Pricing EV Charging Service with Demand Charge

Scientific Achievement

- We propose a pricing scheme for large EV charging systems that provably captures the impact each charging session has on total cost for the system.

Significance and Impact

- This work is a first step toward practical pricing schemes that encourage charging flexibility and reduce overall costs.

Technical Details

- Prices are based on the dual of the minimum cost scheduling problem
- Revenue adequacy is guaranteed if charging is scheduled optimally
- Online model predictive control achieves within 10% of optimal costs.
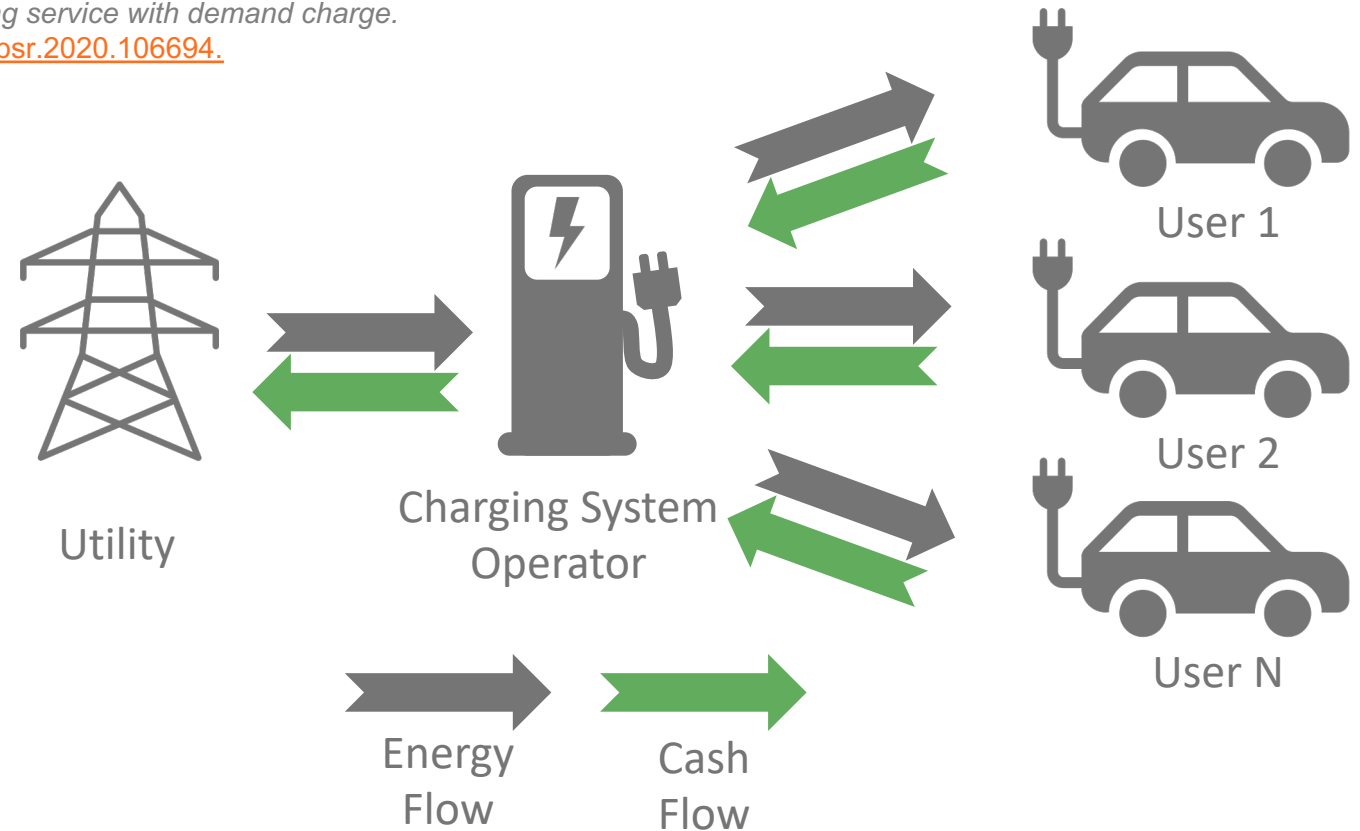
Flow of energy and revenues in a charging system. The Charging System Operator purchases energy from the Utility. The price paid for this energy is dependent on the amount of energy purchased, the time when the energy is used (time-of-use rates), and the peak power draw of the operator (demand charge). The Operator must decide how much energy to purchase at each time, which EVs to deliver that energy to, and how to allocate the costs to each EV. Our work uses model predictive control to solve the energy purchase/allocation problem and convex duality to solve the cost allocation problem. *Image credit: Z. Lee*

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