ROCKY MOUNTAIN INSTITUTE

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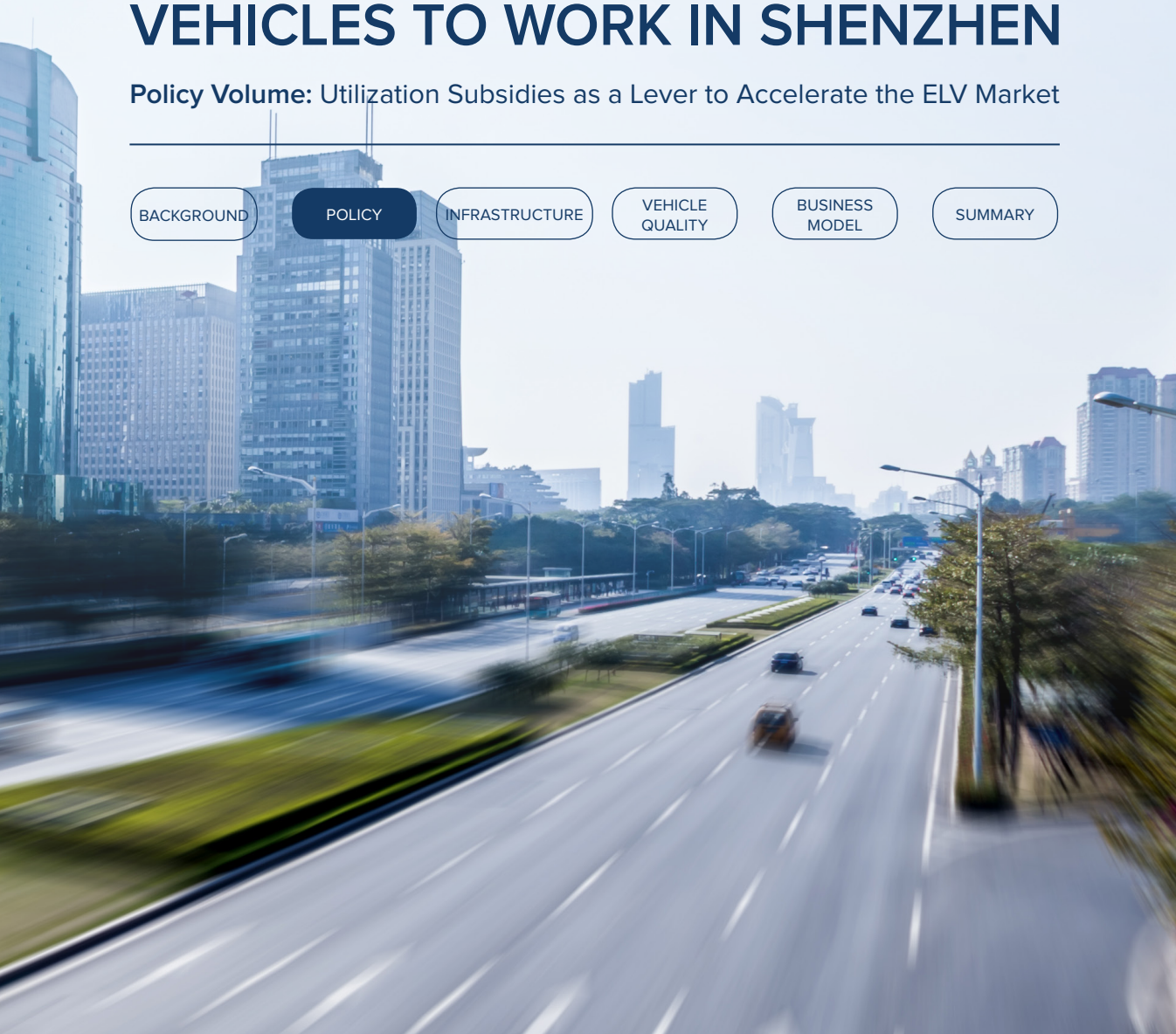
PUTTING ELECTRIC LOGISTICS VEHICLES TO WORK IN SHENZHEN

Policy Volume: Utilization Subsidies as a Lever to Accelerate the ELV Market

BACKGROUND | POLICY | INFRASTRUCTURE | VEHICLE QUALITY | BUSINESS MODEL | SUMMARY



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Shenzhen Electric Vehicle Operating Association

Shenzhen Electric Vehicle Operating Association engages in six sectors including public transportation, taxi, logistics, rental, charging, and technical services and establishes communication platforms for government and enterprises, organizes industrial investigations and key discussions, develops industrial standards and specifications, and participates in policymaking. It strengthens the integration and cooperation between upstream and downstream players of the new energy vehicle industry chain, and promotes the healthy and orderly development of the new energy vehicle operation industry in Shenzhen.

National Engineering Laboratory for Electric Vehicles

Authorized by the National Development and Reform Commission in 2008, the National Engineering Laboratory for Electric Vehicles was established on the basis of the Electric Vehicle Engineering Technology Center of Beijing Institute of Technology. The National Testing and Management Platform for New Energy Vehicles built by the Laboratory provides data support for the research of new energy vehicles technology and the making of industrial policies.

