

GEOTAB[®] Fleet EV & Electric Utility EV Load Use Cases

Overview for GENIVI

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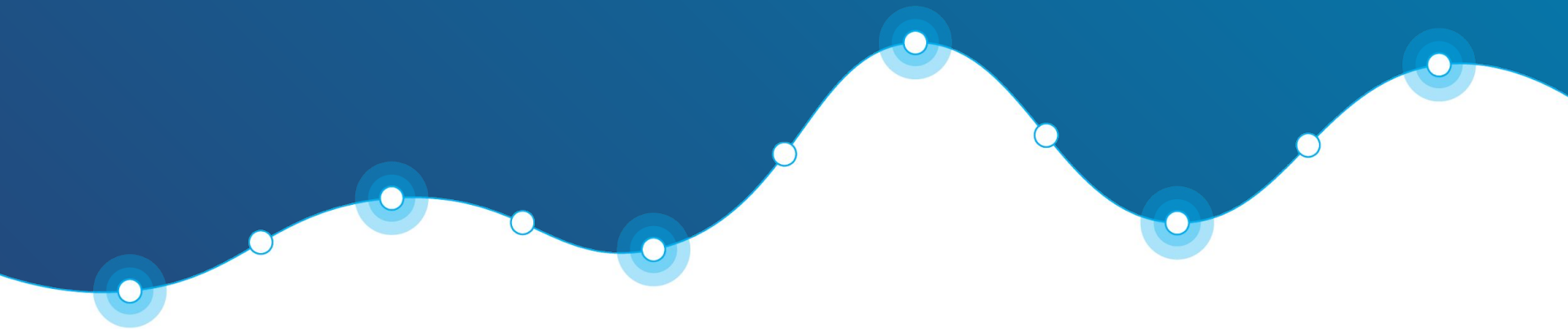
A decorative graphic at the bottom of the slide consists of a dark blue wave-like shape. Along the top edge of this wave, there are several white circles of varying sizes, some of which are surrounded by a light blue circular glow, creating a modern, data-oriented aesthetic.

Geotab EVs: Fleet and Electric Utilities

Geotab works with both fleets (commercial / public sector) and electric utilities.

1. **Fleets:** Data to manage and monitor EVs to support optimal use and adoption.
2. **Electric Utilities / Energy Providers:** Understand and manage new and growing EV load on the grid.

Fleet



Fleet Electrification Overview

Top fleet types electrifying:

- Government – LD
- Delivery / Postal / Service – LD and MHD vans
- Electric Utilities – LD near term, bucket trucks later
- Carshare, Rideshare and Taxi – LD
- Transit and Shuttle – Buses (municipal transit and school) and passenger vans
- Specialty:
 - Military: base (not yet field) - both LD and MHD
 - Police: LD
 - Refuse: HD chassis

Why electrifying? CO2 reduction policies and/or for financial reductions.

New use cases emerge to manage and successfully adopt.

Fleet EV Use Cases Overview (1/2)

1. Electric energy efficiency and range:

- a. How much energy is being consumed?
- b. Are we getting good efficiency (km/kWh)?
- c. What is real-world range?
- d. Help me identify ways to optimize my range.
- e. PHEVs: Are we taking advantage of battery and plugging in?

2. EV HV Batteries:

- a. What is degradation? How does it compare to other MMYs?
- b. Has battery degraded such that it does not meet my range needs?
- c. What is battery degradation impact on residual value?

Fleet EV Use Cases Overview (2/2)

