

Mobility Tech

Q2 2021 VC update





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This report serves as a quarterly snapshot of the mobility tech vertical in Q2 2021. For a comprehensive, detailed analysis of the mobility tech industry by segment, please see our latest [mobility tech annual report](#).

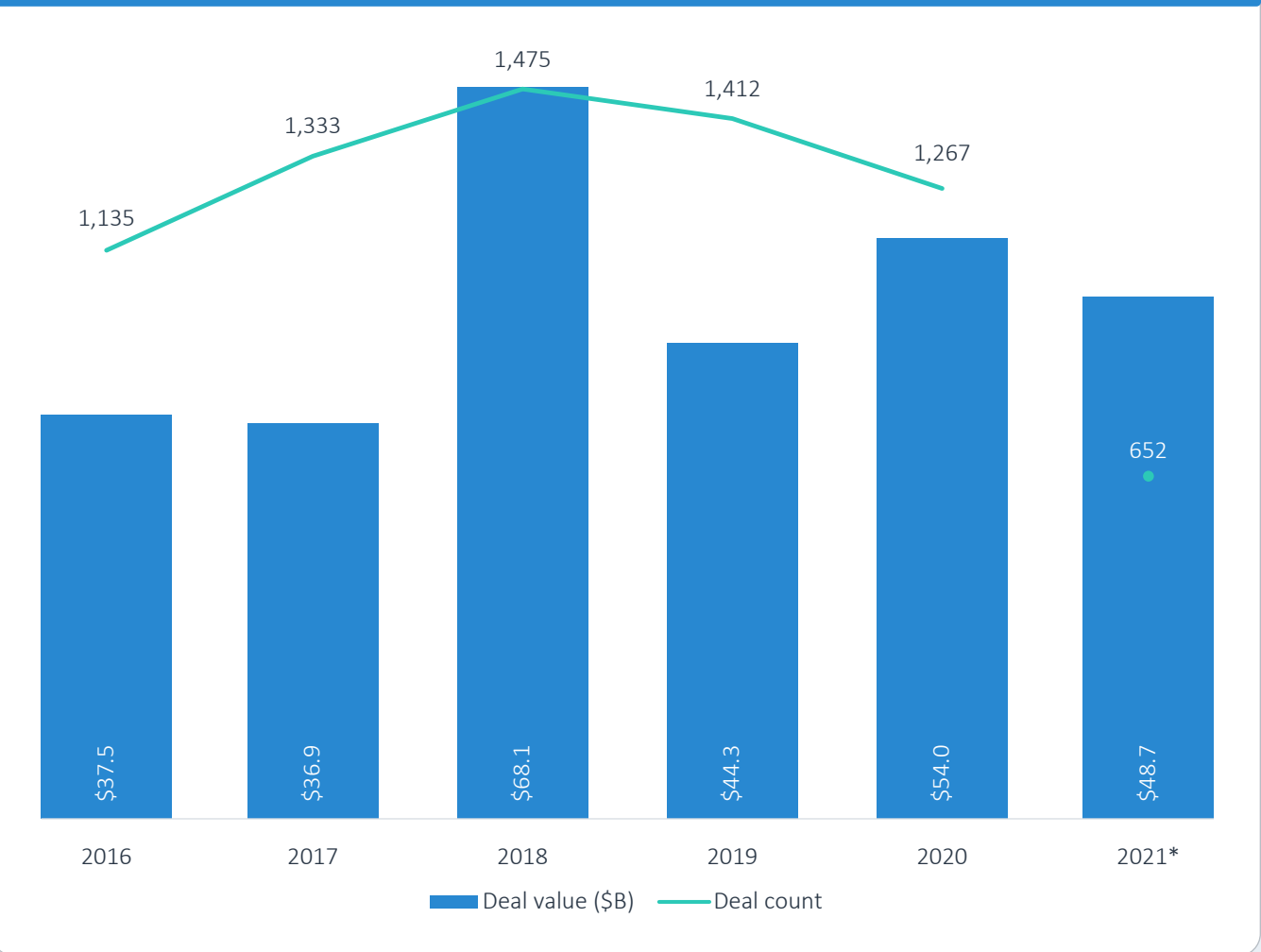


Vertical overview

The mobility industry represents a sprawling ecosystem of startup-driven technologies that address both the growing list of transportation-related problems stemming from urbanization—such as congestion and emissions—and the increased demand for affordable, convenient, and environmentally friendly transportation. While ridesharing, micromobility, and carsharing startups generally connect people to vehicles through mobile and digital platforms, industrial startups are manufacturing new types of vehicles, such as e-bikes, scooters, autonomous cars, electric cars, and even flying cars. Another startup subset is designing enablement technologies to power and support these budding mobility ecosystems. Over the past year, the mobility tech industry experienced increased investment flows as the COVID-19 crisis exposed many underlying problems within existing transportation systems. The growing focus on climate change also drove investment, as consumers increasingly demand electric vehicles and governments pass more decarbonization initiatives. Encouraged by these developments, venture investors poured a staggering \$23.1 billion into mobility tech startups in Q2 2021—putting the year on pace to break the record for mobility investing. Additionally, a flurry of mobility tech companies listed publicly or announced plans to do so via reverse mergers with special purpose acquisition companies (SPACs).

We believe demand for low-cost, convenient, and environmentally oriented mobility tech solutions will continue to drive long-term industry growth. Industry support from governments and investors—as well as growing consumer demand—is boosting adoption of mobility tech services, while autonomous, connected, and electric vehicle (EV) technologies are making significant advancements. We estimate the market for emerging mobility tech solutions is substantial; we forecast that an additional \$250.0 billion in VC will be invested in related technologies and services by 2025.

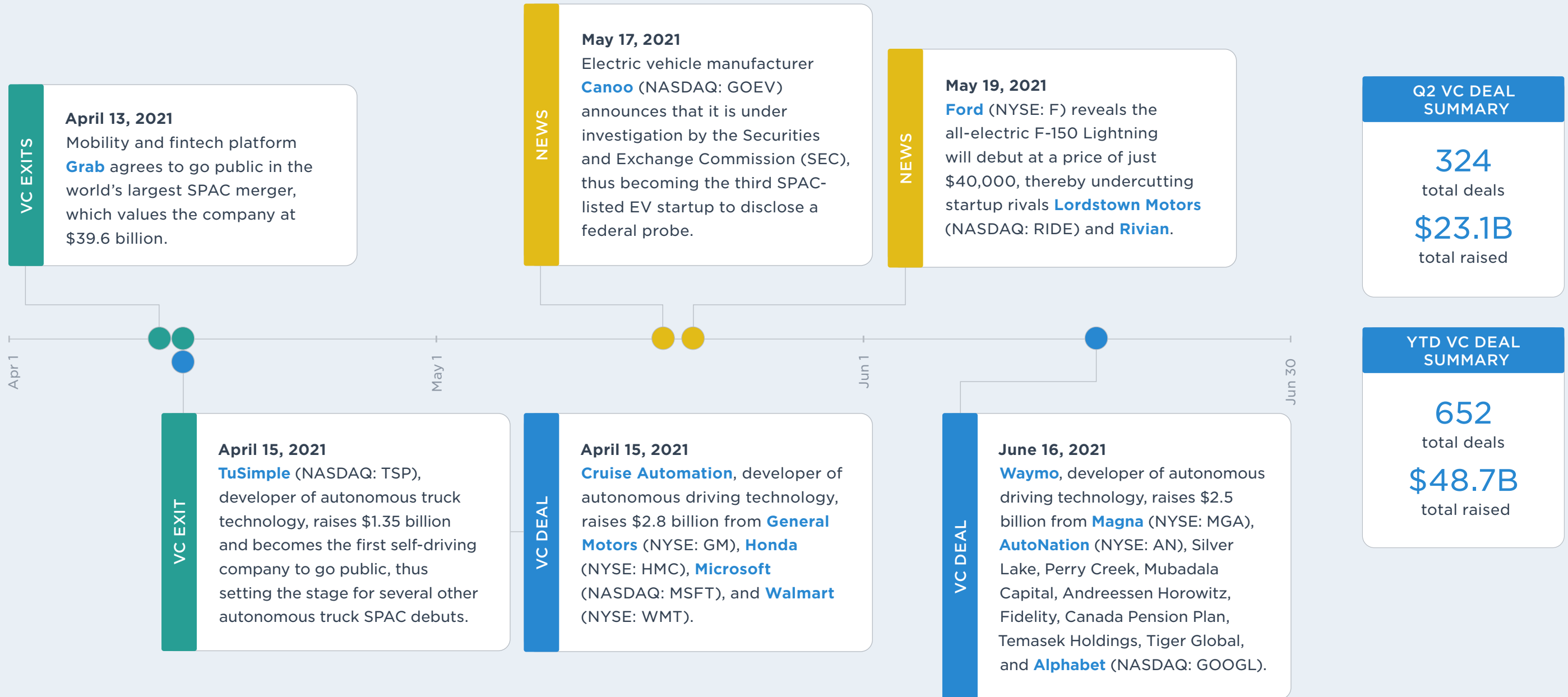
Figure 1. MOBILITY TECH VC DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of June 30, 2021



