Exploring Electric Vehicles Through Data

A Demo Report on Trends, Technology, and Brand Performance

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Exploring the Electric Vehicle Landscape with Power BI

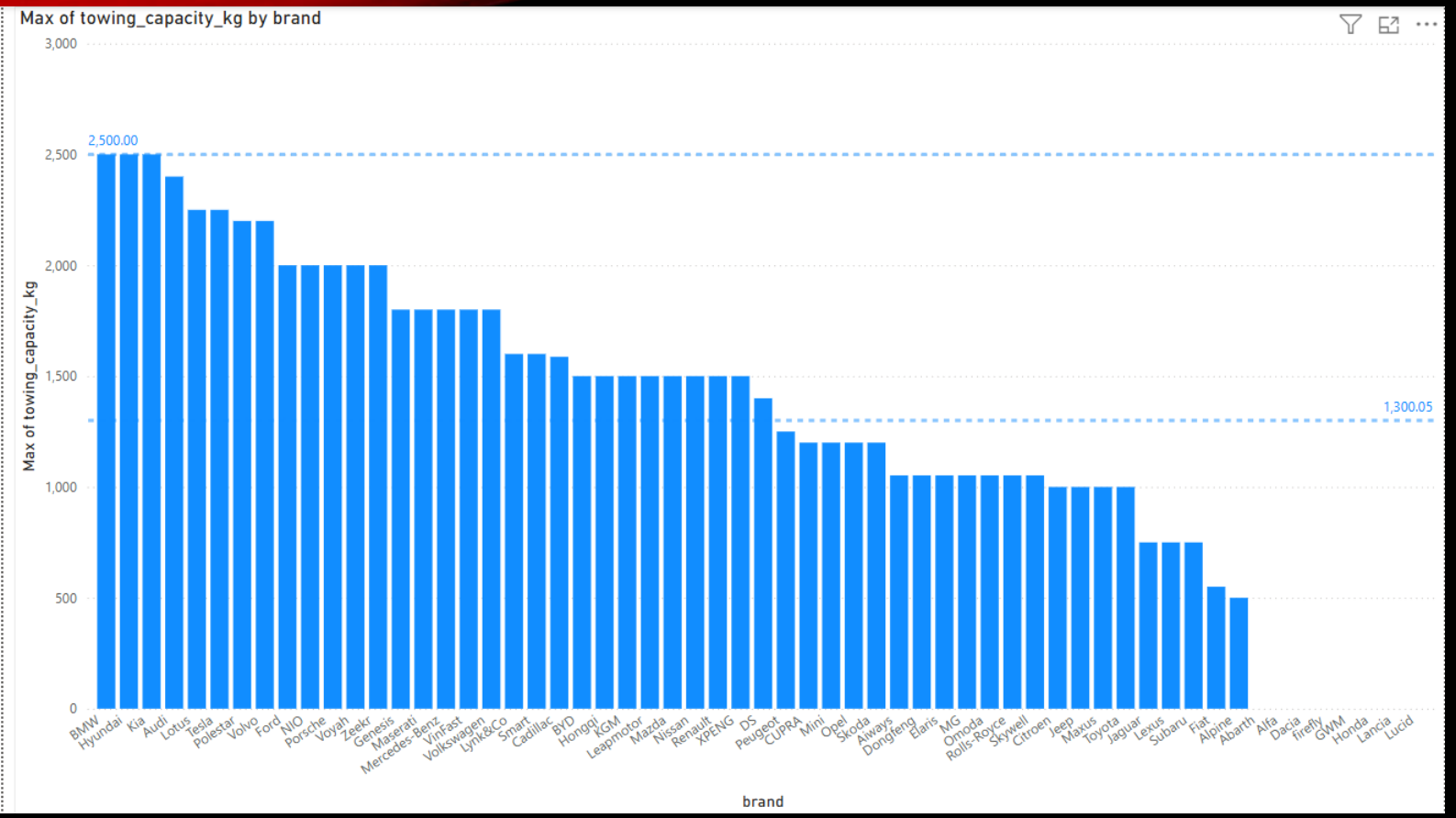
🔍 **What this presentation covers:**

- Efficiency trends across EV brands
- Battery types, charging power, and segment analysis
- Range distribution and acceleration comparisons
- Real-world insights using interactive dashboards

📊 **Tools Used:** Microsoft Power BI, Excel

📁 **Dataset:** Electric Vehicle Specifications (Global Market)

Brands VS Maximum of towing capacity in kg



🚙 **Towing Capacity Analysis of Car Brands**

- **Maximum Towing Capacity : 2500 kg**

➤ Brands: **BMW**, **Hyundai**, **Kia**

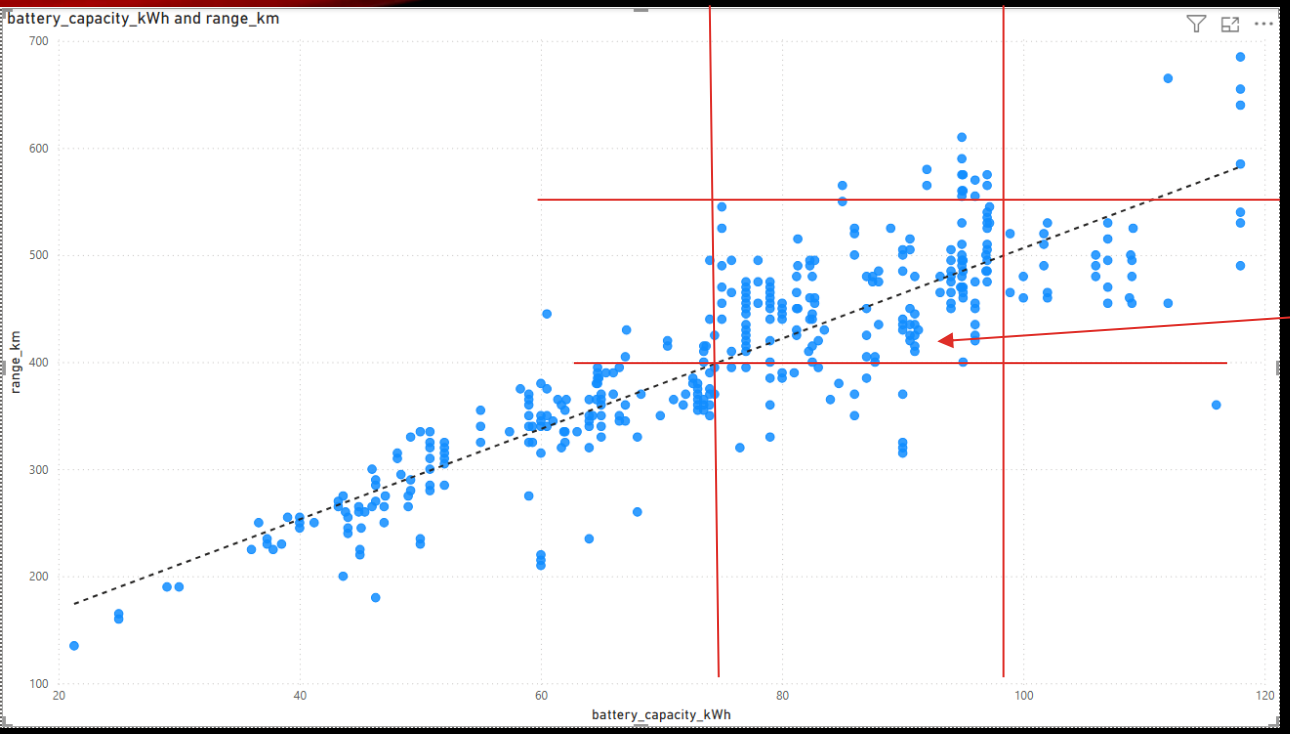
- **Zero Towing Capacity : 0 kg**

➤ Brands: **Abarth**, **Alfa Romeo**, **Dacia**, **Firefly**, **GWM**, **Honda**, **Lancia**, **Lucid**

