Comparison of electric truck models from European incumbents and new entrants

By Mike McCarthy

Prepared for: Transport and Environment

Project Ref: AVS377

August 2026

1 Executive summary

New electric truck manufacturers are increasingly entering the European market. T&E commissioned Apollo Vehicle Safety to compare key specifications of electric truck models offered or announced by new market entrants to best-in-class European models (defined as either best-selling or newest generation). The objective of this comparison was to understand whether models offered by new entrants are competitive in terms of their key characteristics.

This project focussed on vehicles that would service typical European long-haul operations and, where a truck model was offered in different configurations, the version with maximum battery capacity and charging power that would be equipped for use with a standard 13.6m semi-trailer was chosen for analysis. It should be noted that some manufacturers offer trucks that can be tailored to the specific operational customer requirement and the specification used here may, therefore, not be the maximum that is achievable for each parameter. The criteria for selection of trucks were made to enable a consistent comparison.

This comparison of key parameters between trucks in these groups found that:

- New entrants are offering electric trucks which have specifications that are generally similar to those from established manufacturers.
- No electric truck performs best on each metric; some manufacturers, particularly those in the established group, offer solutions that can be tailored to the specific operational requirement.
- The available data shows that there is still a tradeoff between range and payload, and that all of the electric trucks assessed have payload penalties compared with comparable diesel trucks.
- If it is assumed that the load fills the available space, then the maximum payload can, for some vehicles, be constrained by the maximum axle weight on the rear of the tractor. This appears, therefore, to still be a constraint for at least some new entrants with 4 x 2 axle configurations.
- Trucks with 6 x 2 and 6 x 4 axle configurations are unaffected by the rear axle load limit, as are some of the 4 x 2 vehicles, typically those with smaller batteries which do not use e-axles. The payload of the Mercedes Benz Trucks eActros 600 and the Sany e263 is reduced significantly in these circumstances, highlighting that the best vehicle currently depends very strongly on the operational requirements.
- The Weights and Dimensions Directive governing maximum combination weights in use internationally in Europe (Directive 96/53/EC) is currently being considered for Revision. If the proposal were to pass into law, then the payload would increase for the 6 x 2 and 6 x 4 combinations, effectively breaking down the tradeoff between range and payload, provided the small (Volvo Trucks FH Aero Electric extended range) and larger (Windrose E700) constraints on semi-trailer wheelbase can be tolerated in terms of compliance with the 96/53/EC turning circle requirements.
- Since the specifications for new entrants and established manufacturers are generally similar, there is still room for technological development in the market, and competition may be influenced by other factors such as brand loyalty, repair and maintenance networks and pricing.

Contents

1 Aims and objectives

New truck manufacturers are increasingly entering the electric truck market in Europe. The aim of this study is to compare key specifications of electric truck models offered or announced by new entrants to best-in-class European models (defined as either best-selling or newest generation). By making this comparison, the aim is to understand whether models offered by new entrants are competitive in terms of the key characteristics such as payload, range, efficiency, or safety. A full list of the characteristics assessed are presented in Section 2.

2 Scope

T&E specified the following models for investigation (Table 1) in the new market entrants and established manufacturer groups. This project focussed on vehicles that would service typical European road haulage operations and where a truck model was offered in different configurations, the version with maximum battery capacity and charging power that would be equipped for use with a standard 13.6m trailer was chosen for analysis. Additional vehicles in the new entrant category from BYD and Sinotruk were also investigated, but ultimately not included in this report because insufficient technical data was available.

Table 1: Trucks identified for review

New entrants	Axle configuration	Established manufacturers	Axle configuration
SuperPanther: eTopas600	4 x 2	DAF Trucks: XG Electric	4 x 2
SANY: eTruck e263	4 x 2	Daimler Truck: Mercedes Trucks eActros 600	4 x 2
Farizon Homtruck	6 x 4	IVECO: S-eWay Artic	4 x 2
Tesla: Semi	6 x 4	MAN: eTGX	4 x 2
Windrose: E700	6 x 4	Scania: R-Series electric	4 x 2
		Renault Trucks: E-Tech T 585	6 x 2
		Renault Trucks: E-Tech T 780	6 x 2
		Volvo Trucks: Volvo FH Aero Electric – extended	6 x 2

3 Method

Data on truck specifications was collected using desk research methods (e.g. manufacturer websites, press articles) and from online meetings with OEMs. All OEMs included in this report were invited to provide or review information.

To model maximum payload without overloading the rear axle, methods were consistent with previous analyses (Knight & O'Brien, 2025). This assumed that the centre of gravity of the nominal maximum payload was positioned at the exact geometric centre of the load space on a 13.6m semi-trailer with an unladen mass of 5,940 kg.

4 Results

To provide a comparison between the specifications of new market entrants and established European manufacturers, each parameter was assessed according to key specifications (see Appendix A).

4.1 Range on a single charge (km)

Electric trucks for long-haul operations have become a more feasible option with technological advancements in battery capacity that deliver sufficient power within the constraints on weight and the space available on the vehicle for batteries.

In terms of driving range on a single charge, the specification for new entrants was, on average, slightly greater compared with established manufacturers when comparing trucks with the same axle type. Overall, the average was comparable between the two categories and both would be suitable for long-haul transport operations, where the maximum range requirement before the driver would be required to take a 45-minute break would be approximately 360 km (4.5 hours driving at 80 km/h).

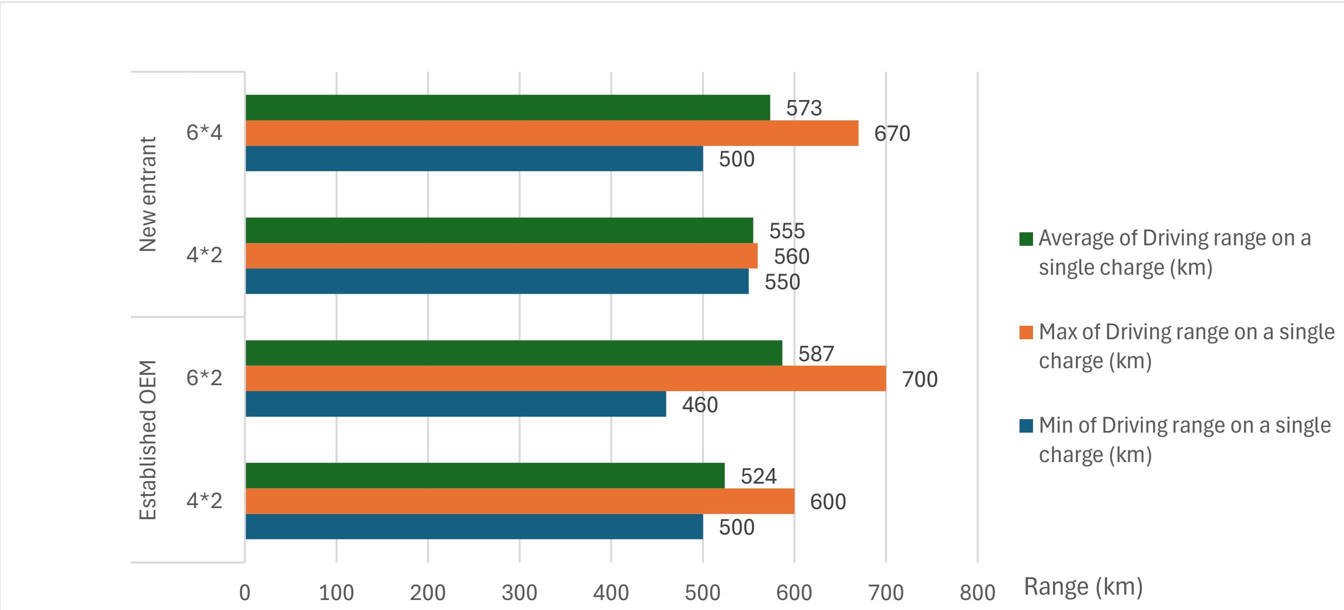

Figure 1: Driving range on a single charge (km)

4.2 Payload

The payload that can be carried by an electric truck is limited by the Gross Combination Weight rating (the combined weight of tractor and laden semi-trailer) permitted and individual axle load limits, of which the most important is the limit for a single rear (driven) axle of 11,500 kg applicable to 4 x 2 configurations. If too much of the additional weight of the batteries and drivetrain of an electric tractor is carried on the rear axle, then this can become overloaded before the nominal maximum payload is reached. Depending on the density of the cargo, the relative placement of the load in the semi-trailer may be able to be adjusted to some extent to mitigate this problem, but this is a significant additional complication for operators trying to achieve compliance in practice.

Based on the assumption of a 5,940 kg semi-trailer (unladen) in all cases, the maximum payload for each electric truck was calculated based on the lesser of the design gross combination weight (GCW) and the regulated GCW (96/53/EC), assuming that the maximum 2 tonne ZEV allowance is permitted.

