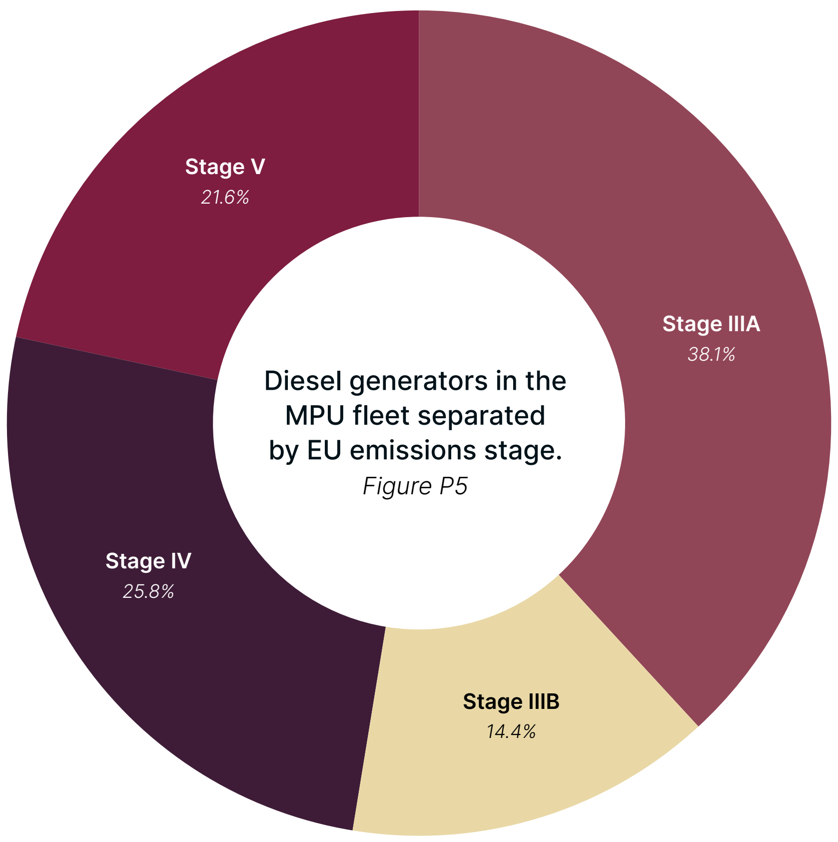


Due to their contribution to air pollution, 38% of the industry's generators would not be permitted under London's Non-Road Mobile Machinery (NRMM) Low Emission Zone for the construction sector.

THE MPU FLEET FALLS BELOW AIR QUALITY STANDARDS

Where the European Union (EU) emissions stage was known and received by the study, **fewer than a quarter are registered as Stage V**[I]. This is the most recent stage for MPUs and represents the cleanest diesel generator models. Due to their contribution to air pollution, 38% of the industry's generators (Stage IIIa) would not be permitted under London's Non-Road Mobile Machinery (NRMM) Low Emission Zone for the construction sector[II]. **Approximately 10% of these Stage IIIa generators are expected to remain in the fleet for at least another five years.** Air quality improvements and potential future government policy around this make a good argument for discontinuing them sooner, or at

I EU emissions stages are a standard to improve the air quality performance of MPUs.
II London currently operates an NRMM Low Emission Zone (LEZ) across the whole of Greater London, requiring a minimum of Stage IIIB. This LEZ is limited to the construction industry and is more stringent in parts of Central London. For further details, visit the Mayor of London website: https://www.london.gov.uk/programmes-and-strategies/environment-and-climate-change/pollution-and-air-quality/nrmm



Diesel generators in the MPU fleet separated by EU emissions stage.
Figure P5

a minimum, refurbishing them to Stage V[III].

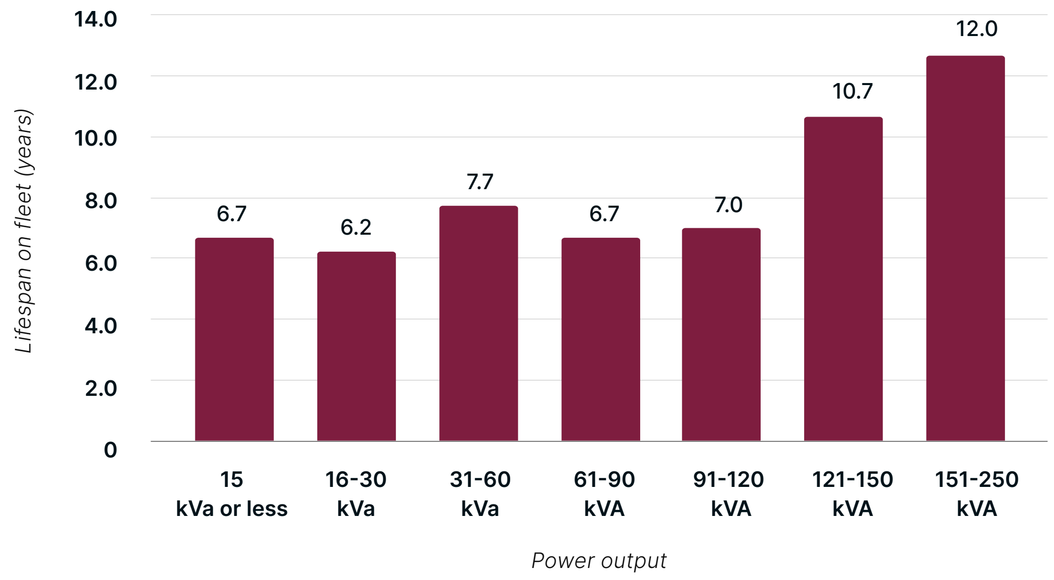
The Fuel Project does not support any further investment in generators which do not comply with London NRMM regulations, even when these may be purchased to create hybrids.

Investment cycles for MPUs can last longer than a decade. MPUs have an average lifespan of seven years but this varies by power capacity (*Figure P6*). High power MPUs, typically with much higher capital costs, are expected to be in fleets for longer periods. If a replacement date was not provided in the fleet data, this study uses these category-specific averages to predict when MPUs will be replaced.

57% of fleets report using some form of power monitoring software. Power monitoring software can be linked to MPUs and is a vital new tool to support accurate data collection. This is common across all sizes of fleet, but especially with very large fleets. Smaller fleets or suppliers that do not offer mobile power as their main service are less likely to use such software. Implementing this software and associated hardware, may be constrained by cost or time taken to benefit from it. This data is important for decision-making to ensure the appropriate MPU is sent to the production, as well as allowing "over-specced" MPUs to be swapped with smaller models as the shoot goes on.

III There is anecdotal evidence that there may be some issues running Stage V generators when they are overspecc'd (i.e. running at low, inefficient levels). Therefore, appropriate power planning is needed.

The MPU fleet separated by MPU category and expected lifespan in the fleet. Note: there was insufficient data on "251 kVA or more" MPUs for analysis.
Figure P6

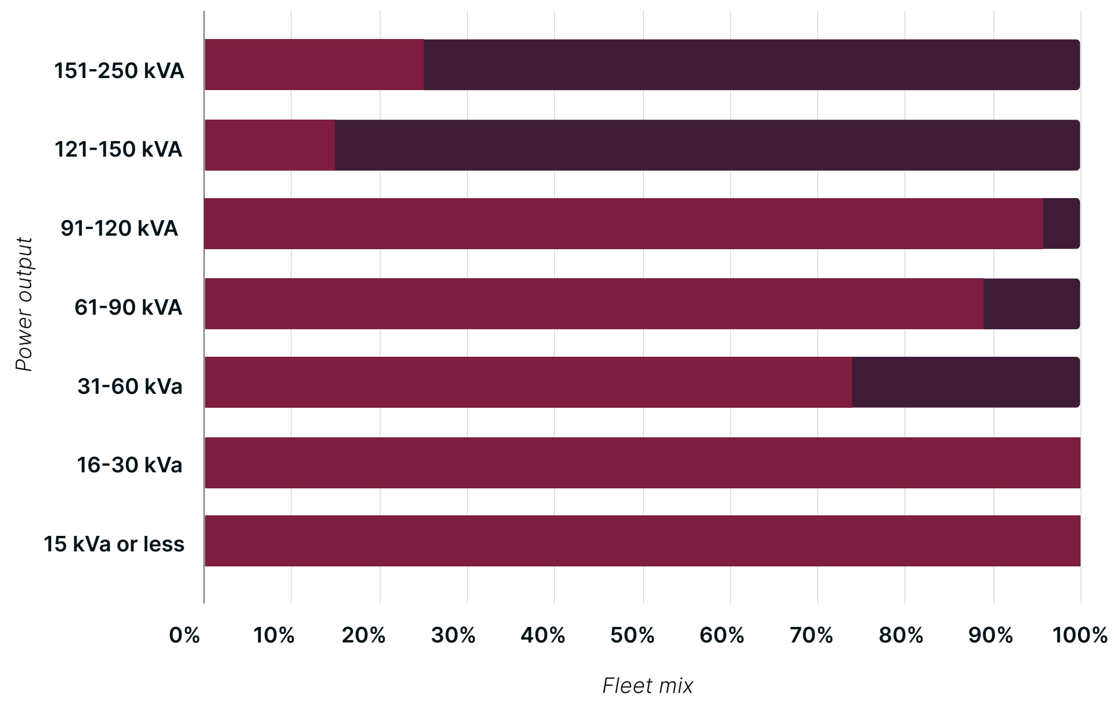


35% of MPUs are mounted on a vehicle. *Figure P7* illustrates how the use of MPUs is enabled by vehicles[IV]. This is important to understand for the transition as vehicle and MPU transition timelines vary and intersect.

As a general rule, high power MPUs are less portable and therefore may benefit from running directly from a vehicle. Low power MPUs are more likely to be designed to be portable and therefore, vehicle mounting is not relevant.

IV There is anecdotal evidence that pick-ups are used for lower kVA MPUs and trucks for higher kVA MPUs but the data could not substantiate this.

The MPU fleet separated by power category and whether the MPU is vehicle-mounted or stand alone.
Figure P7



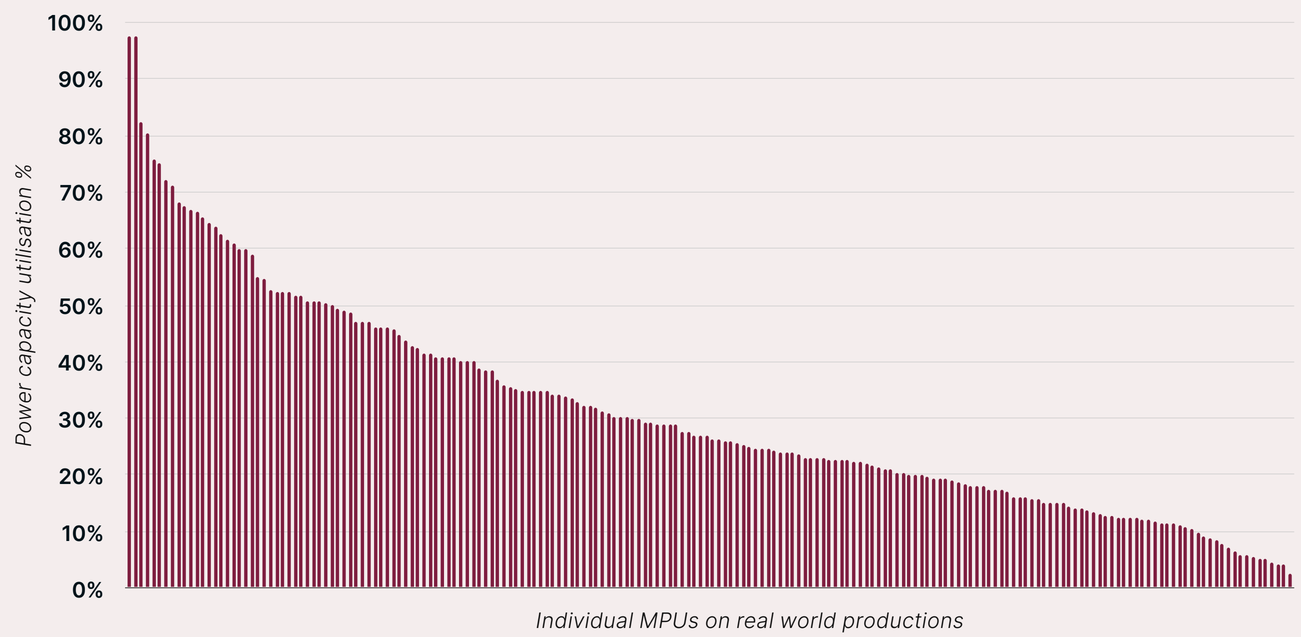
The sector is consistently over-speccing MPUs.

