

How Electric Vehicle Use-Types Impact Utilities' Load Shapes

All EV Charging Loads Are Not the Same

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What is an Electric Vehicle (EV)?

- ❖ Propelled by electric motor(s) on drive train
- ❖ Motor powered by onboard batteries
- ❖ Batteries charged from the electric grid
- ❖ Zero emissions vehicle (ZEV)
- ❖ Operated on public highways
- ❖ Cars, trucks, vans, buses

What do we mean by “Use-Type”

- ❖ We use Gross Vehicle Weight (GVW) to classify vehicles into three different categories.

- ❖ Light-Duty < 10,000 lbs.



Hatchback



Sports Car

- ❖ Medium Duty 10,000 – 19,500 lbs.



Mini Bus

- ❖ Heavy Duty > 19,500 lbs.

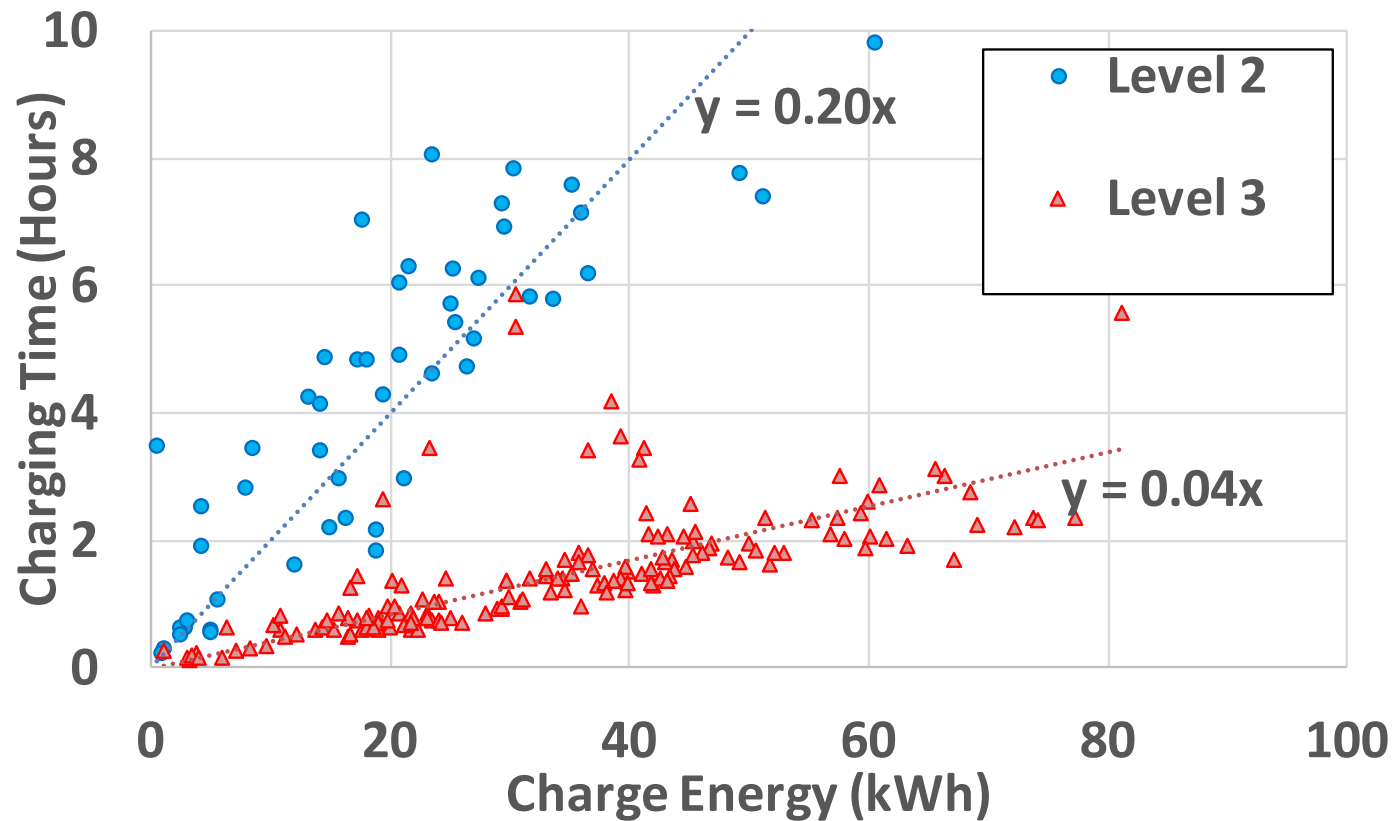


City Transit Bus

EV Charger Types

Type	Alternate Names	Voltage	Typical Charge Time
Level 1	Type 1	120 AC	8 – 12 hours
Level 2	Type 2	240 AC	4 – 6 hours
Level 3	Type 3, DC Fast, CHAdeMO, Tesla, Supercharger	480 DC	< 1 hour

