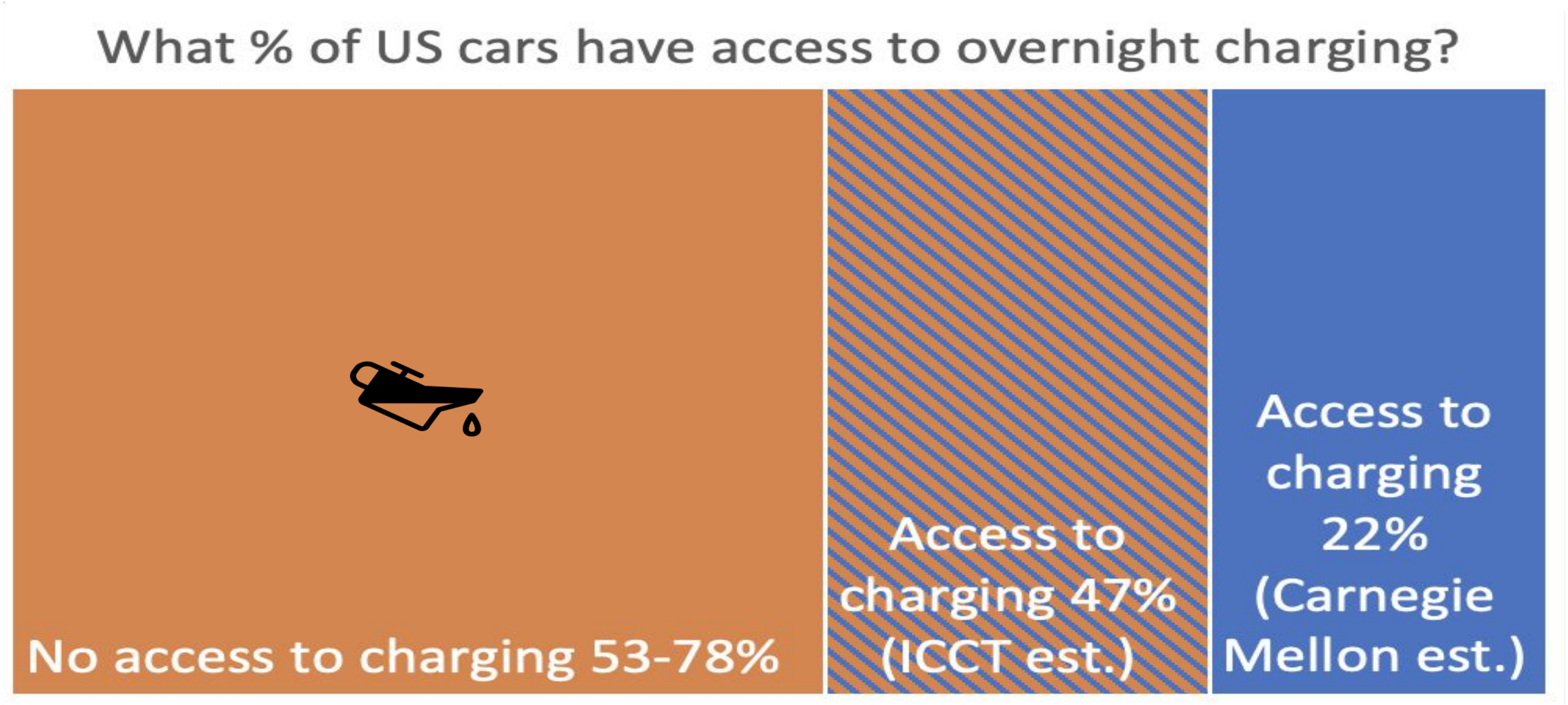
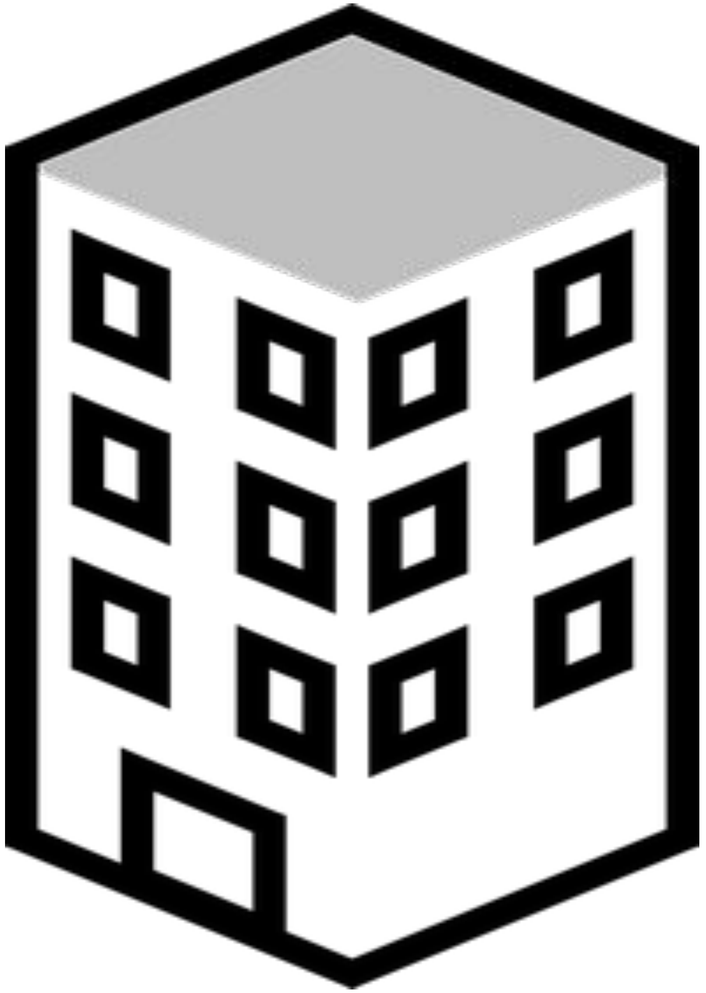
Clean electric miles for everyone