This study's MPU data included real world observations of the actual power load recorded on over 50 film and TV productions. This brings into question how power is being "specced" for productions, and how "over-speccing" results in excess fuel consumption, emissions and increased costs. Over-speccing occurs for a number of reasons. Productions will prepare for the possibility of predictable additional power needs (such as last-minute script changes or additional requests), as well as unpredictable needs (for example, cloudy weather requiring additional lighting). When the difference in rental cost between generators is minimal or zero, it is rational to lower production risks by choosing a higher capacity unit. Likewise, if the cost for suppliers to purchase a larger unit isn't a prohibitive increase, it's rational to go for a larger unit and extend its rental ability.

The analysis observed that the sector appears to be over-speccing significantly, with the vast majority of MPUs currently being used at a much lower load than their capacity. As can be seen in *Figure P8*, **only four of 191 MPUs analysed (2%) reached an optimal peak load for the specification (80%)**[V]. Only 17% of all MPUs analysed even reached half load capacity. The mean average peak load recorded was 23 kW, with an average daily MPU energy demand of 99 kWh. Peak load and average energy demand are just two measurements but are important considerations for MPU speccing. Further research into how the power capacity utilisation rate, and therefore, MPU speccing can be improved, is recommended. In addition, **behavioural change across decision makers would deliver lower emissions without any capital investment, while lowering production costs.**

V In the absence of an industry standard, this study suggests an 80% power capacity utilisation rate as optimal. Power capacity utilisation is a measure of what the recorded peak load (kW) was on a production compared to how much the peak load could have been in relation to MPU specification.

Analysis of how much power is used compared to the power capacity of MPUs used in productions.
Figure P8



DECARBONISATION SCENARIOS

The following section uses data from the survey, telemetry and fleet data to employ three scenarios for decarbonisation.

Sector-wide Survey	Vehicle Data
89 respondents	13 MPU fleets 57 production datasets

Three scenarios have been produced to explore how the MPU fleet could decarbonise. These scenarios are:

A) BASE SCENARIO

Assumes decarbonisation will happen at the pace that technology and investment cycles allow.

B) ADDITIONAL BATTERY SCENARIO

Explores how the Base Scenario would be enhanced if two batteries are used in tandem or swapped out to maintain production power.

C) LIMITED INFRASTRUCTURE SCENARIO

Explores how the Base Scenario would be constrained due to a delay to infrastructure installation projects.

Key Factors

A number of key assumptions have been made for all the scenarios:

DECARBONISATION TECHNOLOGIES: BATTERIES AND THE "NEXT GENERATION"

The battery is the priority technology for decarbonisation. This research demonstrates that the electric battery is already commonly adopted in certain use cases. From reviewing products that are coming to market, it is clear that a full range of battery solutions are becoming available to compete with existing generators at most power capacities. For portable MPUs (e.g. those that are towable), a major limitation with the current generation of batteries is energy density. Therefore a scenario has been built around increasing the availability of batteries via battery swapping or splitting power demand across units.

DECARBONISATION TECHNOLOGIES: HVO

With half of MPUs reported as being fuelled by the supplier with HVO[I], it is considered that this renewable diesel will grow as a key solution in the near future. However, given the widespread adoption today, the additional use of HVO in 2024 and 2025 only contributes a small additional impact in terms of cost and carbon savings.

MPU AVAILABILITY

At the time of writing, there is not a limited supply of batteries for purchase from manufacturers, so no scenario was built to explore this situation. The film and TV production industry will represent a small percentage of the UK's battery market. With the growth of second life batteries emerging from the transport sector, there is reasonable confidence that the supply of lithium-ion battery technologies into MPUs will not be constrained. This will also support circular material reuse and reduced demand for raw materials, which are both vital, not only to nature restoration and preservation, but also for a global just transition. Batteries that are available on the MPU market in 2024 demonstrate that they have the power capacity for many of the load needs for film and TV production already.

INFRASTRUCTURE AVAILABILITY

The installation of infrastructure is assumed to be possible for recharging and refuelling at all suppliers' facilities, either immediately or due to changes suppliers will have to make. For those suppliers who report a current ability to install refuelling infrastructure, the model assumes this will lead to a switch to HVO (if not electric) by 2025. A five-year delay to transition to low-carbon technologies is assumed for the remaining third of businesses.

"BEST FIT" REPLACEMENT INSTEAD OF "LIKE FOR LIKE"

MPU power "speccing" data allows this report's model to suggest the appropriate solution based on real world power consumption. This is important as current use shows that if a "like for like" replacement model is used, decarbonisation will be significantly delayed and more expensive. This is due to investors waiting for higher capacity batteries and new technologies that are not needed and not available. The benefit of this approach may reflect more realistic replacements. However, "capacity anxiety" will need to be overcome and more reliance on pre-production planning and "sticking to the plan" will be needed.

I Results from the sector-wide survey indicated 71% of suppliers who offer MPUs as a service have space for refuelling and/or recharging infrastructure at the operational facility.

The Base Scenario

Phase out date: All diesel & petrol MPUs retired from the fleet	**2036**
Carbon footprint reduction by 2030 compared to 2023	**80%**
Total carbon emissions avoided by 2030	**217,000 tonnes CO_2e**
Average cost increase by 2030 compared to 2023	**£2 million per year**
Average cost increase between 2030 and phase out date, compared to 2023	**£11 million per year**
Average annual cost increase, year on year, until phase out date	**5%**

A) The BASE SCENARIO assumes decarbonisation will happen at the pace that technology and investment cycles allow.

Under the Base Scenario, **carbon emissions from mobile power could decrease by 91% by 2036**, with costs gradually increasing to a peak additional figure of £13 million per year. This is roughly double the 2023 costs.

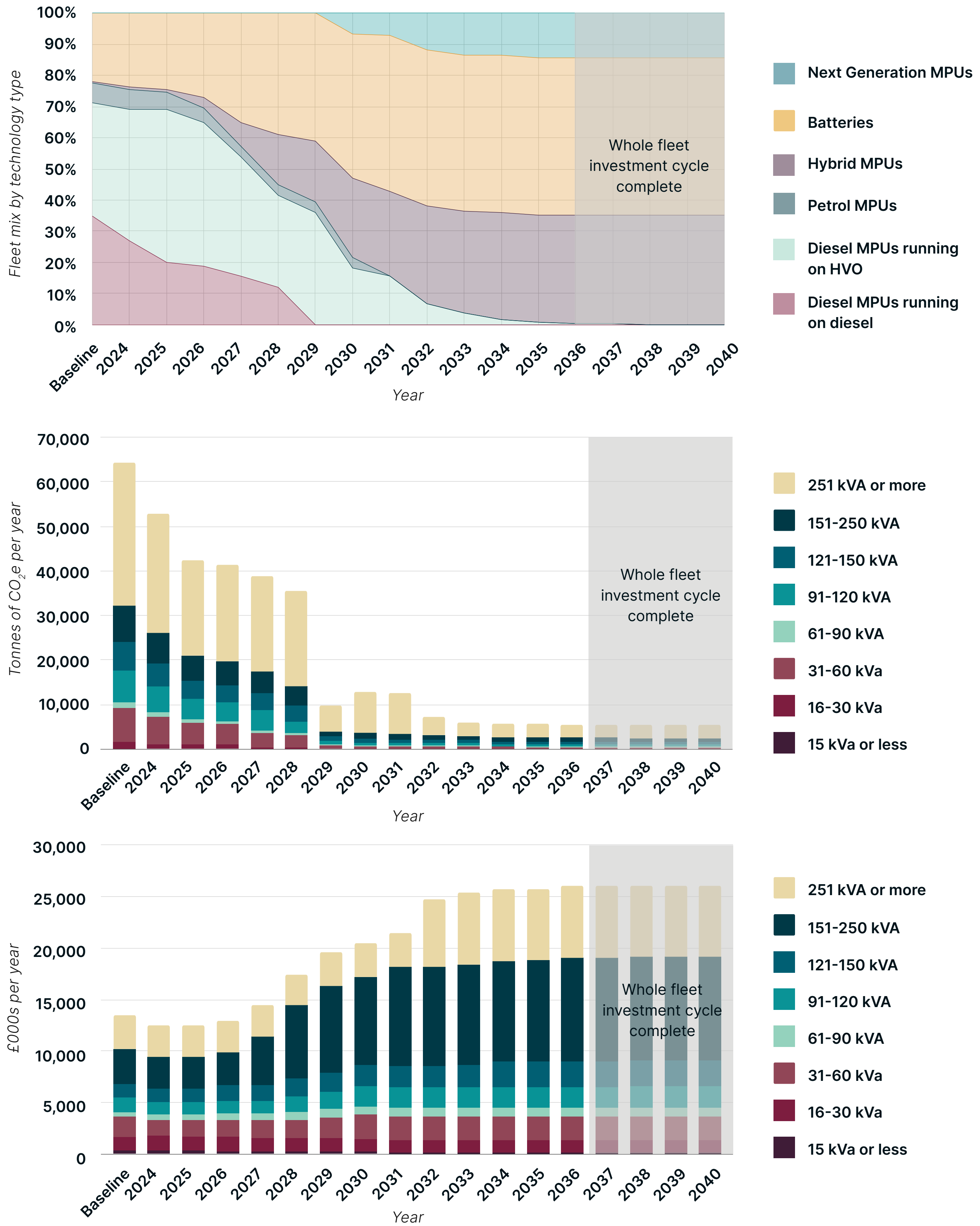
This is achieved by using a mix of batteries, battery-diesel hybrids using HVO and a growth of "next generation" technologies, including hydrogen fuel cells in the future. The analysis shows, that while power requirements can be met, the total daily energy use regularly exceeds the capacity of batteries in the fleet. Larger energy capacities are certainly possible, but these are not currently in use. This Base Scenario assumes that the battery can be removed and recharged via a grid connection each day during production downtime (for example, taken to a charger at night). In situations where there is no downtime, a hybrid or "next generation" solution is considered.

"Next generation" technologies, including hydrogen fuel cell solutions, only start to enter the fleet in a meaningful way from 2030. This is when the investment cycle of many high power MPUs ends and a battery solution is not suitable.

Carbon emissions reduce consistently over the following years, with a dramatic fall towards the end of the decade due to the rapid shift away from diesel to HVO fuel and battery MPUs. From a baseline of 51% running on HVO, it is assumed that those who have the capacity to adopt HVO today, do so by 2025, and those who do not, take five years to create that capacity (by 2029).

Costs begin to rise rapidly as a result of the transition from diesel generators to diesel-battery hybrid MPUs. The widespread adoption of the battery units combined with existing or updated diesel generator technology make this an expensive but useful part of the fleet. Costs also increase significantly when "next generation" and high-power battery units are adopted. The scenario assumes that certain costs are twice as much for hybrids due to doubling of assets.

The Base Scenario for all MPUs operated by London's film and TV suppliers, presented in terms of technology mix, carbon footprint and total cost of ownership. *Figure P_S1*



RECOMMENDED SCENARIO

Additional Battery Scenario

Phase out date: All diesel & petrol MPUs retired from the fleet	**2036**
Carbon footprint reduction by 2030 compared to 2023	**83%**
Total carbon emissions avoided by 2030	**223,000 tonnes CO_2e**
Average cost increase by 2030 compared to 2023	**£2 million per year**
Average cost increase between 2030 and phase out date, compared to 2023	**£14 million per year**
Average annual cost increase, year on year, until phase out date	**6%**

B) The ADDITIONAL BATTERY SCENARIO explores how the Base Scenario would be enhanced if two batteries are used in tandem or swapped out to maintain production power.

While the Base Scenario assumes that grid charging can happen during the downtime of a production, the Additional Battery Scenario assumes that a second battery can either replace the first battery at any time during that day or work side by side, sharing the energy demand. This doubling and/or swapping of battery MPUs effectively doubles the energy capacity while avoiding downtime. This overcomes current energy capacity issues by offering new ways of working.

A lack of battery MPU stock is not anticipated but battery adoption is challenged by the limited energy capacity of the batteries. Much like the industry is used to changing batteries for equipment such as cameras, this scenario assumes service and behavioural changes to make MPU doubling and swapping a reality[I]. Real world production data suggests that current mobile batteries in the fleet are unlikely to have enough energy capacity to power a production for a full day. However, doubling up on batteries would offer sufficient energy coverage for 98% of production use cases.