Charge Rate Comparison by Charger Type for Medium-Duty Vans



EV Charging Data Sources

Vehicle Type	Charging Stations	Vehicles	# of Charge Records
Light-duty Residential	498		7,750
Light-duty Commercial	1849		54,980
Medium-duty		10*	212
Heavy-duty	2**		1,306

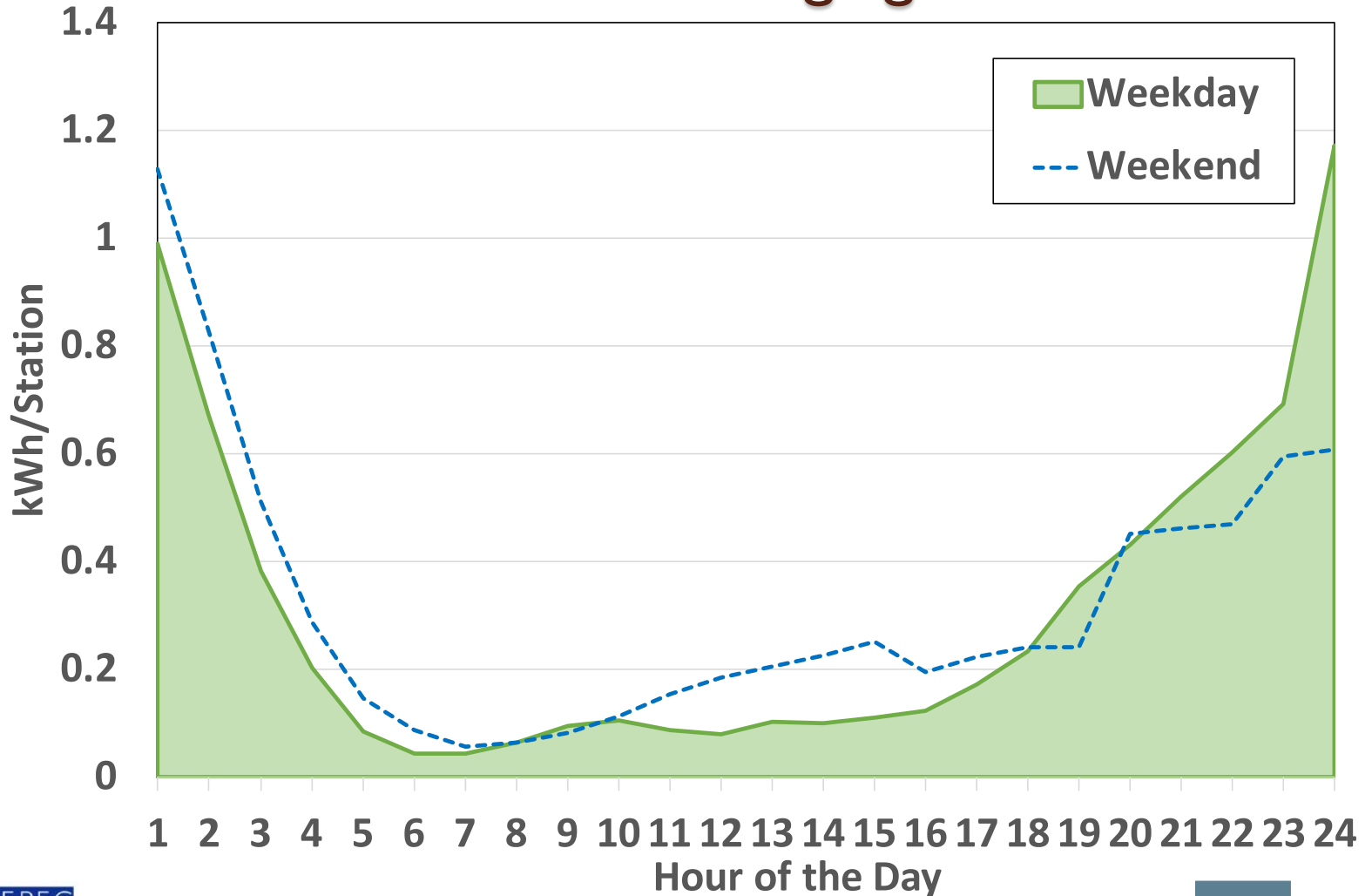
* All were shuttle vans.