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EXECUTIVE SUMMARY

This is the first in a series of analytical reports on Shenzhen's innovative efforts to promote electric logistics vehicles (ELVs). For further background on the promotion, adoption, and utilization of electric logistics vehicles in Shenzhen, please refer to the background volume of this series: *Setting the Stage for Full Utilization of EVs in Shenzhen*. This analysis provides a data-driven look at the effects of operational subsidy—a new policy being piloted in Shenzhen which seeks to incentivize the use, rather than strictly the purchase, of EVs. This includes its impact on total cost of ownership, vehicle utilization, and broader market structure.

The key findings of the analysis include:

1. **The operational subsidy has succeeded in preserving ELV total cost of ownership (TCO) parity with comparable diesel vehicles.** On average over its three-year period, the cumulative value of the operational subsidy effectively replaces the discontinued 2019 purchase subsidy so that the total cost of ownership of electric logistics vehicles is equal to or potentially less than that of internal combustion engine (ICE) vehicles.

2. **The operational subsidy has succeeded in encouraging improved ELV utilization.** Early indications show that the operational subsidy's current mileage threshold of 15,000 kilometers (km) is incentivizing higher utilization of electric logistics vehicles. National EV Data Platform shows that the proportion of electric logistics vehicles that meet this minimum mileage requirement in Shenzhen has increased from less than 20% to approximately 45% from 2018 to 2019.

3. **The operational subsidy has not succeeded, and is unlikely to succeed, in driving consolidation in the logistics market.** The operational subsidy's fleet size requirement of at least 300 vehicles has had a minimal impact on consolidating and optimizing Shenzhen's logistics market. This is primarily because small fleets and owner-operators are able to qualify for the subsidy by affiliating with larger fleets—an arrangement that allows them to collect the subsidy without any changes in operation or management.

Given the highly fragmented nature of the final mile logistics market, requiring ownership of 300 vehicles may not be realistic and may actually hinder access to the subsidy and therefore lessen the adoption and utilization of ELVs. The study team recommends doing away with fleet size as a proxy for efficiency and looking for other indicators.

4. **The operational subsidy could expand its successes by aligning with existing ELV ownership models.** Because many ELVs in Shenzhen are leased, rather than owner-operated, in many cases the operational subsidy accrues to the leasing company, not the vehicle operator. In this case, the subsidy's ability to enhance utilization is decreased because vehicle operators, who determine utilization, do not receive the benefit. Policymakers and leasing companies could experiment with approaches to enable the subsidy to flow to the end-user and therefore incentivize utilization.

5. **The operational subsidy could be modified to better suit the needs of light trucks.** The impact of the subsidy could be increased if it is modified to account for different usage patterns by vehicle class, particularly light-duty trucks, which tend to travel longer distances including significant mileage outside the city itself. In addition, the mileage threshold for 2020 could be reduced to account for the impact of the COVID-19 pandemic on operations.

6. **The operational subsidy could adopt an uncapped, tiered structure for subsidization.** For the next iteration of the operational subsidy, policymakers should consider decreasing the minimum subsidy obtained at 15,000 km but also award additional payments to fleets as they reach increasing mileage benchmarks. This will avoid fleets artificially targeting the 15,000 km threshold and encourage higher utilization of a leaner fleet of electric vehicles.

DESIGN AND IMPLEMENTATION OF SHENZHEN'S OPERATIONAL SUBSIDY

THE HISTORY AND SIGNIFICANCE OF THE ELV OPERATIONAL SUBSIDY POLICY

In order to make electric logistics vehicles (ELVs) more financially attractive, thereby increasing their adoption and utilization, Shenzhen launched the ELV operational subsidy policy in 2018. This has provided monetary support to counteract the phasing out of the purchase subsidy, which had been the primary means of incentivization since 2015.

Under this new subsidy structure, instead of receiving funds at the time of purchase, vehicles were subsidized annually if they met four conditions.

- They had to drive sufficient miles to be eligible
- They had to belong to a fleet of sufficient scale
- They had to enable data sharing with a government data collection platform
- They had to meet certain criteria for vehicle and battery quality.

These requirements arise from the four goals that Shenzhen is pursuing with this policy framework:

- To maintain financial support for ELVs and offset the sunsetting purchase subsidy
- To encourage the rapid replacement of ICE trucks with ELVs
- To consolidate the logistics market in order to enhance operational efficiency of final mile delivery
- To spur market innovation in ELV technology

Shenzhen was the first city in China to adopt an ELV operational subsidy. The policy provides an important lever for sustained support of ELV adoption, particularly as purchase subsidies are reduced or removed altogether. The design of the policy addresses the higher up-front cost of an ELV compared with a similar ICE vehicle while also encouraging fleets to utilize ELVs for more deliveries, thereby accelerating the replacement of ICE vehicles.