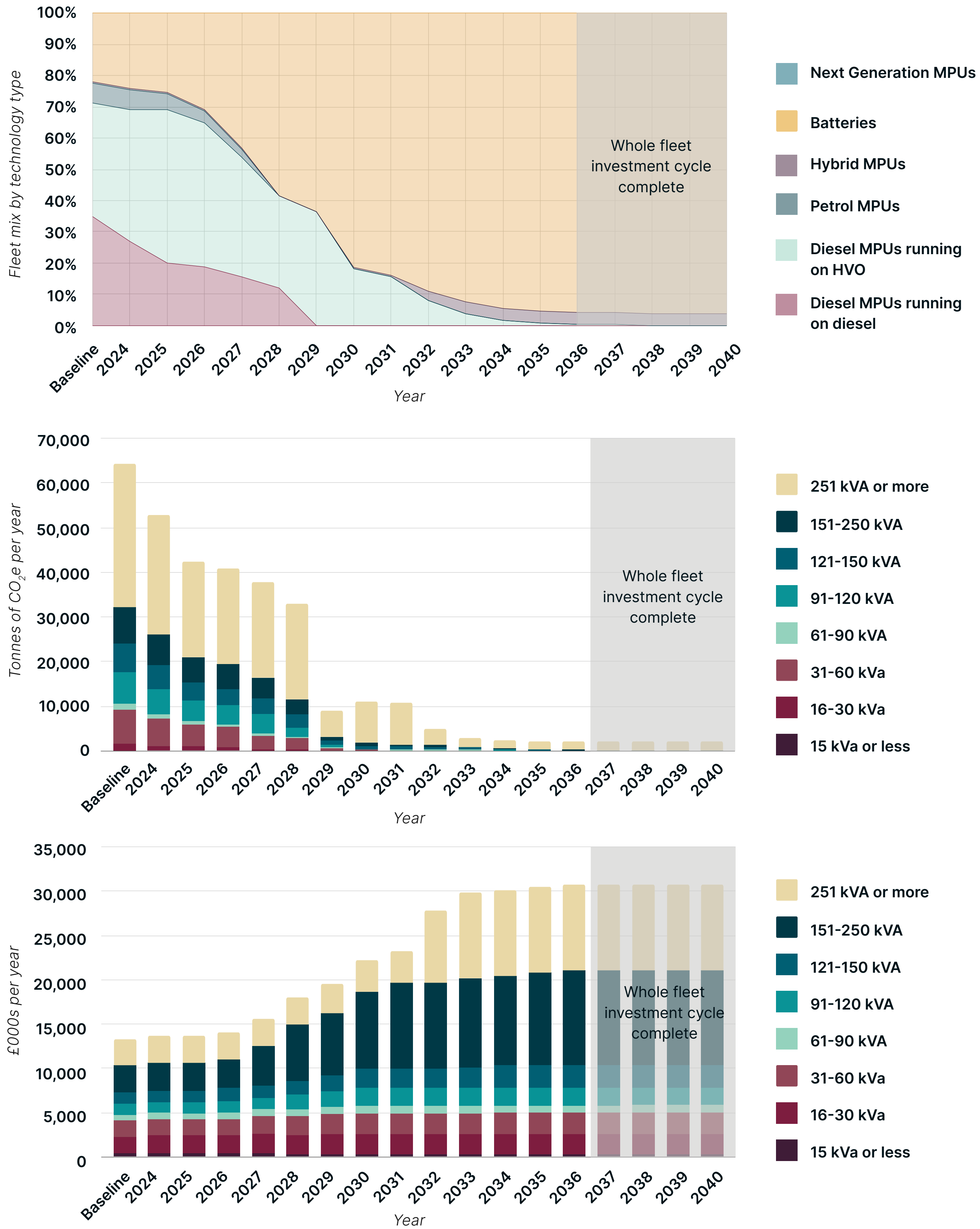
There are three ways to recharge battery MPUs: from on-site solar panels, from a fuel-based generator and from an electricity grid connection. On the basis that on-site solar panels can only currently provide some of the charge needed and that fossil fuel use must be minimised, the recharging solution considered in this scenario is grid connection.

If generators of all power categories transition to a battery swap model, the vast majority of daily energy demands would be met. Moreover, this scenario achieves greater and faster carbon emissions reduction than other scenarios, achieving a 97% reduction by the end of the first full industry investment cycle (2036). This decarbonisation is reached by increasing charging from mains electricity, coupled with the grid's predicted decarbonisation over the coming 15 years. It does not account for further decarbonisation from facilities adopting renewable electricity tariffs or on-site power generation, which would further expedite emission reductions.

The increased emissions reductions and more practical working practices under this scenario come with significant financial cost. To allow swappable batteries, the MPU fleet effectively has to dramatically increase in number. As a result, the scenario estimates the costs would increase by over 100% - rising from £13 million per year to over £30 million per year by 2036 for decarbonising the entirety of London's fleet.

I While it is noted that battery swapping business models are not mainstream, there are current explorations of what these services could look like.

The Additional Battery Scenario for all MPUs operated by London's film and TV suppliers presented in terms of technology mix, carbon footprint and total cost of ownership. *Figure P_S2*



Limited Infrastructure Scenario

Phase out date: All diesel & petrol vehicles retired from the fleet	**2040**
Carbon footprint reduction by 2030 compared to 2023	**76%**
Total carbon emissions avoided by 2030	**207,000 tonnes CO_2e**
Average cost increase by 2030 compared to 2023	**£-0.5 million per year**
Average cost increase between 2030 and phase out date, compared to 2023	**£9 million per year**
Average annual cost increase, year on year, until phase out date	**4%**

C) The LIMITED INFRASTRUCTURE SCENARIO explores how the Base Scenario would be constrained due to a delay to infrastructure installation projects.

A further challenge to decarbonisation of mobile power is the availability of refuelling and recharging infrastructure at supplier facilities. This scenario explores what a delay to installation might mean for emissions reductions.

While many low power battery MPUs will be able to charge from existing sockets, many medium and high power MPUs will require new infrastructure and capacity to do so. This scenario assumes that many suppliers will struggle to upgrade infrastructure even if they have the capacity to do so. There are a number of barriers, such as grid capacity, landlord agreement and budgets which may delay efforts to decarbonise. Similarly, it is expected that the public electric vehicle charging infrastructure will need to develop significantly should suppliers or producers consider it for operational recharging.

> This delay results in diesel generators running on HVO until 2040 and increased supply chain risks.

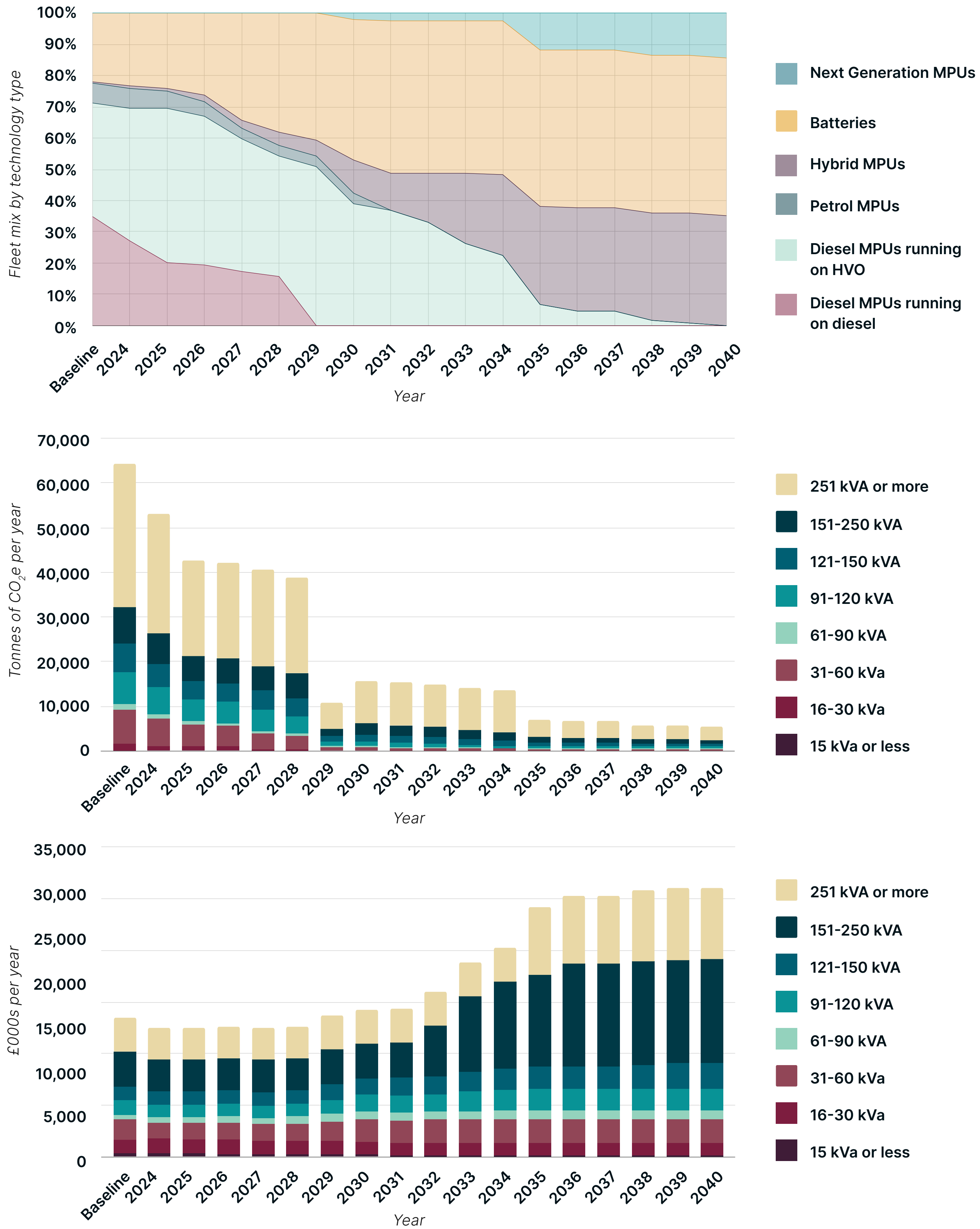
Because of the delay in infrastructure transition, this scenario results in an additional 40,000 tonnes of carbon emissions being created by 2036 compared to the Base Scenario. This is equivalent to adding approximately six months of MPU usage.

This delay postpones the uptake of many technologies but does not affect the ultimate technology mix - 50% become batteries, as per the Base Scenario. This scenario reduces capital costs in the short term and results in an annual running cost of £26 million in 2040.

In addition, this delay results in diesel generators running on HVO until 2040, four years later than the Base Scenario[i]. This also increases risks related to HVO supply chains and lack of supply as highlighted earlier in this report, and therefore should be avoided.

i As discussed in the 'A Decarbonisation Hierarchy' section, the supply of HVO to the film & TV industry may be limited or more expensive in the future. Therefore, a more rapid transformation is advised to battery or next generation technologies.

The Limited Infrastructure Scenario for all MPUs presented in terms of technology mix, carbon footprint and total cost of ownership. *Figure P_S3*



06

CURRENT SECTOR MINDSET

Top mindset action recommendations

1. While suppliers are viewed as responsible for directly investing in new MPUs and vehicles, over 50% of stakeholders believe financial support should come from the government. With this in mind, industry members should come together to ask for government decarbonisation support and legislation.

2. Broadcasters, streamers and film studios should make sure that their decarbonisation goals are reaching the suppliers of their productions and that their production budgets support the use of, and investment in, low-carbon technologies now.

3. All industry stakeholders should work together in committing to over-arching decarbonisation targets in line with the science, as well as setting individual emissions reduction targets.

4. It is agreed that sustainability initiatives and trade bodies hold responsibility for lobbying the government, delivering industry training and creating best practice guidance and initiatives. However, they will need industry funding for these programmes.

CURRENT MINDSET DATA TAKEAWAYS

- There is substantial confidence in batteries and HVO, for both MPUs and vehicles already.
- 88% of suppliers already hire batteries signalling that suppliers and customers are becoming comfortable with the tech.
- London's suppliers expect significant growth over the coming decade.
- Only 15% of suppliers expect to never stop using fossil fuels.
- There is a disconnect between which low-carbon technology, streamers, broadcasters, studios and producers believe has been requested, and what is actually being asked for on productions.
- The majority of companies have already implemented an environmental policy, measure emissions and/or have a CEO directly engaged with environmental efforts.

How prepared are suppliers for low-carbon technologies?