📊 **Summary Statistics**

Highest Capacity: 2500 kg
Lowest Capacity: 0 kg
Average Capacity: 1300.05 kg

Battery Capacity in KWh VS Range in km

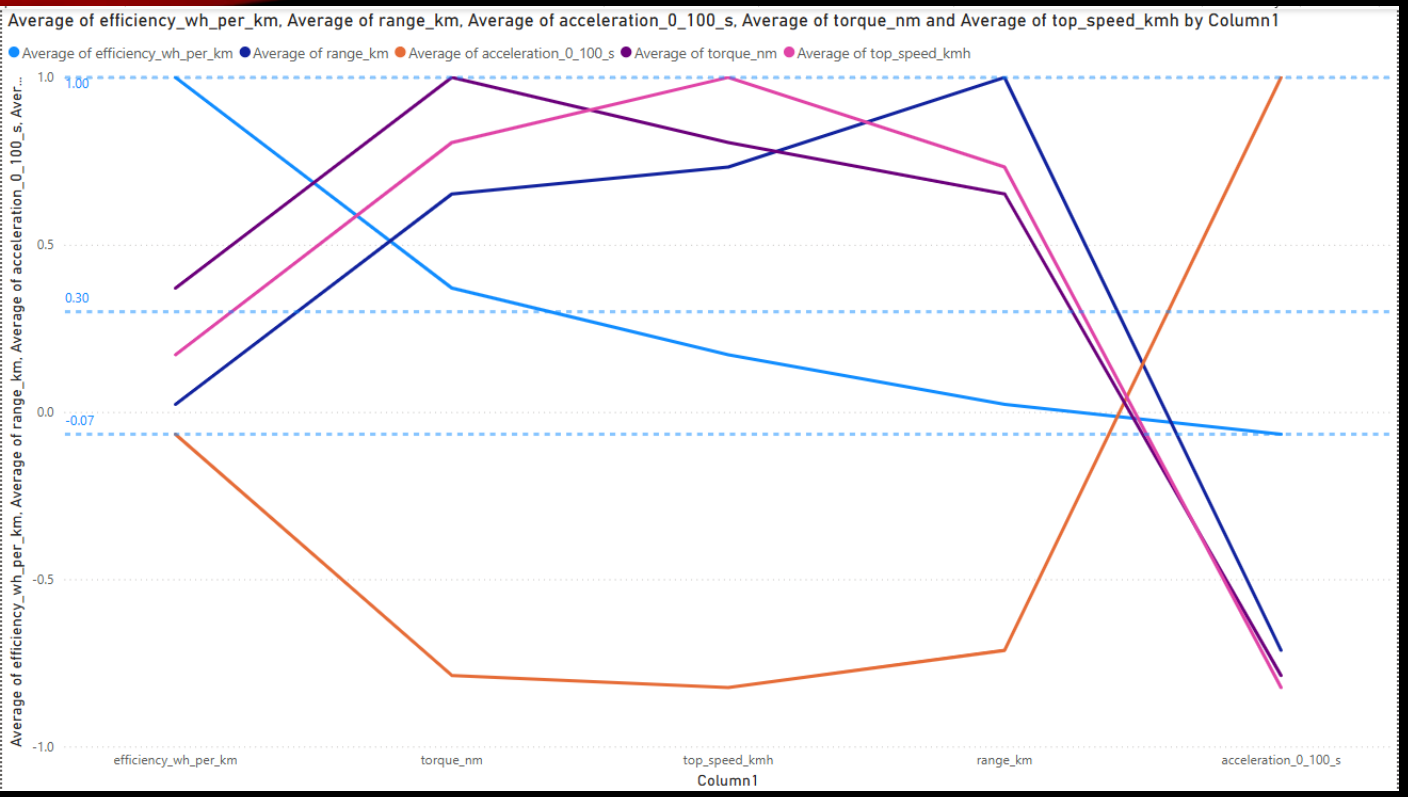


📈 **Insight:**
As **battery capacity increases**, the **driving range (in kilometers)** also **increases proportionally**, indicating a **direct correlation** between energy storage and travel distance in EVs.

A

Observation in section A :
The majority of values are **densely clustered** within the range of:
•**Battery Capacity:** 75 kWh to 98 kWh
•**Driving Range:** 400 km to 550 km
📊 This indicates a **common industry standard** or **optimal balance** between battery size and range in current EV models.