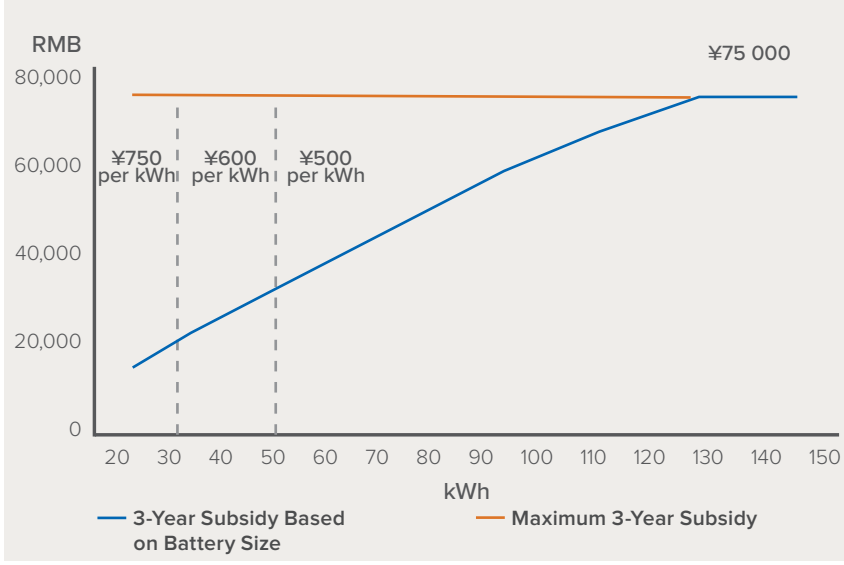
By taking a leadership role in piloting this policy, Shenzhen is both helping to develop the market for ELVs and demonstrating to other domestic and international cities how innovative policy can support ELV adoption at different stages of market development.

MAINTAINING FINANCIAL SUPPORT FOR ELVS

The amount of the operational subsidy is calculated based on the battery capacity of the ELV in a tiered manner. That is, the subsidy covers ¥750 (US$110) per kilowatt-hour (kWh) for the first 30 kWh of battery capacity, ¥600/kWh (US$88/kWh) for the next 20 kWh (31–50 kWh), and ¥500/kWh (US$73/kWh) for any capacity over 50 kWh. The subsidy is distributed equally each year over three years, based on an annual verification of minimum required distance traveled. The total subsidy over three years cannot exceed ¥75,000 (US$11,100) per vehicle (Exhibit 1).[1]

EXHIBIT 1

Shenzhen ELV Operational Subsidy Structure



The subsidy is tiered by battery capacity in order to promote efficiency and dissuade oversizing the battery beyond what is needed for the purposes of capturing the subsidy.

ENCOURAGING THE RAPID REPLACEMENT OF ICE TRUCKS WITH ELVS

The goal of the operational subsidy is to encourage the purchase and use of ELVs, which innovates on previous subsidies that focused purely on purchase. Shenzhen's current operational subsidy policy encourages transportation companies to increase the use of ELVs for deliveries by setting a minimum annual mileage threshold in order for ELVs to qualify for the subsidy. Only ELVs with a driving distance of at least 15,000 km per year within Shenzhen are eligible for the operational subsidy that year.[2]

The mileage threshold encourages ELVs to be utilized more often, thereby replacing ICE trucks. In addition, higher utilization of the ELVs results in a lower TCO per mile since it spreads the cost of the vehicle over more miles, thereby allowing owners to recover their costs more quickly and accelerating market adoption of ELVs.

CONSOLIDATING SHENZHEN'S LOGISTICS MARKET AND SPURRING INNOVATION IN ELV TECHNOLOGY

The freight system in China has long faced challenges around high market fragmentation, particularly in the urban logistics market, as well as freight vehicles of dubious quality plying on its roadways. In order to encourage consolidation of the market and drive the transition to a high-quality trucking fleet, the operational subsidy policy stipulates, among other conditions, that eligible companies and vehicles must meet the following criteria:

- The vehicles need to be included in the *Catalogue of Recommended Models for the Promotion and Adoption of New Energy Vehicles*, released by the Ministry of Industry and Information Technology. They must also meet the technical requirements of the national new energy trucks subsidy, which specifies battery energy density and kWh efficiency qualifications.

- The vehicles have to be connected to the supervision platform of ELVs launched by the Municipal Transportation Commission as required during the assessment period.

- The freight companies must have at least 300 urban delivery vehicles in operation, a significant number of which need to be battery electric. The fleet must include either at least 100 battery ELVs or at least 50 cold-chain battery-electric vehicles.[3]

Together these stipulations create incentives for logistics operators to invest in scale and quality and also give policymakers the monitoring and enforcement capabilities to ensure that subsidy funds are effectively advancing those goals.

EFFECTIVENESS OF AND POTENTIAL IMPROVEMENTS TO THE ELV OPERATIONAL SUBSIDY

In theory, the introduction of an operational subsidy can dramatically increase utilization of ELVs in Shenzhen, as mentioned above. The city's urban logistics market has the potential to electrify at least 50% more of its delivery kilometers, which would grow total ELV use to be equivalent to ICE use (see *Setting the Stage for Full Utilization of EVs in Shenzhen* for more details).