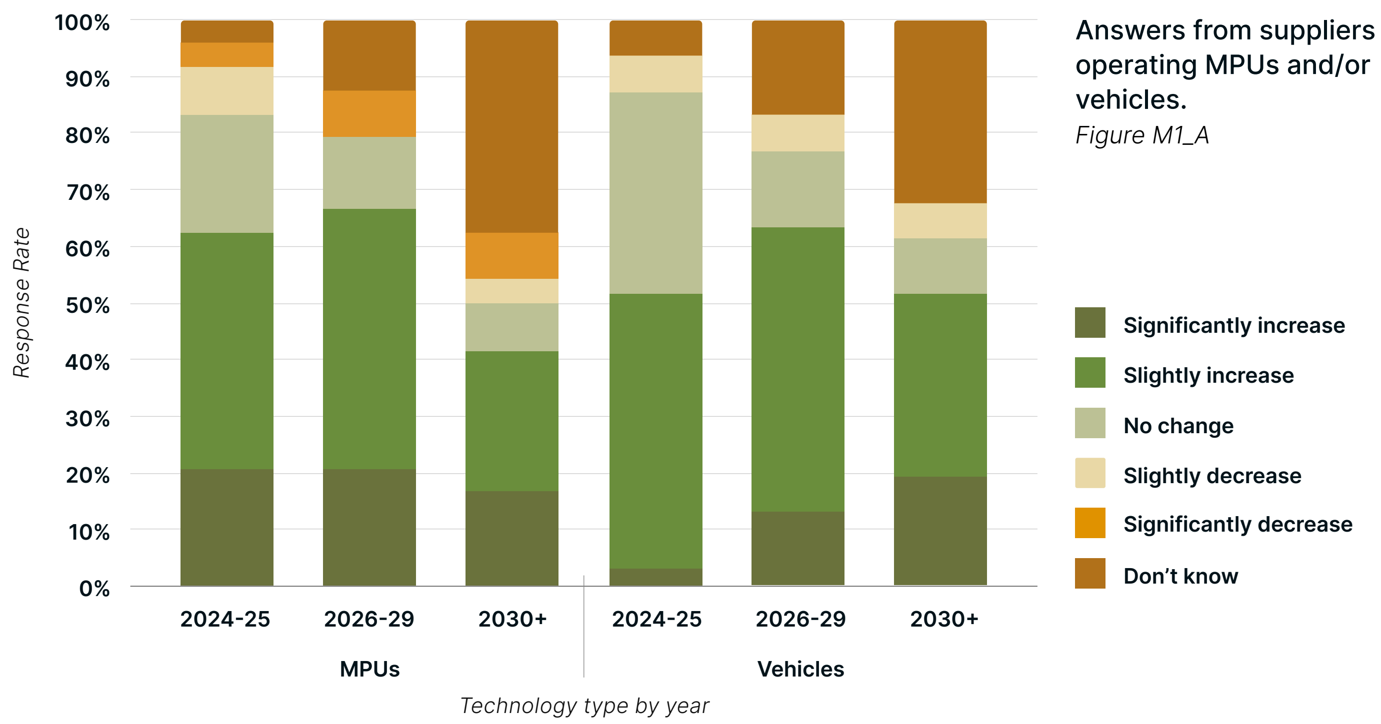
Analysis in this section is based on the sector-wide survey and focuses on questions targeted at suppliers specifically. Of the 89 respondents, 56 were suppliers.

London's suppliers expect to see significant growth over the coming decade. Realising these expectations will bring both new investment opportunities and challenges. Over half of suppliers expect their vehicle and MPU fleets to increase before 2030 (*Figure M1_A*). It is important to note that this growth is not accounted for in this report's decarbonisation scenarios. Further growth will increase carbon emissions, as well as the cost of decarbonisation.

Understanding the likelihood of this growth is out of the scope of this report but will impact the future cost of decarbonisation. The Fuel Project recommends that the Avoid-Improve-Shift model be applied first to any fleet before expansion. Likewise, individual fleet analysis and collective industry action may present economic wins without the need for increased fleet sizes, via cost savings.

Suppliers already have substantial confidence in battery technologies and HVO use for both MPUs and vehicles. **88% of MPU fleets include batteries and over 40% of vehicle fleets include electric models**. This confidence is not reflected in hydrogen technologies, with most suppliers uncertain or expecting never to adopt them. There is some correlation between confidence in low-carbon technologies and confidence in retiring fossil fuels (*Figures M2 and M3*).

How do you expect your fleet size to change over the coming decade?



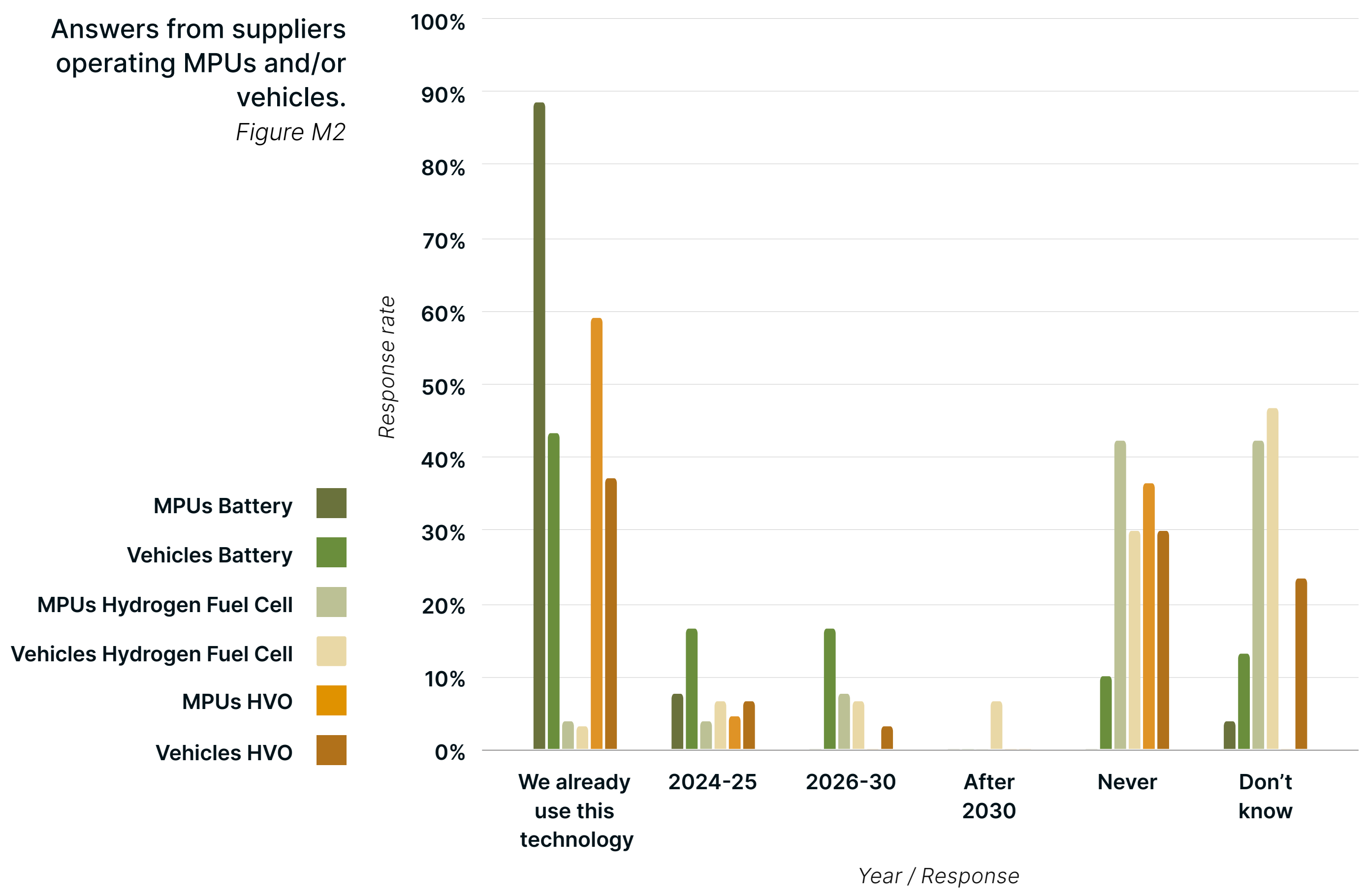
Answers from suppliers operating MPUs and/or vehicles.
Figure M1_A

> 60% of suppliers with MPU fleets and 43% with vehicle fleets already have or expect to retire petrol/diesel by 2040 at the latest.

60% of suppliers with MPU fleets already have or expect to retire petrol/diesel by 2040 at the latest. This drops to 43% for vehicles. With 24% and 40% not knowing when they will retire petrol/diesel generators and vehicles respectively (and roughly 15% expecting to never stop using them), there is a high level of uncertainty about what this transition will look like. Given that the Base Scenario shows that all diesel MPUs can transition to battery or HVO by 2029, and all petrol MPUs can transition by 2031, it is important that MPU owners and operators know that with industry support, they can decarbonise significantly a decade sooner than suspected.

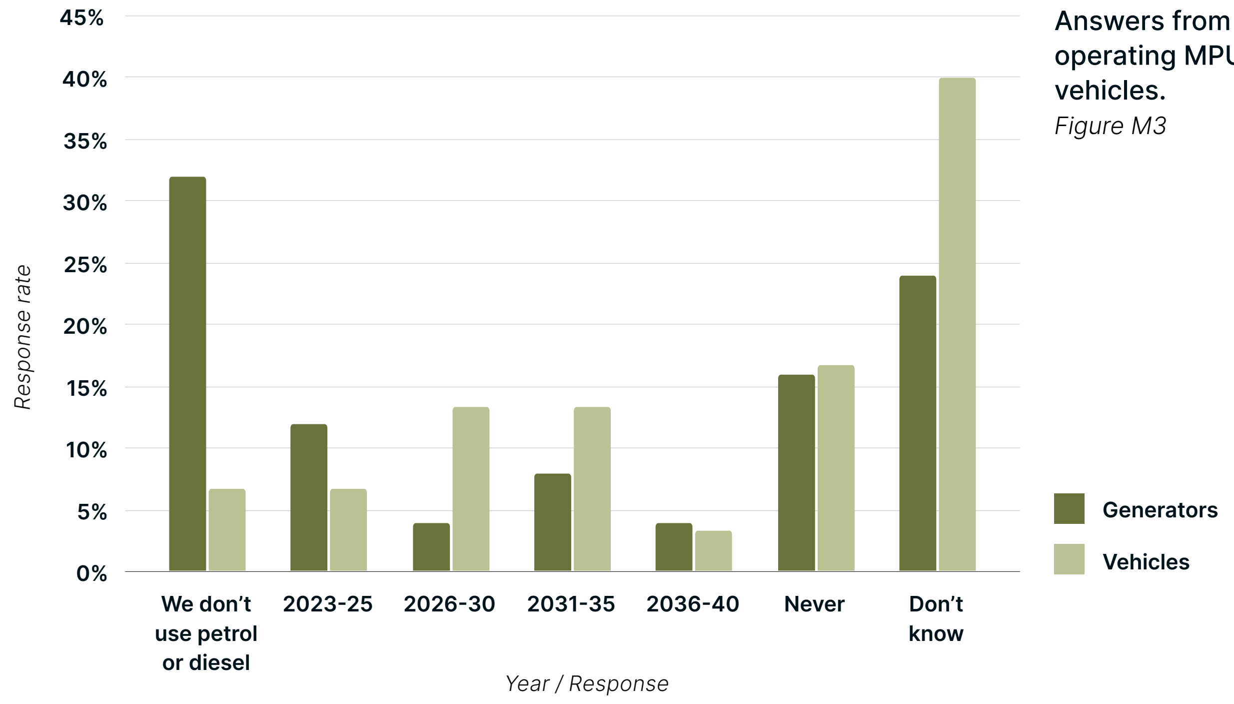
Infrastructure is identified as a key enabler for the transition. Suppliers are already engaged on installing this at operational facilities. (*Figure M4*). A majority of fleets have HVO tanks and/or electric vehicle chargers already. The same is not true for hydrogen, which makes sense given the absence of this technology in fleets today.

When do you expect to introduce low-carbon technologies into your fleet?