Correlation btw efficiency , Torque , top speed , range , acceleration



- **Negative Correlations :**

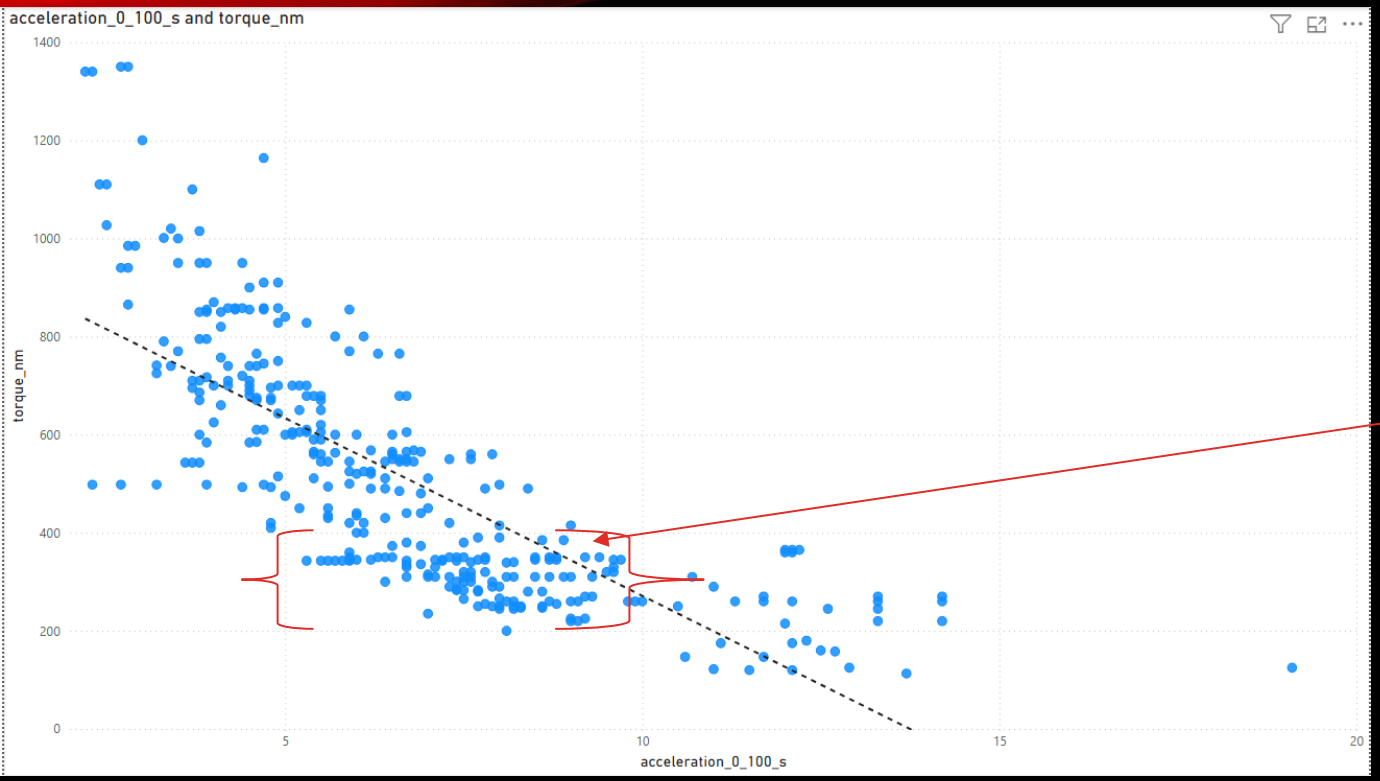
•**Acceleration** also shows a negative correlation with:

➤ **Efficiency**, **Torque**, **Top Speed**, **Range**

•**Torque , top speed ,range** also shows a negative correlation with:

➢ **Acceleration**

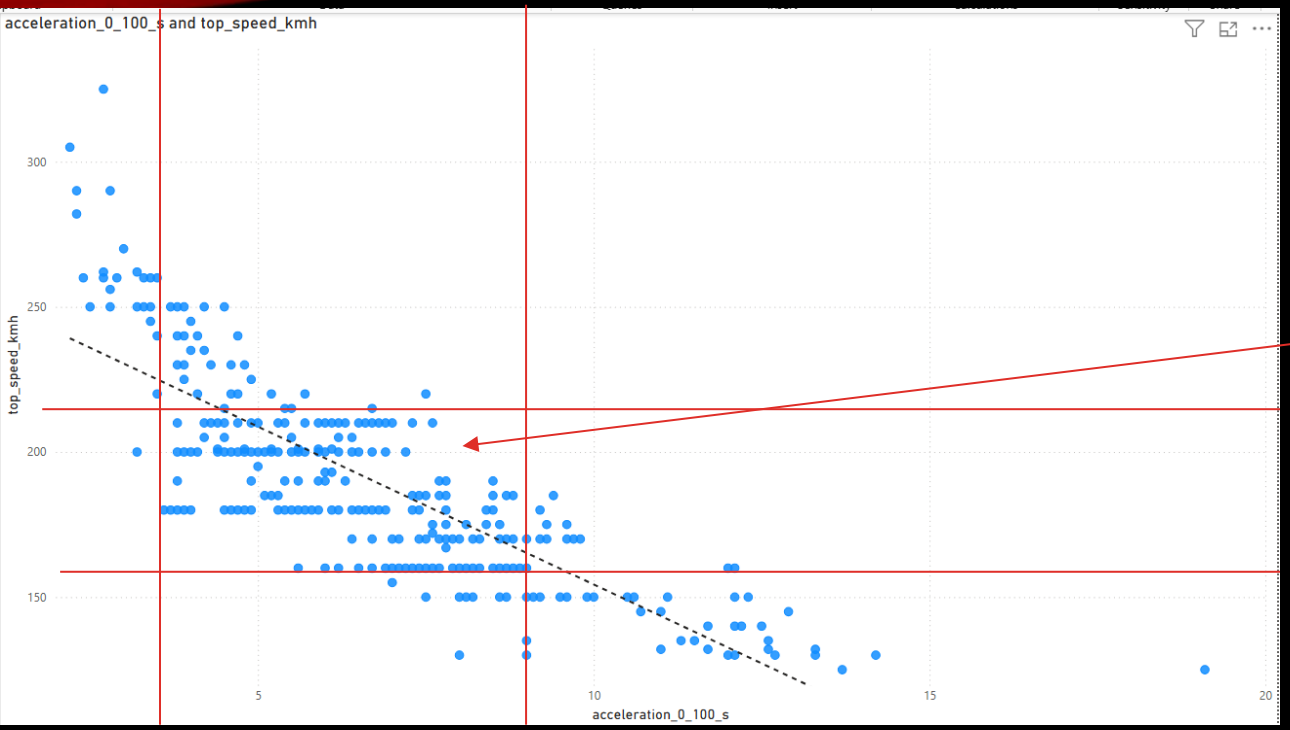
Acceleration VS torque



According to the data, as the acceleration time (0–100 km/h in seconds) increases, the torque tends to decrease.

This section shows the highest density, where most vehicles accelerate from 0 to 100 km/h in 5 to 10 seconds with a torque range of 200 Nm to 400 Nm.