Q2 2021 timeline

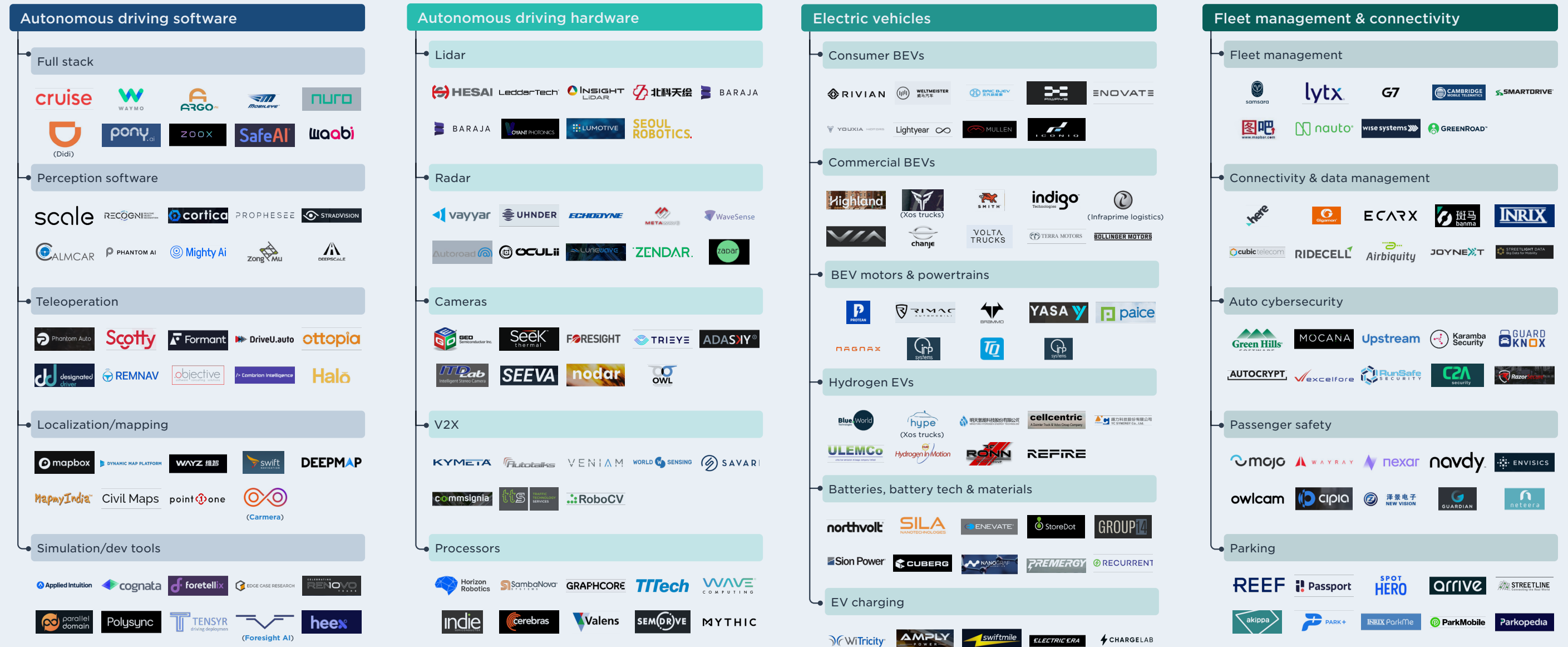




Mobility tech VC ecosystem market map

Click to view the interactive market map on the PitchBook Platform.

Market map is a representative overview of privately held providers in each segment and excludes companies merging with SPACs.





Mobility tech VC ecosystem market map

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Market map is a representative overview of privately held providers in each segment and excludes companies merging with SPACs.





VC activity

VC investment strong even as mobility SPACs underperform.

Our EV/Mobility SPAC Price Change Index recorded a 99.4% return in H2 2020, which far outpaces the S&P 500's total return of 21.4% over the same period. However, the market pulled back in H1 2021, during which the EV/Mobility Price Change Index recorded a -9.0% loss—significantly underperforming the S&P 500's gain of 15.3% over the same period. Several newly public mobility startups have hit snags. In early 2021, the stocks of **Romeo Power** (NYSE: RMO) and **Lordstown Motors** plummeted after management cut guidance. **AEye**, which is currently merging with a SPAC, cut its valuation by 24.0% ahead of the deal closure, citing market conditions. Finally, EV manufacturers **Nikola** (NASDAQ: NKLA), **Lordstown**, and **Canoo** are all facing federal investigations.

Although public market volatility is affecting public mobility companies, it has not constrained the investment boom in private mobility startups. In fact, because in the current market environment, successfully exiting no longer necessitates successfully commercializing, private market investment in mobility startups has only intensified.

Figure 2. EV/MOBILITY SPAC PRICE CHANGE INDEX



Source: PitchBook | Geography: Global
Note: Please refer to [EV/Mobility SPAC Handbook](#) for methodology.



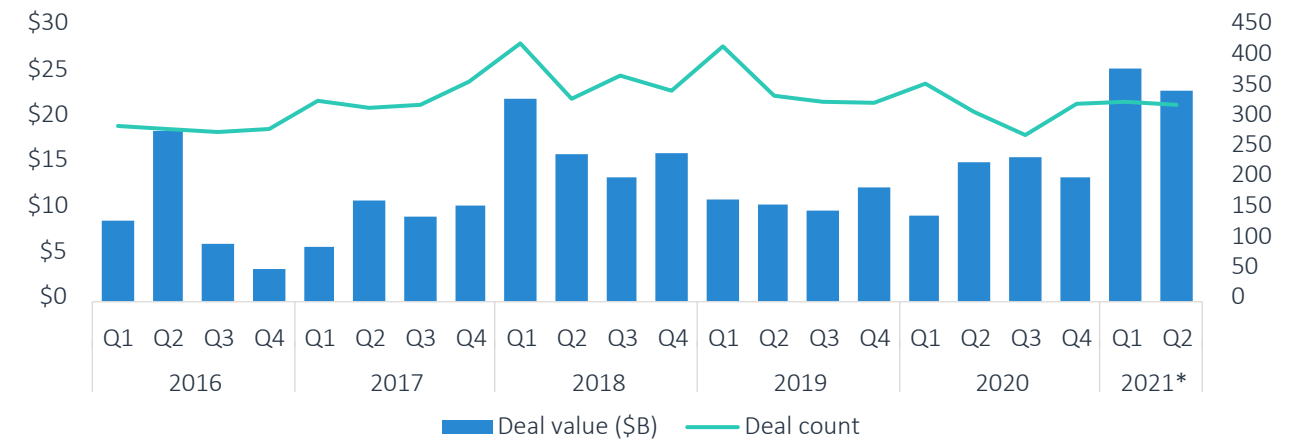
VC ACTIVITY

After previously shunning investing in transportation technologies such as EV batteries and charging, several generalist investors are now reconsidering their stances. In recent months, large asset managers such as Fidelity, T. Rowe Price (NASDAQ: TROW), BlackRock (NYSE: BLK), and Wellington have increased activity in the mobility sector—deploying billions of dollars into dozens of late-stage mobility companies in the EV, autonomous driving, and last-mile delivery segments.

