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Demand Charges 101

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Second Plug-In Electric Vehicle Infrastructure Information Gathering Meeting

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Contents

- Why do demand charges exist?
- What are demand charges?
- *How are demand charges calculated?*
- Fast charging demand charges based on utilization

EPRI makes no recommendations on rates, but it is important to understand the implications of vehicle and charger behavior on total costs

Why do demand charges exist?

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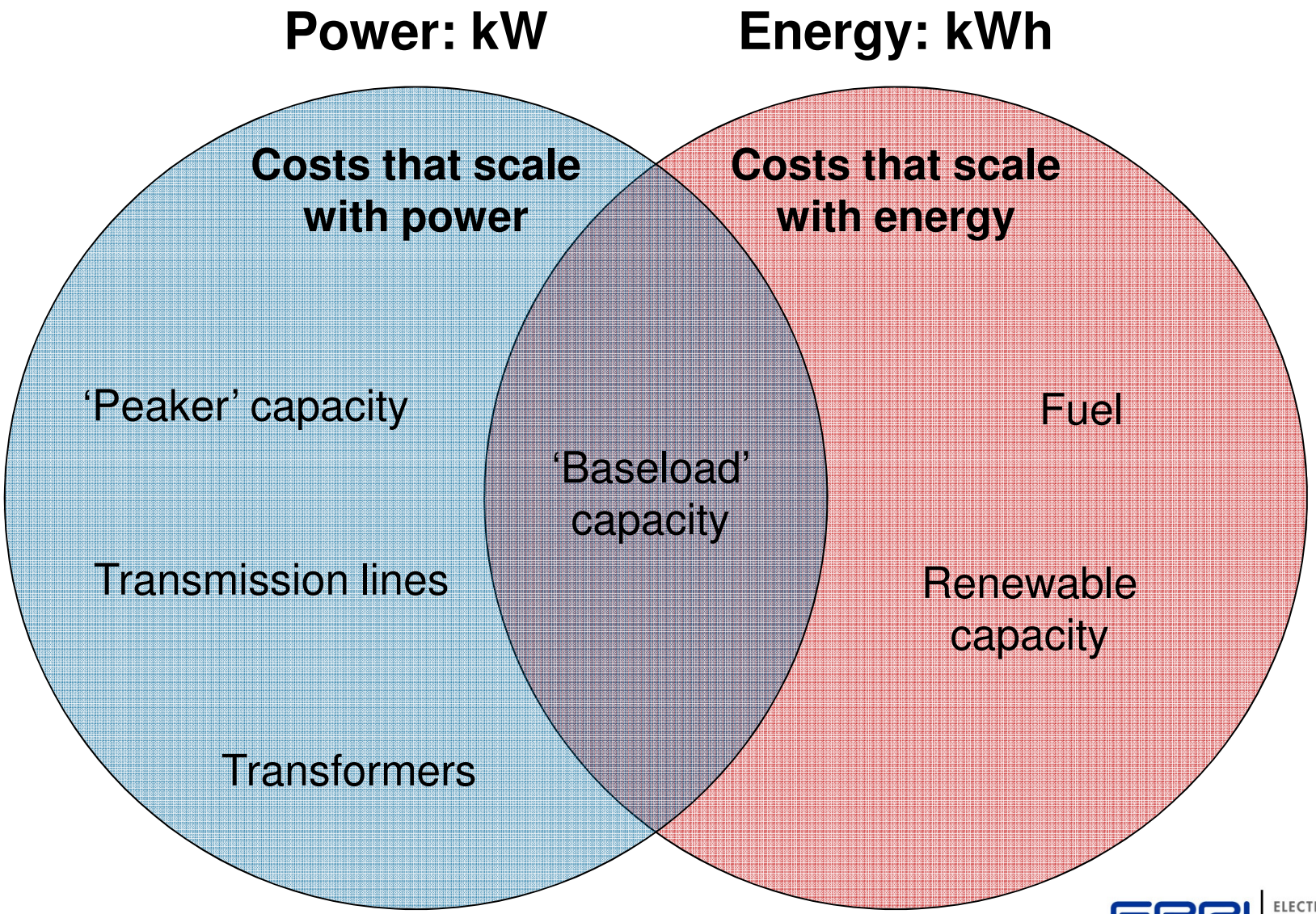
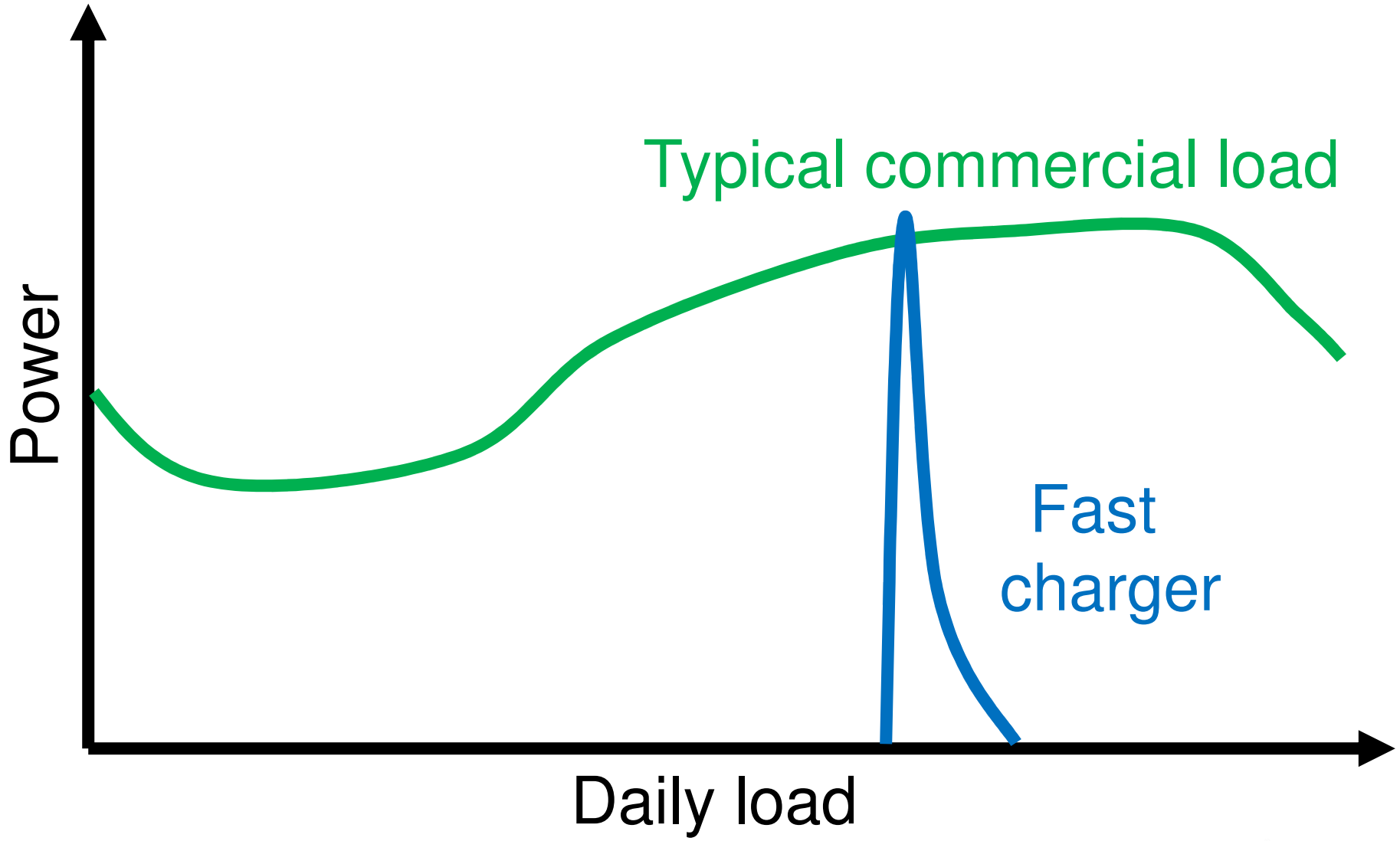
Power: kW	Energy: kWh
Like horsepower	Like gallons of gasoline