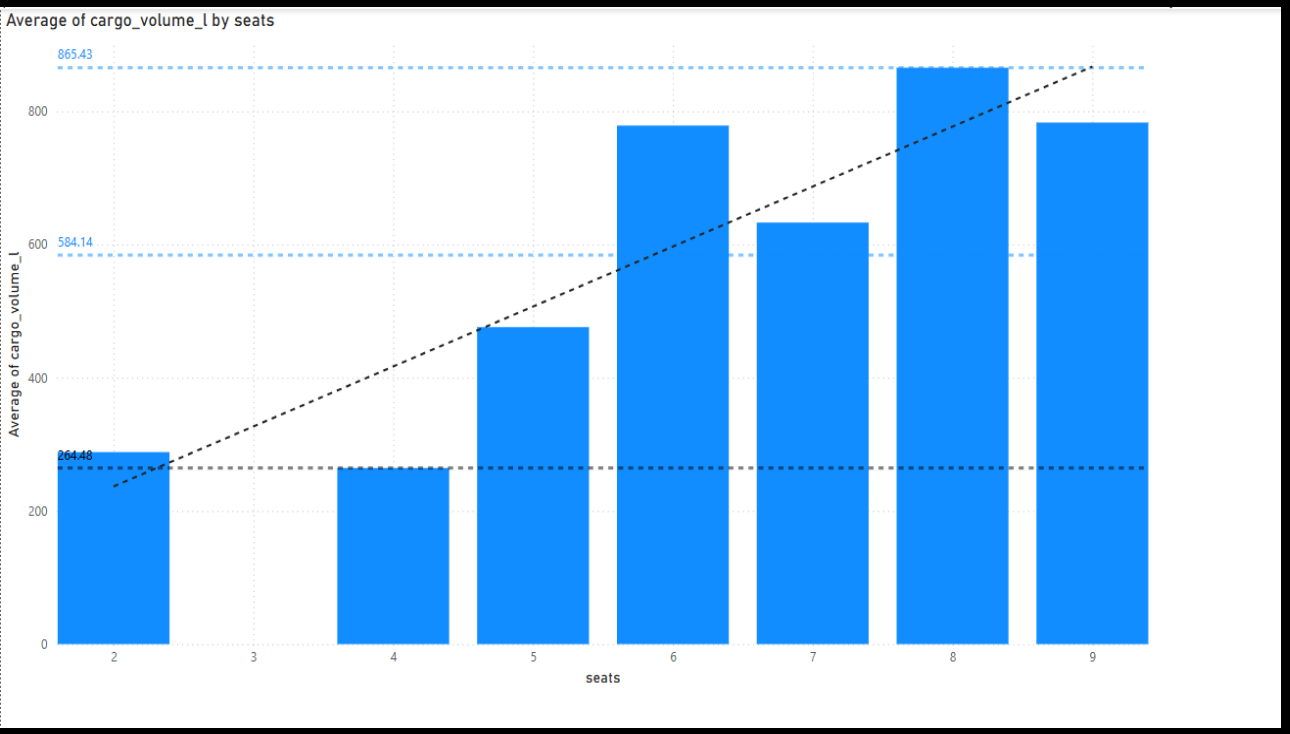
Acceleration VS top speed



Section A shows the most frequent values, where acceleration from 0 to 100 km/h typically occurs between 3.6 and 9 seconds, with corresponding top speeds ranging from 160 to 210 km/h.

A

Seats VS Average cargo volume in liter



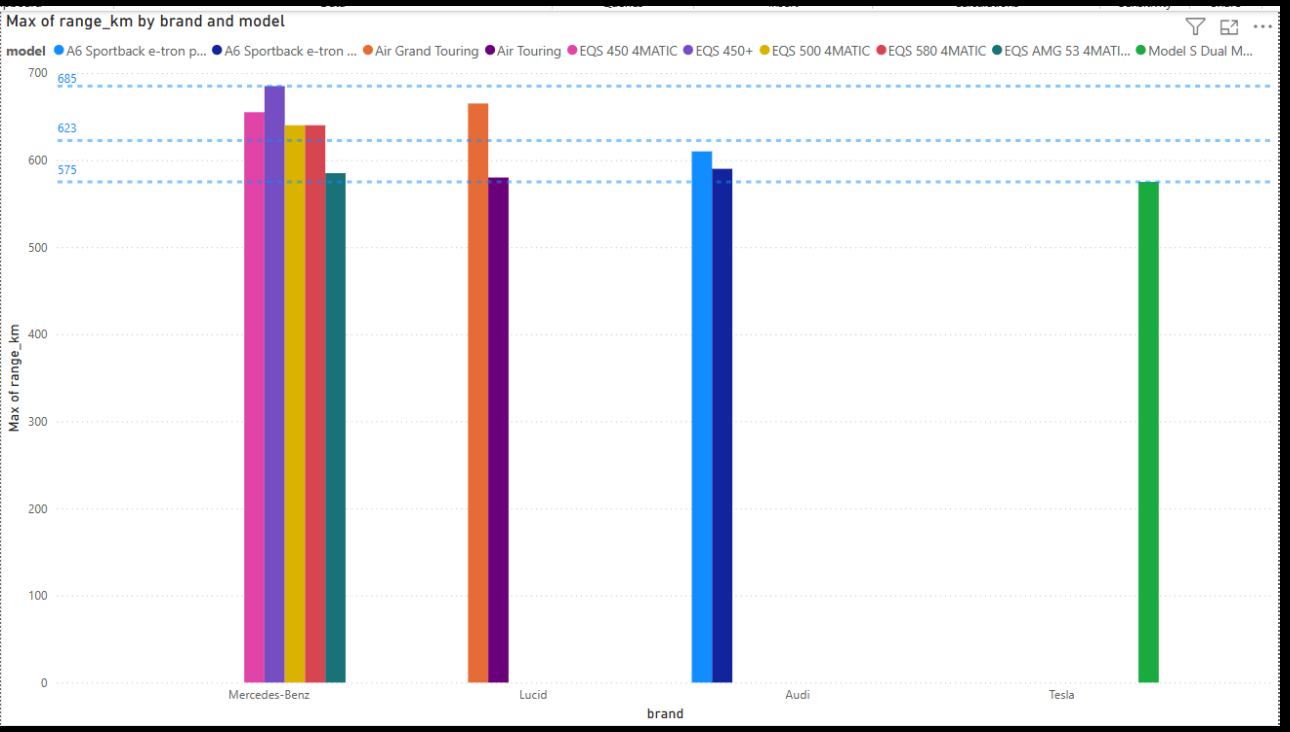
Cargo Volume Insights by Seating Capacity :

Lowest cargo volume:
Found in a **4-seater** car — **264.48 Liters**

Highest cargo volume:
Found in an **8-seater** car — **865.43 Liters**

Note:
No cars in the dataset have **3 seats**

Brand VS maximum Range in Km



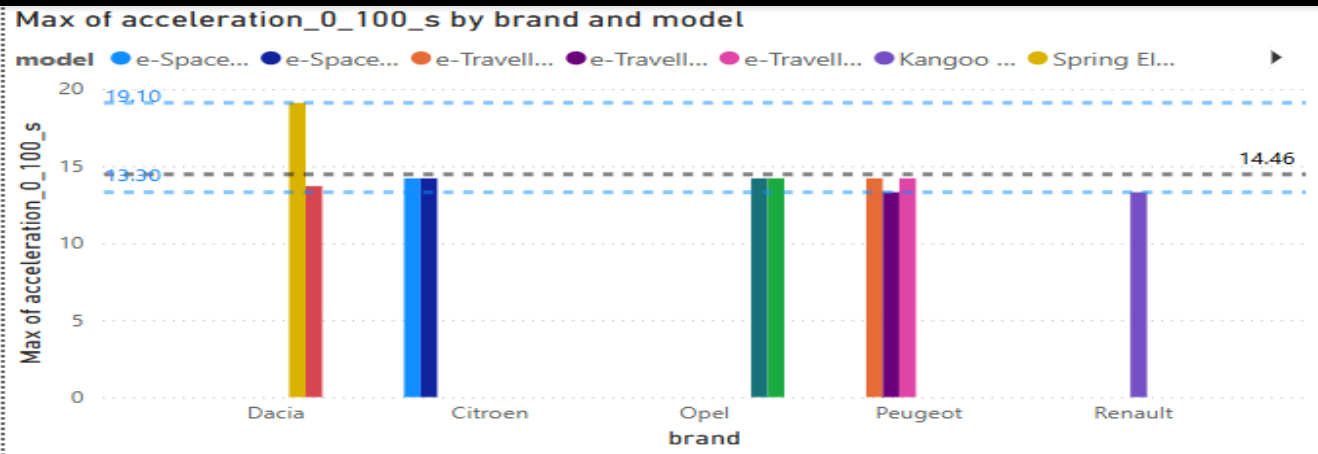
Electric Car Range Insights (in Kilometers):