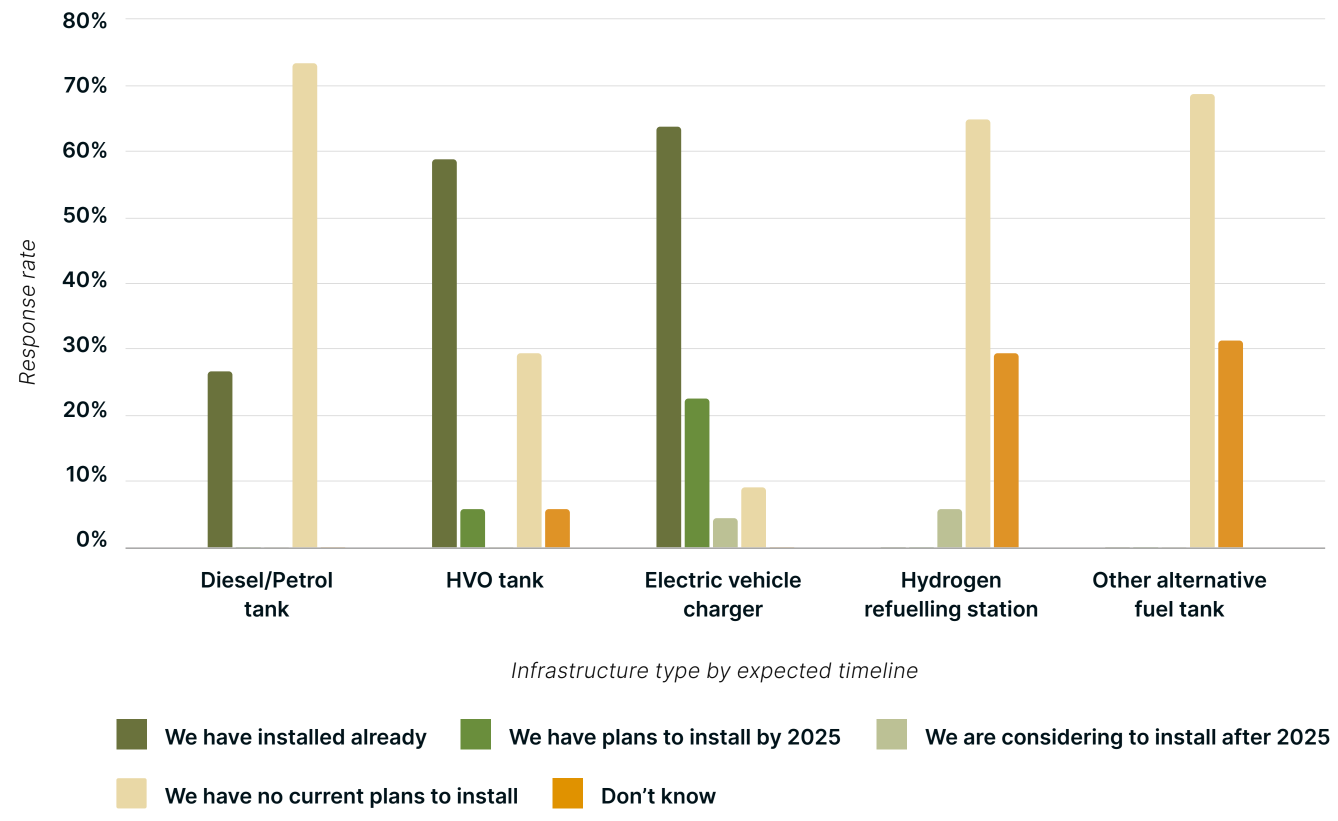
Answers from suppliers operating MPUs and/or vehicles.
Figure M2

When do you expect to retire petrol and diesel (generators/vehicles) from your fleet?



Answers from suppliers operating MPUs and/or vehicles.
Figure M3

Do you have any of the following installed at your operational facility?



Answers from suppliers operating MPUs and/or vehicles only.
Figure M4

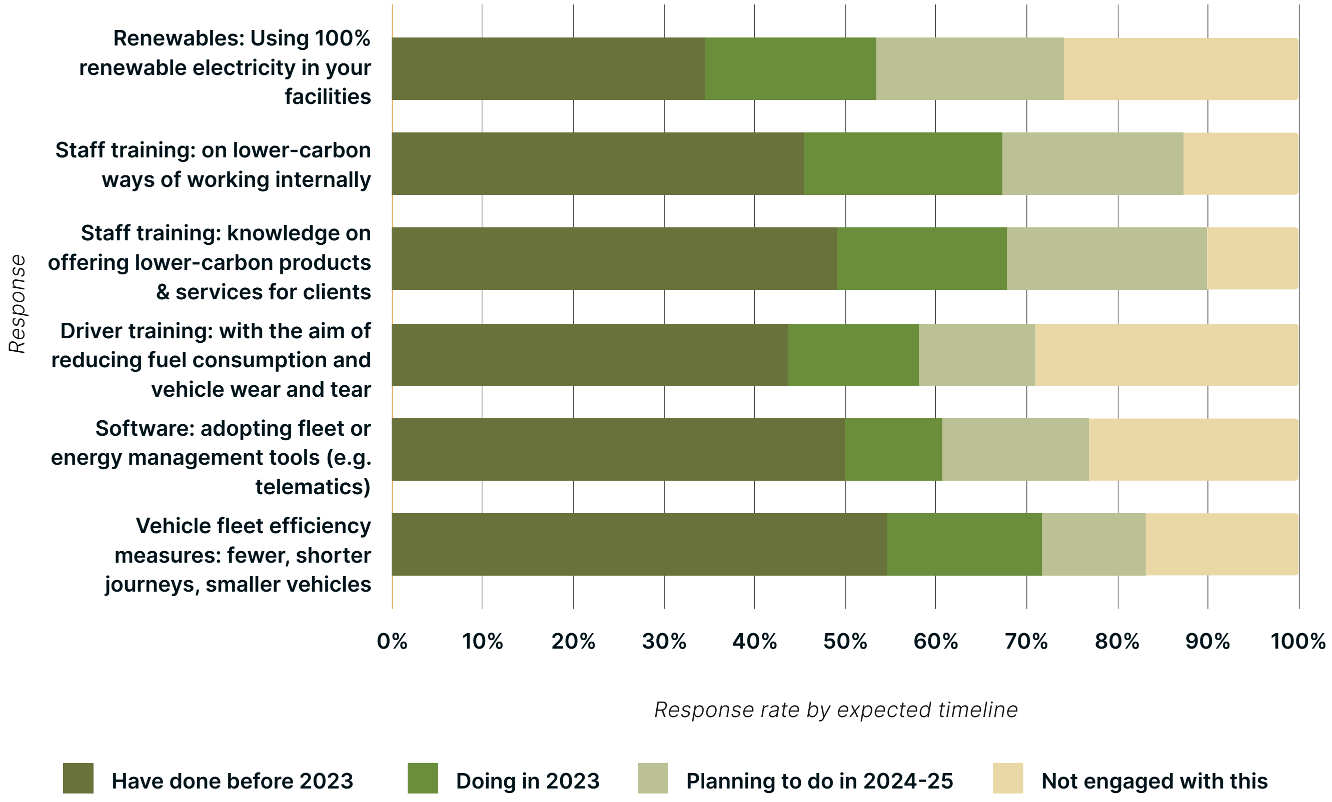
Suppliers are demonstrating engagement on sustainability initiatives.

Suppliers are demonstrating engagement on sustainability initiatives across a wide range of activities (*Figure M5*). While many actions have already been implemented, technology transitions will require additional or renewal of these initiatives in the future. Only 10-20% of respondents indicate plans for the future, while 35-55% report initiatives have already been implemented.

The most common reasons given for suppliers not going further are a limited supply of solutions and a lack of financial support to acquire low-carbon technologies (*Figure M6*). The sector should explore initiatives and mechanisms that can resolve these barriers. This may include industry and government funding for Research and Development (R & D), long-term rental agreements between suppliers and content creators, and/or policies mandating use of low-carbon technologies.

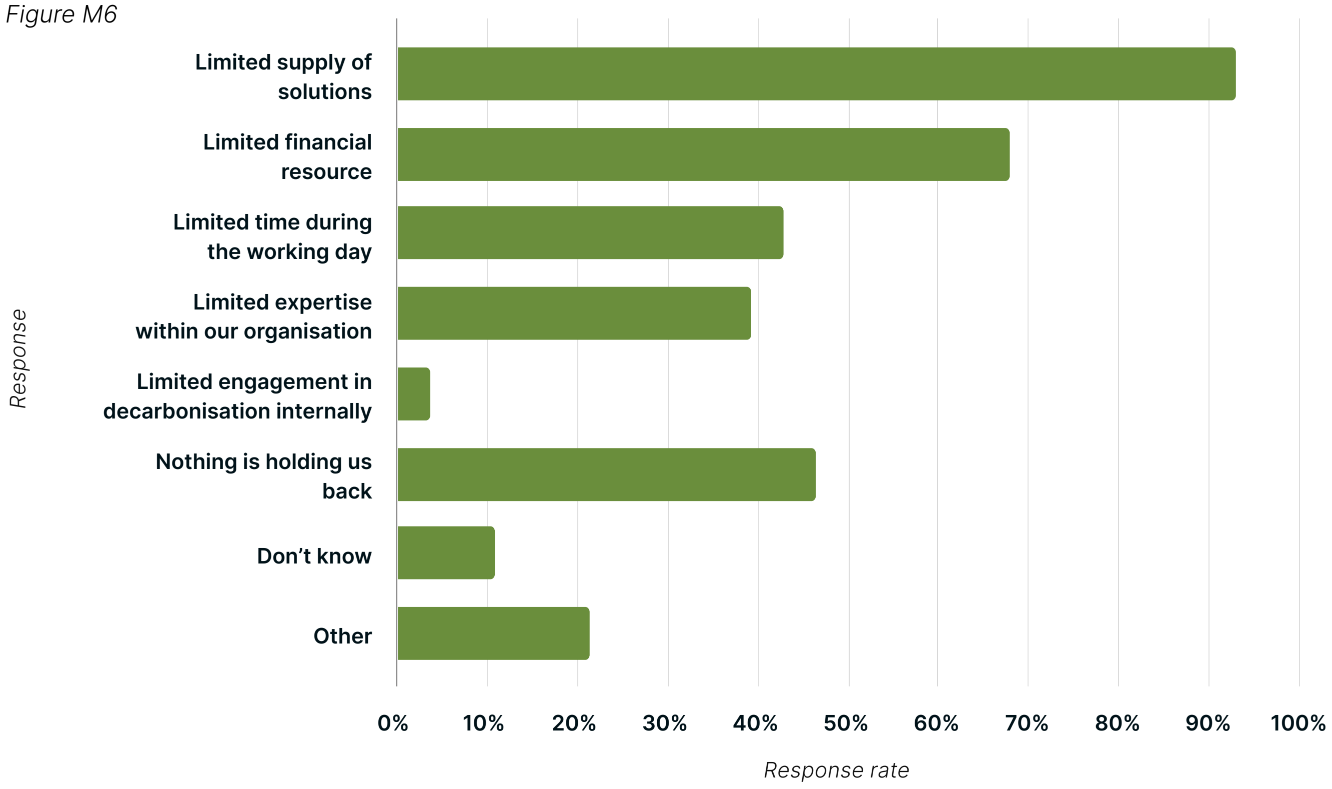
Answers from suppliers only.
Figure M5

How is your organisation engaged with the following activities to reduce carbon emissions?



Answers from suppliers only.
Figure M6

Is anything holding you back from implementing these activities further?



How willing is the sector to engage with decarbonisation technologies?

Analysis in this section is based on data collected through the sector-wide survey from a range of industry stakeholders, as well as suppliers.

Engagement

Decarbonisation is an important focus. The majority of film and TV production stakeholders are engaged in decarbonisation. 65% of respondents have a policy to reduce their carbon footprint and 53% are measuring their progress annually. However, only 28% have specified near-term targets.

Broadcasters, streamers and major studios are those most likely to have already set such milestones. **This correlates with those companies that have dedicated internal sustainability staff and resources.**

Furthermore, environmental engagement is occurring at the most senior levels, with 64% of all stakeholders indicating that the CEO is actively engaged with this work.

Barriers to engagement. A reliable supply of technologies, the infrastructure to support them and the finance to invest, are all common barriers for companies in relation to the transition. As these technologies achieve commercial readiness, there are a variety of roles that different stakeholders can take to overcome these barriers.