Utilities have to meet the requirements for both power and energy

Why do demand charges exist?



Why are we concerned with demand charges?



What are demand charges?

What are demand charges?

- There are two main type of rates:
  - Energy-only

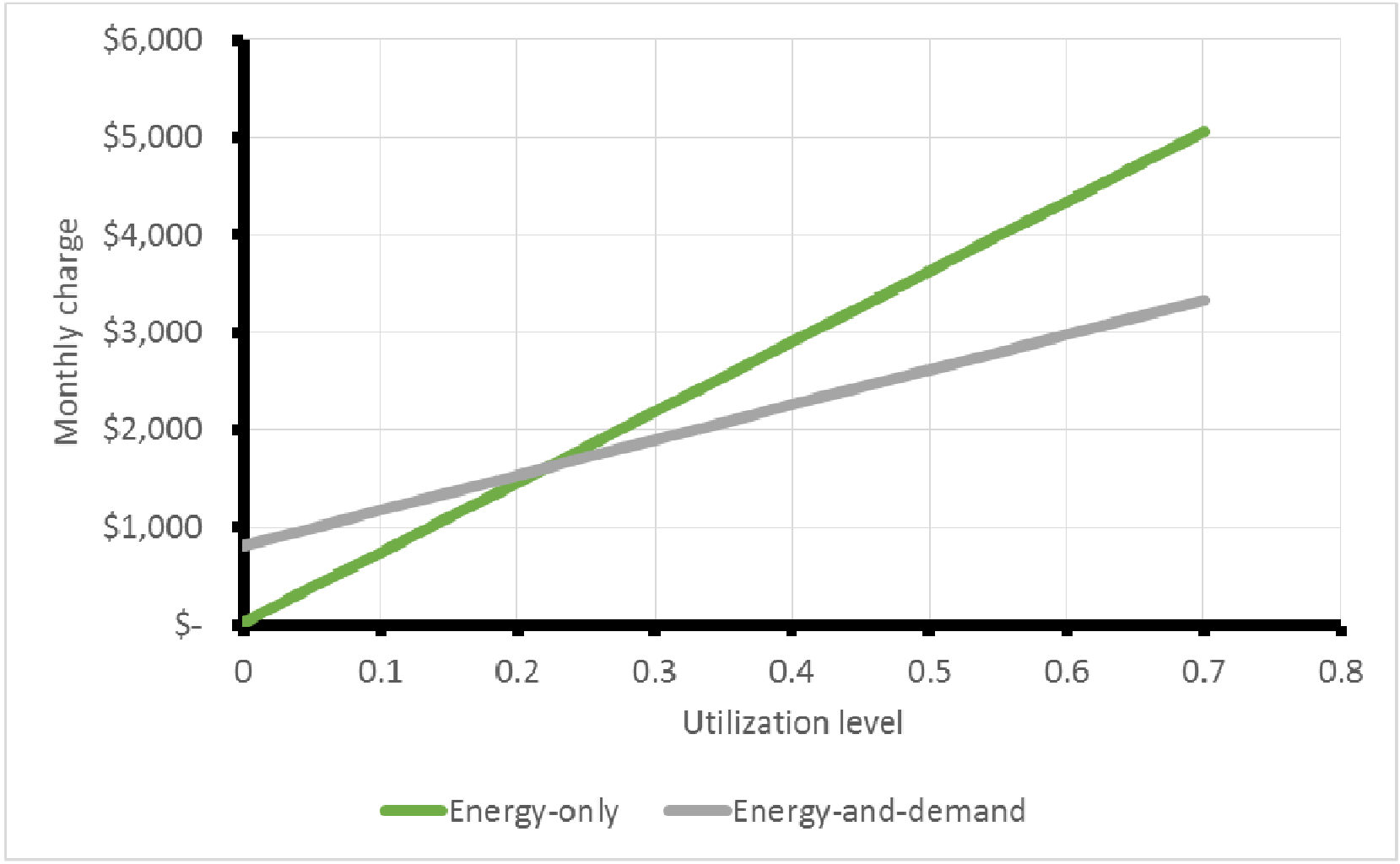
    Total = ($/month) + kWh * ($/kWh)