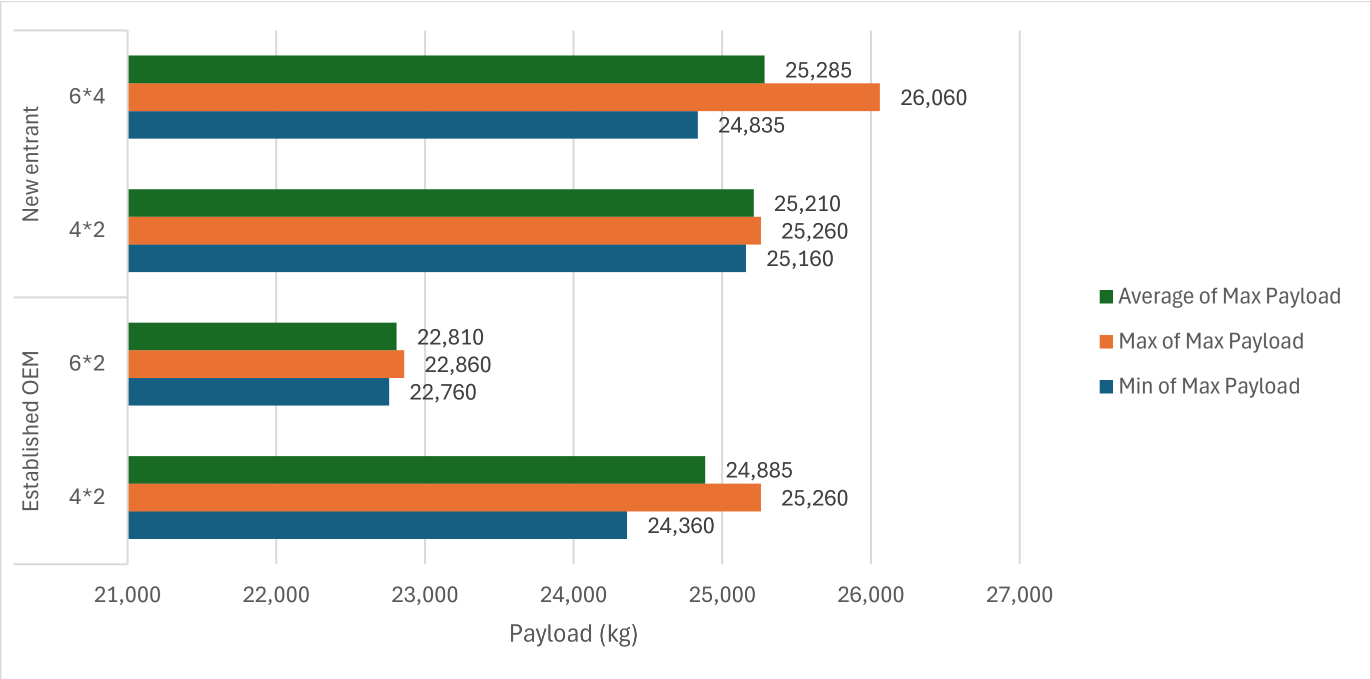

Figure 2: Nominal maximum payload – calculated (kg) assuming actual weight increase maximises the 2t ZEV allowance

In terms of maximum payload, it can be seen that the values for the two groups are similar when compared between axle configuration groups. However, the new entrant group has a slightly greater mean average payload. This could indicate that the design of the new entrants has allowed more efficient integration of battery technology compared with established OEMs who have typically modified existing platforms to accommodate battery drivetrains, however the difference in payload is marginal.

Were the Council Position on 96/53/EC regulated GCW[1] with differentiation of vehicles with 5 or 6 axles to be adopted (42 tonnes for 5 axle combinations, 44 tonnes for 6 axles), this would increase limits by a further

[1] https://www.consilium.europa.eu/en/press/press-releases/2025/12/04/council-sets-position-on-maximum-weights-and-dimensions-for-road-vehicles/

2,000 kg for 6 axle combinations. In this case, the 6 x 4 new entrant vehicles would have an increased payload advantage over established OEMs (see Figure 3), assuming that these vehicles comply with other requirements, such as the turning circle requirements in 96/53/EC.

For the 4 x 2 tractor units, the rear axle load when towing a standard 13.6 m semi-trailer was modelled for those vehicles for which the available data allowed. For those in the new entrant group, the SANY e263 was the only vehicle for which this was possible. The methods were consistent with (Knight & O'Brien, 2025) and assumed that the centre of gravity of the nominal maximum payload was positioned at the exact geometric centre of the load space on the semi-trailer. In this case, the rear axle would have been around half a tonne overloaded. If this problem was resolved by reducing the mass of the payload without moving the centre of gravity, then the payload must be reduced to only 23,140 kg, a loss of over 2 tonnes compared with the nominal 25,160 kg maximum payload. This is because when the load mass is reduced evenly across the length, more weight is removed from the semi-trailer axles than the drive axle. It means that the maximum GCW for this vehicle with a standard semi-trailer full by volume and at the max weight achievable without overloading the drive axle, would be 39,980 kg compared with the 42,000 kg GCW limit. If load were removed from the front of the vehicle only, the loss of payload would be reduced. There would be more scope for this with goods of high density that do not fill the available space. For example, moving goods from in front of the king pin to behind the rear axle could substantially reduce the drive axle load provided it didn't overload the semi-trailer axles.

The same modelling approach for trucks from the established manufactures, using the same assumptions for a standard 13.6m semi-trailer, found that the rear axle for the DAF XG/XG+, MAN eTGX, and 4 x 2 Volvo FH Aero would not be overloaded for the nominal maximum payload. However, assuming that the centre of gravity of the nominal maximum payload was positioned at the exact geometric centre of the load space on the semi-trailer, modelling for the Daimler Truck eActros 600 predicted that the rear axle would be 825 kg overloaded. If the mass of the payload was reduced without moving the centre of gravity, the maximum payload to stay within the 11,500 kg rear axle limit was estimated to be 21,341 kg, a reduction of over 3 tonnes compared with the nominal payload of 24,360 kg. As described earlier, depending on the load density, positioning of the load within the semi-trailer could reduce this effect to some degree.

Although a small sample, this suggests that 4 x 2 new entrants are not dissimilar to existing electric trucks from established European OEMs, in that for tractor units with 2 axles, there is a risk of overloading the rear axle. All new entrants for which data was available used an e-axle for the drive axle, which tends to increase the drive axle weight. In 4 x 2 configurations, this indicates that rear axle overload is still a realistic constraint for those new entrants.

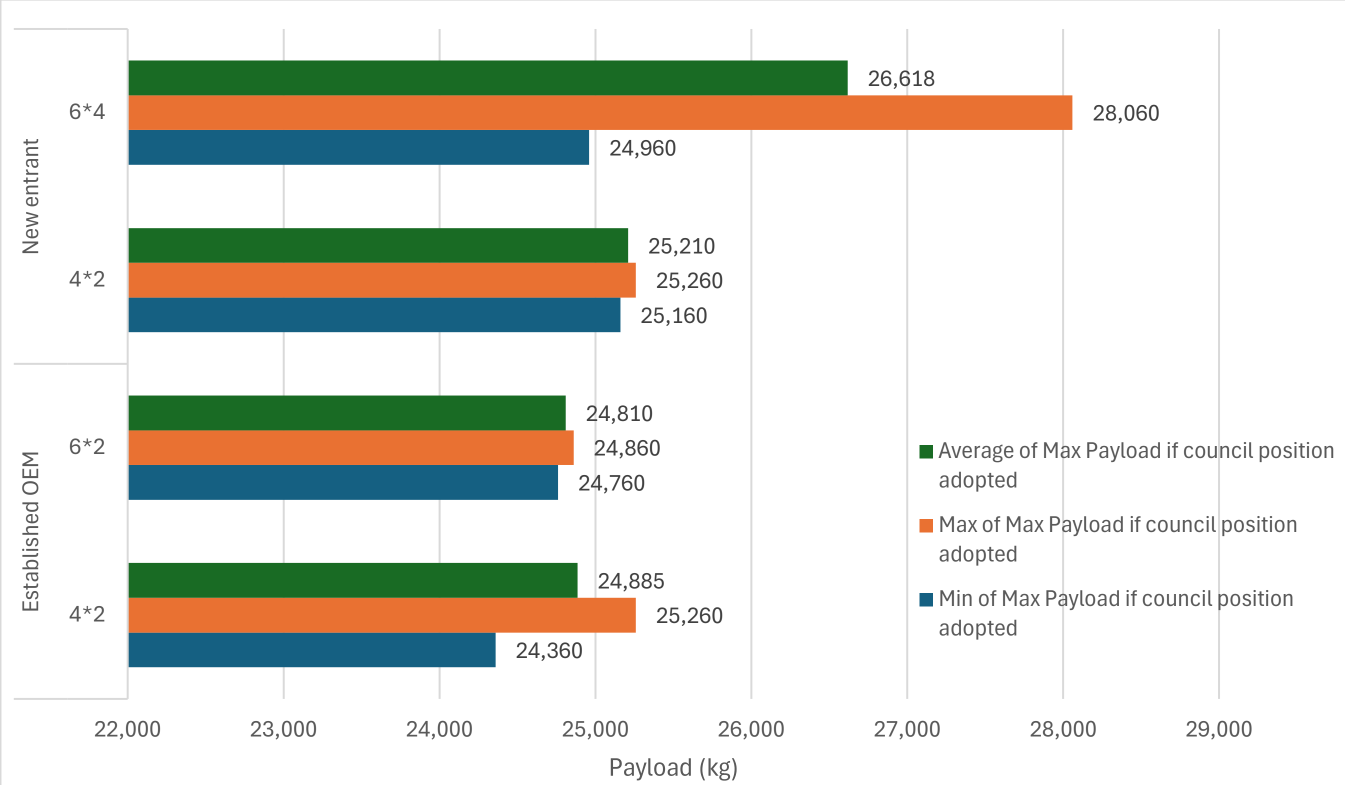

Figure 3: Maximum payload – calculated (kg) assuming Council position on 96/53/EC weight limits is adopted

When considering these aggregate results, it is important to remember that the range provided is not the same in all cases and is strongly related to payload. For example, in Figure 3 above, the best 4 x 2 from an established OEM has a range of 470 km, but the best 6 x 2 with a similar payload has a range of 700 km

4.3 Tractor length, wheelbase and turning circles

The length of the tractor unit has implications for the maximum length of trailer that can be used since the maximum length for articulated vehicles under Directive 96/53/EC is 16.5 metres. A standard semi-trailer is 13.6 metres long with a kingpin 1.668 metres from the front. Therefore, to maintain a combination length within the limit using a typical semi-trailer, a standard tractor unit must measure 4.548 metres or less from the front to the fifth wheel.

However, Directive 96/53/EC Article 9a allows derogations to this maximum length for elongated cabs that have been designed for improved aerodynamic efficiency and/or safety performance. In these cases, no specific maximum length is prescribed, but elongated cabs that comply with Article 9a must meet the requirements of type-approval legislation and must be for improved aerodynamics, energy efficiency and safety while resulting in no increase in usable loading length. The approved vehicle shall carry a marking indicating that it is compliant with 96/53/EC Article 9a. Type approval only considers individual motor vehicles or trailers, not towed combinations. A tractor unit is a motor vehicle. Under type approval it can be up to 12m in length and must be able to turn 360 degrees within two concentric circles of 12.5m and 5.3m radius. Tractor units are much shorter than 12m and can achieve the turning requirements easily as solo units.