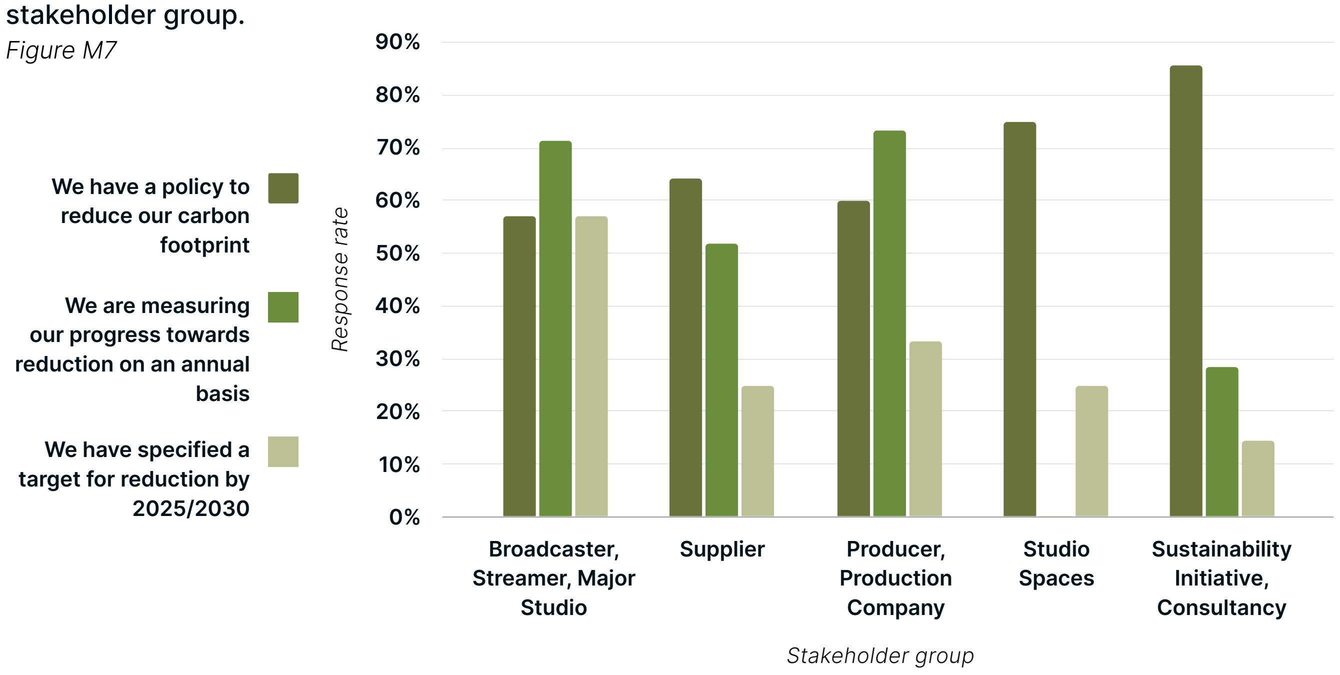
Sector-wide Survey
89 respondents

- 56 Suppliers
- 7 Broadcasters, Streamers, Major Studios
- 15 Producers, Production Companies
- 4 Studio Spaces[I]
- 7 Sustainability Initiatives, Consultancy

I Due to a low response rate from studio spaces, these findings may not broadly represent London studio spaces. Further research on studio spaces is advised.

Answers separated by stakeholder group.
Figure M7

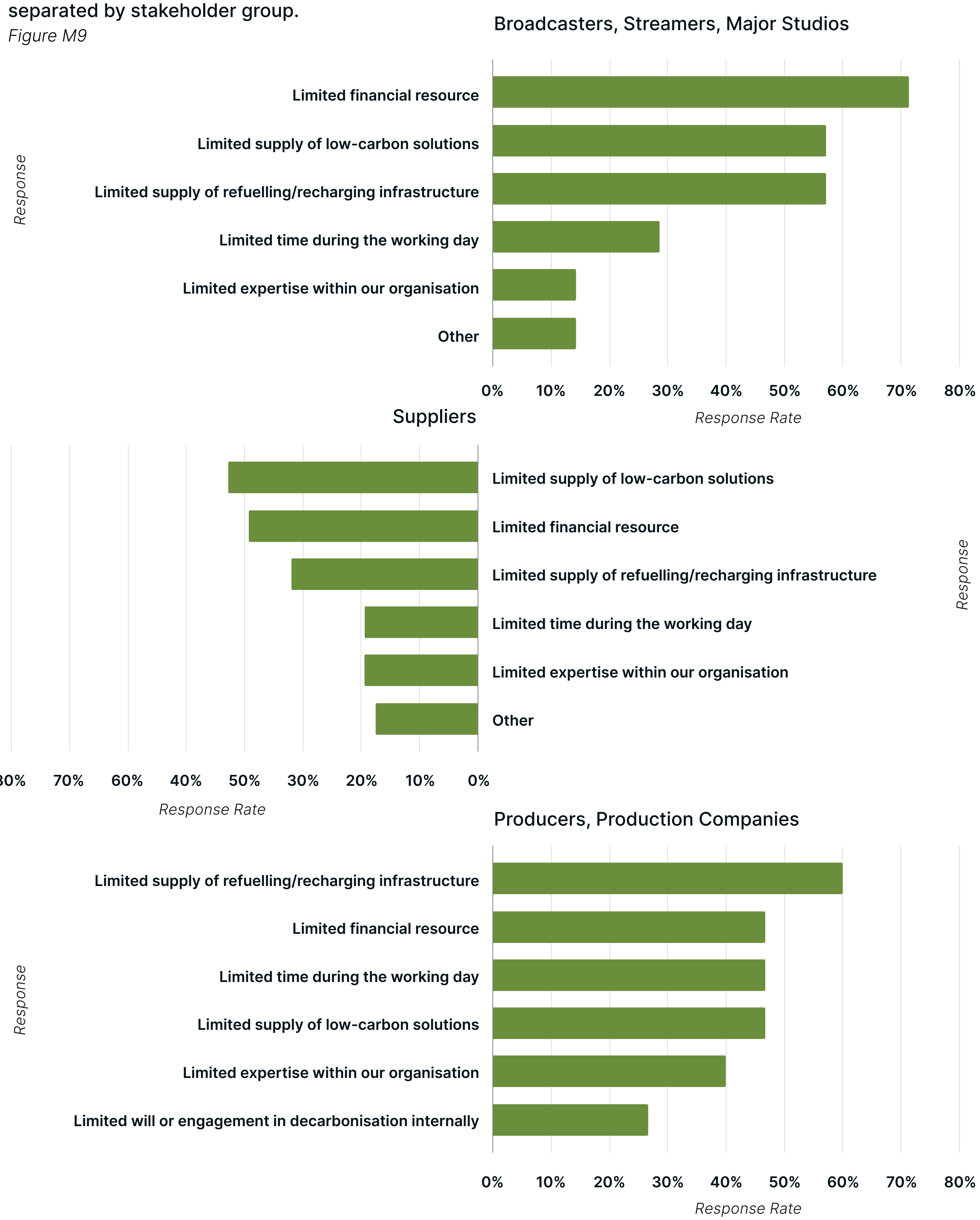
Does your organisation have ambitions to reduce carbon emissions?



Answers separated by stakeholder group.
Figure M8

What is the highest management-level position(s) or team(s) actively participating in climate or environmental impact work within your company?

The top five most common answers to the question "Overall, what challenges does your organisation face in moving away from a reliance on fossil fuels?" separated by stakeholder group.
Figure M9

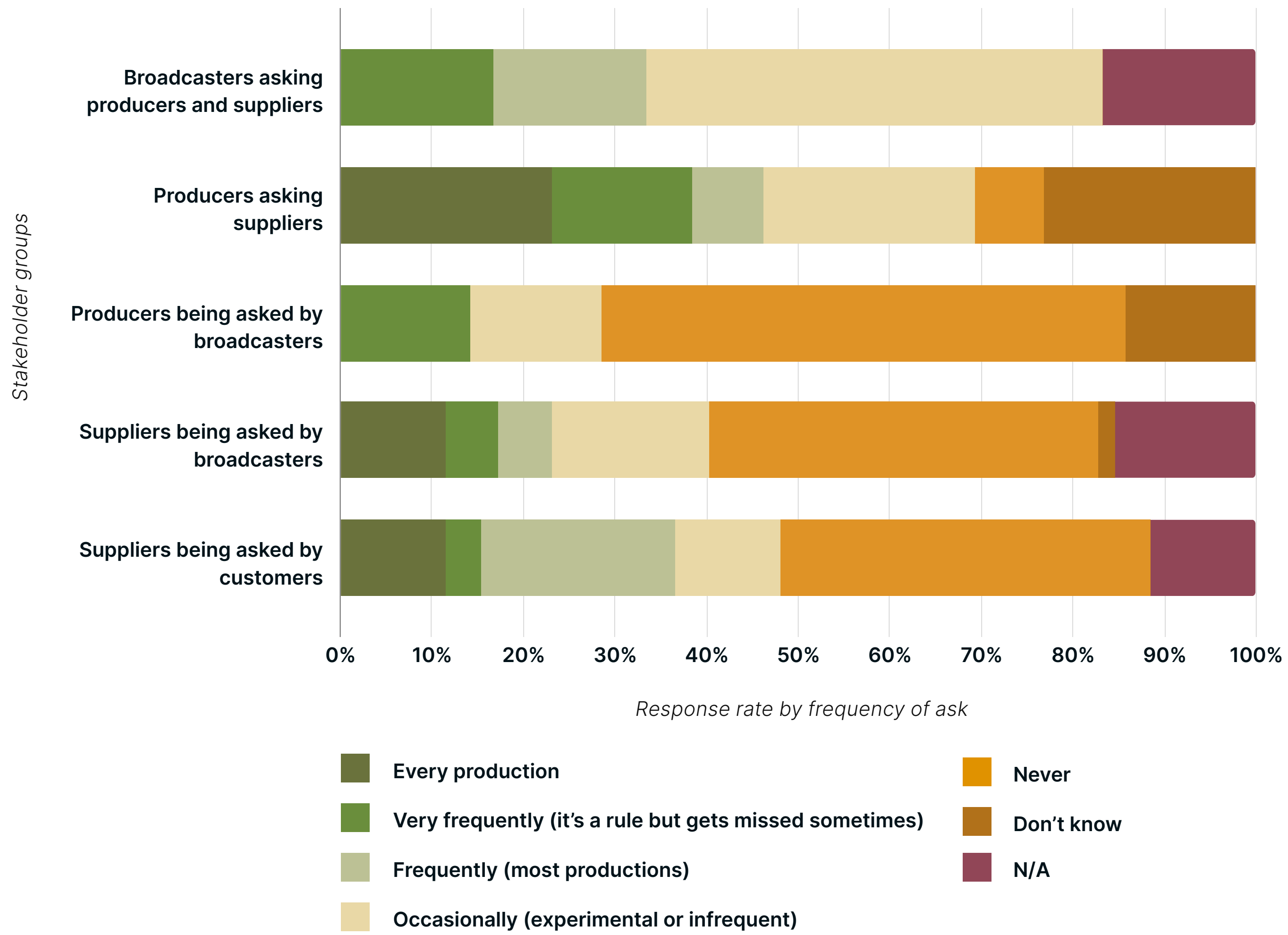


Demand

The survey reveals a notable difference between what **customers believe** *they are asking* for and what **suppliers believe** *they are asked for*. For example, while commissioners and producers (including production companies) generally indicate that they believe they are asking for mobile power spec planning on many/ most productions, the data reports that those receiving the ask are saying that this request rarely comes[i].

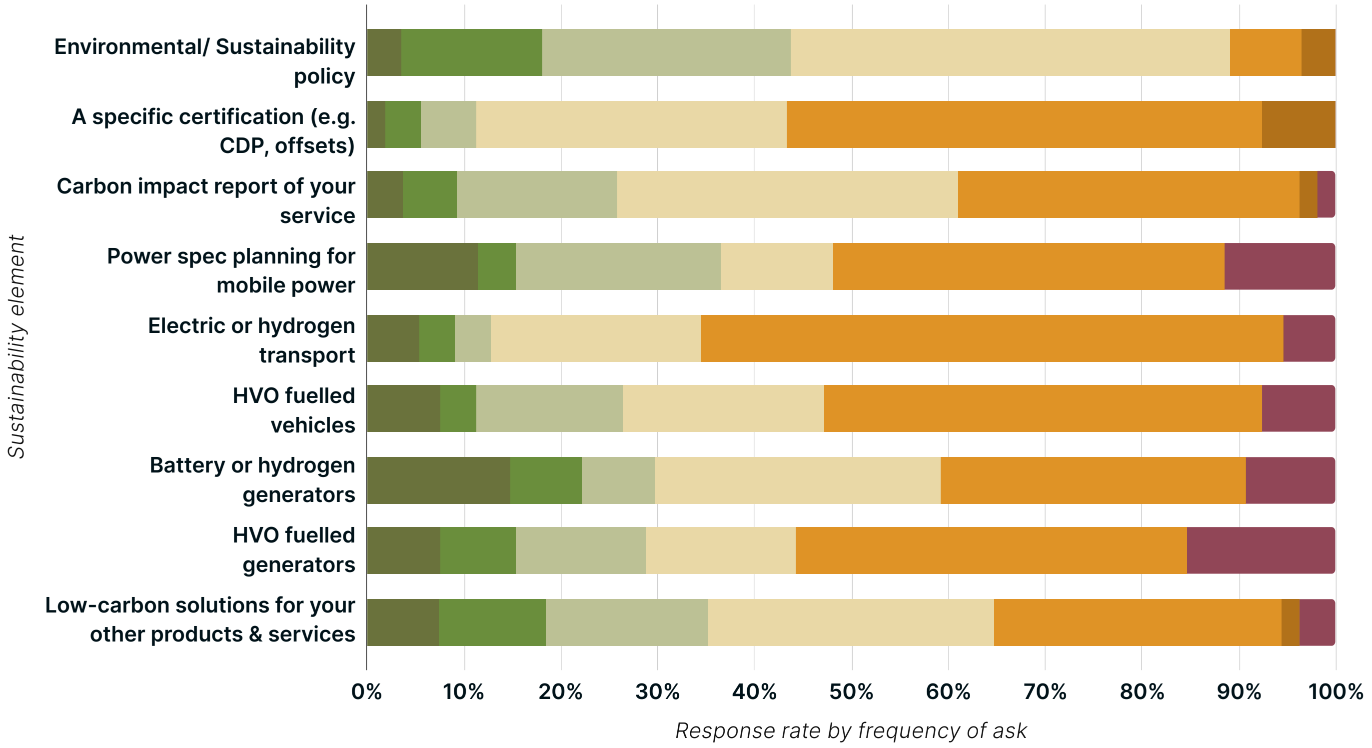
[i] The report used the word 'customer' because the person ordering equipment for a 'production' is often not the 'producer'. The report aimed to ensure all production-related crew were included. This may or may not include broadcasters speaking directly to the supplier.