  - Energy-and-demand

    Total = ($/month) + kWh * ($/kWh) + **kW * ($/kW)**

- The energy-only rate includes power-related costs, but these are rolled up into the energy price
- **This makes the Energy-only kWh rate about twice as high as the energy (kWh) rate for the Energy-and-demand rate**

Total electricity bill changes with utilization (for any load)



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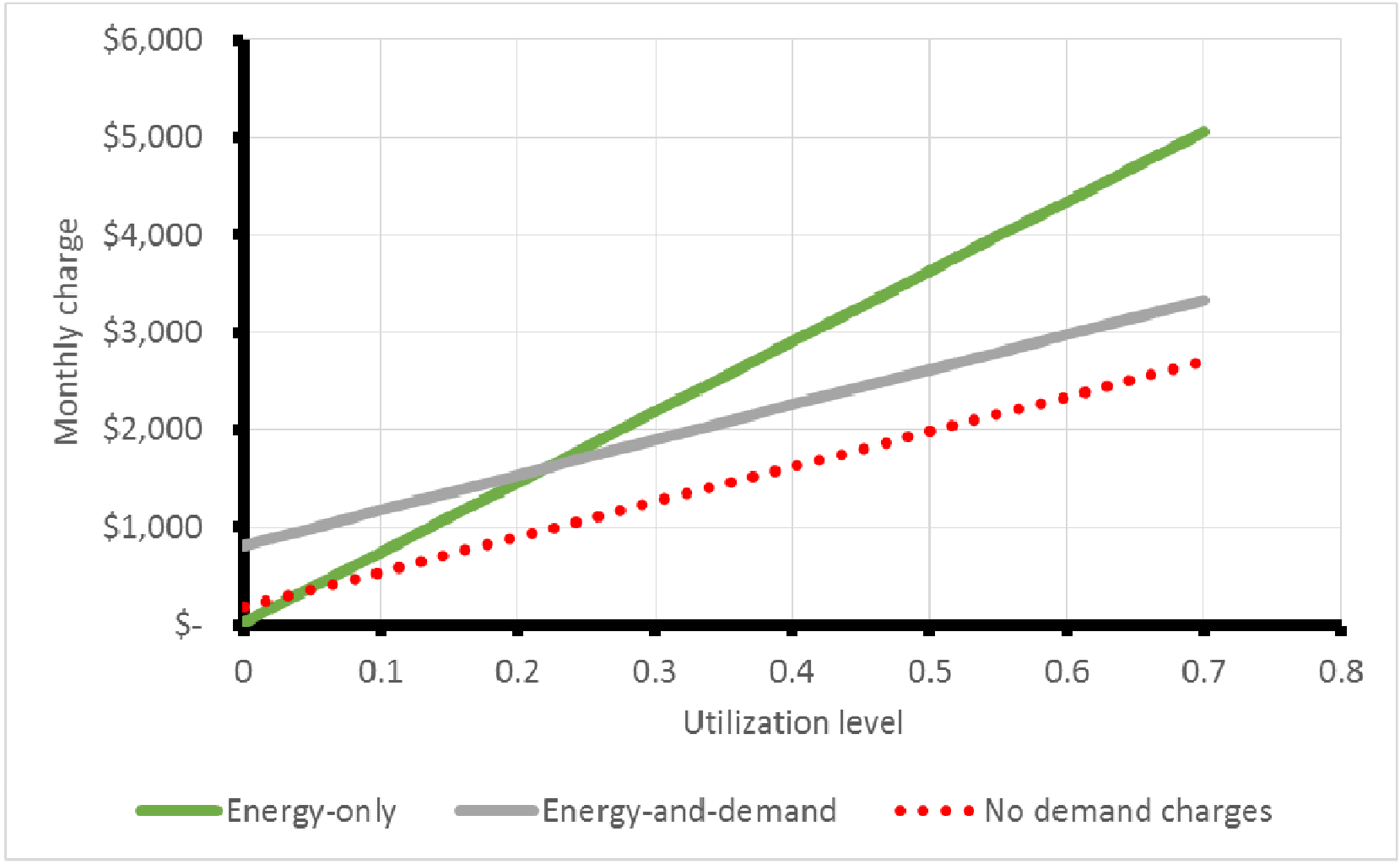


What are demand charges?

- It is important to remember that ratemaking is complex
- There are a lot of other aspects that are considered:
  - Energy efficiency
  - Income-assistance programs
  - Seasonality
  - Time-of-use effects
- Most of these end up getting averaged out in the creation of a rate in order to ensure simplicity
- However, this simplification means that care must be exercised when modifying rates outside of a ratemaking process