Directive 96/53/EC applies to all goods vehicles in service on European roads. Article 9a does not exempt combinations of an article 9a compliant tractor unit towing a standard semi-trailer from a requirement that the whole combination shall also be able to turn 360 degrees within two concentric circles of 12.5m and 5.3m radius. Standard diesel articulated combinations with a tractor unit overall length up to 6 or 6.5 m and with a wheelbase (4 x 2 configuration) of up to 3.8 or 4m can achieve this requirement but do not pass with much space spare. There is limited scope for increases in wheelbase unless either:

- a rear steer axle is used on the tractor
- a rear steer axle is used on the trailer; or
- a shorter trailer is used (compromising payload volume but improving weight capacity, which can be common in industries shipping dense goods such as aggregates or liquids).

Based on the data collected and shown in **Figure 4**, this suggests that all established OEMs and all but one of the new entrants are considered likely to be able to be used in conjunction with a 13.6m semi-trailer. For the Windrose E700, the length of the tractor unit is 8.1m, which is significantly longer than other vehicles and will result in combination lengths that significantly exceed 16.5m where a 13.6m semi-trailer is used. However, the vehicle has an elongated front and the Windrose website[2] indicates the vehicle is fully homologated in Europe. Although capable of being used with a standard semi-trailer (as evidence by photos on the website), whether the combination is capable of compliance with the turning circle requirements of Directive 96/53/EC is not explicitly stated in published documents. This requirement is that the entire combination can negotiate a 360-degree path between two concentric circles of 5.3 m (inner radius) and 12.5 m (outer radius).

Information provided from one manufacturer demonstrates that for a tractor unit with a turning wheelbase of 3.6m and a 5th wheel position just behind that point, the max semi-trailer wheelbase that still allows the entire combination to comply with the turning circle requirements of 96/53/EC is 8,000 mm for a trailer width of 2,550 mm and 7,960 for a trailer width of 2,600 mm (permitted for refrigerated units). For a 4.1m wheelbase that max semi-trailer wheelbase reduces to 7.7m. In practice, a semi-trailer with a wheelbase of 7,700 mm could be considered the European standard, such that the requirements are met. However, 7.7m is not actually a defined standard. The maximum is set in type approval, and trailers must be type approved in isolation, not as a combination. As such, the trailer result could depend on the choice of tractor unit the approval body chose. Regulation (EU) 2019/2144 allows for the Type Approval of semi-trailers on a 'deemed to comply' basis. That is, if the reference wheelbase is less than defined by a formula based on its width, then it is approved. For a semi-trailer 2.55 m in width, the maximum wheelbase is 8.135 m. Although many European semi-trailers have a wheelbase of 7.7 m, not all do. Even among diesel vehicles, tractor unit wheelbases are also variable and 3.8m was possible. There is, therefore, already some risk that tractor units (even diesels) with the longest wheelbases may not fully comply with combination turning limits when towing a semi-trailer with the longest permitted wheelbase. This risk is exacerbated for electric vehicles where the wheelbase is maximised to accommodate more batteries.

The Windrose E700 has a theoretical wheelbase of 5,325 mm (assuming axle 3 is not steered such that the wheelbase for turning is from axle 1 to the midpoint between axle 2 and 3). This significantly exceeds that of the largest standard vehicle that just passes, implying a very high risk that towing a semi-trailer with a wheelbase of 7.7m would not comply with the turning circle requirements and a certainty that an 8.1m wheelbase trailer would not comply. No direct information was obtained from the manufacturer other than from the official website, despite enquiries to their contact centre, so whether steered axles or other solutions are employed to mitigate this cannot be confirmed. Further information from the manufacturer

[2] https://windrose.tech/

would be required to confirm this finding.

The next longest vehicle is the Volvo FH Aero with extended range. Although this is likely to comply with turning requirements for ‘standard’ 7.7m semi-trailer wheelbases, there remains compliance risk with some semi-trailers that have longer wheelbases.

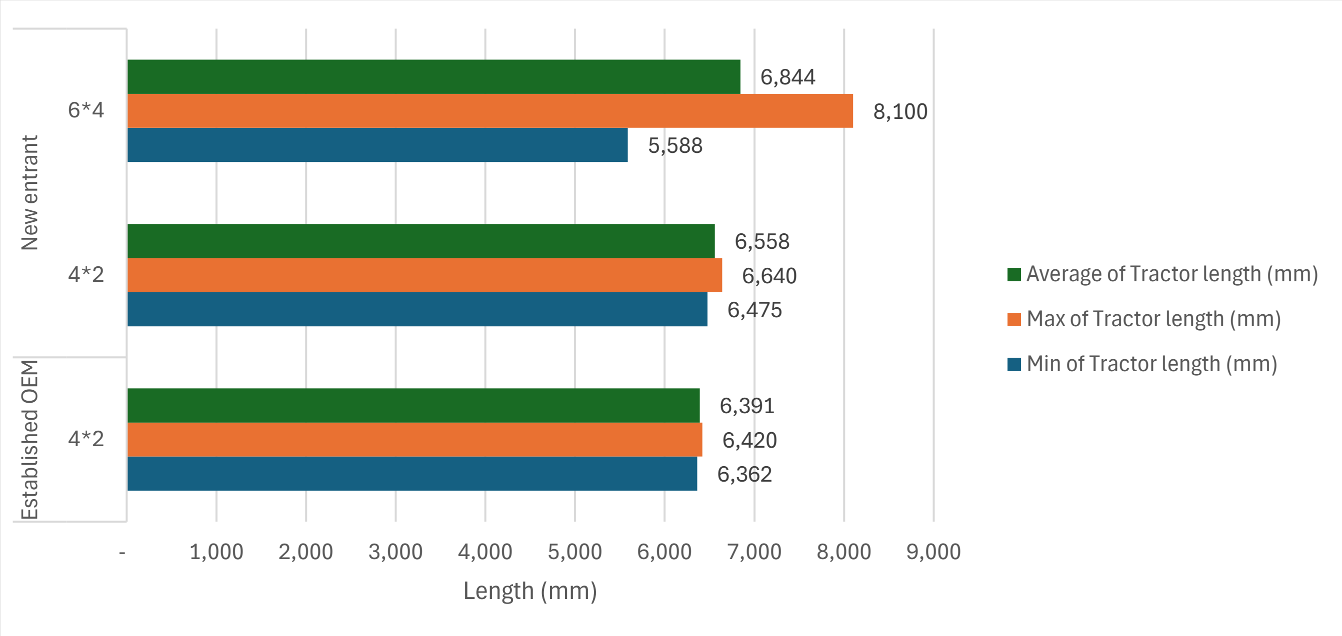

Figure 4: Tractor length (mm)

4.4 Analysis of Range & Payload under Different Scenarios

Range and payload are strongly inter-related because increased range requires more batteries and more batteries mean significantly more weight, so that payload is reduced. As such, some degree of tradeoff would be expected. The payload is also constrained very clearly by the Gross Combination Weight and the unladen weight of the combination. However, as noted above it is also constrained by axle weight limits and the distribution of the load. Where dense loads are carried, they do not fill the space available in a full-size semi-trailer and the load can be moved to provide the optimum distribution of weight amongst the axles to maximise payload. Where a uniform load fills the volume available, there is no positional flexibility. This will not matter for very light loads, but when the load also approaches maximum weight, it will start to become a significant constraint.

The range itself will also depend on the weight carried, so lighter goods would result in a longer range. Data were not obtained for range at different weights in most cases, so the range has been assumed to be the same in all scenarios. Figure 5 below shows the payload and range in the standard European Scenario with 42 tonnes GCW available and the same semi-trailer of 5,940kg unladen mass for all vehicles. It assumes the axle weight limits are not constrained. Under these assumptions, a relatively lightweight 4 x 2 diesel tractor unit towing the same semi-trailer could have a range well in excess of 700km, while achieving a payload of around 26,700kg.

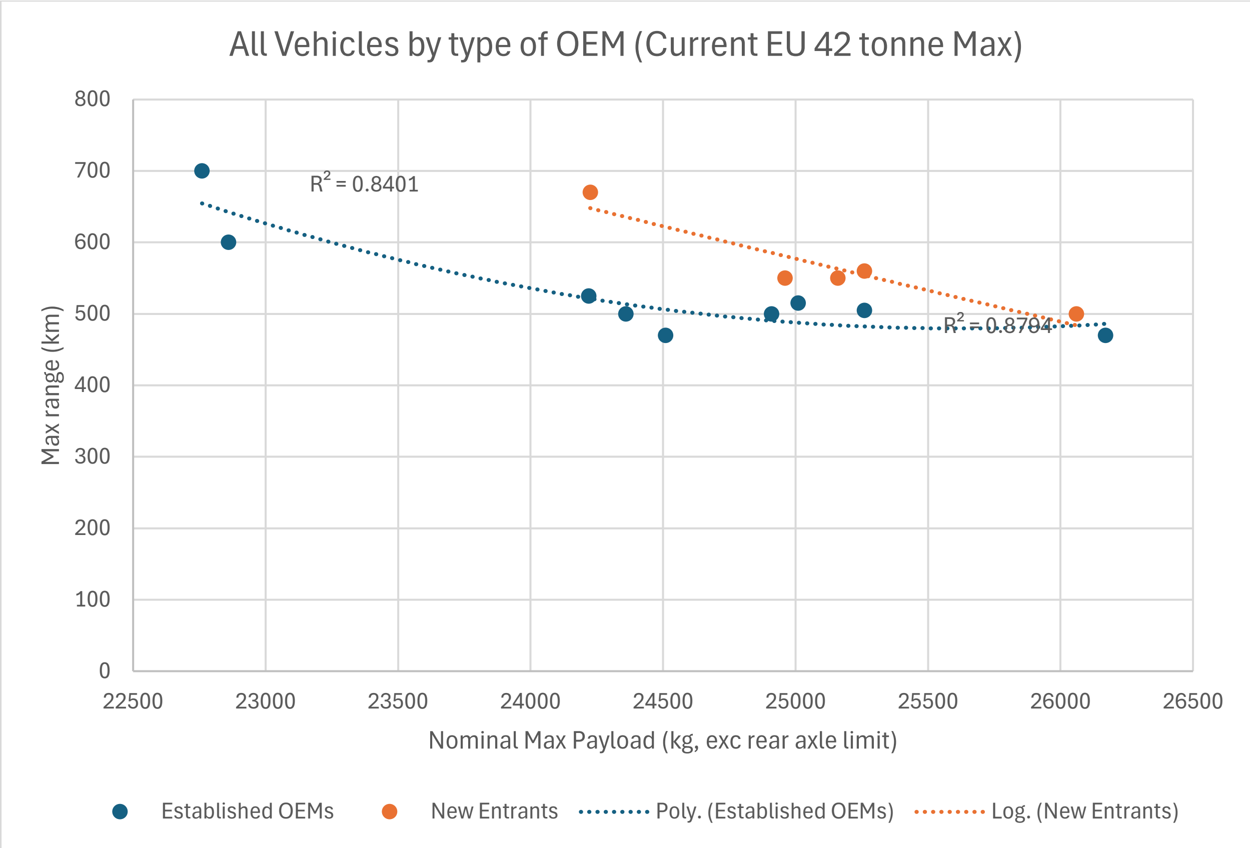

Figure 5: Payload and range for vehicles from established and new entrant OEMs, assuming no constraints from axle weight limits

In Figure 5, the tradeoff can be seen, though perhaps with less marked slope than might have been expected. On this metric, it also appears that the new entrants generally achieve more range for the same payload weight. However, there are important differences and constraints underlying these results. Figure 6 breaks the sample down by individual vehicle in the sample.