🔼 **Maximum Range:**
Mercedes-Benz EQS 450+ has the **highest range**

🔽 **Minimum Range:**
Tesla Model S Dual Motor has the **lowest range**

📊 **Brand with Most Cars Above Average Range:**
Mercedes-Benz has the **highest number of models exceeding the average range**

Brand VS Max. and min. of acceleration from 0 to 100 in sec



Cars with the Slowest Acceleration (0–100 km/h in Seconds)

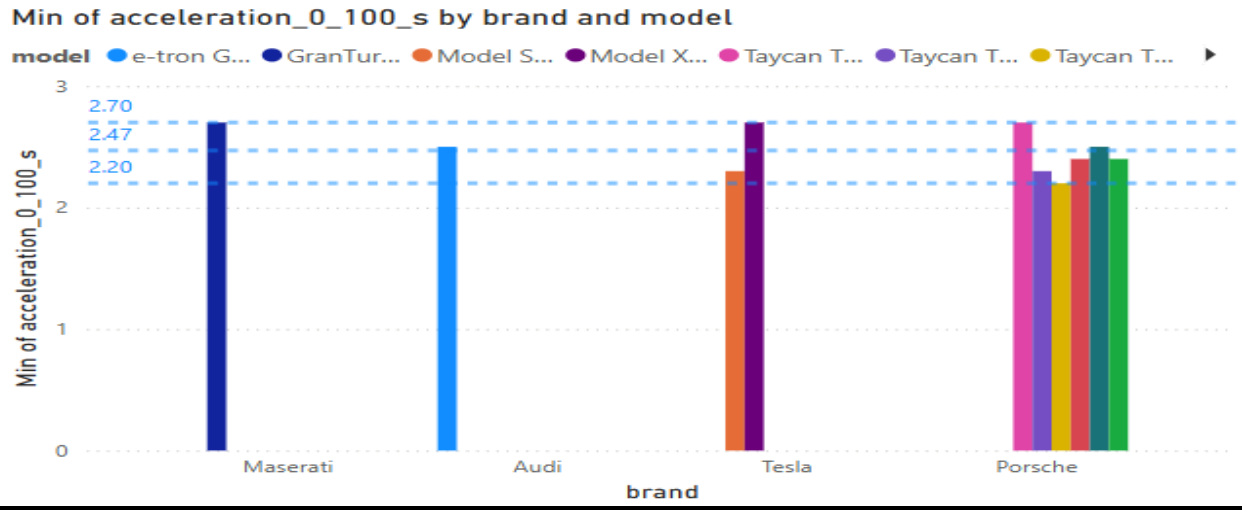
- 🐢 **Slowest Acceleration (Maximum Time):**
  Dacia Spring Electric 45 – 19.10 sec
- 🚶‍♂️ **Second Slowest:**
  Renault Kangoo Grand E-Tech Electric – 13.30 sec

🧠 *Note: Higher acceleration time = slower speed pickup*

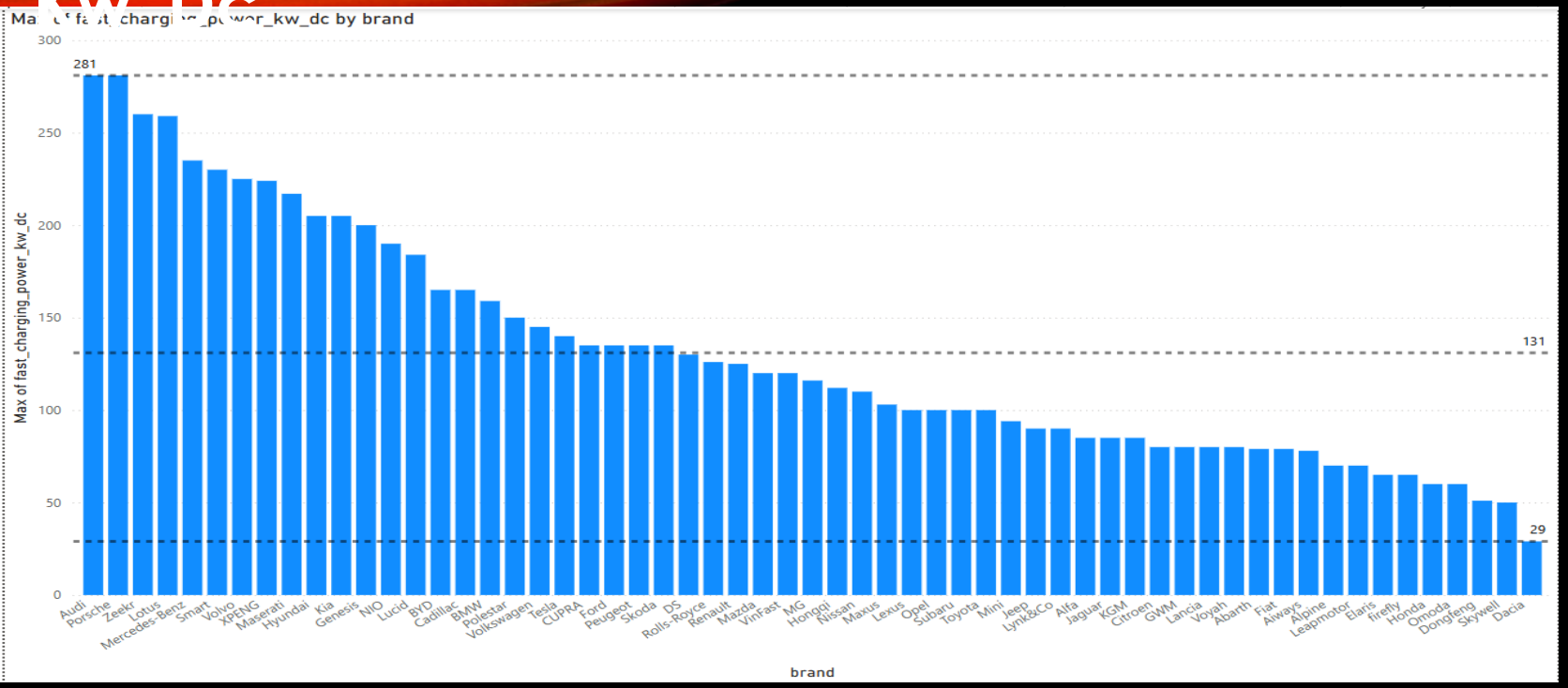
Top Electric Cars with the Fastest Acceleration (0–100 km/h)

- ⚡ **Fastest Acceleration (Minimum Time):**
  Porsche Taycan Turbo GT Weissach – 2.20 sec
- 🔥 **Close Competitors (2.70 sec):**
  - **Tesla Model X Plaid**
  - **Maserati GranTurismo Folgore**
  - **Porsche Taycan Turbo**