Fast charging demand charges based on utilization

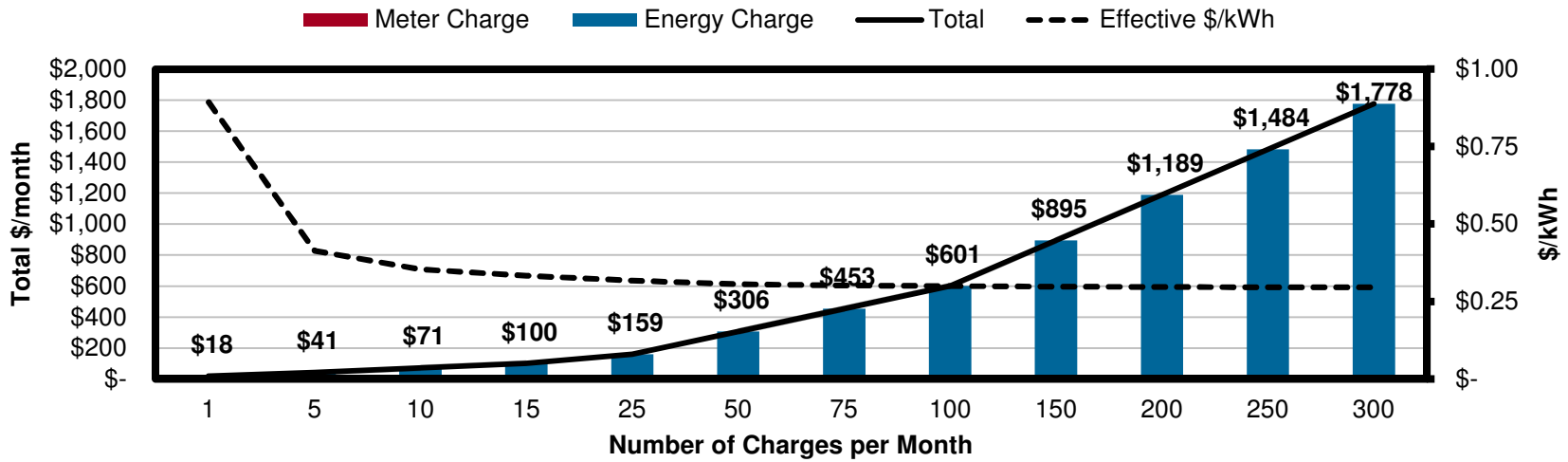
Simplified example for a fast charger

- This analysis uses two sample rates from one utility; even in California there are a dozen utilities and many relevant rates per utility
- This is meant to provide context for how the different rate factors affect total electricity purchase

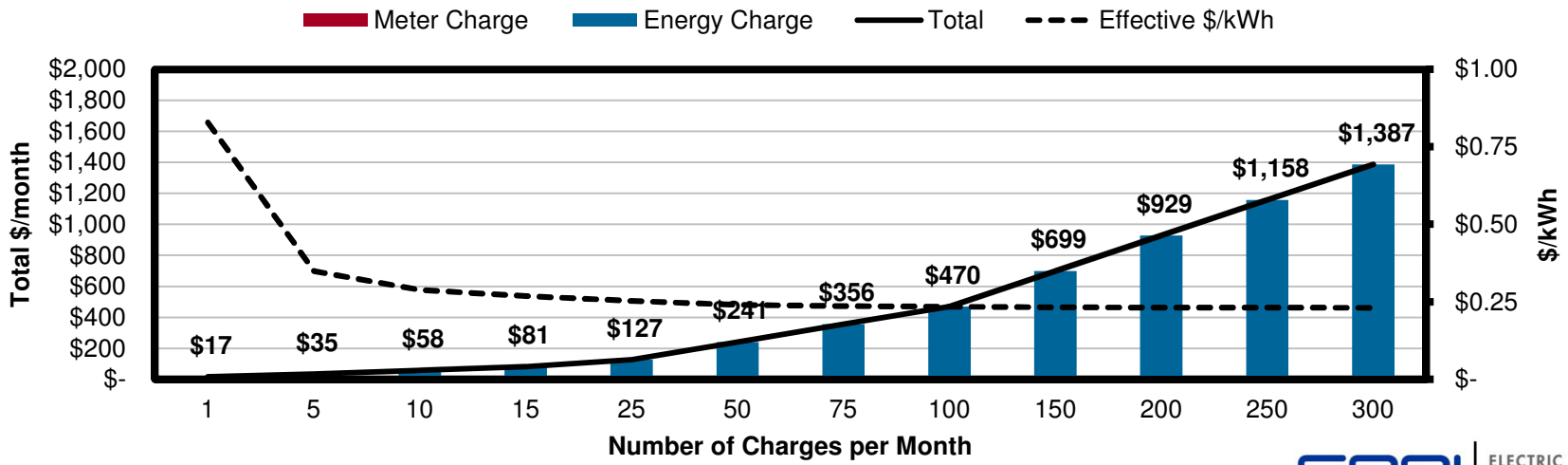
- (this is for a 50kW charger, providing 20kWh per charge)