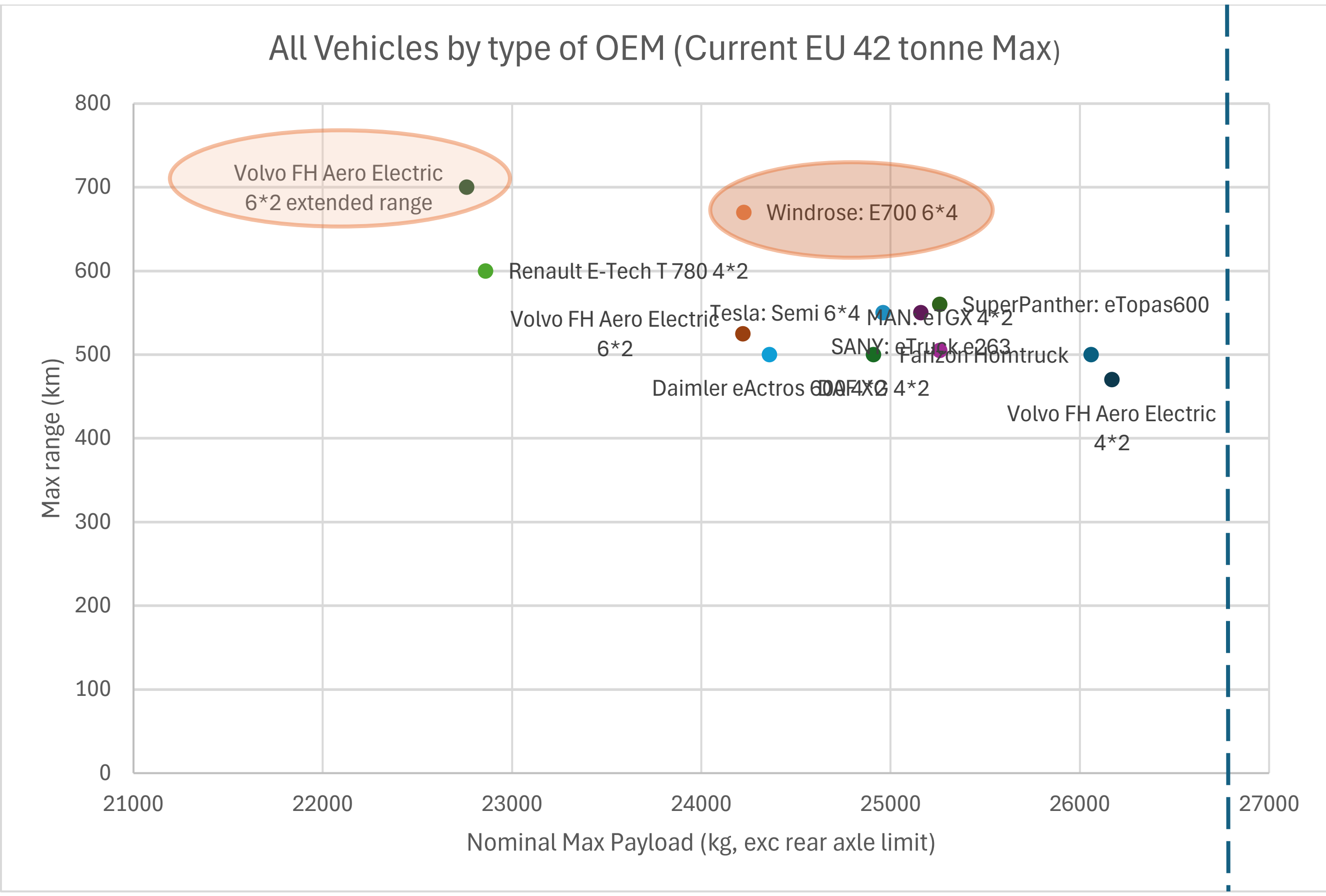

Figure 6: Payload & Range by individual model and axle configuration, assuming no constraints from axle weight limits

The broad tradeoff can still be seen in Figure 6, above. The dashed vertical line represents a diesel vehicle payload in similar conditions (with a GCW of 40 tonnes), highlighting that all the currently assessed electric trucks still have payload penalties as well as range limitations. In addition, two vehicles have been highlighted. The Volvo 6 x 2 extended range has achieved its best-in-class range, while maintaining at least a minimum payload by extending the wheelbase to make space for batteries. The problem of overloading the rear axle has been overcome by adding a 3rd axle for a 6 x 2 configuration. However, the already long wheelbase means the space available for the 3rd axle is constrained and it adds more unladen weight. As such, the 3rd axle is a lightweight one with small wheels taking only around 30% of the mass on the rear bogie with around 70% on the drive axle. Adding a 3rd axle tends to extend the wheelbase from the point of view of turning. This would create significant maneuverability problems, so the 3rd axle has also been made a steered axle, which means it can be ignored for the purposes of maneuverability calculations. This enables compliance with turning circle requirements for the most common semi-trailers.

The Windrose vehicle is based on geometries in other markets and has a much longer turning wheelbase. Unless steered axles are used on tractor, trailer, or potentially both, maneuverability requirements will constrain the maximum length/wheelbase of semi-trailer that can be legally coupled to it.

If a scenario is considered where the same regulations apply, but the assumption is that the load fills the available space, then the maximum payload can, for some vehicles, be constrained by the maximum axle weight on the rear of the tractor. The detail required to calculate this was not available for all vehicles, so the number of vehicles shown is smaller, but the results are presented in Figure 7 below.

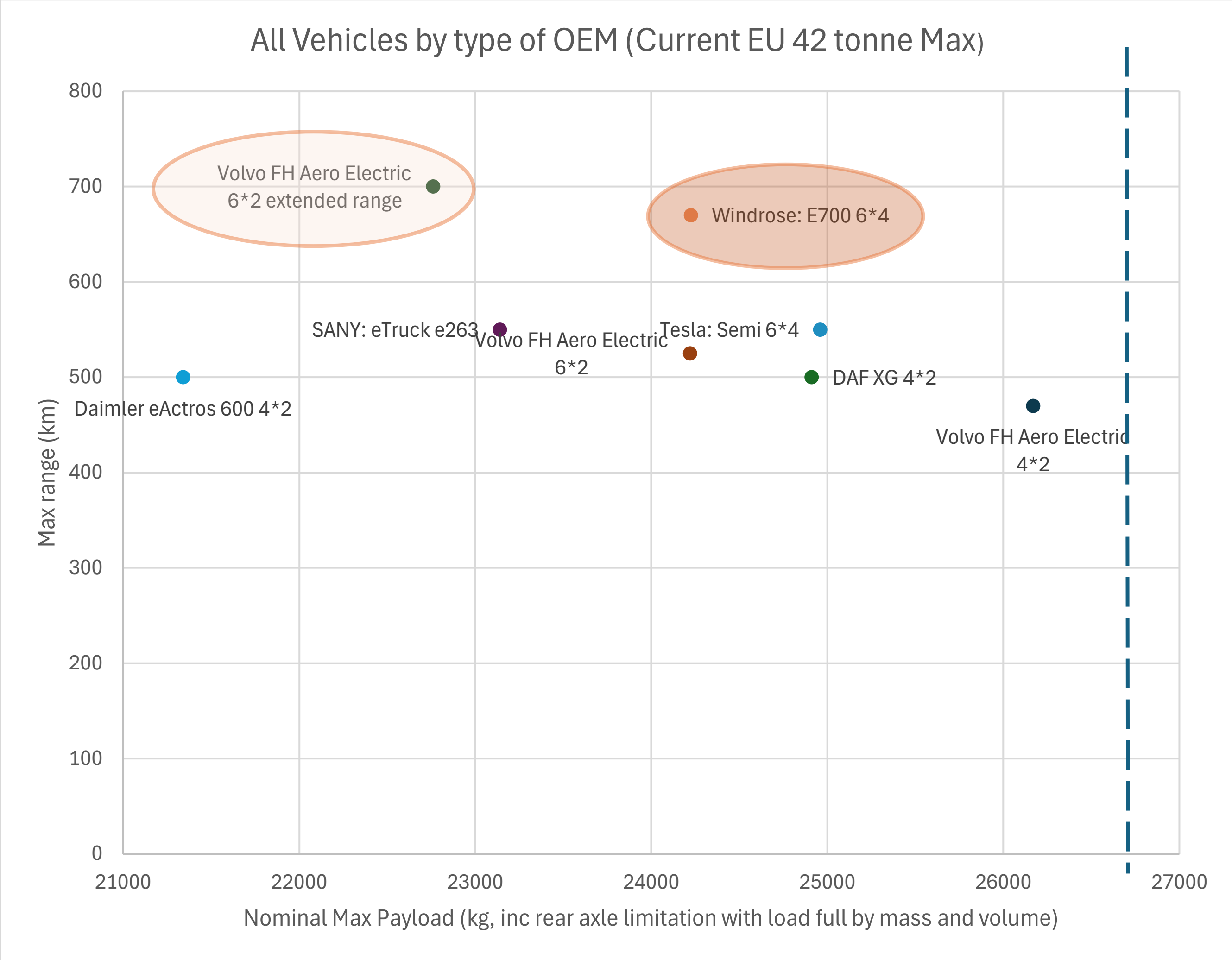

Figure 7: Payload & Range by individual model and axle configuration, assuming a load full by volume and mass centred on the semi-trailer

The 6 x 2 and 6 x 4 vehicles are unaffected by this, as are some of the 4 x 2 vehicles, typically those with smaller batteries and which do not use e-axles. The payload of the eActros and the Sany e263 is reduced significantly in these circumstances, highlighting that the best vehicle currently depends very strongly on the operational requirements.