One objective of this report is to explore the on-the-ground effects of this new subsidy structure. In general, we conclude that Shenzhen's ELV operational subsidy structure provides reasonable, although not optimal, incentives to increase ELV utilization rates. We also conclude that it effectively replaces the now phased-out purchasing subsidy and drives technological advancement and improved quality of trucks. No significant effects on market structure were observed.

OPERATIONAL SUBSIDY IMPACTS ON TOTAL COST OF OWNERSHIP

Generally speaking, the amount of Shenzhen's operational subsidy for ELVs has effectively offset the higher up-front capital cost of the vehicles. According to the current utilization and mileage of ELVs in Shenzhen, the average annual driving distance of regularly used electric minivans and light-duty trucks (LDTs) is approximately 15,000–20,000 km.

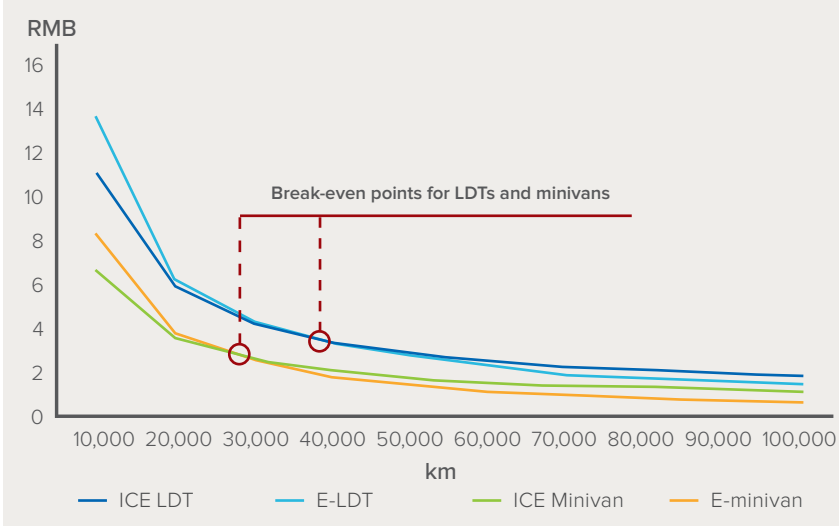
In order to achieve cost parity with ICE trucks on a per kilometer basis, inclusive of the operational subsidy, ELVs would need to operate 30,000–40,000 km (Exhibit 2) over their lifetime. Therefore, based on the current utilization and mileage data, both electric minivans and light-duty trucks on average have a two-year payback for their incremental cost over an ICE vehicle.

This capital recovery period will likely improve as utilization increases due to two key factors. First, improvements in ELV design will make them more compatible with urban delivery duty cycles (discussed further in this series' vehicle quality volume, *Identifying Pain-points in ELV*

Performance that Reduce Utilization). Second, decreased charging times will result from continued deployment of fast and ultra-fast charging (discussed further in this series' charging infrastructure volume, *Enabling EV Utilization through Well-planned Charger Deployment*).

EXHIBIT 2

Operational Cost per km Comparison between ELVs and ICE Logistics Vehicles, Inclusive of the Operational Subsidy



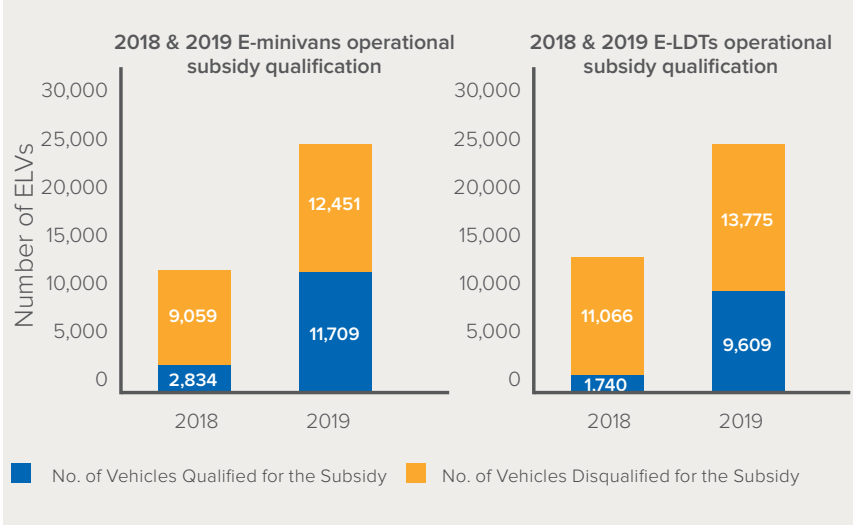
Operational Subsidy Impacts on Mileage

Since Shenzhen introduced its ELV operational subsidy policy, the proportion of vehicles that meet the subsidy's mileage threshold has increased from 18.6% in 2018 to 44.2% in 2019. The number of eligible minivans and light-duty trucks each rose from less than 3,000 in 2018 to approximately 10,000 in 2019 (Exhibits 3 and 4).[i]

[i] The result here is calculated from the Beijing Institute of Technology's New Energy Vehicles Big Data Platform Data Analysis for vehicles with 15,000 or more miles per year. This might be different from the actual number of vehicles qualified for the operational subsidy, which also takes fleet size into consideration.