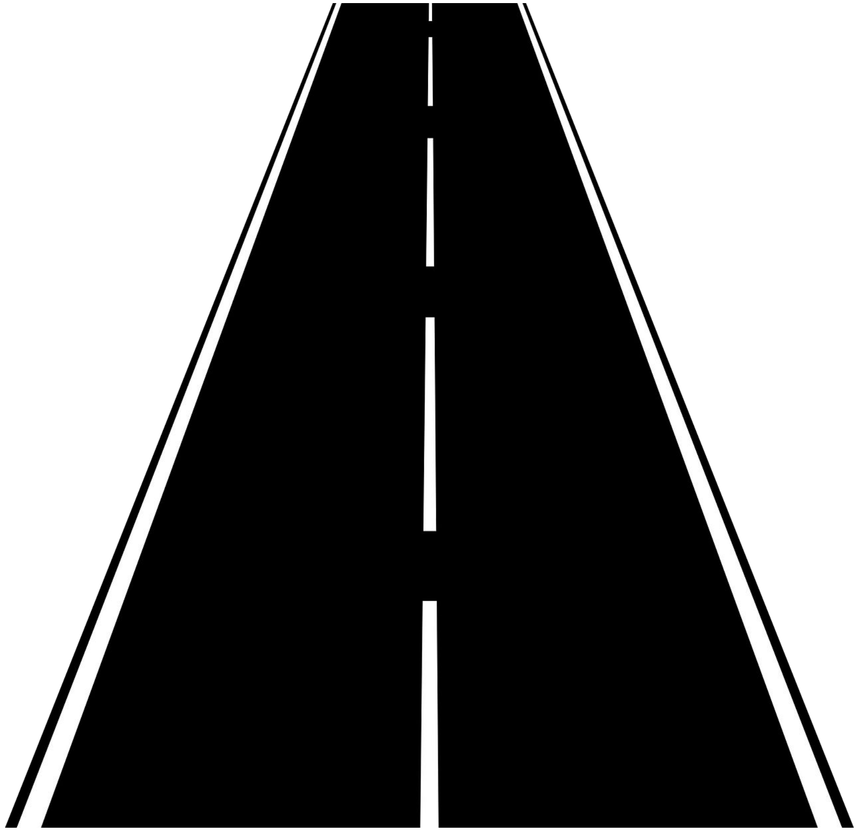
Today US EV sales are limited by charging access



EV use case is limited by charging availability + speed



Multi-unit dwellings
garages



Rural and street parking

Fleets

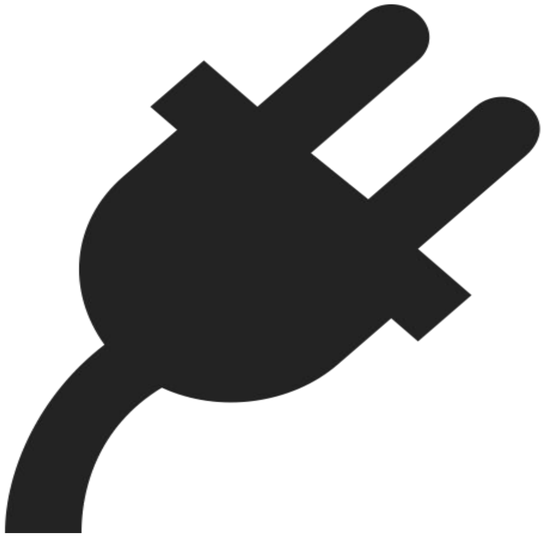
ample

Refueling needs to be as cheap, fast, and convenient as gas

Public L2 Charging

$6-20k per pile

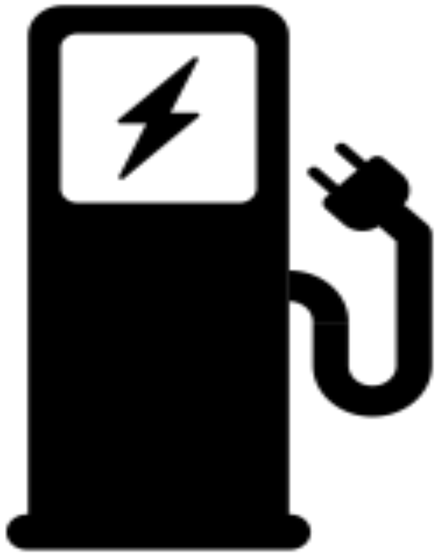
(4-16 hour charging)



Public DCFC+

$45-400k+ per plug

(30-40 min to 80%)