In Q2 2021, mobility tech startups raised \$23.1 billion in venture capital, which puts the year on pace to be a record year for mobility investing. Several mobility startups have put their SPAC merger plans on hold due to public market volatility and are instead choosing to take advantage of the influx in private capital.

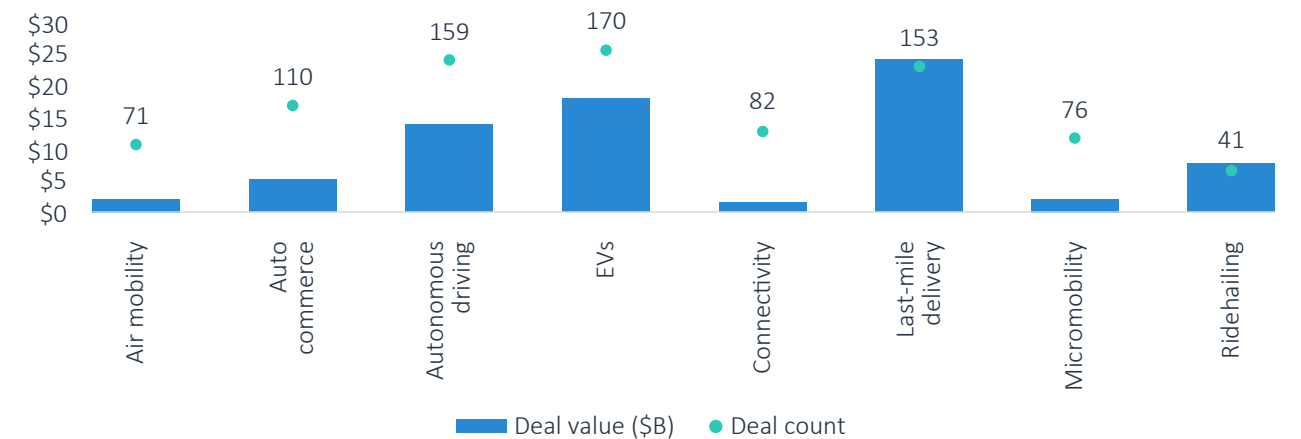
Currently, the mobility tech industry is experiencing a divergence in valuations. For late-stage mobility companies, valuations have risen in tandem with rising public market valuations. In H1 2021, the median pre-money valuation for late-stage mobility tech companies increased 233.3% YoY to \$650.0 million. Meanwhile, value growth among early-stage mobility startups has been more constrained. In H1, the median pre-money valuation for angel & seed and early-stage mobility tech companies was flat and up 14.3% YoY, respectively. As such, we believe it is an opportune time for discerning financial and strategic investors to invest in early-stage startups at reasonable valuations.