EXHIBITS 3 & 4

ELVs Meeting the Utilization Requirements of the Operational Subsidy in 2018 and 2019



According to surveys of ELV operators and delivery companies in Shenzhen, the operational subsidy's utilization threshold has encouraged fleets to more fully utilize ELVs in order to ensure that more purchased vehicles are eligible for the subsidy.

Interviews with the Shenzhen Transportation Department and major fleets similarly suggest that the operational subsidy has successfully motivated most fleets to begin operating previously underutilized ELVs. However, factors like the improvement of vehicle technology and battery range were also cited as being equally important to extending the operating mileage of ELVs. This suggests that requirements around vehicle quality and innovation were also necessary and effective.

Operational Subsidy Impacts on Fleet Market Structure

While the new policy has had a clear effect on vehicle utilization, there was no notable impact on market structure. Data from 2018 and 2019 show little change in fleet size, even with the new subsidy requirement that fleets be of a certain size to qualify. Many small fleets and owner-operators have been able to find ways to "affiliate" themselves with larger fleets in order to take advantage of the subsidy. This was often through lease agreements with rental companies or flexible contracts with digital freight platforms (e.g., Huolala).

Those who are unable to affiliate themselves with larger fleets tend to purchase ICE trucks rather than ELVs since they are not able to qualify for the subsidy. In this sense, the current fleet size requirement has not been effective at consolidating the market and has potentially encouraged a bifurcated market where large fleets prefer ELVs and small unaffiliated fleets prefer ICE vehicles.

AREAS OF FOCUS FOR FUTURE ITERATIONS OF THE OPERATIONAL SUBSIDY

Upon close examination of its existing structure, the current operational subsidy is able to offset the declining purchasing subsidy. It has also encouraged higher utilization of ELVs, but not to the extent needed to truly displace ICE trucks. Furthermore, while it effectively supports minivans, due to the regional travel patterns of light-duty trucks it has been less effective in supporting that vehicle segment. The study team examined each of these challenges in order to provide recommendations for optimizing the operational subsidy.

Success in Offsetting the Cost Premium of ELVs and Increasing Near-Term Utilization

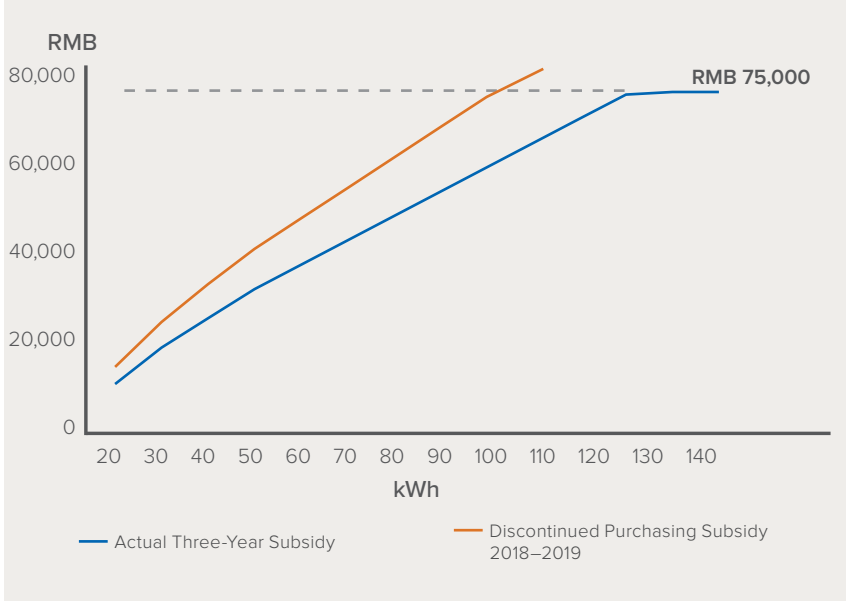
According to the calculation criteria of Shenzhen's operational subsidy, the maximum subsidy for an ELV over three years is ¥75,000 (US$11,100). Both the vehicle data and the vehicle user surveys show that common battery capacities of ELVs in Shenzhen are 30–50 kWh for minivans and 50–80 kWh for light-duty trucks. Therefore, according to the

subsidy's tiered structure based on battery capacity, the majority of the eligible vehicles that meet the 15,000 km annual mileage requirement in Shenzhen are eligible to receive a subsidy between ¥20,000 (US$2,960) and ¥60,000 (US$8,880) over three years (assuming the vehicles meet the mileage requirement each year), while few vehicles are able to obtain the maximum subsidy of ¥75,000 (US$11,100).