>$6/gal equivalent for DCFC

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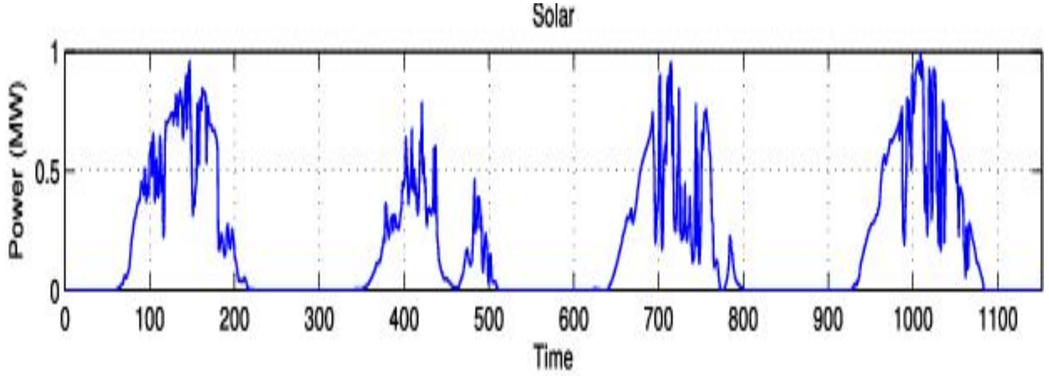
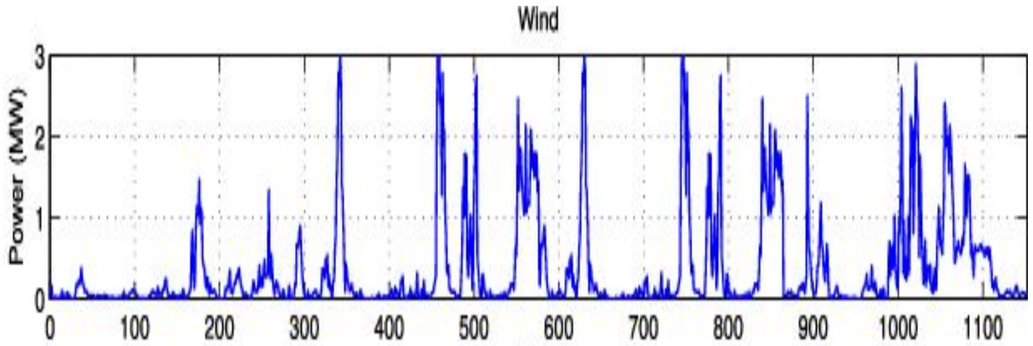
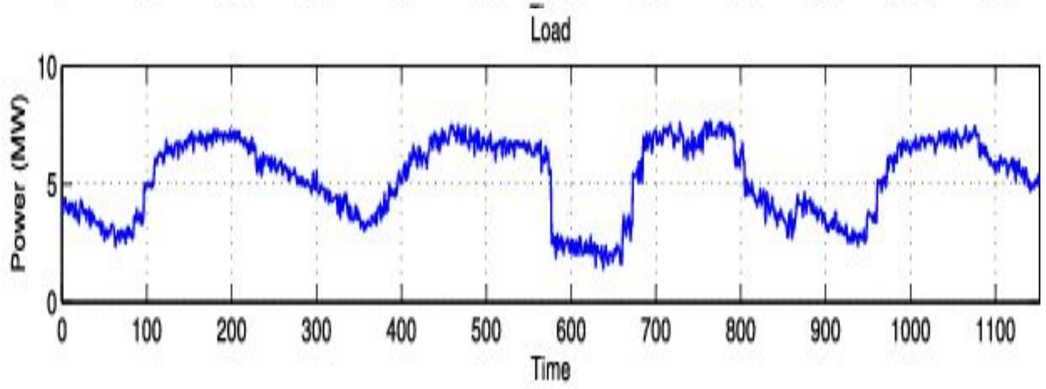
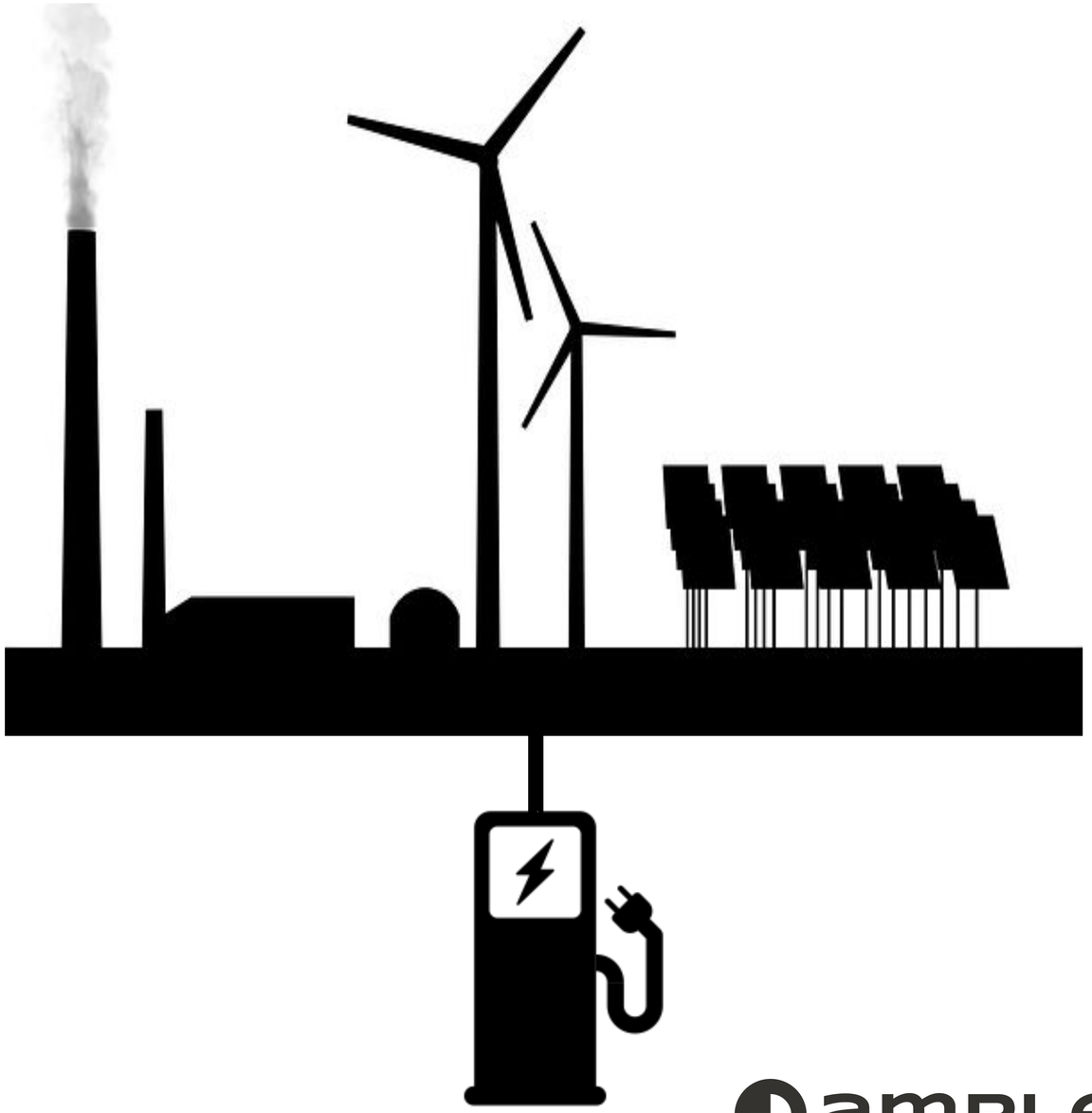
And it needs to rely on clean electricity