Figure 3. MOBILITY TECH VC DEAL ACTIVITY BY QUARTER



Source: PitchBook | Geography: Global | *As of June 30, 2021

Figure 4. TTM DEAL ACTIVITY BY SEGMENT*

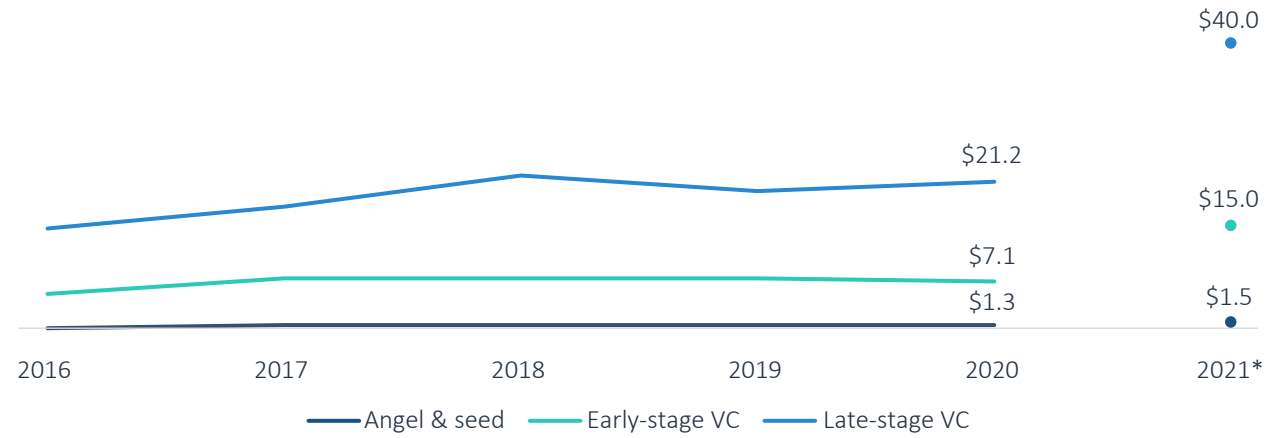


Source: PitchBook | Geography: Global | *As of June 30, 2021



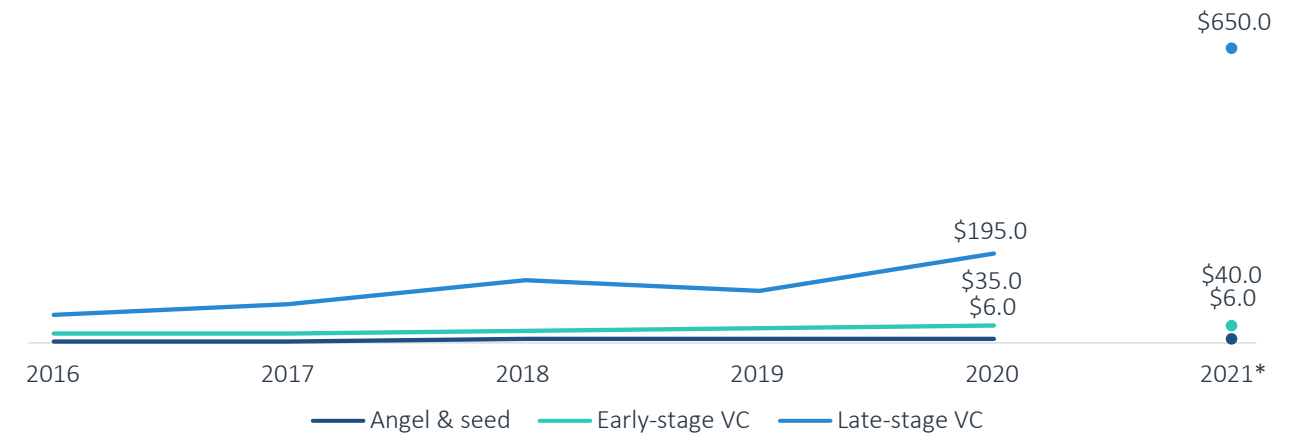
VC ACTIVITY

Figure 5. MEDIAN MOBILITY TECH VC DEAL SIZE (\$M) BY STAGE



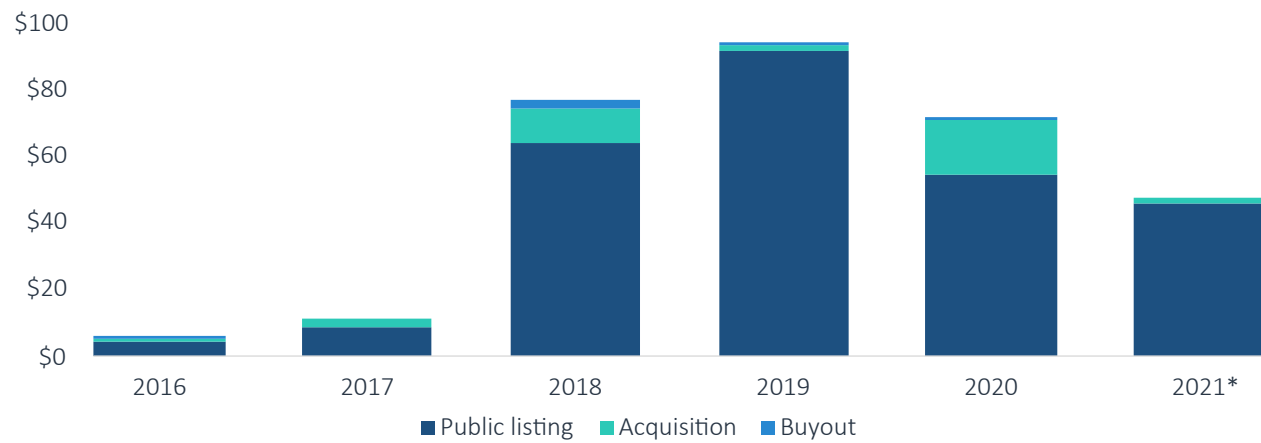
Source: PitchBook | Geography: Global | *As of June 30, 2021

Figure 6. MEDIAN MOBILITY TECH VC PRE-MONEY VALUATION (\$M) BY STAGE



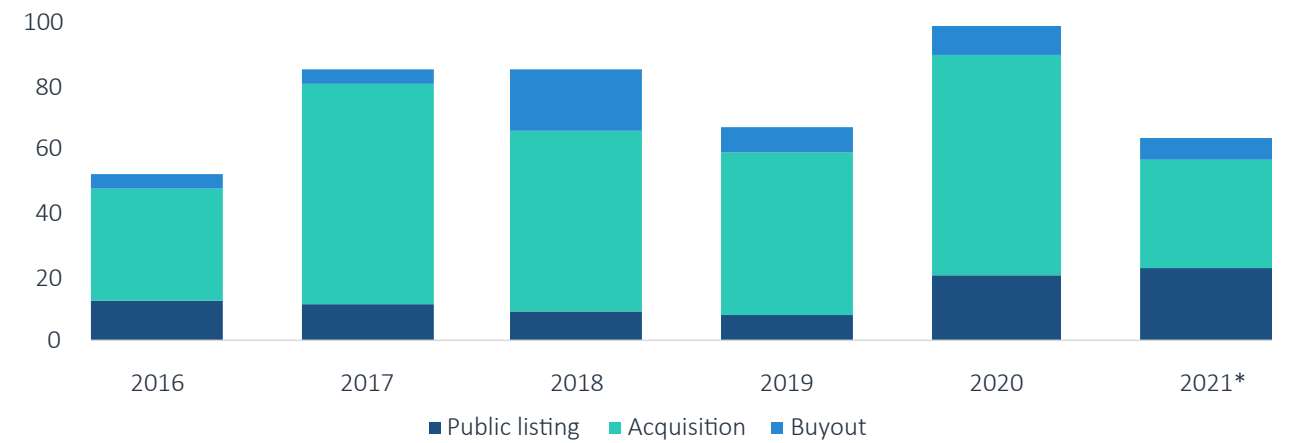
Source: PitchBook | Geography: Global | *As of June 30, 2021

Figure 7. MOBILITY TECH VC EXIT VALUE (\$B) BY TYPE



Source: PitchBook | Geography: Global | *As of June 30, 2021

Figure 8. MOBILITY TECH VC EXIT COUNT BY TYPE



Source: PitchBook | Geography: Global | *As of June 30, 2021



VC ACTIVITY

Figure 9.

Key mobility tech angel & seed deals

COMPANY	CLOSE DATE	SEGMENT	CATEGORY	STAGE	DEAL SIZE (\$M)*	LEAD INVESTOR(S)
Regent	April 20, 2021	Air mobility	eCTOL aircraft	Seed	\$9.0	N/A
Tortoise	April 21, 2021	Micromobility, autonomous driving, last-mile delivery	Other micromobility, teleoperation, delivery	Seed	\$7.8	N/A
Curbie	May 10, 2021	Auto commerce	Digital marketplaces	Seed	\$5.6	Conexus Venture Capital Fund
MightyFly	April 20, 2021	Air mobility	Drones & eVTOL logistics	Seed	\$5.1	N/A
ARTA	May 27, 2021	Freight	Freight	Seed	\$4.5	Flight Ventures, Gaingels, Corazon Capital
Electra Vehicles	June 2, 2021	EVs	Batteries, battery tech & materials	Seed	\$4.4	N/A
Faction	June 2, 2021	Last-mile delivery, micromobility	Delivery, vehicle suppliers	Seed	\$4.3	Trucks Venture Capital, Fifty Years
Empower	April 14, 2021	Ridehailing	Demand planning	Angel	\$4.0	N/A
Ridepanda	June 30, 2021	Micromobility	Vehicle suppliers	Seed	\$3.8	Proeza Ventures, Porsche Ventures, Yamaha Motor Ventures & Laboratory Silicon Valley
Joyride	June 22, 2021	Micromobility	Management & analytics	Seed	\$3.7	Urban Innovation Fund, Proeza Ventures, Craig Miller

Source: PitchBook | Geography: Global | *As of June 30, 2021



VC ACTIVITY

Figure 10.

Key mobility tech early-stage VC deals

COMPANY	CLOSE DATE	SEGMENT	CATEGORY	STAGE	DEAL SIZE (\$M)*	LEAD INVESTOR(S)
Didi Autonomous Driving	May 31, 2021	Autonomous driving	Full stack	Early-stage VC	\$300.0	Guangzhou Automobile, GAC Capital
Flink	June 4, 2021	Last-mile delivery	Delivery	Series A	\$243.3	Mubadala Capital-Ventures, Bond Capital (San Francisco), Prosus
Zhidian Automobile	June 15, 2021	EVs	Commercial BEVs	Series A	\$156.1	Henglu Asset
Dott	April 20, 2021	Micromobility	Network operators	Series B	\$85.0	Sofina
Waabi	June 8, 2021	Autonomous driving	Simulation/development tools, other autonomous driving	Series A	\$82.7	Khosla Ventures
Innovusion	May 11, 2021	Autonomous driving	Lidar	Series B	\$64.0	Temasek Holdings
Flexcar	June 29, 2021	Auto commerce	Online car rental	Series B	\$60.3	VentureFriends, Uni.Fund, Seaya Ventures
GO Sharing	April 22, 2021	Micromobility	Network operators	Early-stage VC	\$59.4	Opportunity Partners (Netherlands)
Alto	June 28, 2021	Ridehailing	Ridehailing platforms	Series B	\$45.0	Goff Capital Partners, Tuesday Capital
Breton Technology	April 27, 2021	EVs, autonomous driving	Commercial BEVs, other autonomous driving	Early-stage VC	\$38.2	Ordos Group, Puchao Capital, Zhiming Capital

Source: PitchBook | Geography: Global | *As of June 30, 2021



VC ACTIVITY

Figure 11.