🏁 *Lower acceleration time = quicker launch. These are the beasts of electric speed!*



Brand VS Maximum of fast charging power Kw_Dc



Fast Charging Power Analysis (kW DC)

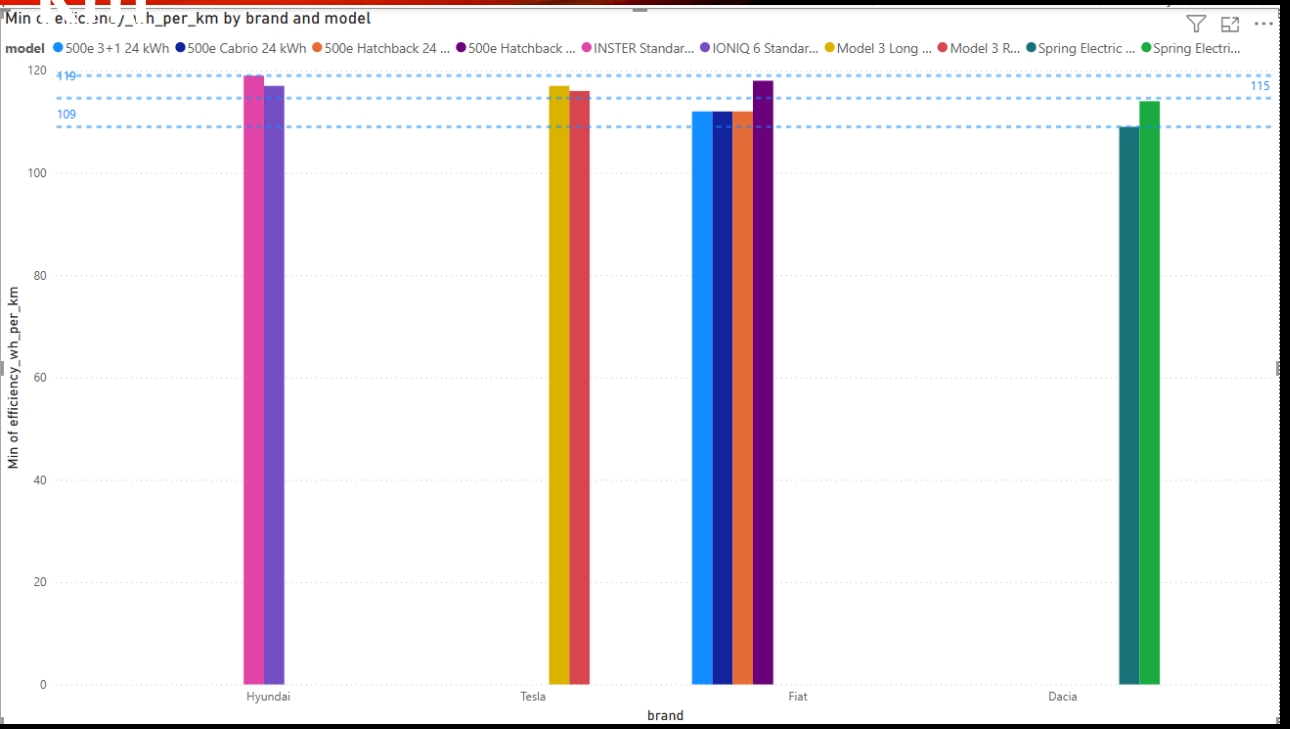
- 🔼 **Maximum Fast Charging Power:**

Audi and **Porsche** — **281 kW**

- 🔽 **Minimum Fast Charging Power:**
  Dacia — **29 kW**
- 📊 **Brand Distribution vs. Average:**
  - **24 brands** have fast charging power **above the average**
  - **35 brands** fall **below the average**

💡 *Majority of car brands offer lower-than-average fast charging speeds, indicating room for improvement in charging infrastructure or battery compatibility.*

Brand VS Efficiency Wh per Km



Top Efficient Electric Cars (Based on Energy Consumption)

- ✅ **Most Efficient Car:**

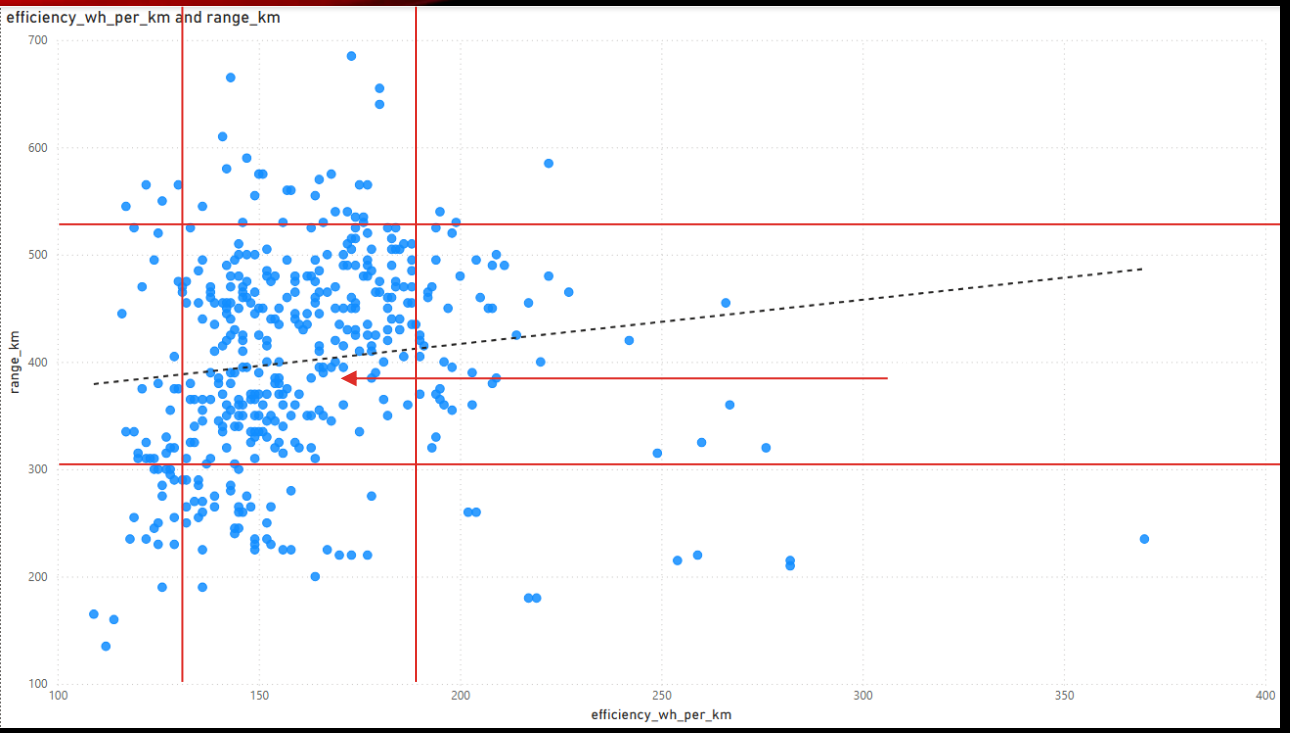
Dacia Spring Electric 45

- ❌ **Least Efficient Car:**

Hyundai INSTER Standard Range

💡 *Efficiency is measured by how little energy (Wh/km) the car uses — lower values indicate higher efficiency.*