A range of responses to the series of questions asking whether "power spec planning for mobile power" is an asked for element of sustainability.
Figure M10



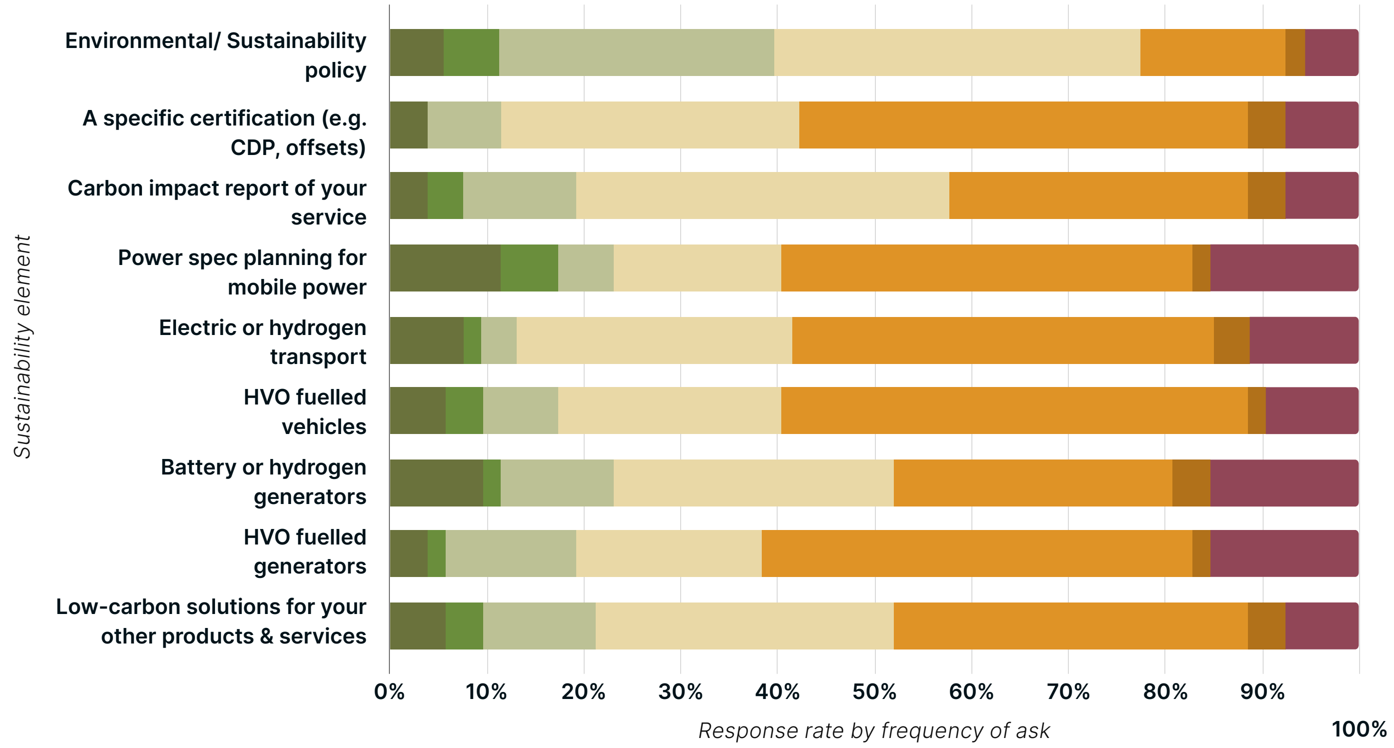
How frequently are you asking your **producers and suppliers** for the following sustainability elements of their services?

Answers from **broadcasters, streamers and major studios** only. *Figure M10-2*



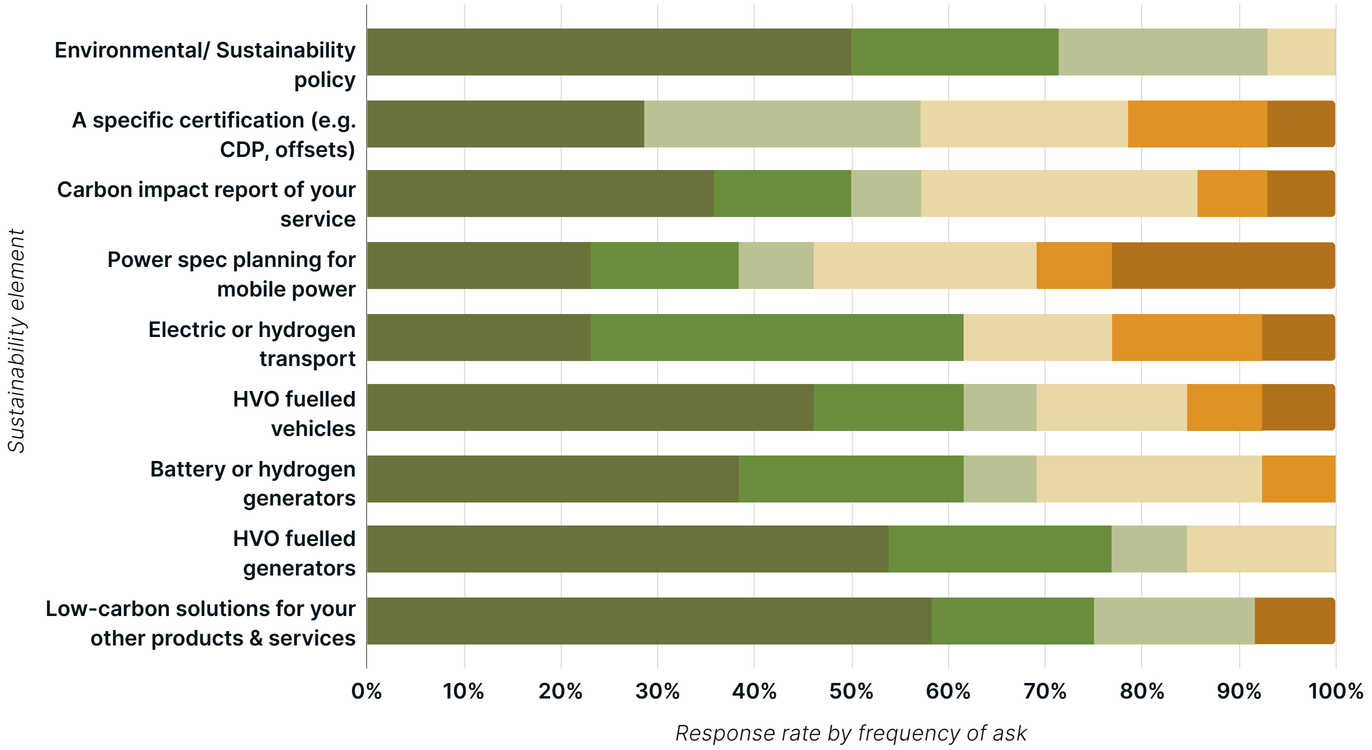
How frequently are **broadcasters or streamers** asking you for the following sustainability elements of your services?

Answers from **producers and production companies** only. *Figure M10-3*



How frequently are you asking your **suppliers** for the following sustainability elements of their services?

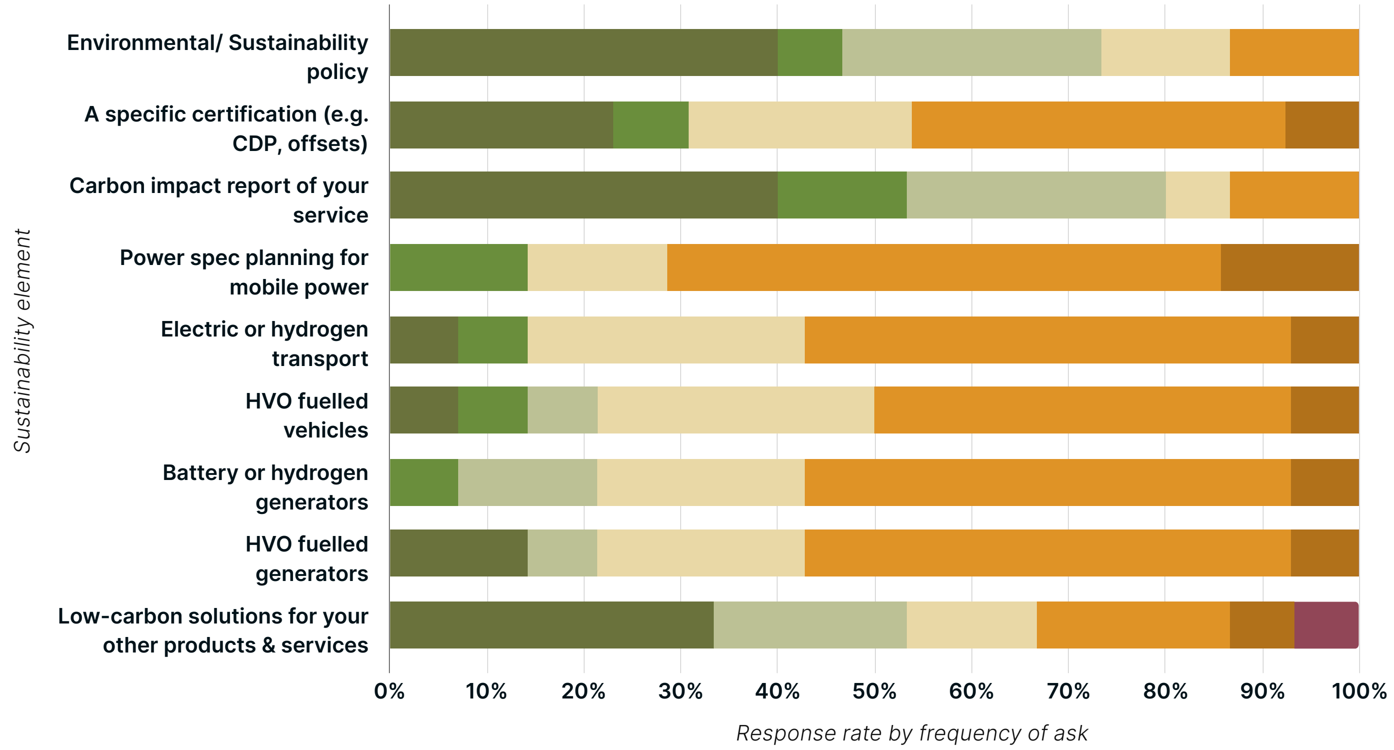
Answers from **producers and production companies** only. *Figure M10-3*



Every production | Very frequently (it's a rule but gets missed sometimes) | Frequently (most productions) | Occasionally (experimental or infrequent) | Never | Don't know | N/A

How frequently are **broadcasters or streamers** asking you for the following sustainability elements of your services?