** The two charging stations charged 14 buses throughout the day.

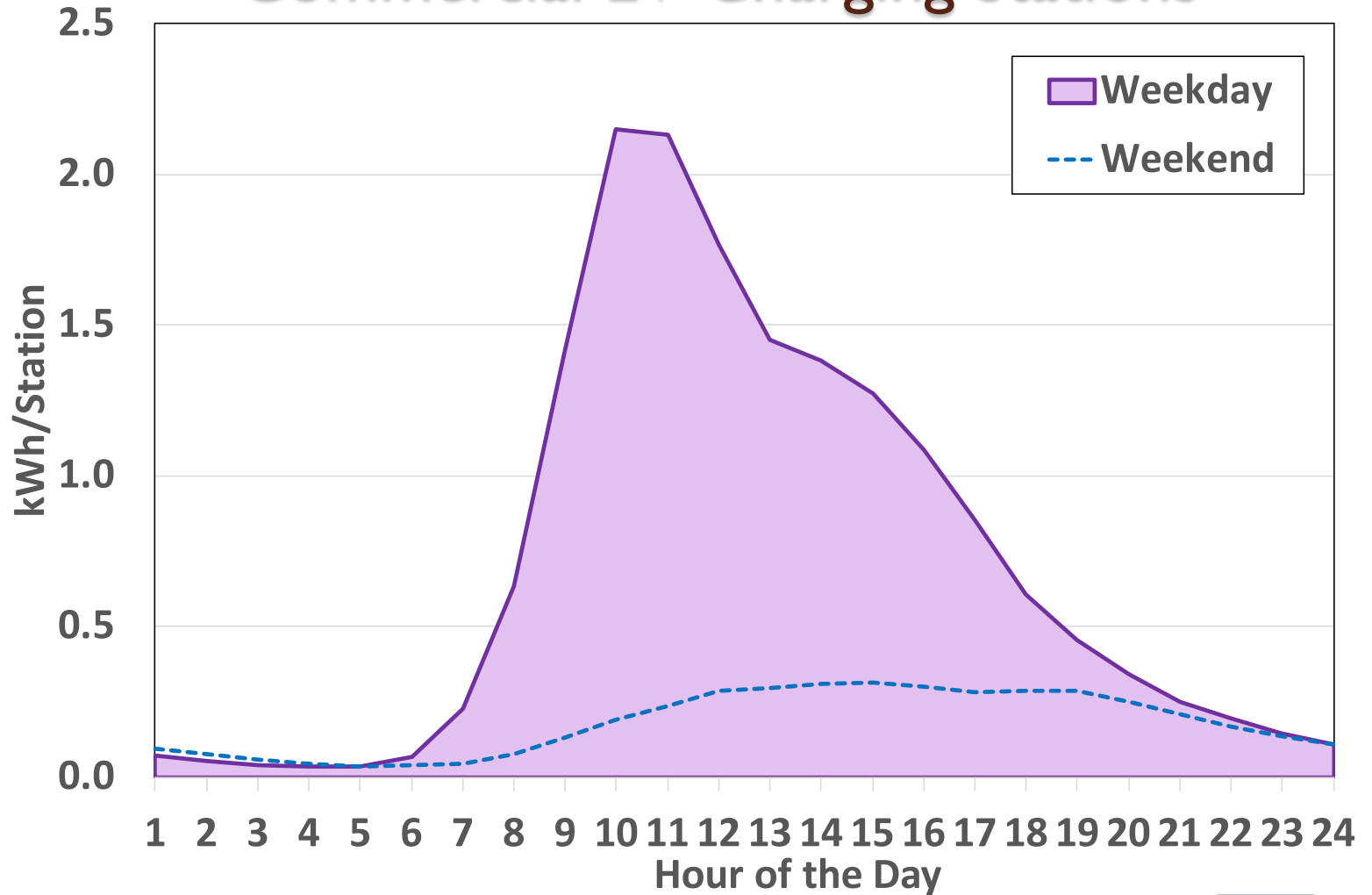
Average EV Charging Characteristics

Vehicle Type	Average charging time	Average charges per day	Average kWh per charge	Average kWh per day
Light-duty Residential	2.18 hours	0.80 / station	9.44	7.56 / station
Light-duty Commercial	2.38 hours	1.35 / station	9.93	13.41 / station
Medium-duty vans	2.14 hours	1.50 / van	30.57	45.97 / van
Heavy-duty buses	4.3 minutes	48.0 / station	18.75	901 / station