As a result, for the majority of vehicles, 80% of the discontinued purchase subsidy is replaced by the new operational subsidy. Therefore, although the total amount of the operational subsidy for ELVs in Shenzhen is lower than the original purchase subsidy, it can generally offset the higher up-front purchase cost of vehicles while also encouraging utilization via its mileage requirement (Exhibit 5).[4]

EXHIBIT 5

Battery Capacity-Based Operational Subsidy Amount for ELVs in Shenzhen (over three-year period)



Through interviewing both administrative authorities and fleet companies in Shenzhen, the research team concluded that both sets of stakeholders emphasize the ability of the current operational subsidy to relieve the financial burden caused by the declining purchase subsidy. The stakeholders also maintain that it is encouraging utilization of the vehicles. Also, most of the vehicles that were not able to meet the 15,000 km mileage requirement were not far from the threshold. Therefore, the hope is that the promise of the subsidy will incentivize those operators to increase utilization in order to meet the threshold.

Potential for Improvement in the Subsidy Mileage Threshold

Based on surveys of delivery companies, the current 15,000 km mileage threshold of the operational subsidy corresponds to minivans' average daily driving distance of 50 km, assuming they operate approximately 80% of the year (about 300 days). It also corresponds with light-duty trucks' average daily driving distance of 80–90 km, assuming they operate approximately 50% of the year (about 180 days). That is to say, Shenzhen hopes to ensure that ELVs can cost-effectively satisfy demand for urban deliveries under current utilization patterns in both market segments and that they can gradually gain market share via their operational cost advantage.

Based on the increasing number of vehicles that qualified for Shenzhen's operational subsidy from 2018–2019, most vehicles are expected to reach the 15,000 km threshold by the end of 2020. However, the structure of the subsidy also creates complex incentives. For example, fleet owners that have multiple ELVs will temporarily idle those that have already met the qualification threshold in order to more intensively use ELVs which have not yet met the threshold. This utilization transfer may cause the subsidy's effect on overall utilization to be overstated if subsidy qualification is the primary metric to measure utilization improvements.

And while the operational subsidy has increased ELV utilization, it has not enabled ELVs to obtain utilization parity with ICE vehicles. Since ICE Logistics Vehicles operate on average about 90% of days with an average daily range of about 160 km—both metrics higher than the average ELV—achieving complete replacement of ICE logistics vehicles by ELVs will prove difficult. It may require future changes to the operational subsidy structure such as gradually increasing mileage thresholds. To the extent that lower utilization is the result of a technical inability to perform, technological advancements in the chassis material, carriage quality, and battery range may also be required to gain utilization parity with ICE vehicles.

Subsidy Structures and Operational Patterns of Different Vehicle Types

The data on average utilization of ELVs—both in terms of days operated and mileage—showcases the fact that minivans have achieved higher utilization rates than most light-duty trucks. This is due, in part, to the fact that light-duty trucks are mainly used for deliveries outside of the urban core, which both require longer ranges and are less affected by the preferential right-of-way policies,[5] therefore making ICE vehicles the optimal choice for many routes. But it is also partly due to the structure of the current operational subsidy.

First, the conventional light-duty truck delivery scenario is dominated by deliveries throughout the greater metropolitan area, with relatively wider coverage and higher mileage demand, compared with the conventional minivan delivery scenario. This requires greater range provided by a larger battery pack. However, the current operational subsidy decreases with battery pack size and is effectively capped at 130 kWh. Given that the cost of purchasing a light truck is higher than a van, the subsidy for light trucks is actual lower relative to vehicle cost than it is for smaller vans.

Secondly, many companies said in the interviews and surveys that since their warehouses are distributed in Shenzhen and surrounding cities such as Dongguan and Huizhou, the delivery ranges of light-duty trucks in their fleets cover not only the city of Shenzhen, but also surrounding suburbs and smaller cities. However, the current process for calculating qualifying mileage excludes miles traveled outside the city itself, thereby artificially diminishing the subsidy-eligible mileage of light-duty electric trucks.

As a result, the operational subsidy is often irrelevant for vehicles that may travel well in excess of 15,000 km per year but do so out of Shenzhen's city limits. Therefore, overall the operational subsidy is more effective at supporting the purchase and use of vans than trucks.

RECOMMENDATIONS FOR THE NEXT ITERATION OF THE ELV OPERATIONAL SUBSIDY

Based on the above analysis of the utilization rate of ELVs and the effect of Shenzhen's operational subsidy policy, it is clear that from 2018 to 2019, Shenzhen has made notable progress in the utilization rate of ELVs. It is also clear that the operational subsidy has achieved a relatively strong initial effect. However, ELVs—especially light-duty trucks—are still far from the target of replacing ICE trucks in terms of utilization.

While technological advancements will help, it will also be crucial for Shenzhen to maintain policy incentives in order to achieve the goal of full electrification of logistics vehicles. Therefore, based on the above analysis, the research team proposes the following four recommendations on Shenzhen's ELV operational subsidy policy.