Monthly Electricity Costs: Energy-only rate

Summer Monthly Cost



Winter Monthly Cost



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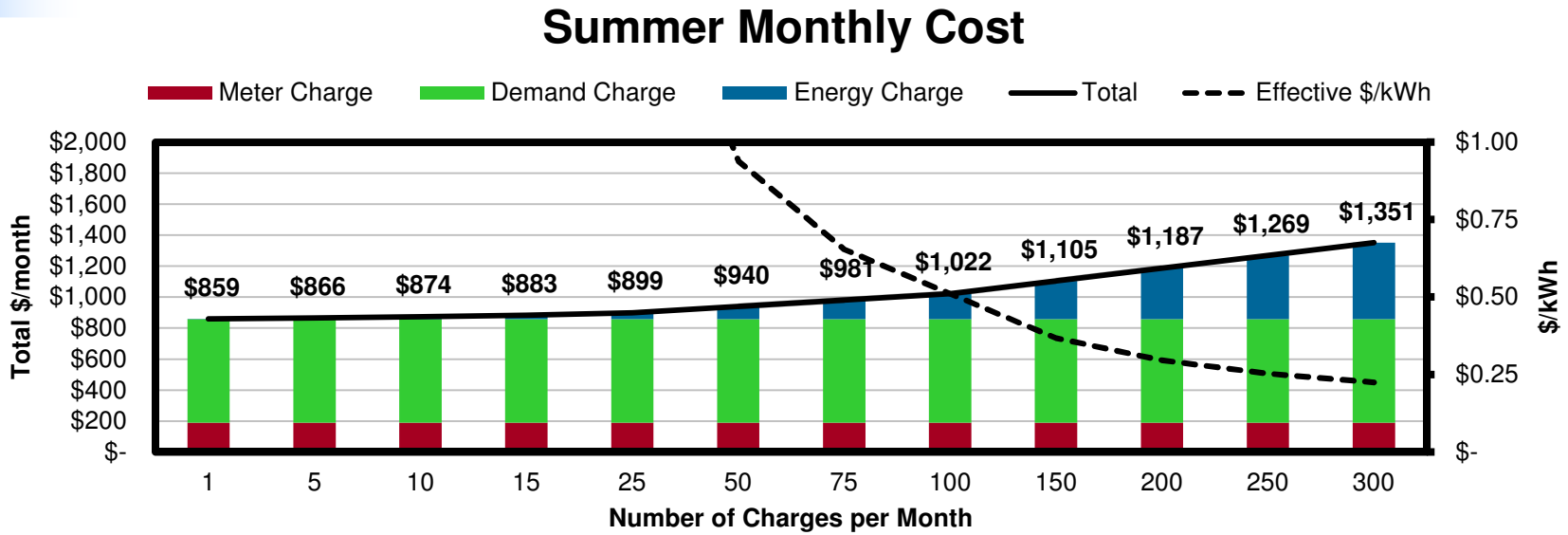
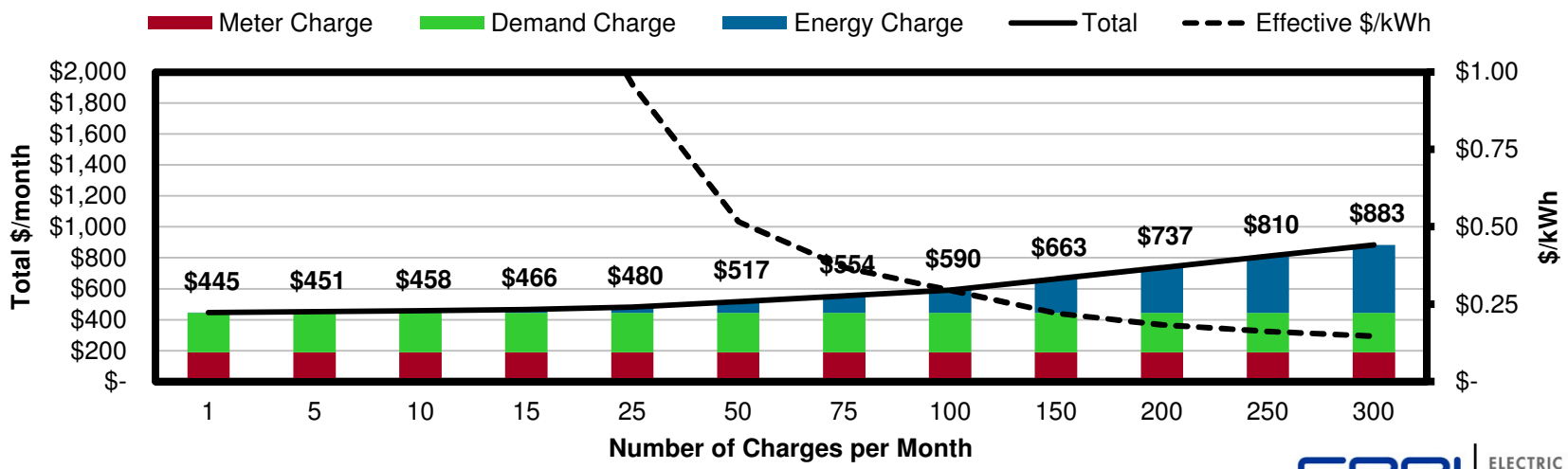
Monthly Electricity Costs: Energy-and-demand rate





Average Electricity Cost per Charge Varies With Utilization

Energy-only rate

Number of Charges	Winter	Summer
1	$ 16.40	$ 17.65
5	$ 6.80	$ 8.05
10	$ 5.60	$ 6.85
15	$ 5.20	$ 6.45
25	$ 4.88	$ 6.13
50	$ 4.64	$ 5.89
75	$ 4.56	$ 5.81
100	$ 4.52	$ 5.77
150	$ 4.48	$ 5.73
200	$ 4.46	$ 5.71
250	$ 4.45	$ 5.70
300	$ 4.44	$ 5.69

~$5/charge

Energy-and-demand rate

Number of Charges	Winter	Summer
1	$ 445.26	$ 859.43
5	$ 90.18	$ 173.15
10	$ 45.79	$ 87.36
15	$ 31.00	$ 58.77
25	$ 19.16	$ 35.89
50	$ 10.28	$ 18.74
75	$ 7.32	$ 13.02
100	$ 5.84	$ 10.16
150	$ 4.36	$ 7.30
200	$ 3.62	$ 5.87
250	$ 3.18	$ 5.01
300	$ 2.88	$ 4.44

~$5/charge

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Summary

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EPRI makes no recommendations on rates, but it is important to understand the implications of vehicle and charger behavior on total costs

- Fast chargers have unusual load characteristics
- It is very rare for a utility to supply a customer who is actually selling electricity; customers typically sell bicycles, books, ice cream, etc.
- This is going to require some creative thinking; however, it is important to understand the system before we start tinkering

Followup

- Let me know if you have questions or comments:

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Appendix: How are demand charges calculated?