Key mobility tech late-stage VC deals

COMPANY	CLOSE DATE	SEGMENT	CATEGORY	STAGE	DEAL SIZE (\$M)*	LEAD INVESTOR(S)	VALUATION STEP-UP
Northvolt	May 20, 2021	EVs	Batteries, battery tech & materials	Series E	\$2,750.0	Fjärde AP-fonden, Första AP-fonden, OMERS Administration Corp.	2.3x
Waymo	June 16, 2021	Autonomous driving, ridehailing	Full stack, ridehailing platforms	Late-stage VC	\$2,500.0	Magna International, AutoNation, Silver Lake, Alphabet	N/A
Horizon Robotics	June 11, 2021	Autonomous driving	Processors	Late-stage VC	\$1,500.0	Weihaio Chuangxin, BOE Technology Group	N/A
Swiggy	April 5, 2021	Last-mile delivery	Delivery	Series J	\$800.0	MIH India Food Holdings	1.2x
Dingdong Maicai	April 6, 2021	Last-mile delivery	Delivery	Series D	\$700.0	DST Global, Coatue Management	N/A
SambaNova Systems	April 13, 2021	Autonomous driving	Processors	Series D	\$678.0	SoftBank Investment Advisers	1.7x
FlixBus	June 2, 2021	Public mobility solutions	Smart transit	Series G	\$650.0	General Atlantic, Permira, TCV	0.7x
Getir	June 4, 2021	Last-mile delivery	Delivery	Series D	\$555.0	Sequoia Capital, Tiger Global Management	2.7x
Kavak	April 7, 2021	Auto commerce	Digital marketplaces	Series D	\$485.0	D1 Capital Partners	2.3x
BETA Technologies	May 24, 2021	Air mobility	Drones & eVTOL logistics, eVTOL passenger aircraft	Series A	\$425.6	Fidelity Management & Research	N/A

Source: PitchBook | Geography: Global | *As of June 30, 2021



VC ACTIVITY

Figure 12.

Key mobility tech VC exits

COMPANY	CLOSE DATE	SEGMENT	CATEGORY	EXIT SIZE (\$M)	EXIT TYPE	ACQUIRER(S)/INDEX	POST-MONEY VALUATION (\$M)*
DiDi Global	June 30, 2021	Ridehailing	Ridehailing platforms	\$10,803.4	IPO	NYSE	\$15,238.6
AUTO1 Group	February 4, 2021	Auto commerce	Digital marketplaces	\$7,990.1	IPO	FRA	\$9,204.7
Deliveroo	March 31, 2021	Last-mile delivery	Delivery	\$7,880.1	IPO	LON	\$9,265.9
TuSimple	April 15, 2021	Autonomous driving, freight	Full stack, freight	\$7,406.6	IPO	NASDAQ	\$8,487.7
ACV Auctions	March 24, 2021	Auto commerce	Digital marketplaces	\$3,440.0	IPO	NASDAQ	\$3,853.8
Olo	March 17, 2021	Last-mile delivery	Delivery	\$3,100.3	IPO	NYSE	\$3,550.3
Alkami	April 14, 2021	Last-mile delivery	Delivery	\$2,314.1	IPO	NASDAQ	\$2,494.1
BigBasket	March 2, 2021	Last-mile delivery	Delivery	\$1,305.2	M&A	Tata Group	\$1,919.4
Roadster	June 2, 2021	Auto commerce	Other auto commerce	\$360.0	M&A	CDK Global	\$360.0
ChargePoint	February 26, 2021	EVs	EV charging	\$317.0	SPAC	Switchback Energy Acquisition	\$2,400.0

Source: PitchBook | Geography: Global | *As of June 30, 2021



VC ACTIVITY

Figure 13.

Key publicly traded mobility tech companies

COMPANY	TICKER	SEGMENT	CATEGORY	EV/2021 REVENUE*	EV/2022 REVENUE*	Q2 STOCK RETURN
Aeva	AEVA	Autonomous driving	Lidar	162.8x	51.1x	-8.9%
Arrival	ARVL	EVs	Commercial BEVs	N/A	9.4x	-2.4%
Blade Urban Air Mobility	BLDE	Air mobility	Air mobility services	16.8x	9.3x	N/A
Canoo	GOEV	EVs	Commercial BEVs	N/A	14.9x	10.1%
CarLotz	LOTZ	Auto commerce	Digital marketplaces	1.4x	0.5x	-23.4%
ChargePoint	CHPT	EVs	EV charging	49.4x	29.1x	30.1%
Deliveroo	ROO	Last-mile delivery	Delivery	2.5x	2.1x	1.0%
DoorDash	DASH	Last-mile delivery	Delivery	12.7x	10.3x	36.0%
Electric Last Mile Solutions	ELMS	EVs	Consumer BEVs	N/A	N/A	N/A
EVgo	EVGO	EVs	EV charging	N/A	N/A	N/A

Source: PitchBook | Geography: Global | *As of June 30, 2021
 Note: Revenue based upon consensus analyst estimates.



VC ACTIVITY

Figure 13.

Key publicly traded mobility tech companies (cont.)

COMPANY	TICKER	SEGMENT	CATEGORY	EV/2021 REVENUE*	EV/2022 REVENUE*	Q2 STOCK RETURN
Fisker	FSR	EVs	Consumer BEVs	N/A	13.3x	12.0%
Hyllion	HYLN	EVs	Hydrogen EVs	1,184.3x	24.2x	9.2%
Innoviz Technologies	INVZ	Autonomous driving	Lidar	161.3x	65.8x	N/A
Lightning eMotors	ZEV	EVs	BEV motors & powertrains	11.1x	2.0x	N/A
Lordstown Motors	RIDE	EVs	Commercial BEVs	27.3x	1.1x	-6.0%
Luminar	LAZR	Autonomous driving	Lidar	249.6x	196.1x	-9.7%
Lyft	LYFT	Ridehailing	Ridehailing platforms	6.0x	4.2x	-4.3%
Metromile	MILE	Fleet management & connectivity	Connectivity & data management	18.0x	9.9x	-11.1%
Nikola Motor Company	NKLA	EVs	Hydrogen EVs	305.7x	28.9x	30.0%
Otonomo	OTMO	Fleet management & connectivity	Connectivity & data management	N/A	N/A	N/A

Source: PitchBook | Geography: Global | *As of June 30, 2021
 Note: Revenue based upon consensus analyst estimates.



VC ACTIVITY

Figure 13.

Key publicly traded mobility tech companies (cont.)

COMPANY	TICKER	SEGMENT	CATEGORY	EV/2021 REVENUE*	EV/2022 REVENUE*	Q2 STOCK RETURN
Ouster	OUST	Autonomous driving	Lidar	52.1x	21.6x	46.9%
Proterra	PTRA	EVs	Commercial BEVs	N/A	N/A	N/A
QuantumScape	QS	EVs	Batteries, battery tech	N/A	N/A	-34.6%
Romeo Power	RMO	EVs	Batteries, battery tech	30.7x	3.9x	-2.3%
Shift Technologies	SFT	Auto commerce	Digital marketplaces	1.1x	0.6x	3.1%
Solid Power	SLDP	EVs	Batteries, battery tech	N/A	N/A	N/A
Tesla	TSLA	EVs	Consumer BEVs	13.2x	9.8x	1.8%
TuSimple	TSP	Autonomous driving	Full stack	2,528.3x	435.7x	N/A
Uber	UBER	Ridehailing	Ridehailing platforms	6.2x	4.4x	-8.1%
Velodyne Lidar	VLDR	Autonomous driving	Lidar	19.5x	10.4x	-6.7%
Median				19.5x	10.1x	-2.3%

Source: PitchBook | Geography: Global | *As of June 30, 2021
 Note: Revenue based upon consensus analyst estimates.