ample

It’s time to scale the market

2010-2020: Creating a market for clean energy technologies

Americans bought 667k EVs in 2021...

2020-2030: Building a carbon free economy

...20 trillion electric miles in 2050

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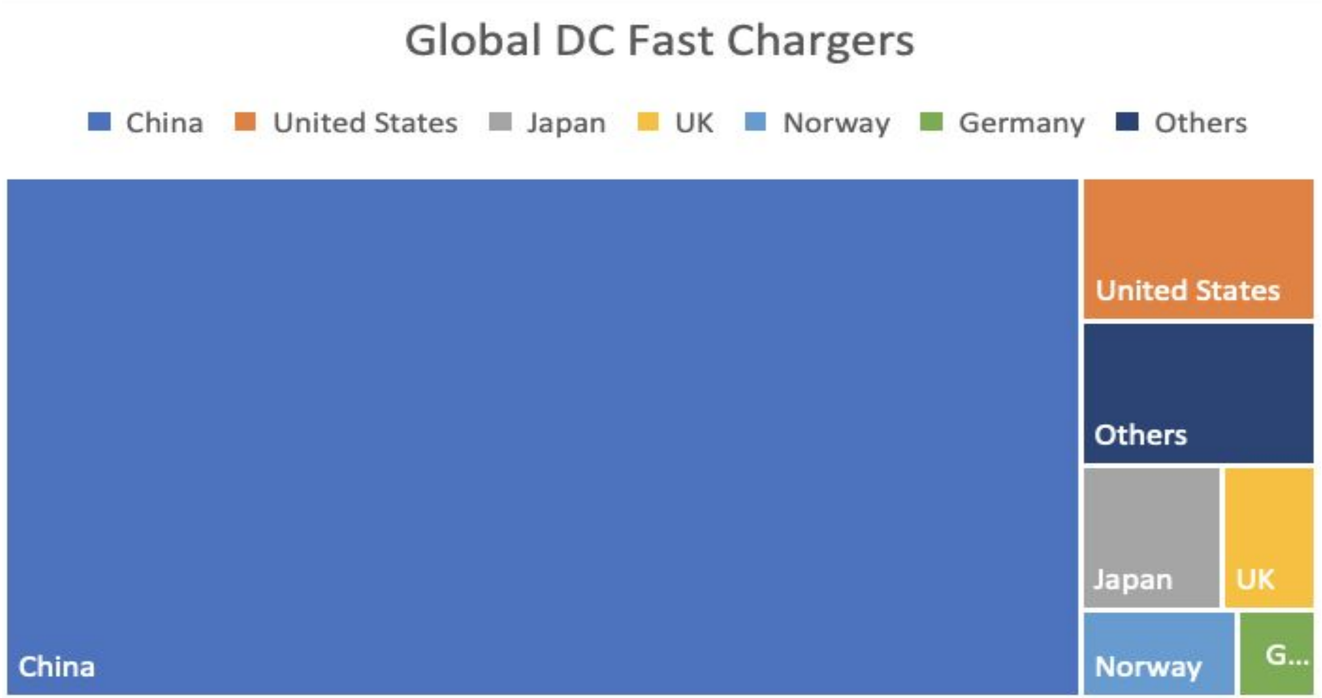
China is banking on swap

- One battery swapping station replaces >100 charging stations
- China has 2000 battery swapping stations or

200K 100kw chargers equiv



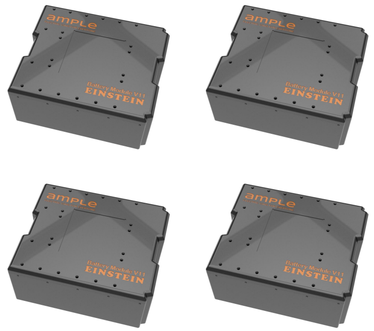
China, India, and Europe are banking on battery swap

- January 2022: Chinese automaker Nio deploying battery swapping stations in Norway, Germany, other countries
- Nio's 2025 target is 4000 stations globally or ~1.3 million/day capacity
- India will expand battery swapping

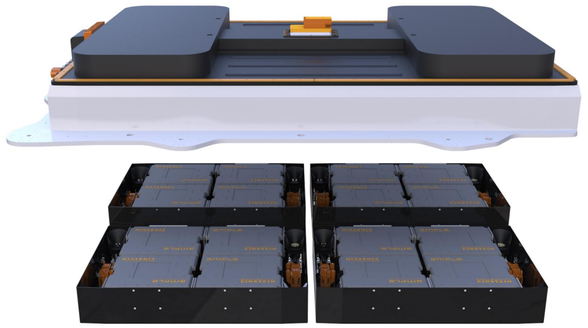
"Considering the constraint of space in urban areas for setting up charging stations at scale, **a battery swapping policy will be brought out and interoperability standards will be formulated**.'"