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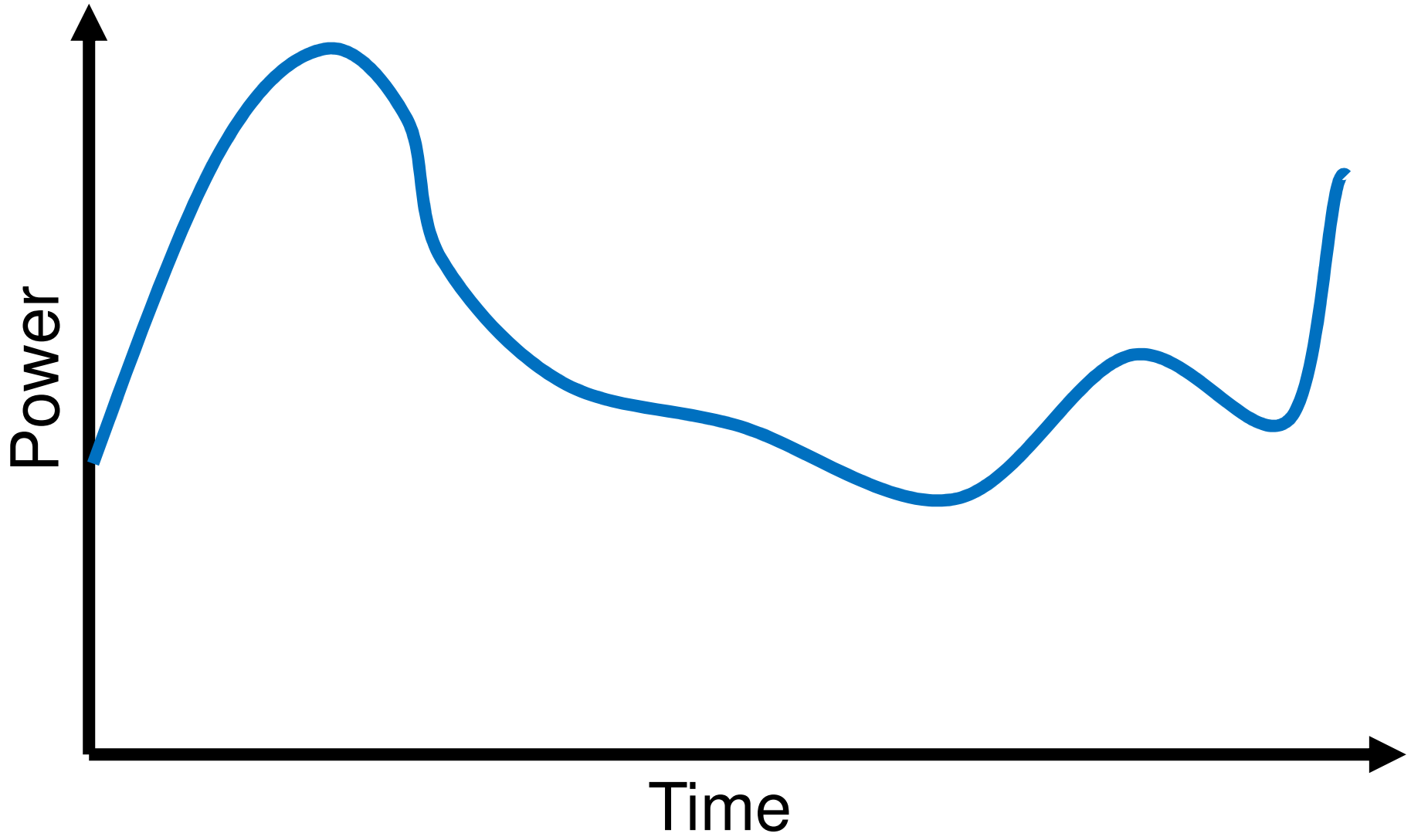

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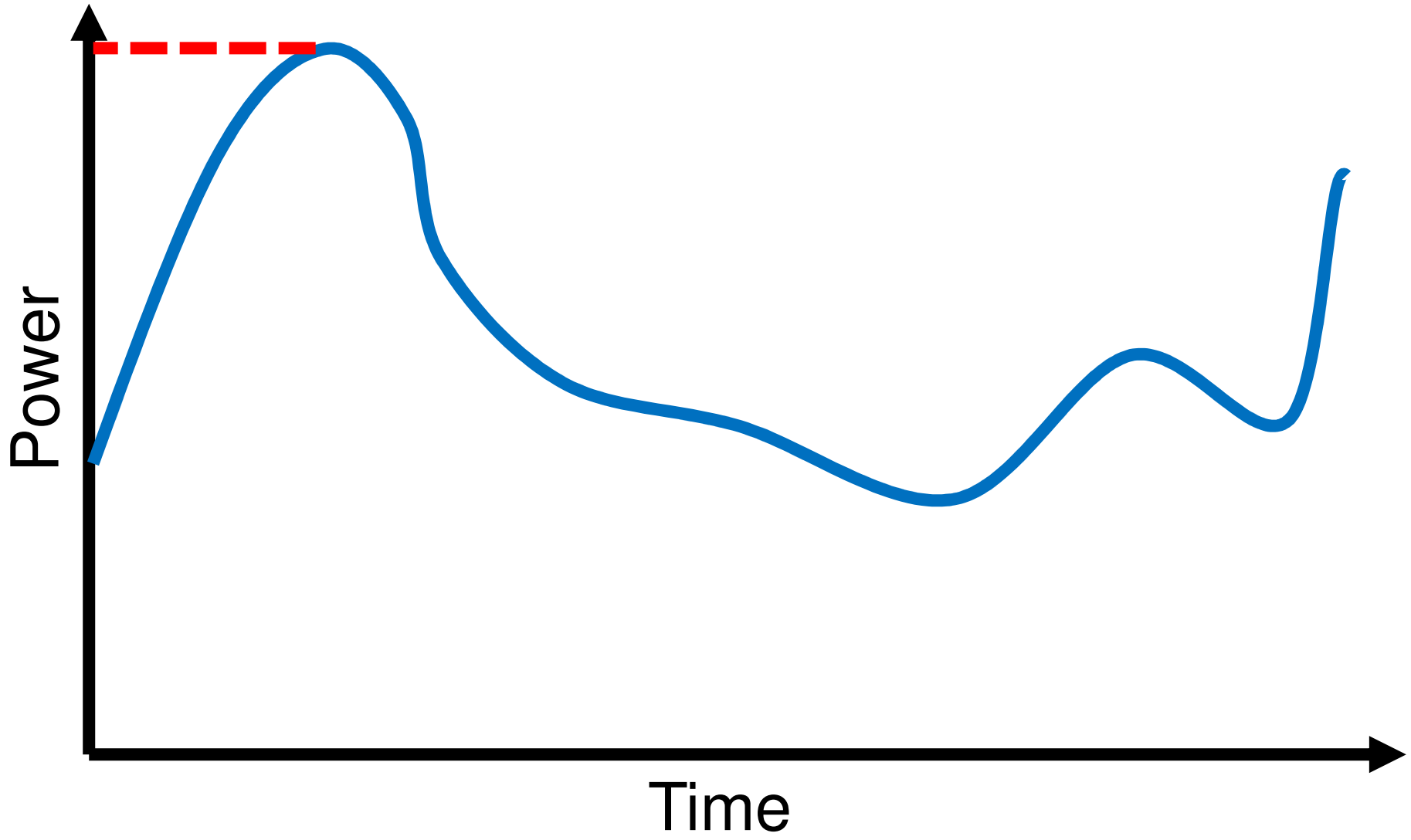