VC ACTIVITY

Figure 14.

Key mobility tech VC-backed companies

COMPANY	VC RAISED TO DATE (\$M)*	SEGMENT	CATEGORY
Rivian	\$6,451.3	EVs	Consumer BEVs
Waymo	\$5,500.0	Autonomous driving, ridehailing	Full stack, ridehailing platforms
Northvolt	\$4,410.1	EVs	Batteries, battery tech & materials
Faraday Future	\$3,080.0	EVs	Consumer BEVs
Instacart	\$2,734.8	Last-mile delivery	Delivery
Gopuff	\$2,434.7	Last-mile delivery	Delivery
Nuro	\$1,532.0	Autonomous driving, last-mile delivery	Full stack, delivery
Glovo	\$1,323.4	Last-mile delivery	Delivery
Flexport	\$1,311.9	Freight	Freight
Karma Automotive	\$1,297.4	EVs	Consumer BEVs

Source: PitchBook | Geography: Global | *As of June 30, 2021



VC ACTIVITY

Figure 15.

Top mobility tech VC Investors since 2018

COMPANY	DEAL COUNT*	COMPANY	DEAL COUNT*	COMPANY	DEAL COUNT*	COMPANY	DEAL COUNT*
Alumni Ventures Group	45	Enterprise Ireland	18	Bessemer Venture Partners	16	Intel Capital	14
Tiger Global Management	37	Flight Ventures	18	DST Global	16	NGP Capital	14
500 Startups	29	Sequoia Capital	18	Qualcomm Ventures	16	NextGear Ventures	14
Sequoia Capital China	27	SOSV	17	GV	16	Shunwei Capital	14
FJ Labs	25	Keiretsu Forum	17	Founders Fund	15	Fontinalis Partners	14
Gaingels	21	GGV Capital	17	Toyota Ventures	15	Eight Roads	14
Sequoia Capital India	20	Right Side Capital Management	16	General Catalyst	15	Index Ventures	14
Accel	20	BMW i Ventures	16	Trucks Venture Capital	15	Prologis Ventures	13
8VC	19	Maniv Mobility	16	OurCrowd	14	Partech	13
Autotech Ventures	18	Shell Ventures	16	TransLink Capital	14	Cathay Innovation	12

Source: PitchBook | Geography: Global | *As of June 30, 2021

Emerging opportunities

Teleoperation startups

5G could spark paradigm shift in mobility

Micromobility subscription services

Providers shift to subscription services

Battery tech

EV adoption spurs innovation in batteries



Teleoperation startups

Teleoperation, or the remote monitoring and control of vehicles, is becoming more prominent as vehicles become increasingly autonomous. In situations such as construction zones or severe weather conditions, wherein autonomous vehicles become stuck or unable to drive autonomously, teleoperators can remotely take over and safely guide the vehicle.

Even as VC investment in autonomous driving soars—with a record \$11.1 billion invested in H1 2021—investment in teleoperations-focused startups has been relatively limited, with just \$16.8 million invested in the same timeframe. So far, the slow rollout of robotaxi services has constrained the teleoperations industry, as autonomous driving companies face challenges in solving the operating design domain (ODD) of dense urban areas. As we outline in our recent analyst note [Robotaxis and the Road to Profitability](#), robotaxi companies must expand to densely populated cities to be profitable at scale. However, these cities are the most challenging ODDs for robotaxis to navigate. As such, several teleoperations startups have been acquired or pivoted from monitoring cars to monitoring industrial robots.

Remotely operated mobility services could set the stage for telecommunications companies to take a more prominent role in the future of mobility, as reliable, low-latency networks will be critical for enabling remote operation. We anticipate global carriers such as [AT&T](#) (NYSE: T), [Verizon](#) (NYSE: VZ), and [NTT](#) (TKS: 9432) will seek to leverage their 5G networks to enable mobility services.

Figure 15.

Key teleoperation startups

COMPANY	VC RAISED TO DATE (\$M)	LAST VALUATION (\$M)*
Phantom Auto	\$22.0	N/A
Ottopia	\$12.0	\$7.1
Scotty Labs	\$8.8	\$16.1
Formant	\$6.0	\$10.5
DriveU.auto	\$4.0	N/A
Cambrian Intelligence	N/A	\$1.3
Halo	N/A	N/A
REMNAV	N/A	N/A
Formation	N/A	N/A