The Weights and Dimensions Directive governing maximum combination weights in use internationally in Europe (Directive 96/53/EC) is currently being considered for Revision. At the time of writing, no agreement has been reached between Parliament and Council. However, one proposal[3] is that the weight allowance for 5 axle combinations stays at 2 tonnes (42 tonnes GCW) but increases to 4 tonnes (44 tonnes GCW) for 6 axle combinations. If this were to pass into law, then the payload would increase for the 6 x 2 and 6 x 4 combinations, as shown below.

[3] https://www.consilium.europa.eu/en/press/press-releases/2025/12/04/council-sets-position-on-maximum-weights-and-dimensions-for-road-vehicles/

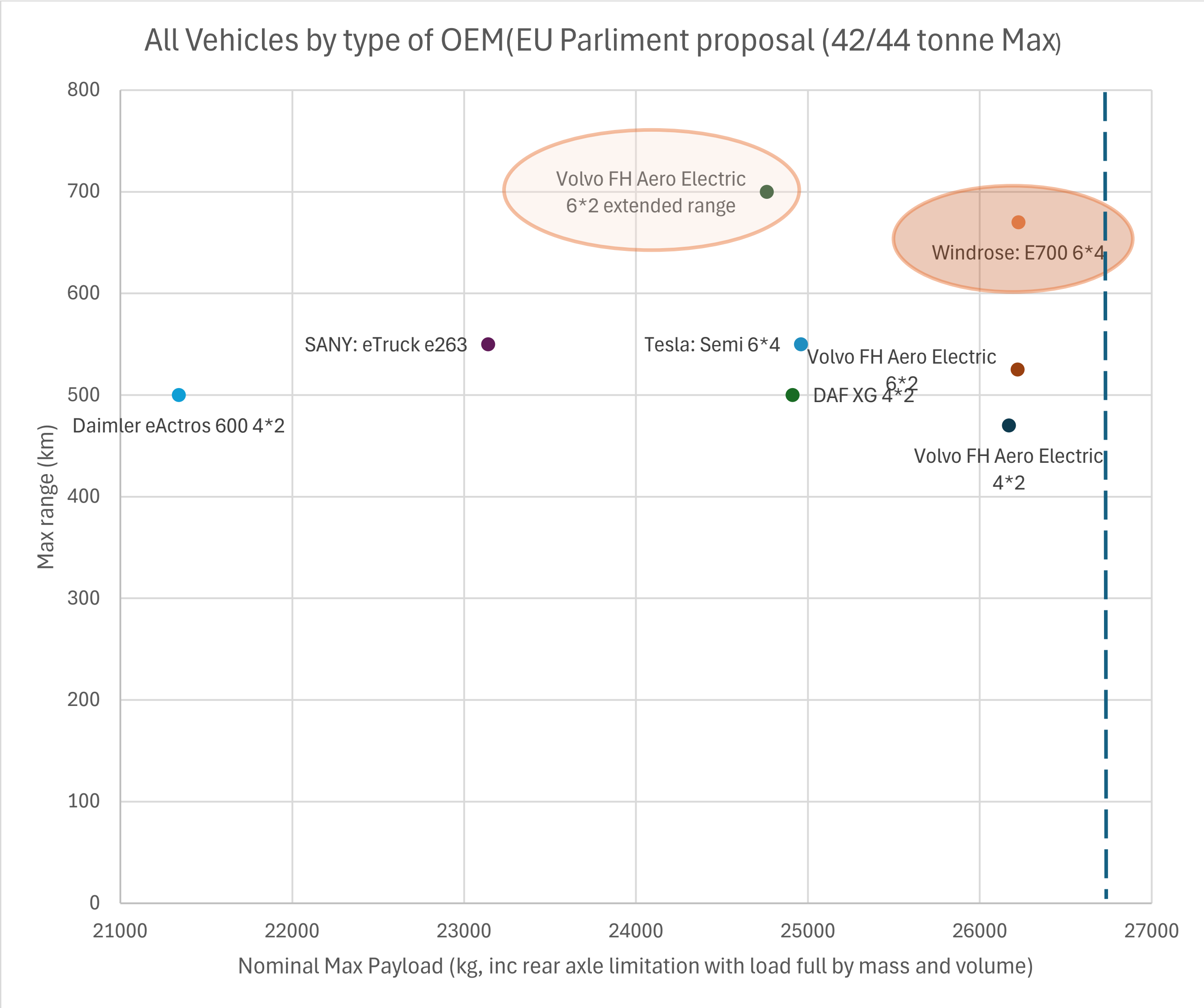

Figure 8: Payload & Range by individual model and axle configuration, assuming a load full by volume and mass centred on the semi-trailer and an increase to 44 tonnes for 6 axle combinations

It can be seen that in this scenario, the Volvo and the Windrose achieve better payload despite their long range, effectively breaking that tradeoff observed earlier, provided the small (Volvo) and larger (Windrose) constraints on semi-trailer wheelbase can be tolerated.

4.5 Battery capacity

In terms of gross battery capacity, the 4 x 2 new entrants had greater average battery capacity compared with 4 x 2 trucks from established OEMs. However, the greatest battery capacities were for the 6 x 2 trucks from established truck OEMs.

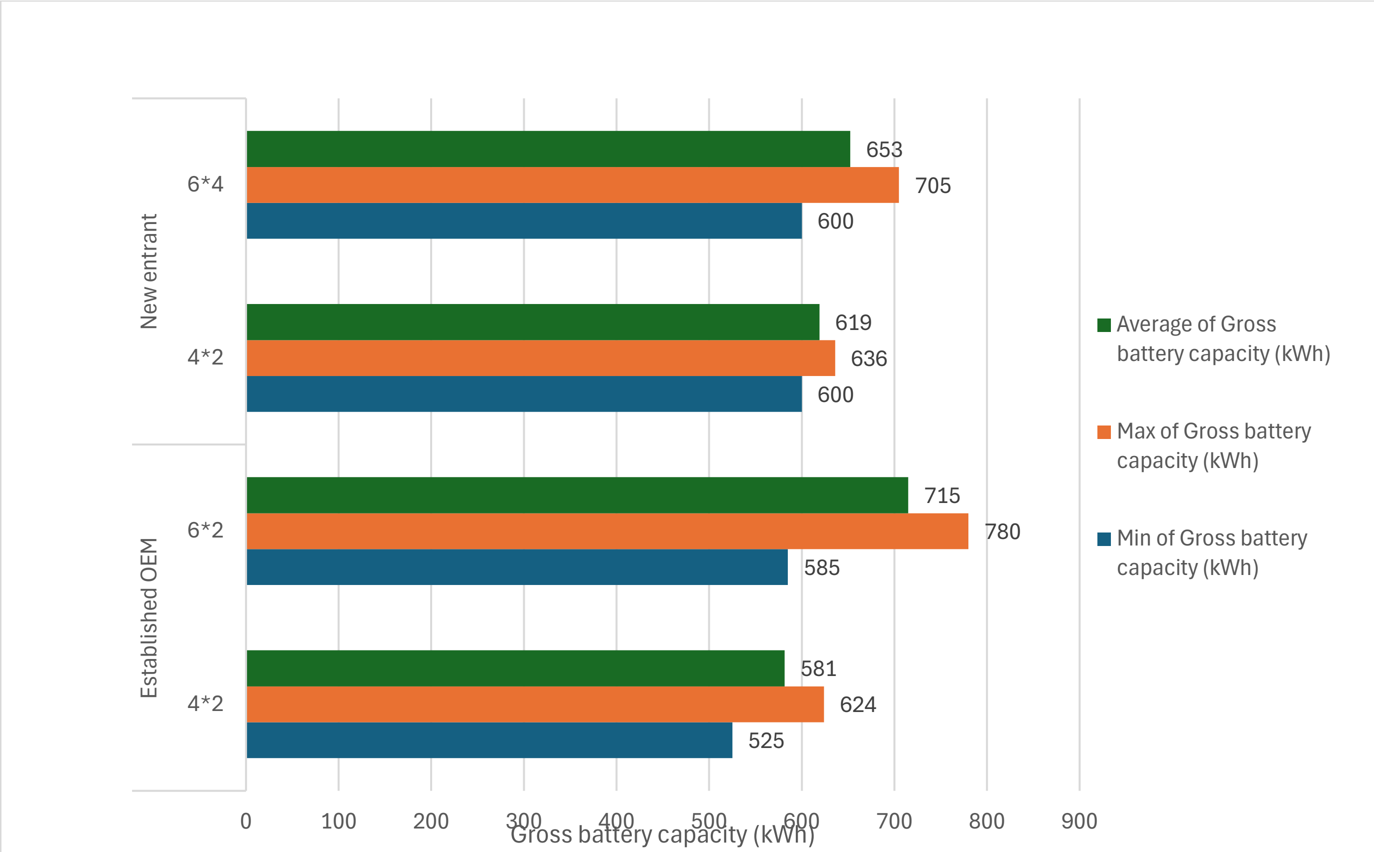

Figure 9: Battery capacity (gross) (kWh)

Net battery capacity was only available for a small number of vehicles, so comparison is less meaningful.