Average Light-duty EV Load Profile Residential EV Charging Stations



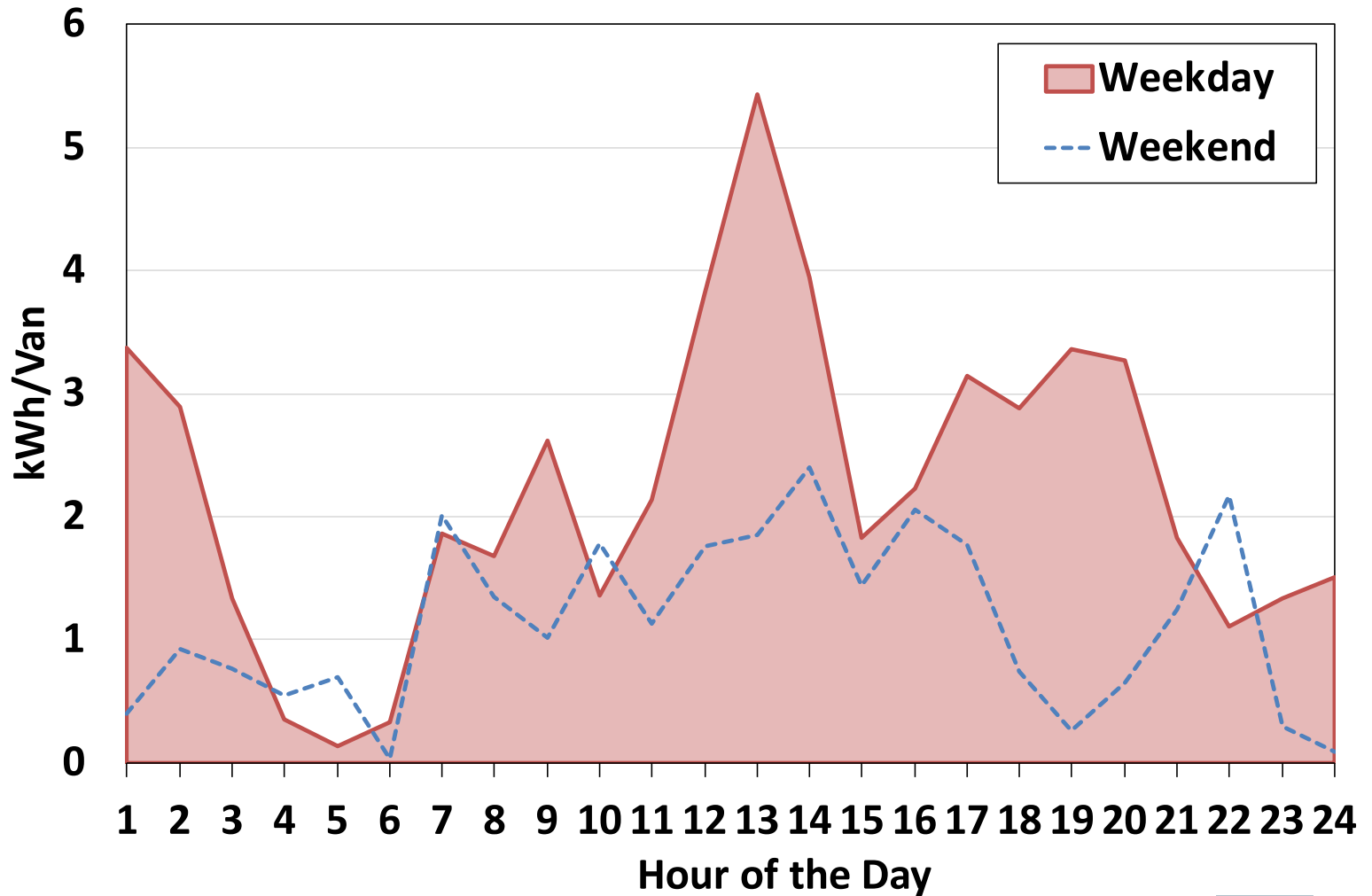
Average Light-duty EV Load Profile Commercial EV Charging Stations