1. MAINTAIN THE OPERATIONAL SUBSIDY BEYOND 2020 AND ACCELERATE SUBSIDY CALCULATION AND PAYMENT

The first phase of the ELV operational subsidy policy is from 2018 to 2020. Current results show that the operational subsidy will play an important role in helping Shenzhen achieve its goal of increasing the share of ELVs to 50% of all urban logistics vehicles in the city.

Many delivery companies stated in the surveys that the operational subsidy is an important tool to reduce the cost burden for the purchase and use of ELVs in the current stage. While challenges remain with regard to vehicle technology and battery range, maintaining the operational subsidy will be crucial to achieving the complete replacement of ICE trucks by ELVs.

At the same time, the companies also pointed out that the current operational subsidy for 2018 has been delayed due to lags in mileage calculation and other issues, which has hurt the balance sheets of fleets that are eligible for the subsidy and have built the expectation of having a subsidy payment in their financial planning. It will be important

to accelerate eligibility calculation and payment processing as an element of the development of the second iteration of the subsidy in order to reduce working capital costs of fleets and enable effective operational planning.

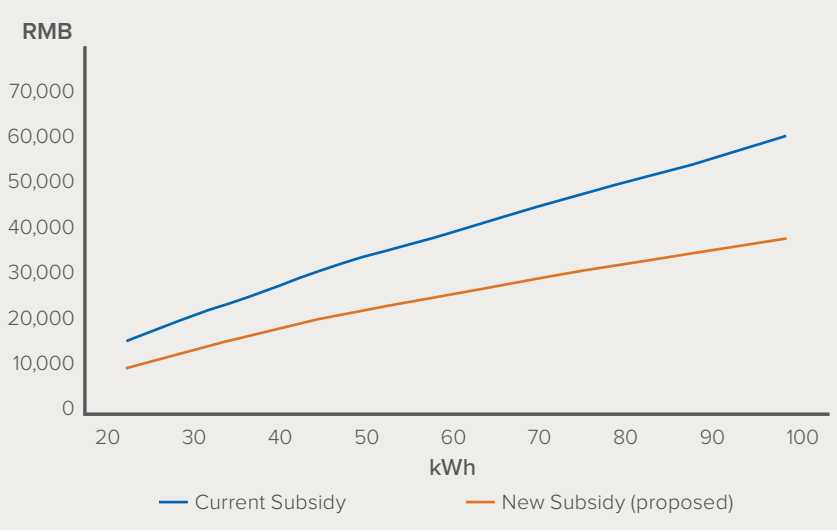
2. MAINTAIN THE SUBSIDY BUDGET CONSTANT AS A SHARE OF CITY GDP

A rough estimate of the fiscal expenditures of the phase one operational subsidy finds that, as the proportion of ELVs with mileage above the 15,000 km threshold has increased from less than 20% to more than 40%, the total fiscal expenditure of Shenzhen's operational subsidy was approximately ¥750 million (US$111 million). This was relatively close to the subsidy budget of ¥900 million (US$133 million).

Assuming that ELV utilization continues to improve, certain adjustments would need to be made to ensure that the subsidy program continues to operate within its budget. The first would be to increase the mileage threshold from 15,000 km to 20,000 km. The second would be to decrease the rate of subsidization per kWh of battery capacity. If the subsidy structure were to be reduced to ¥500/kWh (US$74/kWh) for battery capacity lower than 30 kWh, ¥400/kWh (US$59/kWh) for capacity between 30 kWh and 50 kWh, and ¥300/kWh (US$44/kWh) for capacity above 50 kWh, then the total expected fiscal expenditure of Shenzhen's operational subsidy, given continued projected improvement in utilization, would be about ¥1 billion (US$148 million) (Exhibit 6). This represents a share of GDP equal to that budgeted in the first phase, thereby not placing any additional financial burden on the city's budget.

EXHIBIT 6

Comparison of Phase 1 Subsidy and Proposed Phase 2 Subsidy for a Vehicle Traveling 20,000 km per Year