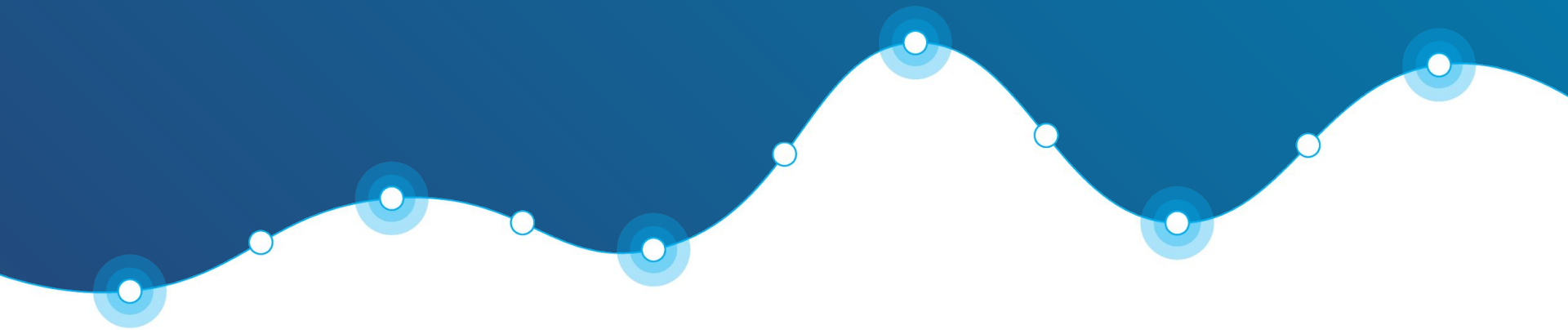
3. Charging:

- a. How much charging energy am I consuming? What are my costs?
- b. Help me identify and prioritize who needs to charge, who has enough range for routes.
- c. Access to charging history: identify trends and troubleshoot.

4. Charging Load:

- a. What is my power level needed for coincident charging to ensure all vehicles are charged when I need them.
- b. Do I have enough building capacity? Do I have enough local transformer capacity?
- c. Do I need to manage coincident power levels given (local) capacity limitations?
- d. Do I need to manage coincident power levels given grid limitations?
- e. **Advanced:** Can I use my fleet vehicles to provide energy for my operations in case of emergency?

Electric Utilities



Electric Utility / Energy Providers EV Load Overview

Varying business models and types globally.

- **Own grid component(s):** Generation, transmission, distribution
- **Retail:** Retail energy providers, Co-operatives, Municipality-owned, CCAs (Community Choice Aggregation)
- + mix of the above

Monetization models (= different incentive structures for managing new load):

- Throughput = revenue / kWh
- De-coupled = revenue de-coupled from kWh; determined by regulatory body and based on assets or per customer

Electric Utility EV Load Overview

An EV on average adds ~ 4000 kWh to household load annually (based on Geotab's consumer vehicle data averages).

- NA average is ~ 11,000 kWh ([US src](#); [Can src](#)).
- UK average is ~ 4000 kWh ([src](#)).

Current grid generation and assets sized for pre-EV load.

Electric Utility EV Load Use Cases (1/2)

1. **Understand EV load today and plan for future growth:**
 - a. When, where, how much additional power?
 - b. Understand grid capacity impacts: Enough capacity? Upcoming problem?
 - i. Generation?
 - ii. Transmission?
 - iii. Distribution?
 - c. Forecast future load growth: tied to EV adoption rates (consumer and fleet).
 - d. Plan for a clean and cost effective energy mix and strategies to serve the new load:
 - i. Generation
 - ii. Storage
 - iii. use DERMS (Distributed Energy Resource Management Systems) / DSM (Demand Side Management) / NWAs (non-wires alternatives) <- DR (Demand Response) is a strategy within these concepts

Electric Utility EV Load Use Cases (2/2)

2. **Manage EV Load - DR Strategies (Demand Response) - and Load Shaping:**
Balance supply and demand in cost effective and clean ways.
 - a. **Manage Peak Demand:** An alternative strategy to increasing capacity (via assets and new power generation options). It's aim is to reduce demand and shift it to alternative times, as a more cost effective / clean option.
 - b. **Manage Surplus:** When more supply than demand (overnight, excessive solar on sunny day), surplus typically sold cheaply or at a loss. EVs = great surplus consumer!

How?

1. **Behavioural:** Incentivize (via rates / rewards) the driver to *choose* to charge at “good times” (peak reduction or consume surplus).
2. **Direct load control:** Driver allows a technical control (via car / EVSE) to shift charging to “good times”.



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