–Minister of Finance of India, Nirmala Sitharaman, February 1, 2022.

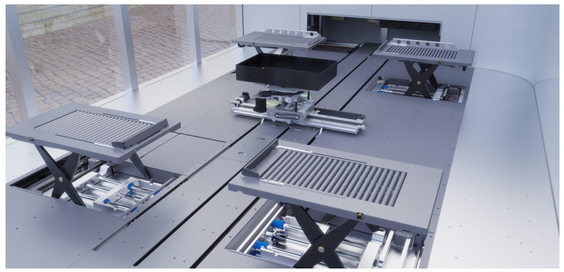
Ample “smart batteries” + autonomous robotics



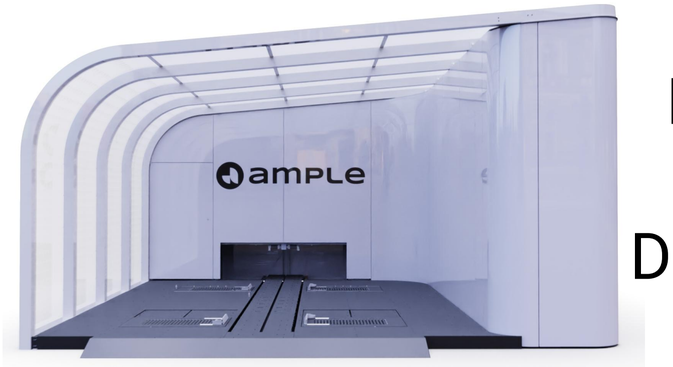
Smart
Modular **Batteries**



Vehicle
Specific
Adapter
Plate and
Trays



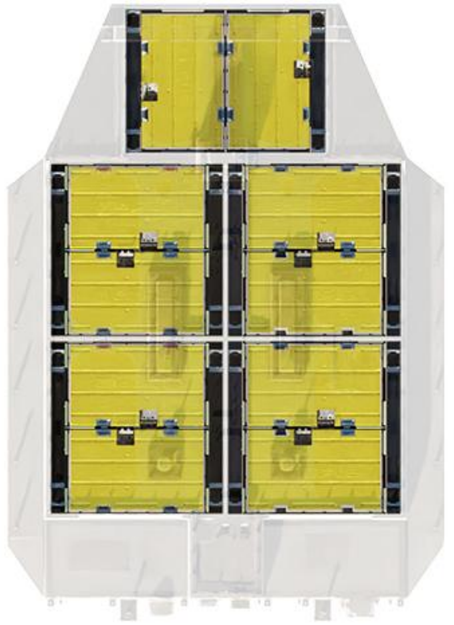
Autonomous
Battery Swap
Robot

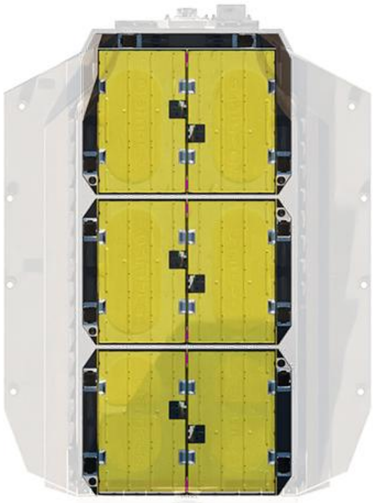


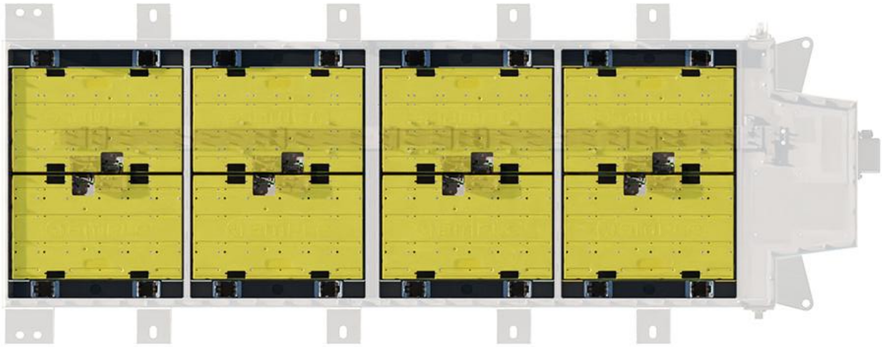
Battery Pod
Charging &
Dispenser Unit

ample

Same Module, Different Platforms







Ample is engaged in multiple fleet deployments

Markets (Urban Centers)

- Americas
- Europe

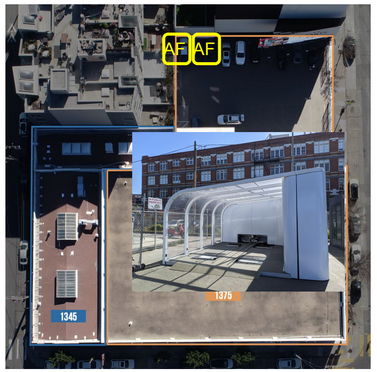
Vehicle Classes

- Passenger
- LCV/light-medium duty

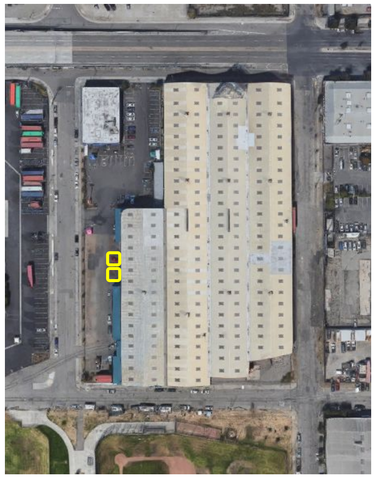
Segment (Fleets)