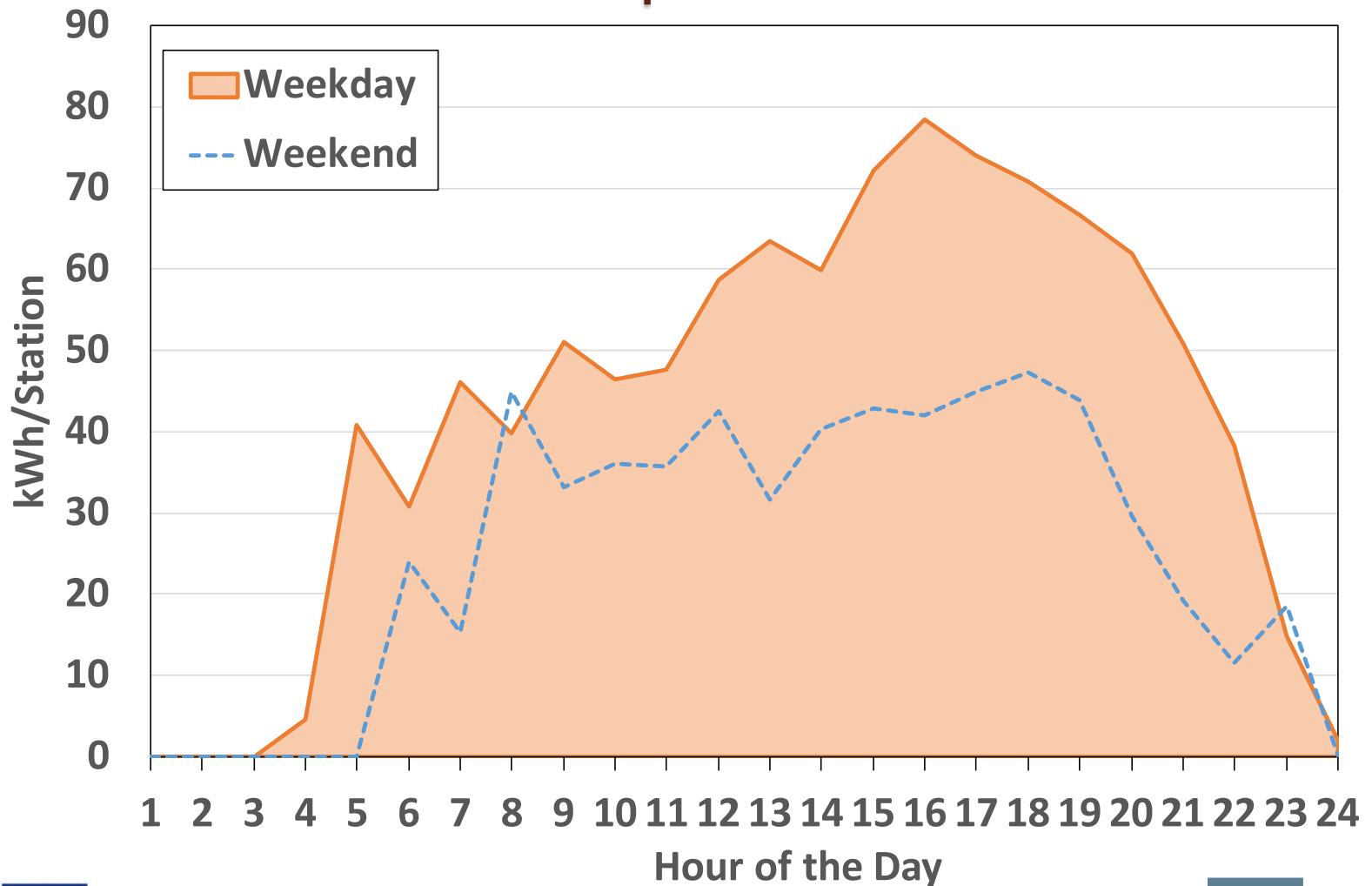
Light-duty Commercial EV Charging Distribution by Location and Charger Type

Location Category	Type 1, %	Type 2, %	Type 3, %	Total, %
Workplace	0.0%	68.9%	1.3%	70.2%
Municipal	0.2%	9.0%	0.0%	9.2%
Retail	0.0%	5.8%	0.4%	6.2%
Education	0.0%	3.5%	0.0%	3.6%
Parking	0.0%	3.0%	0.0%	3.0%
Multifamily	0.0%	2.6%	0.0%	2.6%
Healthcare	0.0%	1.7%	0.0%	1.7%
Hospitality	0.0%	1.4%	0.0%	1.5%
Government	0.0%	1.2%	0.0%	1.2%
Fleet	0.0%	0.9%	0.0%	0.9%
Total	0.3%	98.0%	1.7%	100.0%

Average Medium-duty EV Charging Load Profile 10 Shuttle Buses across 5 Fleets



Average Heavy-duty EV Charging Load Profile 14 Municipal Fleet Buses



Thank you for Attending