Source: PitchBook | Geography: Global | *As of June 30, 2021

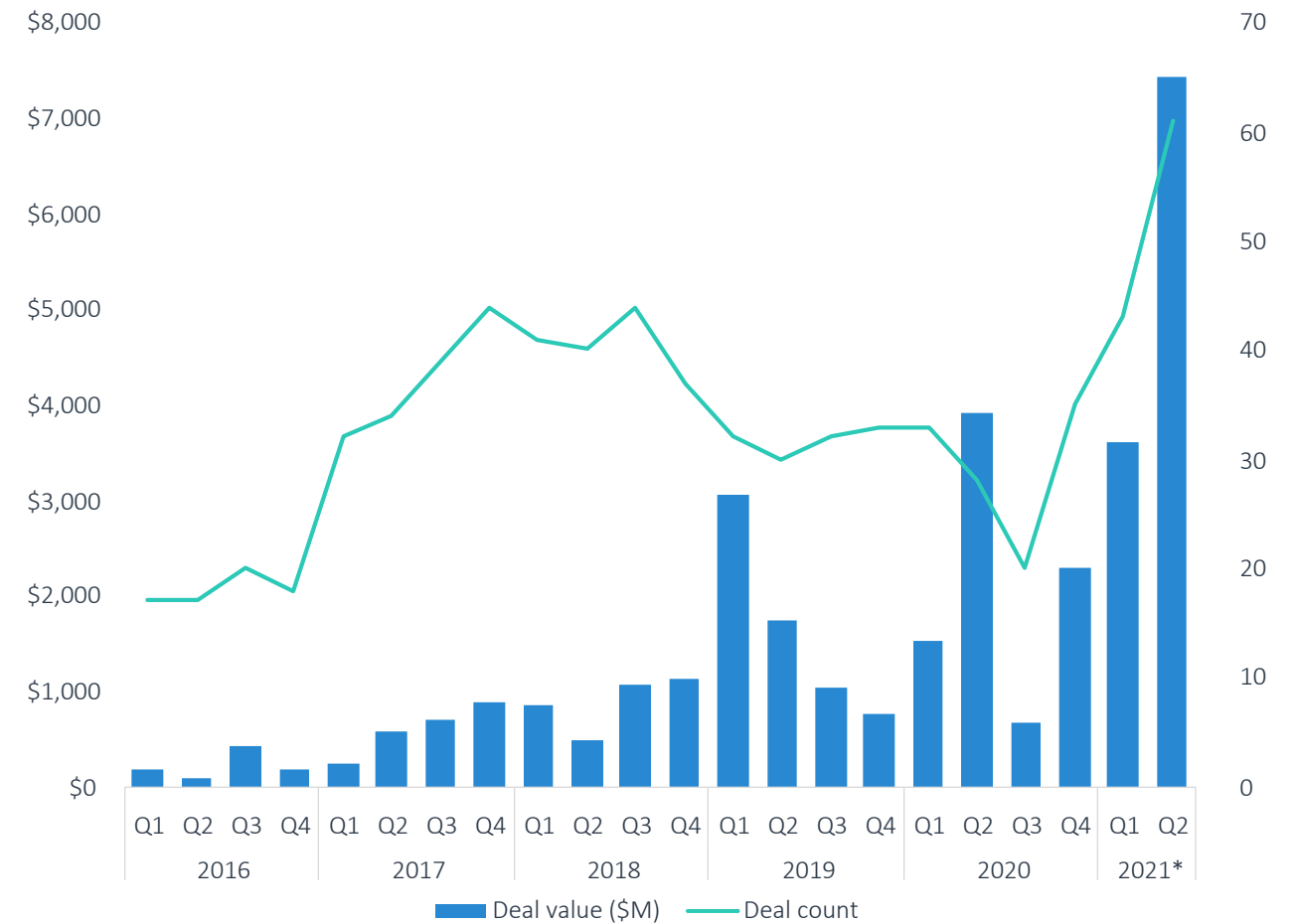


TELEOPERATION STARTUPS

In one such partnership, startup **Halo** recently announced a pilot with **T-Mobile** (NASDAQ: TMUS) to enable remotely operated on-demand carshares. Through the pilot, electric cars ordered through the **Halo** app are piloted by remote operators and delivered directly to consumers. The vehicles are fitted with cameras, radar, and ultrasonic sensors and integrated with **T-Mobile**'s 5G network for low-latency remote operation, with automatic emergency braking as a failsafe.

Remotely operated carshares could disrupt the dynamics of the mobility industry by offering the convenience of on-demand ridehailing with the flexibility of carsharing. As the cars would be remotely operated only between trips, driving costs could be reduced to 10% to 20% of those of ridehailing. Additionally, **Halo**'s approach is highly scalable and avoids the immense capital expense, complexity, and timeline uncertainty of developing and commercializing robotaxis. At scale, **Halo** expects to generate a contribution margin of 35% to 60%. Over the long term, the startup plans to further expand margins by automating relatively simple tasks such as highway driving and navigating slow, bumper-to-bumper traffic.

Figure 16. AUTONOMOUS DRIVING VC DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of June 30, 2021



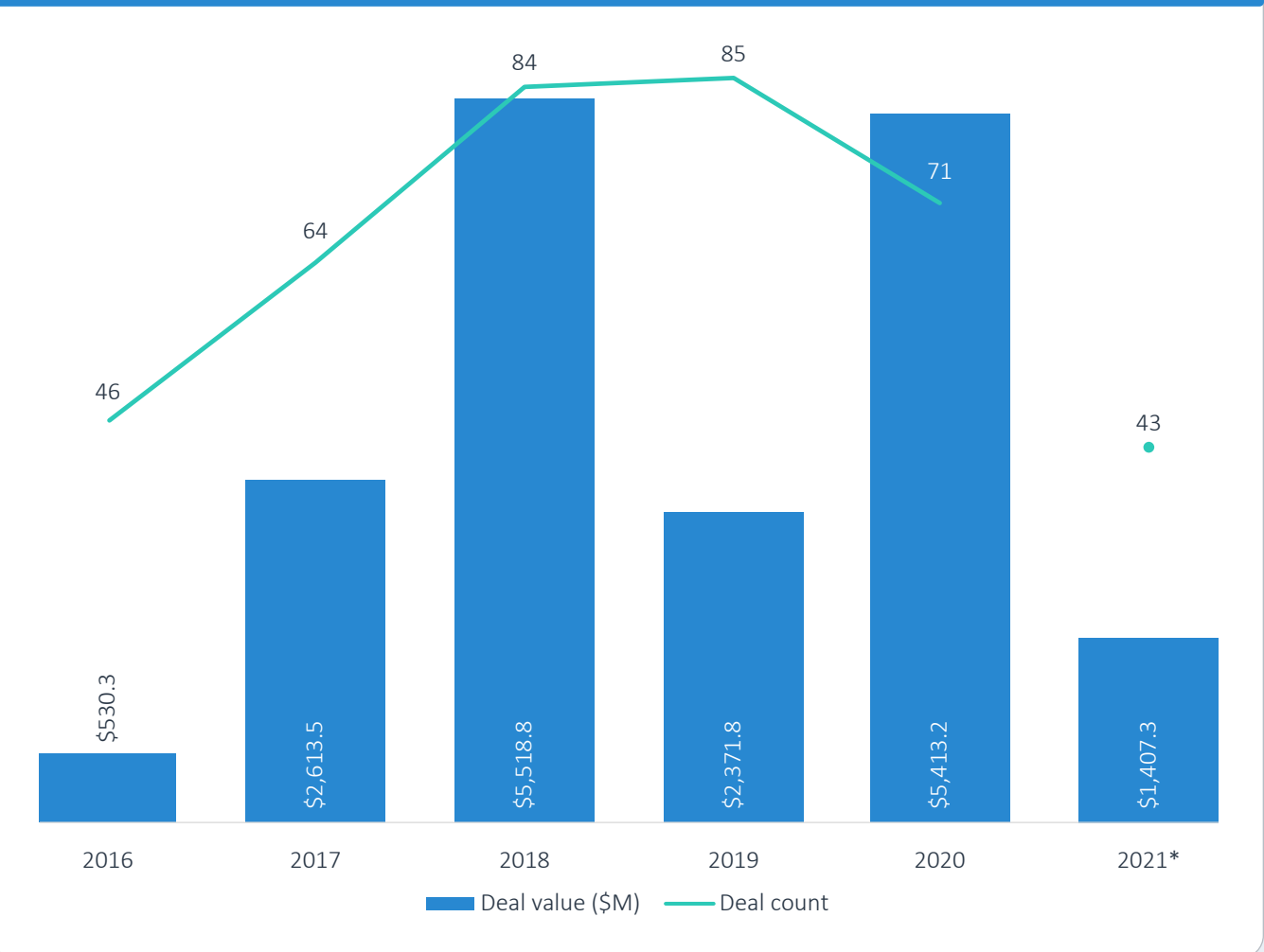
Micromobility subscription services

Globally, the electric bicycle industry is booming. In the US, e-bike sales are up 139% in 2021 YTD compared with 2020.¹ 4.5 million e-bikes were sold in Europe in 2020—up 34% compared with 2019—and e-bikes are expected to grow from 20% of European bicycle sales to 50% by 2025.² We anticipate continued strong growth in light electric vehicle sales, particularly in Europe and Asia.

As electric bikes and scooters become more prominent, we believe subscription-based ownership models could make the market more accessible. Currently, purchasing consumers face three major obstacles: high upfront cost, ongoing repair and maintenance, and theft risk. Electric bikes can cost more than \$1,000 each and require regular servicing of electrical and conventional biking components. A recent spike in bicycle thefts in the US has led to experts recommending bike commuters use multiple bike locks.³ Free-floating shared micromobility services such as **Bird** and **Lime** reduce these friction points, but consumer competition for vehicle availability can introduce uncertainty. Micromobility subscription services offer ease of mind through flexible, affordable leasing with bundled features such as repair, maintenance, roadside assistance, servicing, and insurance—which covers the risk of theft.

1: “The E-Bike Revolution Is Here,” *Barron’s*, Jim Motavalli, June 18, 2021.
2: “Half of All Bikes Sold in Europe Will Be Electric by 2025, Predicts Manufacturer” *The Financial Times*, Harry Dempsey, July 9, 2021.
3: “Bike Thefts Spike Across US as Cycling Becomes More Popular,” *CBS News*, Megan Cerullo, October 20, 2020.