- Ride & Car Sharing, Taxi
- Last-Mile-Delivery
- Corporate, Municipal

Bay Area Deployment

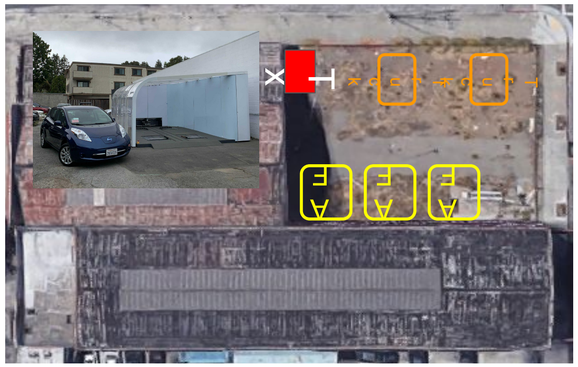


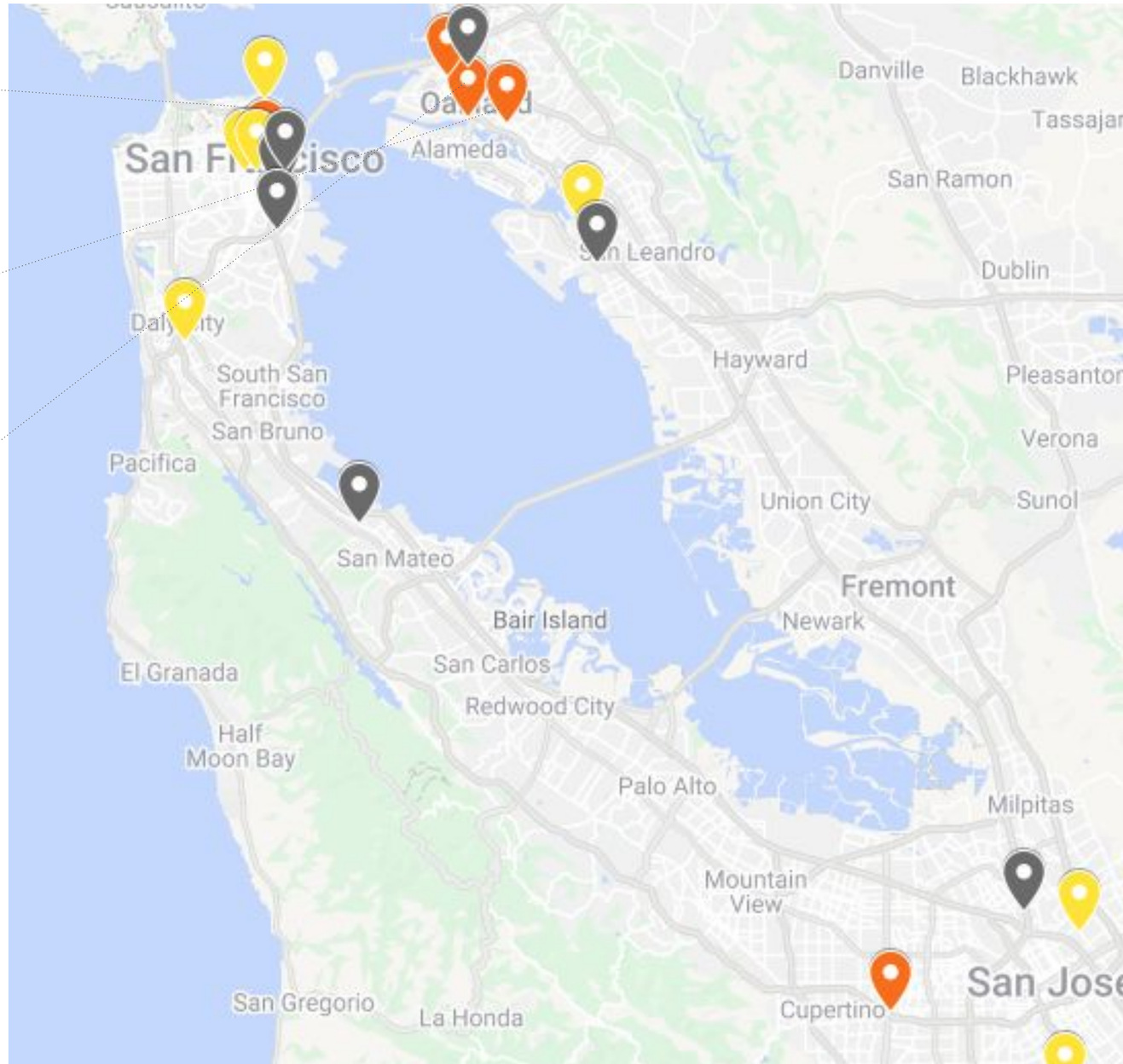
SF site



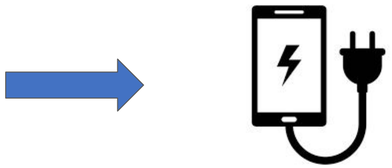
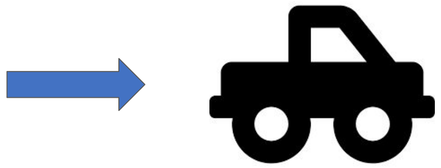
Oakland Site #2