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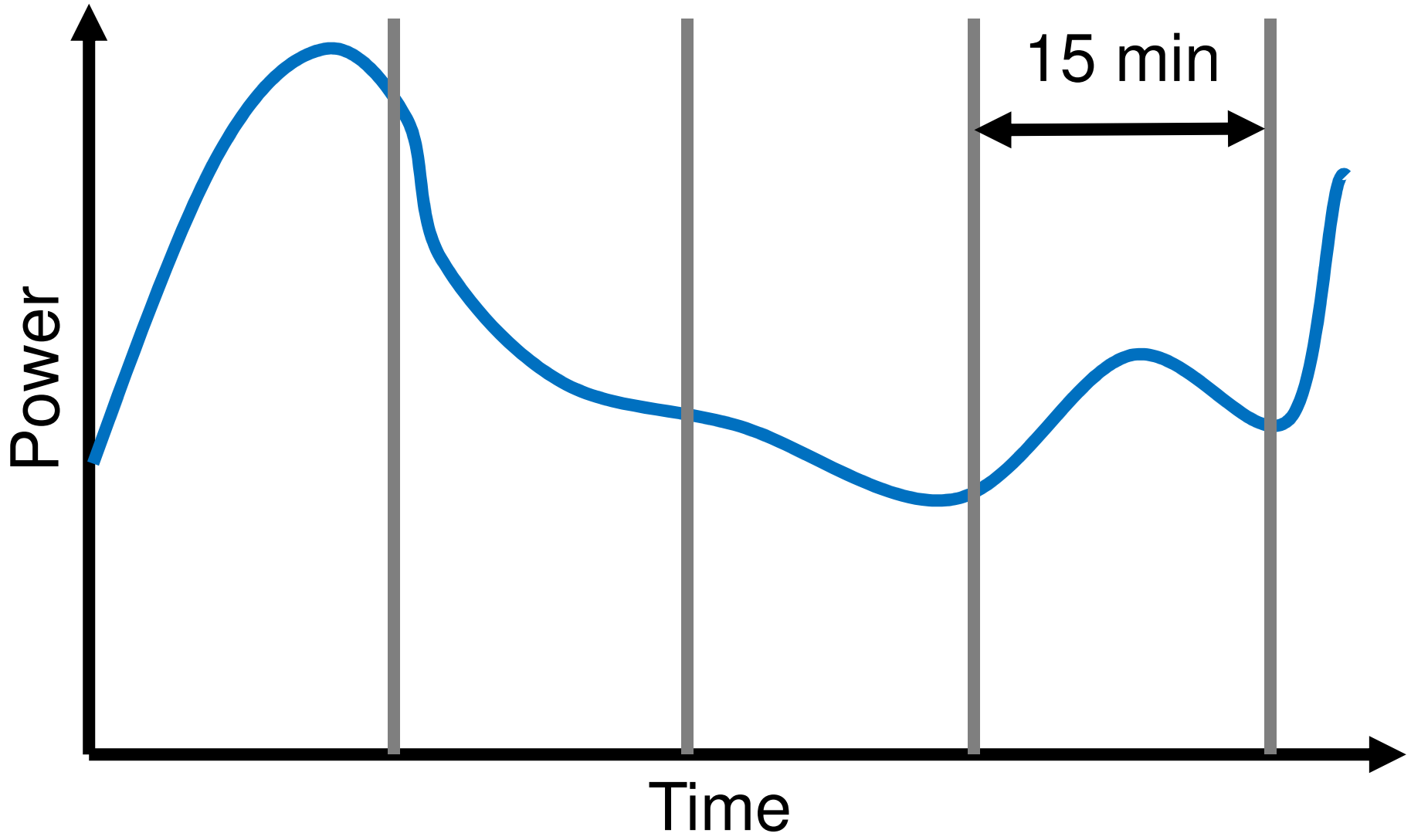