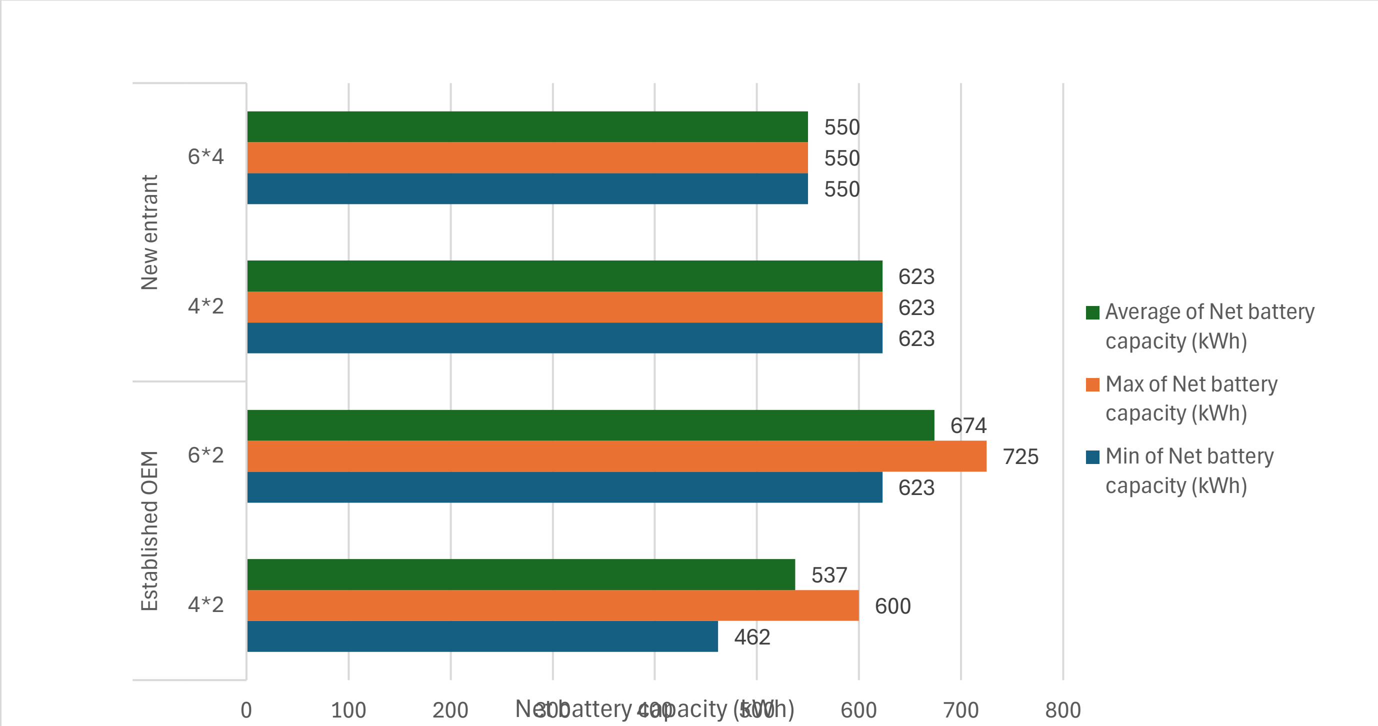

Figure 10: Battery capacity (net) (kWh)

4.6 Battery chemistry

Figure 11 and Figure 12 shows that LFP (Lithium Iron Phosphate), a lithium-ion battery that uses Iron Phosphate as the cathode material, is the most prevalent battery chemistry for both established OEMs and new market entrants. NCA (Lithium-ion battery with cathode made from Nickel, Cobalt, and Aluminum) is used by the Volvo Group. One new market entrant (Tesla) uses NMCA (Lithium-ion battery with Nickel, Manganese, Cobalt, and Aluminum).

TRATON use NMC batteries because the density is greater and this therefore assists with reducing the likelihood of overloading the rear axle at maximum payload.

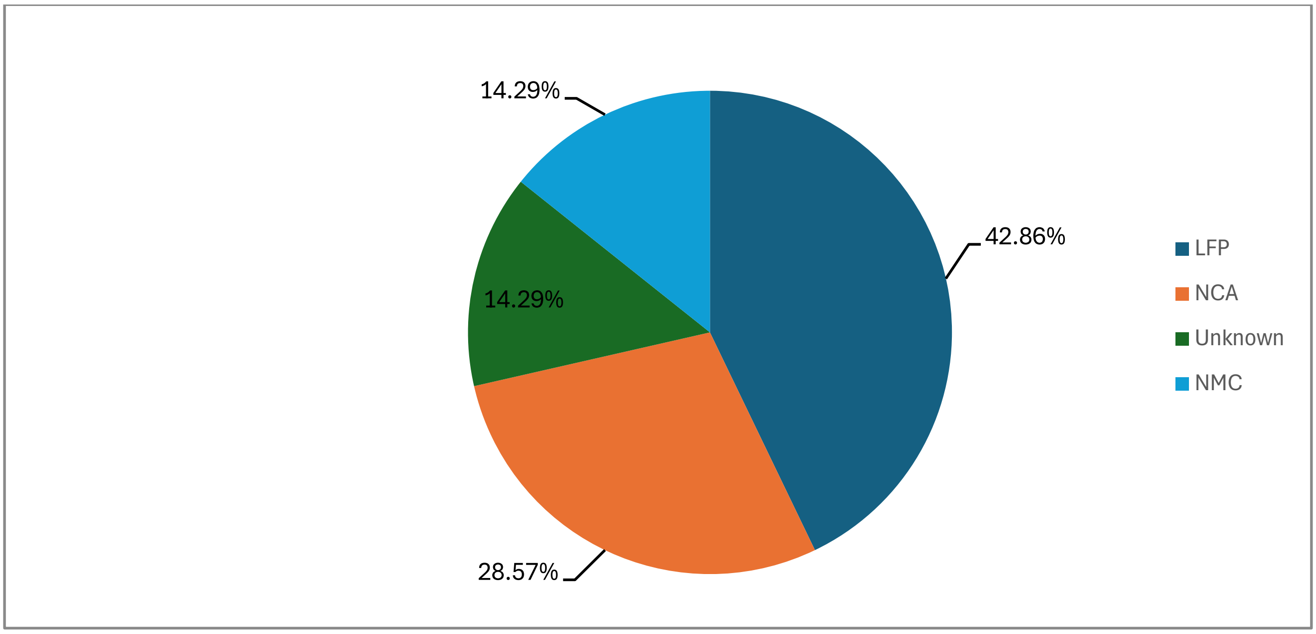

Figure 11: Battery chemistry: Established OEMs

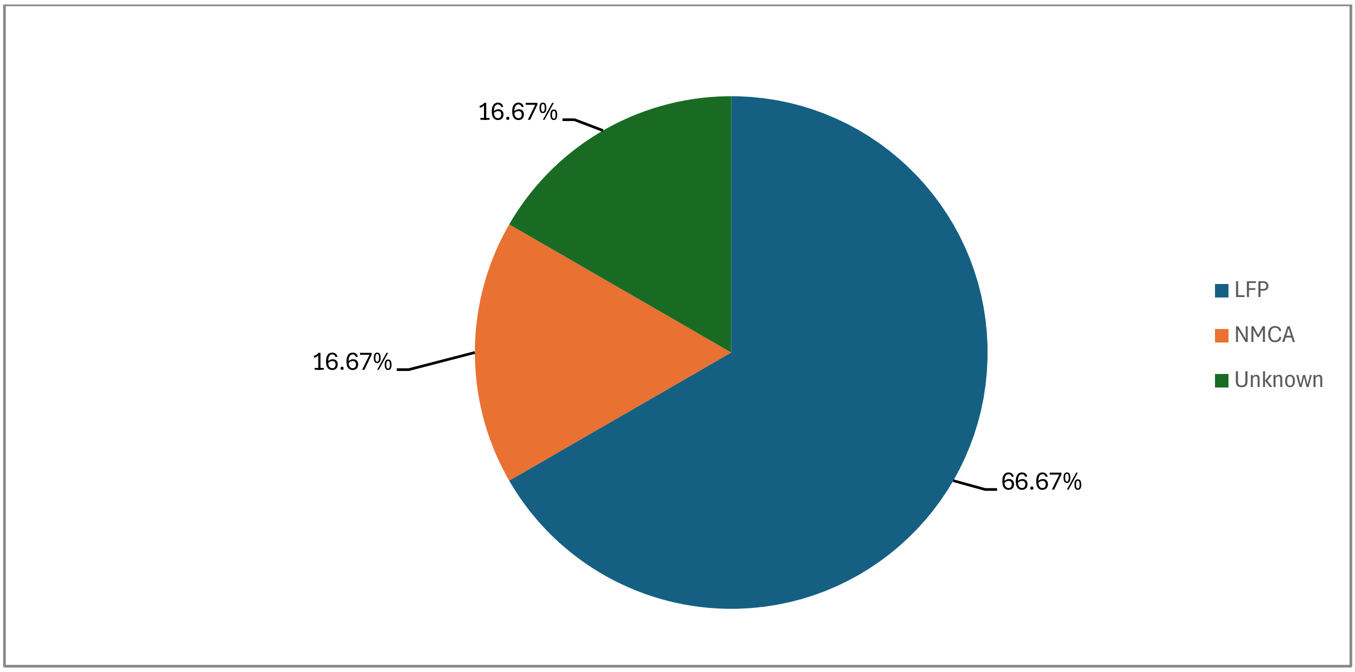

Figure 12: Battery chemistry: New market entrants

4.7 Charging port type

All of the vehicles included in scope were equipped with at least a Combined Charging System Type 2 (CCS2) port and some OEMs also offer Megawatt Charging ports (MCS) in addition to the CCS2 port. For this analysis, we selected the port delivering the greatest charge rate. Figure 13 and Figure 14Figure 13 shows that a greater proportion of established OEMs offer MCS charging compared with new market entrants.