Oakland - Jack London





Relevant IRA provisions for swapping + Ample

Provision		Guidance
45X Adv. Manuf. Prod. Credit: $10/kwh for modules, $35/kwh for cells		**–Batteries as a Service business should be explicitly covered.** **–As battery cell manufacturer, Ample should be allowed to receive credit even though it does not sell batteries (e.g. Ample could transfer batteries to leasing subsidiary and elect to treat it as sale to "unrelated person.")**
30C EVSE property credit 6%, or 30% if prevailing wages paid and apprentices used, up to $100,000		**–Batteries in swapping station should be eligible for the 30% credit.** **–No relevant apprenticeship programs for robotics and other components of battery swap station. Guidance should allow for flexibility to avoid penalizing battery swapping.**
45W Qualified Commercial Clean Vehicle Credit –Lesser of 30% of cost OR Δ with ICE –Up to $7,500		**–Swappable vehicles should be treated equitably.**
30D Clean Vehicle Credit for EVs $3750 for cells (FTA critical minerals); $3750 for components (NAFTA)		**–Batteries are removable (not associated with specific vehicle).** **–Final assembly: installing battery adapter plate, trays, and swappable batteries at Ample facility should count as final assembly because swappable EV cannot be driven without these components.** **–Vehicle may be purchased without battery.** **–Taxpayer will not own battery .**

ample

From: **Levi Tillemann (Vice President for Policy and International Outreach, Ample Inc.), Matthew McGovern (Policy Counsel, Ample, Inc.)**

To: **U.S. Department of Treasury**

Date: **November 3, 2022**

Re: **Treasury Notice 2022-50**

Introduction

On October 5, 2022 the U.S. Treasury released six notices requesting public input on climate and clean energy tax incentives in the Inflation Reduction Act. This memo is in response to Treasury's request for comments on elective payments of credits under § 6417 and transfer of credits under § 6418 the Internal Revenue Code (Code), as amended by §§ 13401 of Public Law 117-169, 136 Stat. 1818 (August 16, 2022), commonly known as the Inflation Reduction Act of 2022 (IRA). The goal of this memo is to assist Treasury in considering a number of technological and business model aspects of battery swapping – a burgeoning trend within international EV markets – and batteries-as-a-service (BaaS) business models more broadly. Both will become increasingly salient as EV penetration rates climb over the coming decades. Battery swapping promises to have significant implications for consumer EV markets as EV ownership expands beyond early adopters to populations that lack access to at-home charging. With respect to §§ 6417 and 6418 there are a number of differences between companies like Ample that manufacture EV batteries for leasing in batteries-as-a-service applications and companies that sell EV batteries.

The organization of this memo is as follows:

1. Policy and regulatory background on battery swapping.
2. Background on Ample and modular battery swapping.
3. Response to specific questions posed by Treasury's Request for Comments on §§ 6417 and 6418 of the Internal Revenue Code.

Policy and regulatory background on battery swapping in electric vehicles

The consumer EV industry is little more than a decade old. At its inception, a debate on optimal EV architecture for charging contemplated two separate technology pathways: tethered charging (represented by Tesla and Nissan) and battery swapping (represented by Renault and Better Place). Early EV policy included frameworks supporting both of these pathways and many policymakers considered each pathway to be equally likely. However, over the late 2000s and early 2010s policy and market developments nudged the industry toward a tethered charging model for early EV deployment. The first of these was the bankruptcy of the battery swapping company Better Place. This was paired with the success of Tesla – which was saved from bankruptcy by a large Department of Energy Advanced Technology Vehicle Manufacturing

loan. But there were additional factors. For instance, early EV purchases were concentrated among affluent early adopters. These individuals tended to place a premium on performance (e.g. 0-60 times) and, conveniently, most had access to home charging. As a result, almost all EVs sold in the United States relied on tethered charging (e.g. plugging in an electrical charging cable in order to transfer electrons). Slow charge times and high EV costs meant that EVs were primarily accessible to high-income individuals capable of charging at home. Accordingly, in America EVs are still a relatively small proportion of automotive sales, they are primarily owned and operated by affluent individuals, and they can therefore rely on home charging for about 90% of energy needs – only utilizing public charging periodically.

But America accounts for only about 10% of global EV sales[1] and larger EV markets (China at 57% and the EU at 27%) have already pushed past the market for early adopters. (In China roughly a quarter of new vehicle sales are electric.) Because of this, China and Europe have begun deploying a variety of next generation EV charging technologies. One of the most important is battery swapping which allows drivers to change out an empty battery for a fully charged one in minutes. This approach is fast, low-friction and reduces strain on the grid compared with fast charging. In the world's largest EV market, China, the market for battery swapping electric vehicles is growing quickly. China already has over 2000 battery swapping stations for light duty electric vehicles, many more for heavy duty electric vehicles and hundreds of thousands of battery swap-enabled EVs on the roads. Battery swapping stations, like gas stations, can fully charge many dozens or even hundreds of EVs a day. Whereas today's charging stations are generally limited to the single digits.

As America's EV market reaches a level of maturity similar to China and Europe, its reliance on battery swapping will increase – especially for EV drivers without access to overnight charging. There are some unique business model and technology considerations that Treasury must consider so as not to inhibit growth of this important market.

Background on Ample
Ample provides modular battery swapping services to fleet customers and manufactures all of the major components used in its battery swapping system, including battery modules and battery packs, at its facility in Brisbane, California. Ample's batteries-as-a-service (BaaS) model repowers EVs faster than conventional DC fast-charging at a price lower than gasoline. Ample has deployed a fleet of swap-enabled Nissan Leafs and Kia Niro EVs in the San Francisco Bay Area in partnership with Uber and the rideshare rental car company Sally. Ample currently is adding more swapping stations and swap-enabled EVs in the Bay Area, and will be expanding into other US and European markets soon.