Efficiency VS Range



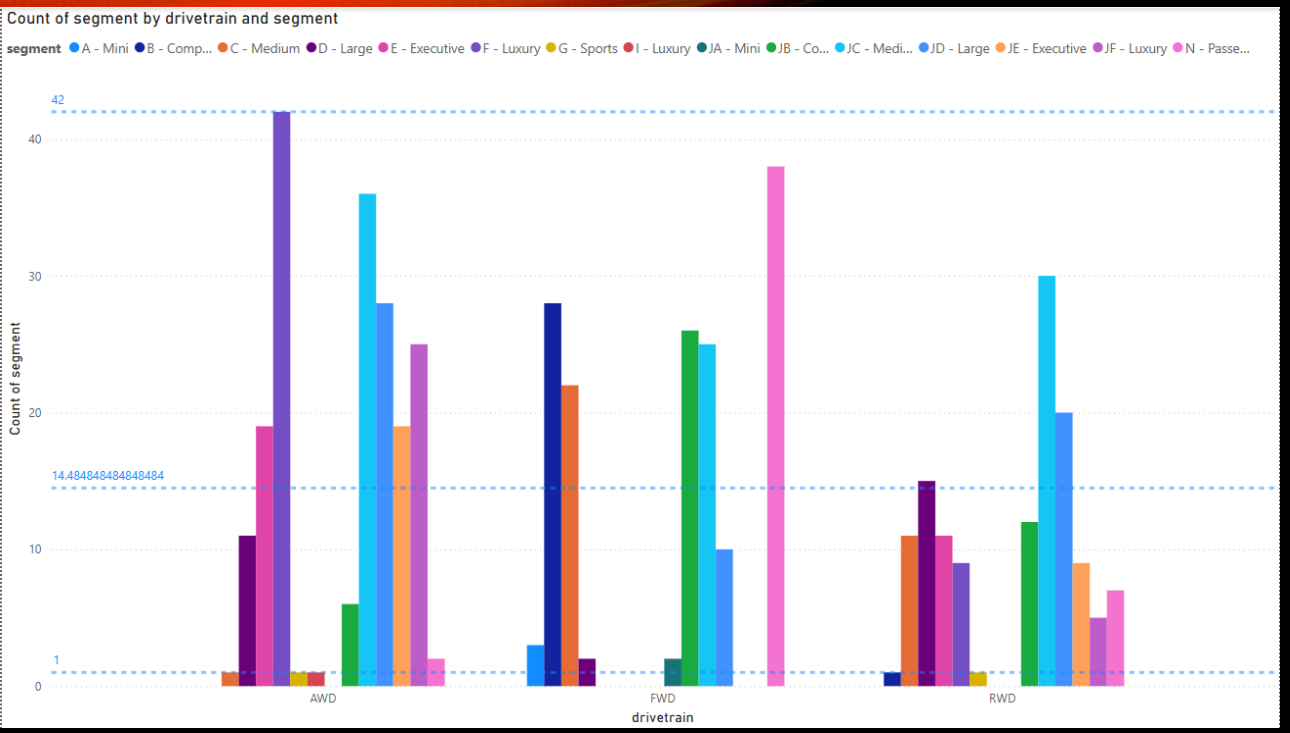
High-Density Efficiency Cluster (Zone A)

Zone A represents the area with the **highest frequency of data points**, where:

- **Efficiency** ranges from **140 Wh/km to 190 Wh/km**
- **Driving Range** falls between **300 km and 530 km**

💡 *This range indicates the most common balance between energy consumption and range in current electric vehicle models.*

Drivetrain with segment VS count of segment



Segment Distribution by Drivetrain (AWD/RWD)

- 🔼 **Highest Count in AWD:**

Segment F – Luxury with **42 vehicles**

- 🔽 **Lowest Count in AWD/RWD:**

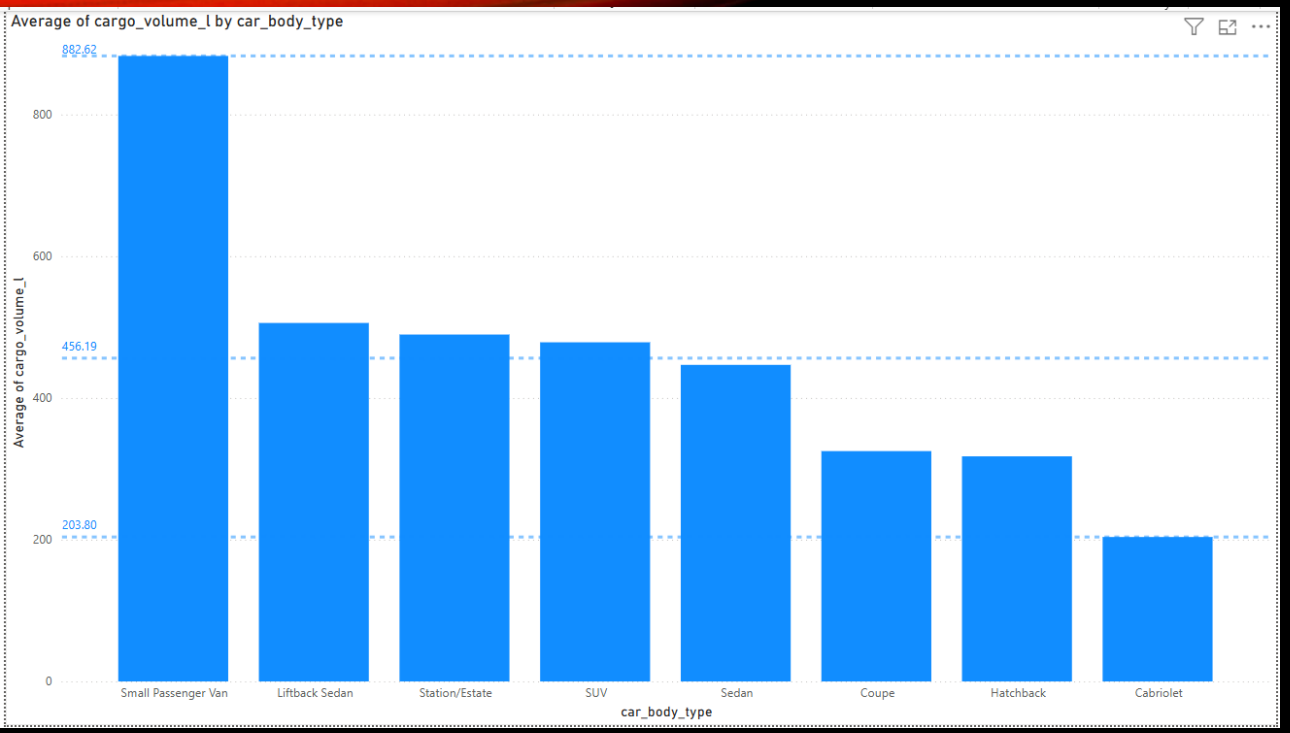
Segments with only **1 vehicle each**:

➤ **C – Medium**, **G – Sports**, **L – Luxury**, **B – Compact**

- 📊 **Segment Count vs Average:**
  - **19 segments** have a count **below the average**
  - **14 segments** are **above the average**

💡 *Luxury vehicles dominate AWD offerings, while some segments like sports and compact appear less frequently in AWD/RWD setups.*

Car body type VS cargo volume in litre



Cargo Volume by Car Body Type

- 🔼 **Maximum Cargo Volume:**

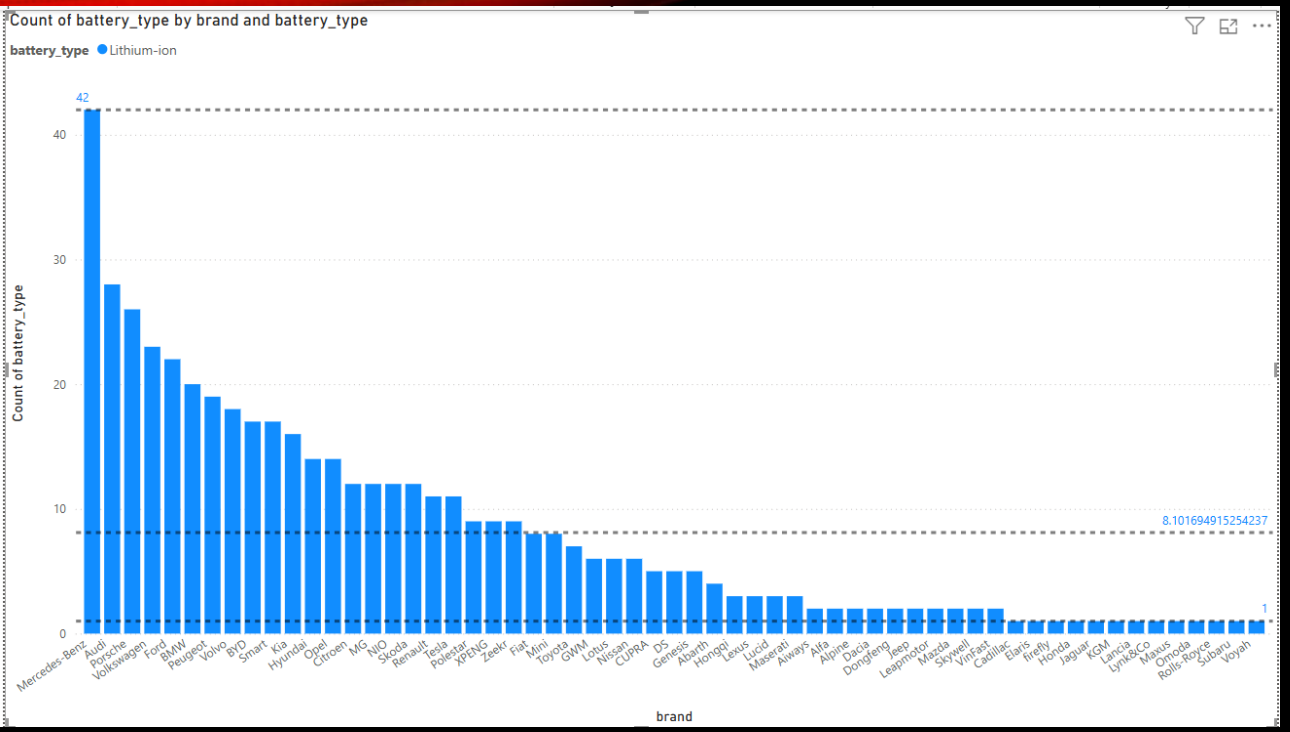
Small Passenger Van — 882.62 Liters

- 🔽 **Minimum Cargo Volume:**

Cabriolet — 203.80 Liters

💡 *Vans offer the highest practicality in storage space, while cabriolets trade cargo capacity for design and performance.*

Brand VS count of battery type



🔍 **Observation:**

There is a **significant drop** in the number of battery types used by brands:

- **Mercedes-Benz** leads with **42 battery types**
- The next in line, **Audi**, uses only **28 types**

➡️ A **sharp decline of 14 battery types**

Battery Type Distribution by Brand

- 🏆 **Most Diverse Battery Types:**

Mercedes-Benz – 42 different battery types
(Leading in battery versatility and innovation)

- 🥈 **Second Highest Variety:**

Audi – 28 battery types
(Indicating strong portfolio depth)

- 🔽 **Minimum Variety (Only 1 Battery Type):**

Brands like **Cadillac, Elaris, Firefly, Honda, Jaguar, KGM, Lancia, Lynk & Co, Maxus, Omoda, Rolls-Royce, Subaru, Voyah**

💡 *Luxury and legacy brands like Mercedes-Benz and Audi are leading in battery diversity, whereas niche or newer market entrants stick to a single solution.*

This large gap suggests Mercedes-Benz is taking a **highly diversified battery strategy**, possibly aiming to optimize across segments, regions, or performance classes. Audi, while still diverse, has a noticeably more focused approach.

Combined Insights – What the Data Tells Us

✅ 1. Dacia – Best in Efficiency, Not in Speed
- **Dacia Spring Electric 45** is the **most efficient** car (lowest Wh/km).
- But it also has the **slowest acceleration** (0–100 km/h in 19.10 sec).
- 🔁 **Insight:** Dacia focuses on **energy-saving and economy**, not performance.

✅ 2. Power vs. Efficiency – Often a Trade-off
- Brands that offer **high acceleration** (like sports or luxury cars) often have **lower efficiency** (higher Wh/km).
- Example: Hyundai INSTER has lower efficiency compared to Dacia but may offer better acceleration or features.

✅ 3. Segment Influence Is Clear
- **Luxury (F-Segment)** dominates AWD configurations (42 cars), indicating **more premium cars focus on power/performance**.
- **Compact or medium segments** have limited AWD, aligning with their economy and efficiency goals.

✅ 4. Battery Diversity = Brand Strategy
- **Mercedes-Benz** leads with 42 different battery types – a sign of a **broad product range**.
- Most other brands have far fewer, suggesting **focused or budgeted offerings**.

✅ 5. Range vs Efficiency Cluster
- Most cars fall between **140–190 Wh/km** with a **range of 300–530 km**.
- This range is where **majority of consumer-focused EVs** lie — a balance of range and consumption.

✅ 6. Cargo Volume and Purpose
- Vans and family cars like **small passenger vans** have highest cargo space.
- **Cabriolets (convertibles)** have the lowest — showing how **design impacts utility**.

Thank You for Your Time and Attention!

- I hope the insights shared today gave you a deeper understanding of electric vehicle trends across brands, efficiency, performance, and technology.
- Special thanks for your interest and curiosity – it drives meaningful discussions and innovation.