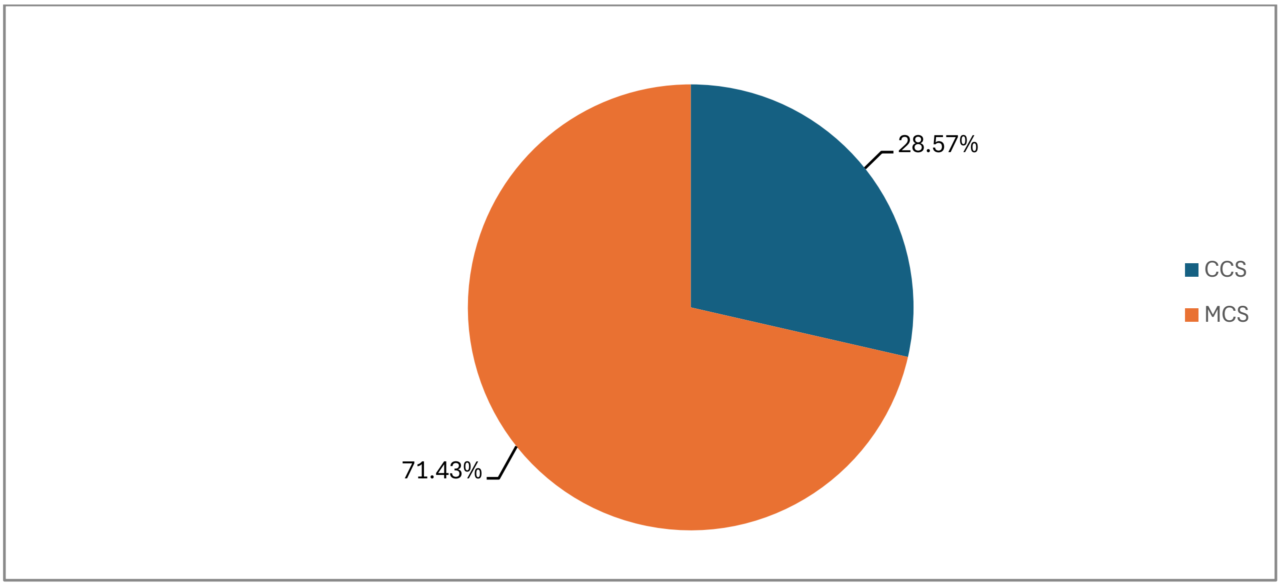

Figure 13: Percentage of Established OEMs with CCS2 or MCS charging ports for greatest charge rate

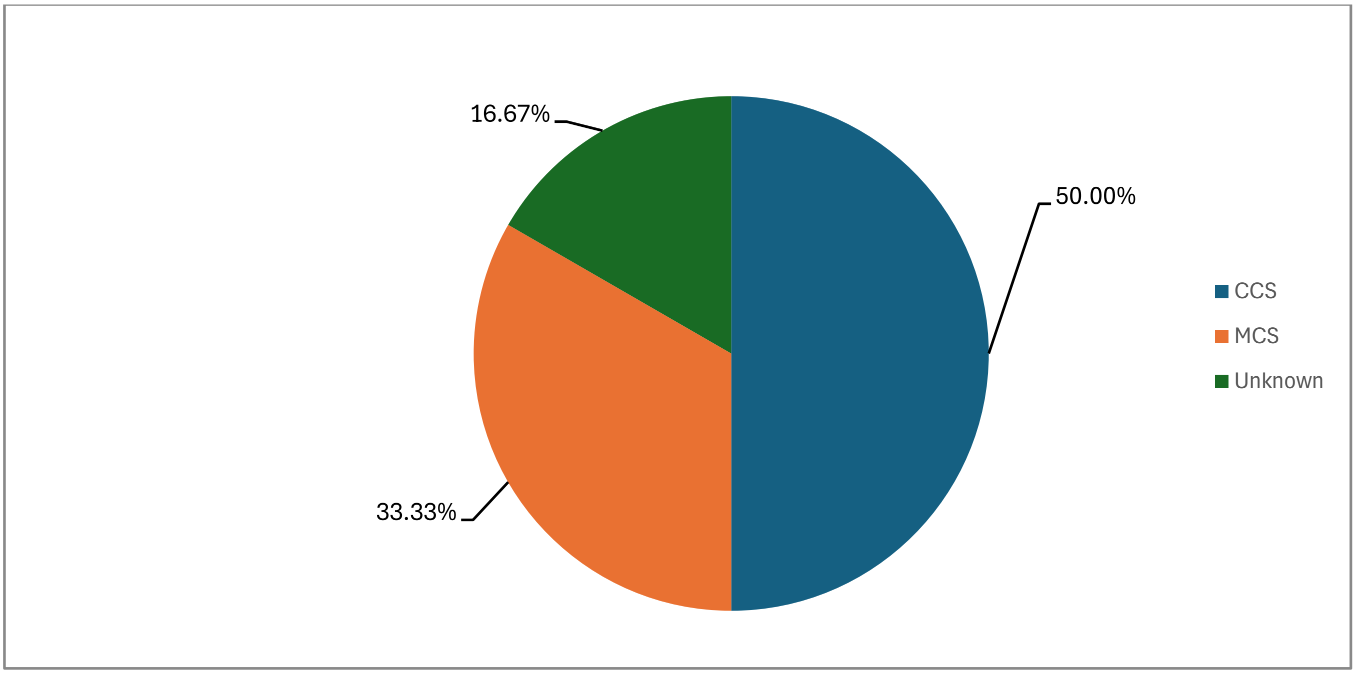

Figure 14: Percentage of new marker entrants offering CCS2 or MCS charging ports for greatest charge rate

4.8 Maximum charge rate

Figure 15 shows that new entrants for 4 x 2 trucks had greater average charging rates compared with 4 x 2 trucks from established OEMs. The 6 x 4 new entrants, however, have the greatest charging rates. All of these charging rates allow significant range to be recouped during a driver's rest break.

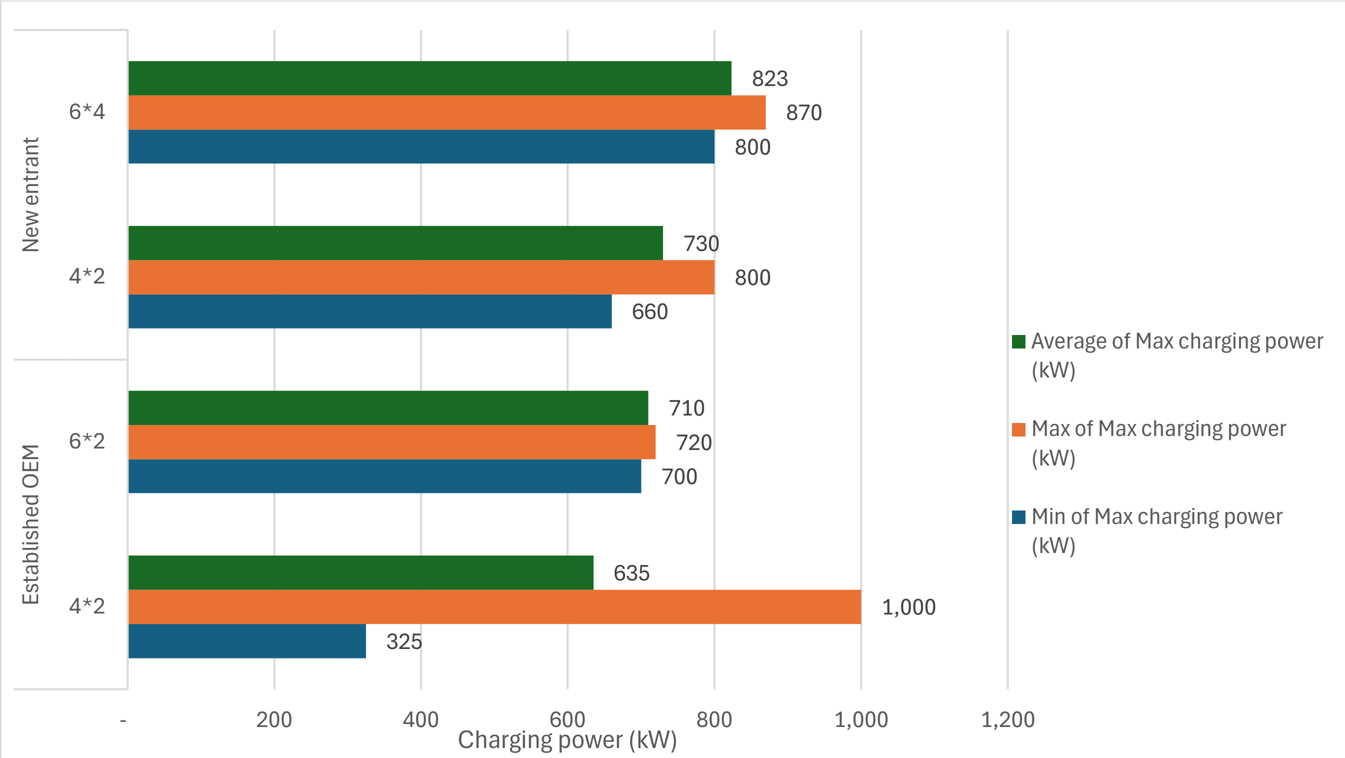

Figure 15: Maximum charging power (kW)

4.9 Driving efficiency

The information for efficiency that was available directly from manufacturer information related only to new entrants. For these vehicles, efficiency during driving varied from approximately 0.9 to 1.2 kWh/km.

The efficiency was calculated using the net battery capacity (kWh), or 95% of the gross battery capacity where the usable capacity was unavailable, and the stated range on a single charge (km). Figure 16 shows that vehicles of the same axle configuration from the new entrant category were very similar compared with those from the established OEMs.