Like many providers of battery swapping services worldwide, Ample does not sell its EV batteries. It provides EV repowering services on a "pay-as-you-go" basis. Drivers pay a monthly fee to use the swapping service and Ample's batteries, plus a per-mile charge. This reduces up front costs and leads to more efficient utilization of scarce battery stocks. Vehicles can right-size their battery for a specific duty cycle and fast swapping reduces the charging anxiety associated with running out of energy. Currently, Ample's major customers are rideshare and last mile delivery fleets.

[1] Canalysis, Global EV sales up 63% in H1 2022, with 57% of vehicles sold in Mainland China (August 11, 2022) https://www.canalys.com/newsroom/global-ev-sales-h1-2022

Because of these differences, treatment of battery swap enabled vehicles under § 30D will not be the same as treatment of tethered charging vehicles. But to the extent possible, treatment should be equivalent as the IRA is clearly intended to be technology neutral.

The mechanics of Ample modular EV battery swap technology
Ample's platform consists of four major components (swapping stations; vehicle plates; vehicle trays; and battery modules) that form the basis of a drop-in replacement for OEM EV battery packs and enable faster, more affordable repowering than DC fast-charging.

Battery Module: Battery modules contain lithium-ion battery cells connected serially. Battery modules can be stacked and arranged into various form factors (shapes) in order to fit into different vehicle chassis. This is accomplished by nesting smaller battery modules into a larger tray. The tray serves two functions: 1) It secures the battery and 2) provides a latching mechanism to allow the tray to fasten securely into an adaptor plate.

Tray: Each vehicle holds multiple trays, and trays in turn house one or two battery modules side-by-side. They allow the battery module and its attendant electronics to securely interface with the plate.

Plate: Ample's adaptor plate is the same size and shape as the OEM battery pack, with the same mechanical, electrical, and data interfaces. A plate typically holds four trays, but this can be adjusted depending on the size of the vehicle and the geometry of the undercarriage and OEM battery pack. Each Ample-enabled vehicle will have one plate installed where a fixed battery pack would otherwise be located.

Swapping Station: The battery swap station utilizes an array of interconnected subsystems in order to safely and efficiently remove discharged modular battery packs from a vehicle, replace them with fully charged modular battery packs, and recharge the discharged battery packs.

The swapping process
The process of swapping begins by raising the vehicle via a lift embedded in the floor of the Ample swapping station. After the vehicle is raised, Ample's swapping robot positions itself underneath a tray and sends an electronic handshake to the vehicle instructing it to release the adjacent tray. The tray is unlocked by means of latching mechanisms that are internal to the vehicle (and thus protected from debris, inclement weather and under-vehicle impacts). The robot then delivers that tray to a swapping bay where a robot removes discharged batteries and replaces them with charged batteries. Discharged battery modules are racked for charging and subsequent swapping. This process is repeated until every tray within a vehicle has been swapped.

This is, obviously, very different from tethered charging. Accordingly, some of the key assumptions underlying the business model for tethered charging do not hold true for battery swapping electric vehicles. It will be important for Treasury to pursue technology neutral guidance that does not needlessly bias the implementation of the IRA against battery swapping and Battery as a Service (BaaS) business models. Some key considerations that should impact guidance are enumerated below.

US Treasury Request for Comments

On October 5, 2022, the IRS and US Department of Treasury issued Notice 2022-50 requesting comments to help inform guidance and implementation of the elective payment provisions and elective transfer provisions under §§ 6417 and 6418. Ample requests that the IRS and Treasury provide maximum flexibility for entities taking advantage of the elective payment provisions and elective transfer provisions to further the climate, energy savings, and job creation goals of the Inflation Reduction Act. Treasury and the IRS should make sure they are not favoring or disfavoring one technology or business model over another. The text of the Inflation Reduction Act is explicitly technology-neutral and business-model neutral.

Elective payment of applicable credits under § 6417

Section 6417(b) defines the term "applicable credit" to mean each of the following:

> *(6) in the case of a tax-exempt entity described in § 168(h)(2)(A)(i), (ii), or (iv), the credit for qualified commercial vehicles determined under § 45W by reason of § 45W(d)(3);*
>
> *(7) the credit for advanced manufacturing production under § 45X(a);*

- Section 45W provides a credit for the purchase of clean commercial vehicles and § 45X provides credits for manufacturing a variety of clean technologies, including EV batteries like those produced by Ample.
- While Ample is currently focused on ridesharing fleets like Uber and Lyft, Ample intends to also manufacture swap-enabled EVs for non-profit and government fleet use. Accordingly, Ample requests that IRS guidance provide flexibility not bias implementation either for or against specific technologies or business models.

Treasury has requested comments on § 6417 on p. 15-19 of Notice 2022-50. Beyond Ample's request for technology and business-modely neutral guidance in the spirit of the Inflation Reduction Act, Ample does not have specific requests for guidance § 6417.

Transfer of certain credits under § 6418

Beyond Ample's request for technology and business-modely neutral guidance in the spirit of the Inflation Reduction Act, Ample does not have specific requests for guidance under § 6418.

Conclusion

The comments above address topline recommendations for §§ 6417 and 6418 of the Inflation Reduction Act. In general, Ample has seen a great deal of flexibility and good will from federal policymakers on addressing similar issues. The IRA is premised on the importance of creating a level playing field for innovators working to solve the problems of large-scale electrification. The IRA's clear legislative intent is that its various provisions be instituted within a technology neutral framework.

Conservatively, it is safe to assume that fewer than 1% of vehicle miles traveled in the U.S. are currently electrified. In order to catalyze the electrification of the remaining 99% of vehicle miles traveled, we strongly urge Treasury to pursue technology neutral, performance-based standards that are open to innovation.

Technology neutrality and business model neutrality will be a critical variable determining whether the United States is successful in achieving electrification and decarbonization goals and accomplishing maximum decarbonization at the lowest possible cost. Well-designed policies will avoid command and control-style technology requirements in favor of performance-based requirements based on technology-neutral criteria.