3. SET TIERED MILEAGE THRESHOLDS TO REWARD CONTINUED UTILIZATION

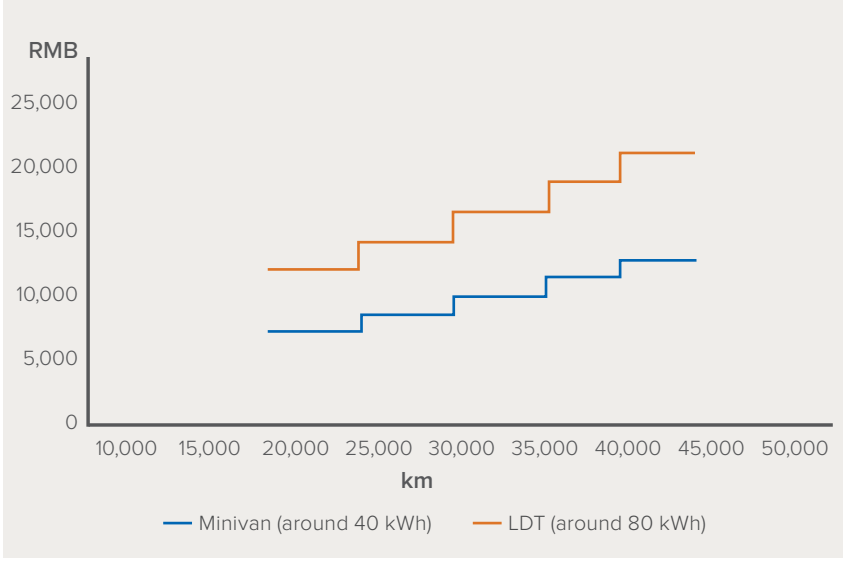
In addition to offsetting the sunsetting purchase subsidy to reduce the cost burden for companies to purchase and use ELVs, the operational subsidy, by its nature, also encourages companies to increase the use of ELVs. The existing mileage threshold helps encourage ELVs to meet the basic delivery demands of the city of Shenzhen. However, as vehicle technology and charging infrastructure matures, continuous updating of the subsidy structure is needed to ensure that the subsidy remains effective at spurring utilization. Increasing the base qualifying utilization requirement helps in that regard, but more innovations could further enhance the impact of that policy.

The research team recommends discrete utilization tiers, beyond the initial utilization threshold, which would qualify a vehicle for further subsidization. This can further incentivize ELVs to achieve delivery mileage closer to that of ICE trucks. The structure of the new proposed policy would be as follows (Exhibit 7):

1. With 20,000 km per year as the minimum mileage threshold, vehicles that reach the threshold would be eligible to receive the baseline operational subsidy according to their battery capacity, and the subsidy would be distributed equally over three years, provided the vehicle meets the minimum mileage threshold each year.

EXHIBIT 7

Relationship between Annual Utilization and Subsidy Amount in the Proposed Phase 2 Operational Subsidy of Minivans and Light-Duty Trucks



For each additional 5,000 km a vehicle operates above the minimum 20,000 km threshold, an additional 20% of the annual baseline subsidy would be granted as an incremental subsidy. The existing cap of ¥75,000 (US$11,100). could be raised to allow for sustained incentivization of utilization up to utilization levels obtained by ICE vehicles.

2. Light-duty trucks with delivery operations that span the broader Shenzhen metro area will be eligible for the subsidy—the same as those vehicles that operate only in Shenzhen—as long as the minimum mileage threshold is met and at least 50% of that mileage (in this case, 10,000 km) takes place within the boundaries of Shenzhen.

4. INVESTIGATE ADDITIONAL CRITERIA FOR THE NEXT PHASE OF OPERATIONAL SUBSIDY TO ENABLE GREATER DISPLACEMENT OF ICE MILEAGE BY ELVS

According to survey results, part of the cause of ELVs lagging ICE vehicles on the three important utilization indicators—number of days per year, hours per day, and miles driven—are the limits on ELVs' loading capacity and operational capabilities needed to service the delivery market's demands. These technical shortcomings, especially loading limitations caused by battery weights and their distribution on the chassis, limit the ability of ELVs to replace ICE vehicles in hauling heavier loads. Enhancing the technical requirements for subsidy eligibility to ensure that the subsidized vehicle is capable of fully replacing a competitor ICE could help to drive the production of higher quality, more capable vehicles.

CONCLUSION

Supported by years of policy incentives and market development, Shenzhen has built a strong foundation for ELVs to fully replace ICE trucks. Particularly in the urban delivery sector, influential right-of-way policies have resulted in an advantage for ELV deliveries in terms of both cost and flexibility. As the purchase subsidy phased out, Shenzhen has maintained the market momentum for the purchase and utilization of ELVs through the pioneering operational subsidy, and has achieved a significant increase in vehicle utilization rates in the past two years.

However, a comprehensive comparison of ELVs with ICE trucks indicates that ELVs still lag behind ICE trucks in terms of utilization. The operational subsidy has won the favor of the industry and participating companies by proving to be an effective policy. In order to further optimize the operational subsidy for phase 2 and incentivize companies to overcome the current shortcomings of ELVs in a targeted, systemic manner, the mileage requirements and overall amount of the subsidy need to be revisited.

Beyond subsidization, a key finding of our fleet interviews was that the continuous improvement and development of charging infrastructure has greatly enhanced the confidence of companies in utilizing ELVs. In the next volume of this report series, the research team will provide an in-depth analysis on the impact of the existing charging model, including the quantity and location of charging stations, on the utilization rate of ELVs in Shenzhen. It will also provide recommendations for how to more effectively deploy ELV charging infrastructure to meet demand.

ENDNOTES

1. Shenzhen Transportation Committee, Shenzhen Development and Reform Commission, Shenzhen Financial Committee, *Shenzhen Modern Logistics Development Special Funding Management Plan*, 2018.

2. Ibid.

3. Ibid.

4. Shenzhen Electric Logistics Vehicles Rental Companies and Fleets Investigation.

5. "Shenzhen Municipal Government, Shenzhen Municipal Government 2018 "Shenzhen Blue" Sustainable Action Plan", 2018.

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