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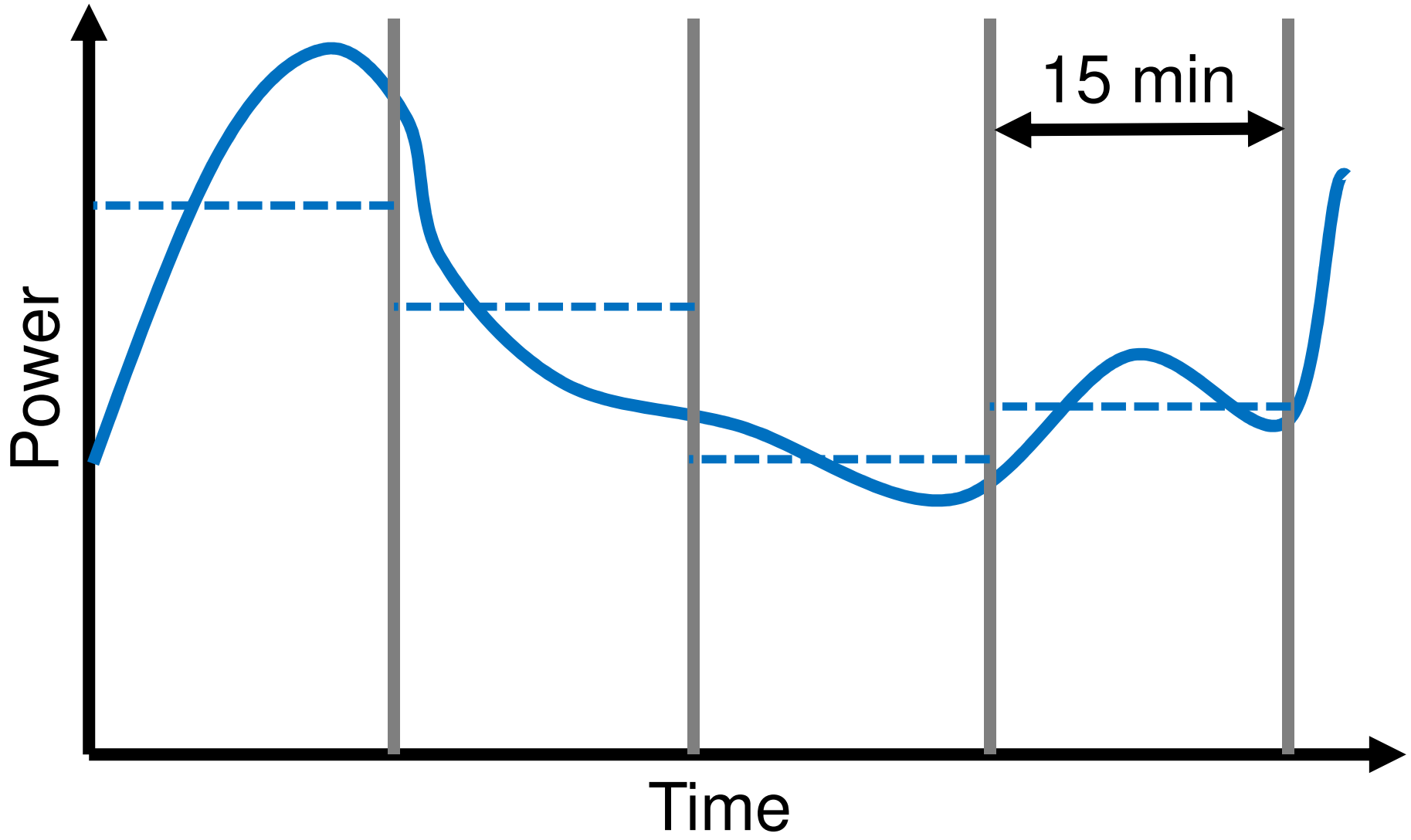
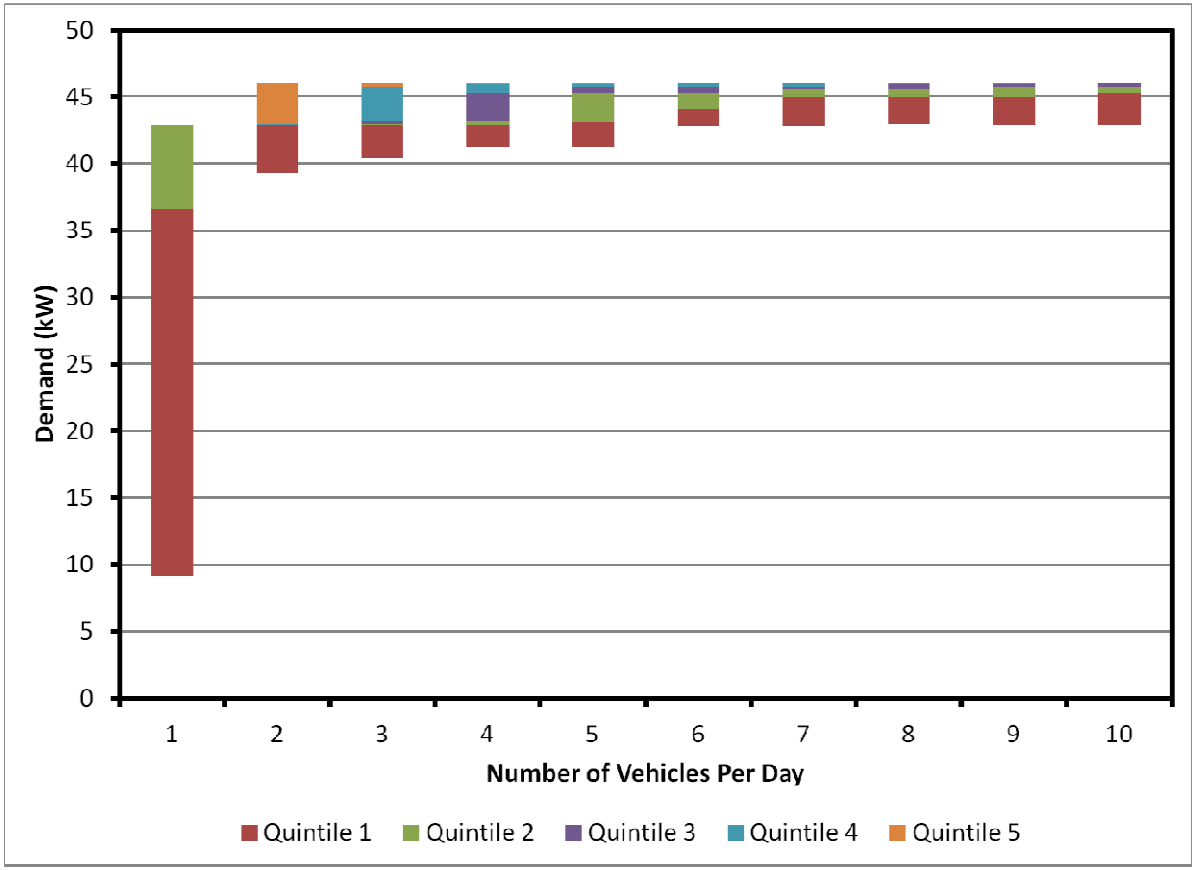


Effects of a 15 minute averaging interval for a single DC Fast Charger



- With a 15 minute interval (common in California), the demand is nearly equal to the power of the charger for almost all chargers, even at low utilization.