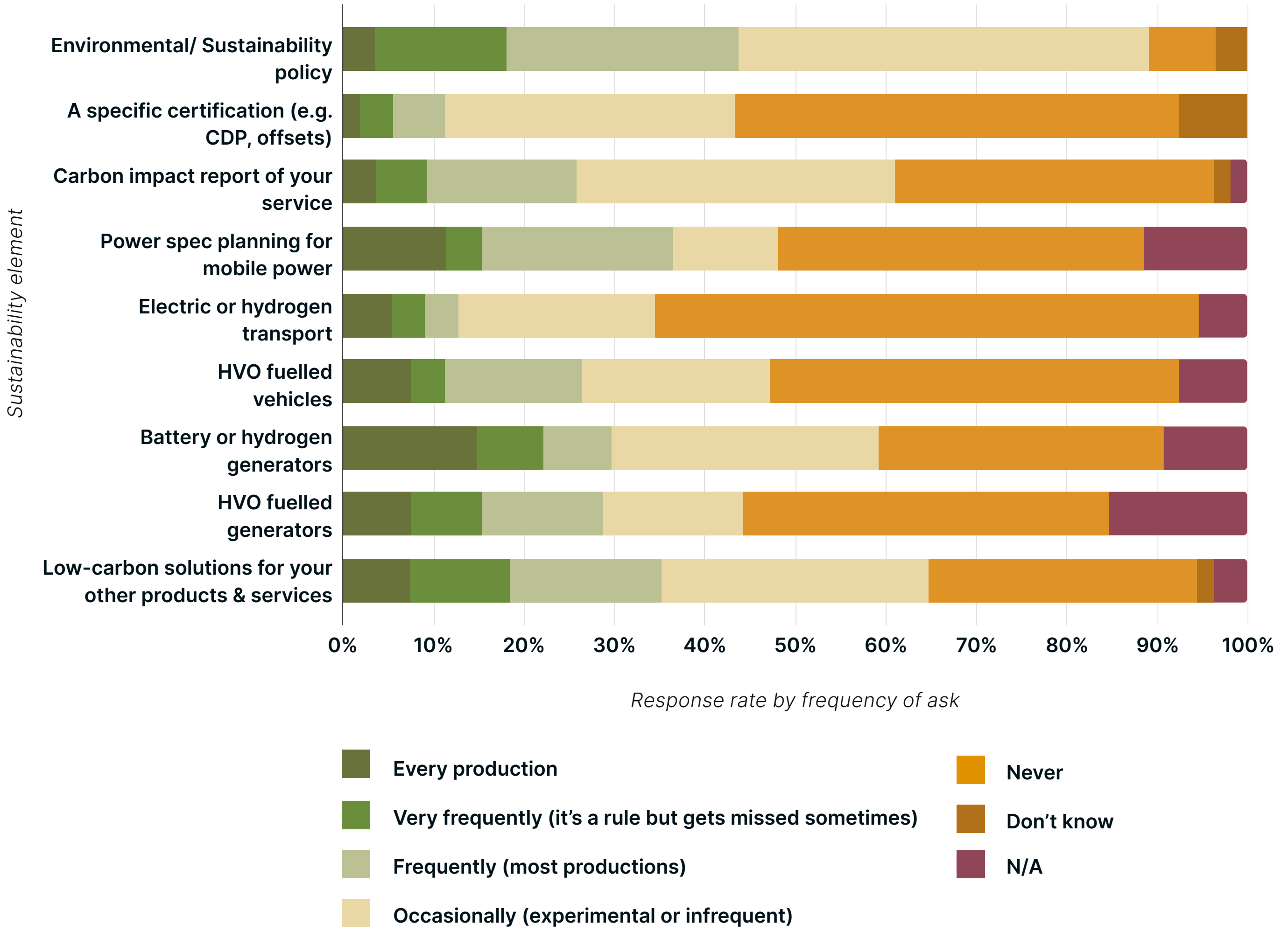
Answers from **suppliers** only. *Figure M10-4*



Every production | Very frequently (it's a rule but gets missed sometimes) | Frequently (most productions) | Occasionally (experimental or infrequent) | Never | Don't know | N/A

How frequently are **customers** asking you for the following sustainability elements of your services?

Answers from **suppliers** only.
Figure M10-5



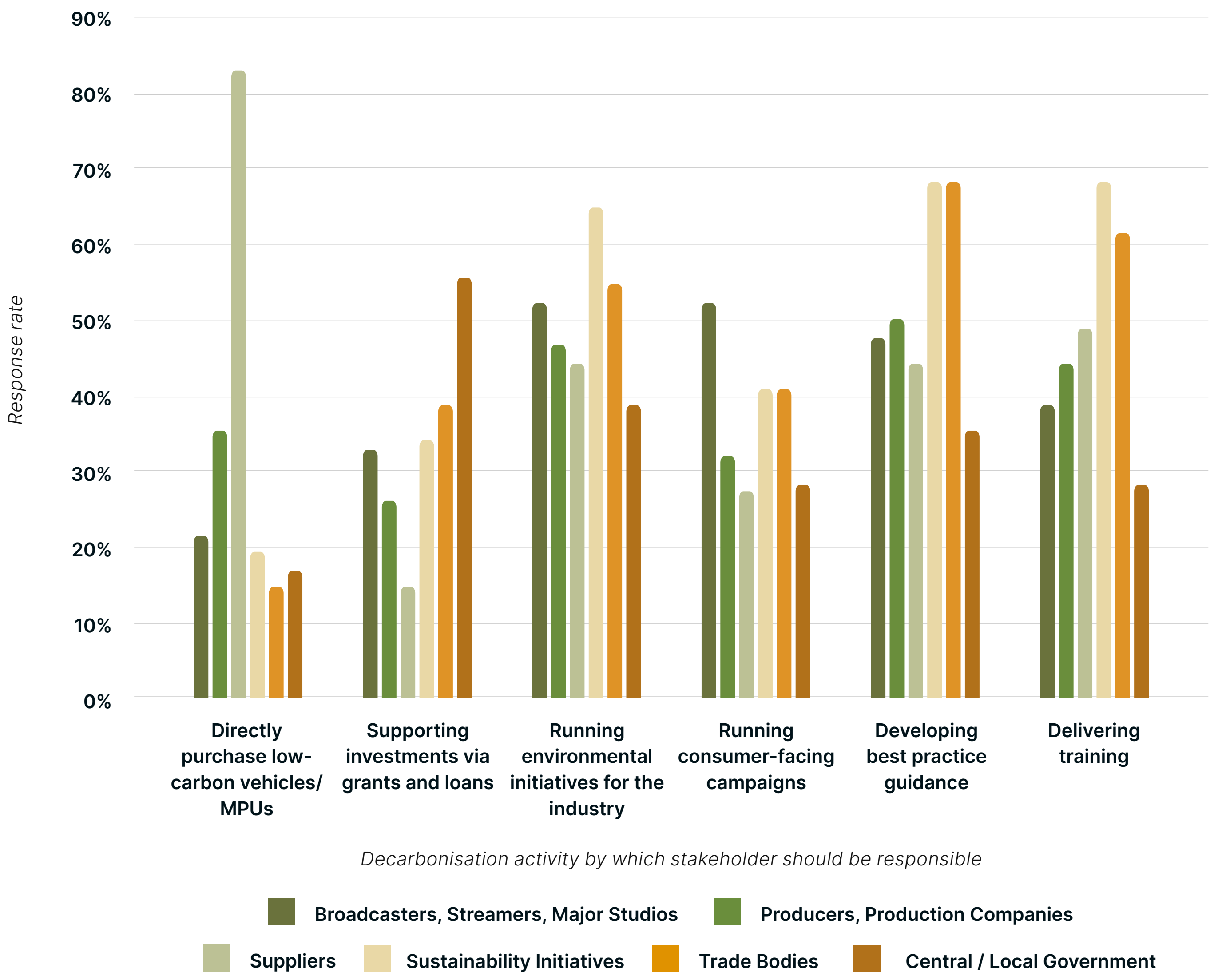
Responsibility

The industry should make specific contributions in stimulating the transition. While the supplier is seen to be responsible for investing in new MPUs and vehicles, over 50% of industry members surveyed believe that financial support should come from the government. The data suggests that trade bodies may be the right actors to secure that government funding.

There is overall agreement that sustainability initiatives and trade bodies should deliver sector-wide best practice guidance, environmental initiatives and training. This suggests that those two stakeholder groups should consider working more closely together. Broadcasters are also seen to be responsible for running environmental initiatives, alongside communicating decarbonisation messaging to the general public.

There are several activities that can support the decarbonisation of the audiovisual sector. Who do you think should have significant responsibility for each?

Answers to the question.
Figure M12



AUTHORS' CONCLUSION

In Closing

With 2023 recorded as the warmest year on record and 2024 looking warmer still, the need to increase the ambition and speed of our energy transition is clear. However, SME suppliers cannot be solely burdened with the cost of decarbonisation. Funding needs to be collaborative and begin immediately to target current investment cycles. Missing these targets will lock in fossil fuels, strand assets and delay decarbonisation by another decade. Aligning now on a shared timeline for decarbonisation, alongside new ways of working, funding and training, can empower the industry to make the commitments and investments needed to expedite the transition. This report calls for government support to aid the transition and acknowledges that, **for the cost of a film per year, the industry can dramatically cut carbon today**. The technology and know-how to start the transition exists but work is needed to decide how it is now funded. This can look like dedicated budgets, funding pots/grants, long-term lease agreements, hire costs that cover new technologies or all of the above. Further collaborative discussions and data will be needed, but this report represents a plan that can begin now and that should give hope to our reader. As an industry, we can share this optimism beyond our sector, by demonstrating what is possible when we work together.

In tandem with funding, other work is needed. This includes action on standardised fuel/power planning and monitoring, improved preproduction planning, updated production policies, increased access to renewable grid power, collective phase-out dates for fossil fuels, production scale considerations and reducing production energy demands. These are all options that do not require significant new knowledge or technological innovation, and largely represent the **Avoid** and **Improve** parts of the model. However, they do require the will of individuals and action from companies, and we should not make the mistake of waiting for these to be in place before we begin to invest in **The Shift**.

Though beyond the scope of this project, it appears that the implementation of legislation – such as low emission zones – has worked in driving investment to less polluting vehicles and MPUs in other industries. Therefore, further legislation around decarbonisation and air quality should be supported. Given the industry's sizable role in the UK economy, it is important that London's film and television community uses its voice to support environmental action. Pushing for existing NRMM legislation to be industry-agnostic may be an easy win for the industry, while faster grid decarbonisation would support collective goals. Combining lobbying efforts with other industries reliant on the development of low-carbon transport and MPUs would support faster decarbonisation across multiple sectors.

Renewable electricity tariffs should likely be a minimum facility policy, with on-site renewables offering additional emissions reductions and energy security, while reducing the need for mobile power and reducing energy costs. Whilst needing further research, new technologies, such as vehicles that are themselves batteries and virtual production, offer opportunities to reduce both transport and mobile power needs. Such innovations are promising for mitigating the industry's footprint and consideration is needed to ensure sustainable procurement of materials and digital technologies, alongside upskilling of the workforce.

> We want to recognise that contributions to this analysis were often down to a decision by individuals to step out of their traditional job roles and support the view of a brighter, better future for all.

Our goal was creating achievable, equitable and holistic industry decarbonisation. **We are excited to see that the possible dates for this could be so close and the fix so relatively easy**. This is of course a huge win. We are also inspired by the level of participation and collaboration demonstrated through the undertaking of this report. We want to recognise that contributions were often down to a decision by individuals to step out of their traditional job roles and support the view of a brighter, better future for all. We hope that this level of collaboration, often across competitors, acts as a template for the work that now needs to accelerate and might serve as a model for other industries within the UK and beyond. We thank all those who helped make this report a reality, and hope the unified spirit it exemplifies will continue as we rapidly reduce the environmental impact of film and TV production.

Thank yous

The Fuel Project is extremely grateful for the dedicated contribution from individuals and companies both within and beyond the film and television sector who made this report a reality.

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The Fuel Project Contributors

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GeoPura Limited
Get Set Hire
Green Eyes Production
Green Kit Ltd
Green Voltage Ltd
Hat Trick Productions
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House Productions
ITV Studios
Location One
Lucas Films
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Netflix
No Drama
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OnBio Ltd
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On-Set Location Services
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Picture Zero
Pixipixel Rental Ltd
Plus Zero Power
Provision ITV Studios
RD Studios
Red Chutney Ltd
S+O Media
See Saw / Sweetpea
Shift 4
Skoon Energy
Sky UK
SISTER
SP Location Rental
Sunbelt Rentals UK Ltd
Sustainable Film
Tim Barker Sound Ltd
Timeline TV
Translux International Ltd
Troubadour Theatres Ltd
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Fuel Project Future Work

If you would like to contribute to future phases of The Fuel Project, please get in touch with Creative Zero or Film London at: laurence.johnson@filmlondon.org.uk and/or roxy@creativezero.co.uk

Endnotes

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