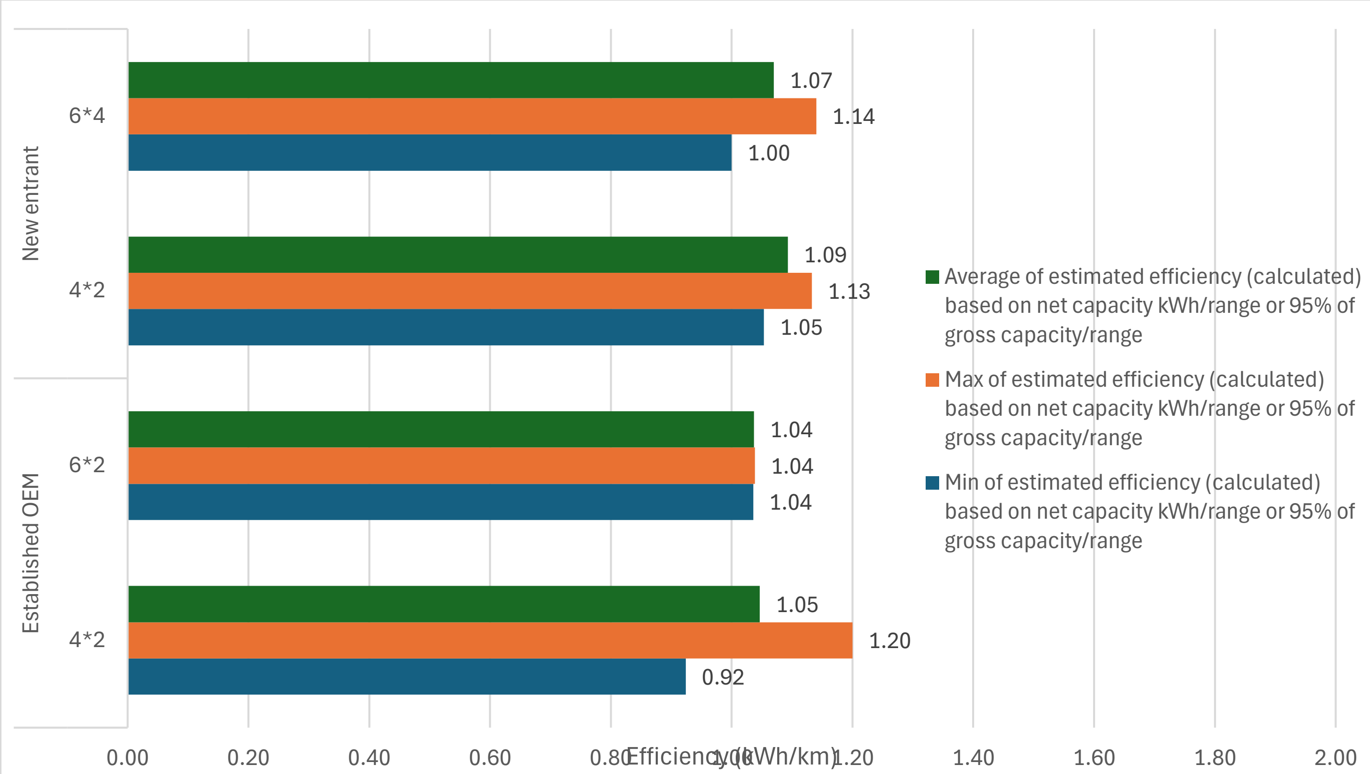

Figure 16: Calculated efficiency (kWh/km) based on net (usable) battery capacity or 95% of gross capacity

4.10 Battery warranty

Three out of six new entrants provided information on their battery warranty. Where this information was available or was provided, this ranged between 800,000 km and 1.2 million km in terms of distance and two of the manufacturers offered a timescale of 8 years (whichever occurs sooner). For established OEMs, four out of seven provided information on a battery warranty, ranging from 720,000 km to 1 million km. In terms of timescale, three offered warranty periods of 8 years and one offered 10 years.

4.11 Maintenance network

Established OEMs have an existing maintenance network, and this was seen as one of their key advantages in the market along with brand track record. New entrants are seeking the development of maintenance networks, and these will be established in regions where the trucks are launched. Some new entrants may have existing service networks that could be used to provide maintenance.

4.12 Euro NCAP rating

None of the new entrants surveyed had achieved a Euro NCAP rating. For established OEMs, similar truck models (diesel equivalents) have been tested and range from 2 to 5 star-rated vehicles. It is likely that new market entrants and established OEMs will seek to achieve Euro NCAP ratings for electric trucks in the future.

4.13 Price

Prices were generally not available for new entrants or established OEMs. New market entrants are considered likely to be very competitive in price, but no details were available to verify this. Prices for established OEMs also vary significantly according to very specific details (vehicle specification and order details) and it is therefore difficult to provide definitive figures for vehicle pricing.

5 Conclusions

Electric trucks from established manufacturers in the European market were compared with those from new market entrants. Comparison of key parameters between these groups found that:

- Range on a single charge for new market entrants is similar, but on average, slightly greater for the new entrants than the established OEMs for the same axle configuration (555 km compared with 515 km for 4 x 2 axle trucks). This range is well in excess of the distance before which a break is required to meet driver's hours requirements (~360 km), and so suitable for long-haul operation in both cases.
- Nominal maximum payload (96/53/EC GCW limit or design GCW, minus unladen weight) for new entrants was very similar to established OEMs, and was, on average 25,210 kg compared with 24,885 kg for 4 x 2 axle configuration (assuming a semi-trailer of 5,940 kg unladen weight in all cases).
    - Where the data allowed, investigative modelling of rear axle loads when coupled to a standard 13.6 m semi-trailer was undertaken. Assuming the maximum payload is positioned such that its centre of gravity is in the geometric centre of the semi-trailer, we found that the rear axle limit of 11.5 tonnes would be exceeded for both the SANY e263 and the Daimler Truck eActros600. To avoid overloading, the maximum payload would need to be reduced to 23,140 kg in the case of the SANY e263 (meaning a 2 tonne payload penalty) and 21,341 kg for the eActros 600 (i.e. a 3 tonne penalty). Therefore, neither of these vehicles can take advantage of the 2-tonne allowance in Directive 96/53/EC for zero emission vehicles, although the payload could be increased somewhat if the goods carried are denser, so that space is available to move the load more toward the rear of the trailer.
    - Although a small sample, this suggests that 4 x 2 new entrants are similar to electric trucks from the established European OEMs in terms of their weights and dimensions. All new entrants for which information was available were using e-axles, which tends to increase rear axle weight and the risk of exceeding the 11.5 tonne axle limit. As such, they may suffer more payload constraints with medium density goods that tend to approach payload volume and mass limits.
    - Tractor units with 3 axles (6 x 4 or 6 x 2) are permitted up to 19 tonnes on the rear bogie so are less likely to be constrained by rear axle weight. For this configuration, the maximum payloads of the new entrants are substantially greater than 4 x 2 trucks from established OEMs.
- Tractor length was greater for new entrants with 4 x 2 axle configurations, indicating design changes to accommodate batteries for clean sheet designs. Two of the new entrants with 6 x 4 axle configurations were of substantially different design to established European vehicles. The Windrose E700 was much longer than other vehicles at 8.1m and a wheelbase of 5.3m. The website lists Directive 96/53/EC as a regulation the vehicle complies with, but no confirmation could be found that, when carrying a standard 13.6m semi-trailer, it achieves compliance with the turning circle requirements. Information from one manufacturer indicates that for a standard European semi-trailer with a wheelbase of 7,700 mm, the maximum tractor unit wheelbase that would still comply with in-use turning circle requirements is just over 4,000 mm. Given the much larger wheelbase of the Windrose, it is difficult to see how compliance with a standard semi-trailer would be possible without the use of rear steer axles on either the tractor unit or the semi-trailer.
- Established OEMs were found to be more likely to offer a MCS charging port, although the average charging power for 4 x 2 trucks was greater for new entrants (730 kW) compared with established OEMs (554 kW). All provide the opportunity to recover significant range during driver rest breaks,

assuming the necessary charging infrastructure is available. New entrants sometimes offer dual CCS charging and only one truck (DAF XG Electric) does not offer megawatt charging,

- Efficiency (kWh/km) data was collected where this was available, although because efficiency values depend on the specific conditions, data for the stated range on a single charge (km) and battery capacity was used to compare efficiency on a consistent basis. Net (usable) battery capacity (kWh) was used where this was available and otherwise on an estimate based on 95% of stated gross capacity. This analysis indicated that trucks from new entrants are on average very similar to trucks from established manufacturers with efficiency values in the range of 0.9 to 1.2 kWh/km for trucks in both categories.

Overall, new market entrants with 4 x 2 axle configurations offer superior range compared with 4 x 2 trucks from established OEMs and similar nominal payloads. Information from a small sample indicates that new entrants in 4 x 2 configuration can be limited by the maximum rear axle load in 96/53/EC in the same way as some trucks from established manufacturers, making them less able to exploit the existing 2 tonne allowance on combination weight. Thus, the tradeoff between payload and range is present in some cases for both new entrants and established manufacturers.

New entrants with 6 x 4 axle configurations have greater average range and similar maximum payload compared with both 4 x 2 and 6 x 4 trucks from established OEMs. This advantage could be greater if the council position on the revised weights and dimensions directive was adopted. However, some trucks from established OEMs can exceed both metrics, and so the competitiveness of new entrants will likely be determined by pricing, brand trust, and effectiveness of local maintenance networks.

6 Bibliography

Knight, I. & O'Brien, E., 2025. *Zero Emission Heavy Goods Vehicles: The Infrastructure and payload impacts of different options for regulating gross and axle weights,* Brussels: Transport & Environment.

Appendix A: Electric truck specifications

The following key vehicle specifications were reviewed for vehicles listed in Table 1.

- Chassis weight, driving axle load, and implication for the maximum payload (taking into account new weight allowances under Weights & Dimensions)
- Tractor length, and implication for the type of trailer which can be coupled
- Turning radius and other dimensions relevant for approval for use on EU & UK roads or related to manoeuvrability
- Presence of a sleeper cab
- Euro NCAP safety rating
- Driving range on a single charge
- Maximum charging power (presence of a MCS port or multiple CCS ports)
- Battery capacity (specifying whether net or gross; ideally, both would be collected)
    - Optional: battery chemistry (LFP or NMC, or NCA in the case of Volvo Group)
- Battery warranty in years / mileage
- Energy efficiency during driving
    - Optional: energy consumption from climate control at rest
- Where possible: Vehicle price (range)
- Charging and battery management systems in place to avoid losses (relevant for net vehicle efficiency)
- Battery placement (under cab or not; relevant for vehicle dimensions)
- e-axle (yes/no, number of; mainly relevant for efficiency and potentially vehicle dimensions)
- Clean sheet design (yes/no)

Additionally, during interviews stakeholders were asked about:

- Truck production and sales plans for Europe until 2030
- Status and plans for manufacturer service and repair network
- What they believe is their competitive advantage in the market