Figure 17. MICROMOBILITY DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of June 30, 2021



MICROMOBILITY SUBSCRIPTION SERVICES

The shift to e-bike subscriptions could favor larger, scaled companies and lead to widespread consolidation. Today's bicycle market—especially the service side—is fragmented and dominated by local shops. Larger companies will be better positioned relative to local competitors to provide a seamless experience that includes repair, maintenance, battery swaps, and insurance.

Leading micromobility startups include **Swapfiets**, **Dance**, **Zoomo**, and **DOCKR**. Another major player is **Grover**, which raised \$71.1 million to offer flexible subscriptions for a variety of consumer electronics, including e-scooters.

In a growing trend, micromobility network operators **Revel**, **Bird**, **Spin**, and **Fenix** have launched weekly or monthly subscriptions. E-bike manufacturers **VanMoof**, which raised \$12.3 million of mezzanine financing in February 2021; **Brompton**, which generated \$72.5 million in revenue in 2020; and **Dance**, which raised a \$17.6 million Series A in October 2020, all offer e-bike subscriptions. Online used-bike platform **rebike1** recently partnered with German car-subscription platform Fleetpool to offer bike subscriptions.

Automakers are also getting into the micromobility business. **BMW** (ETR: BMW), **Mercedes Benz**, **Porsche**, **Harley-Davidson** (NYSE: HOG), and **Jeep** have each recently launched e-bike lines. **Ford**-owned **Spin** recently launched Spin+, a \$59 monthly electric scooter

subscription that includes unlimited maintenance, support, and swapping.⁴ A tough business for automakers—**Audi** (LTS: OFG8), **BMW**, **Ford**, and **Maserati** all have attempted to sell e-bikes in the past with limited success. The recent popularization of subscription services could enable automakers to leverage their repair and maintenance networks to gain a foothold in this market.

As micromobility expands beyond scooters and bikes, accessibility is becoming a key consideration. In 2019, **Scootaround**, a micromobility subscription provider, acquired **WHILL**, a developer of motorized wheelchairs. **Scootaround** has partnered with **Bird** to offer long-term rentals of three- and four-wheel scooters and power wheelchairs.

4: "Spin+ Monthly Rental. Coming in 2021," **Spin**, 2021, accessed on July 1, 2021.



Battery tech

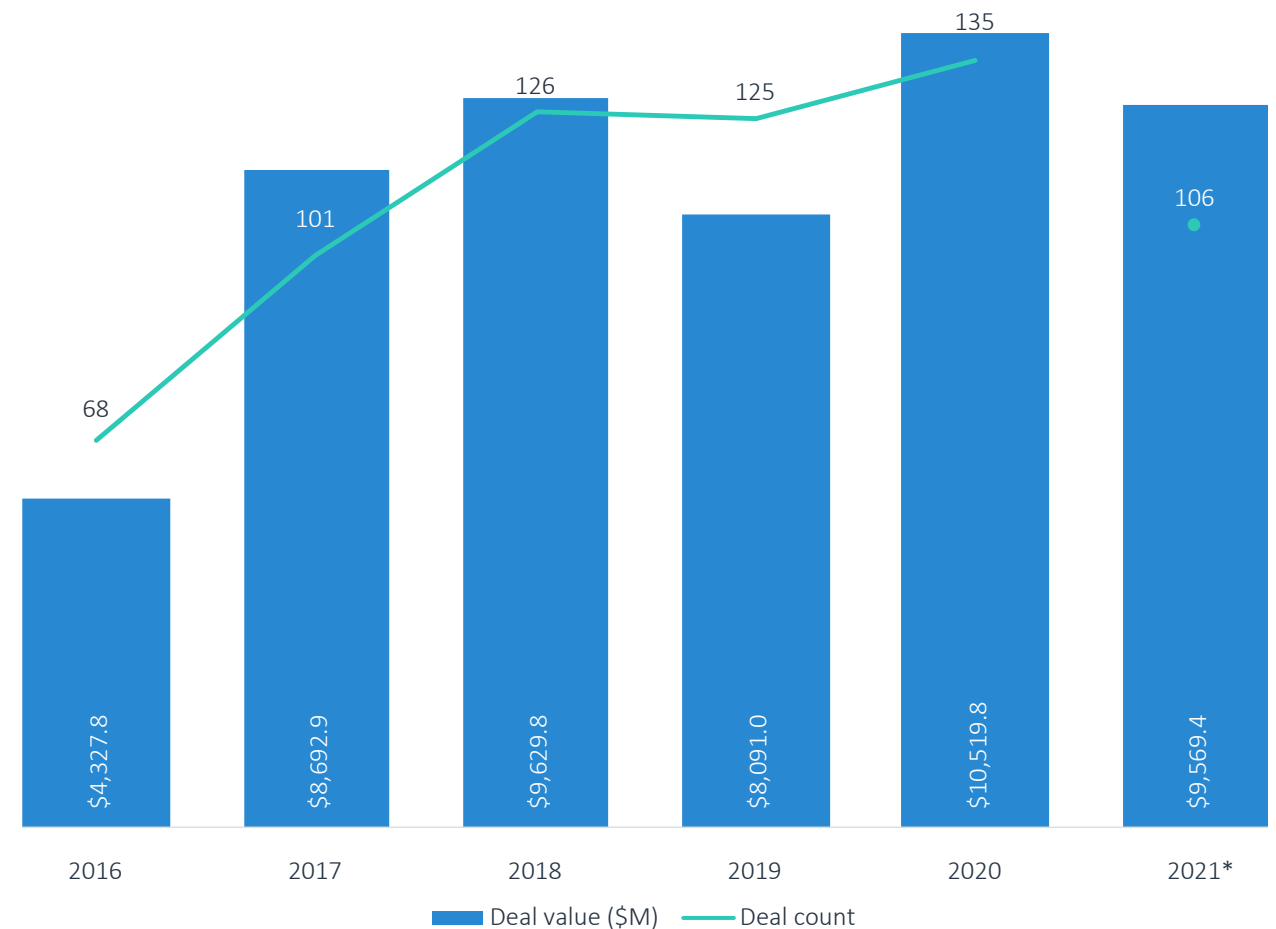
Several startups pursuing battery tech opportunities are raising significant funding from VC investors. We forecast electric vehicle passenger car sales will rise from 4.5% of global car sales in 2020 to 15.6% in 2025, which will drive demand for improvements in battery monitoring, thermal management, charging, and recycling.

VC investment in EV startups is increasing, with battery tech emerging as a leading beneficiary. In H1 2021, electric vehicle startups raised \$9.6 billion—nearly eclipsing the previous year’s total of \$10.5 billion and putting the year on pace to break the annual record. In H1 2021, 49.1% of VC invested in EV startups went toward battery tech startups, well up from 2016’s 7.3%.

Used EV battery health and range can vary widely, which makes selling used EVs more challenging. Battery monitoring systems can help address this problem. **Recurrent** provides independent, **CARFAX**-like reports on the health of used electric car batteries to dealerships and consumers. By leveraging a data-sharing fleet of over 5,000 electric vehicles, **Recurrent** has developed a machine learning model to statistically predict battery health and range for car dealers selling used EVs.

Improved thermal management systems could play an important role in extending the lifespan of EV batteries. Higher ambient temperatures and high-load situations can accelerate the degradation of lithium-ion batteries. Improved thermal management systems can mitigate this impact by cooling batteries. **Premergy** is a US-based startup developing battery management and control systems that extend the range of passenger and commercial EVs by more

Figure 18. ELECTRIC VEHICLES DEAL ACTIVITY



Source: PitchBook | Geography: Global | *As of June 30, 2021



BATTERY TECH

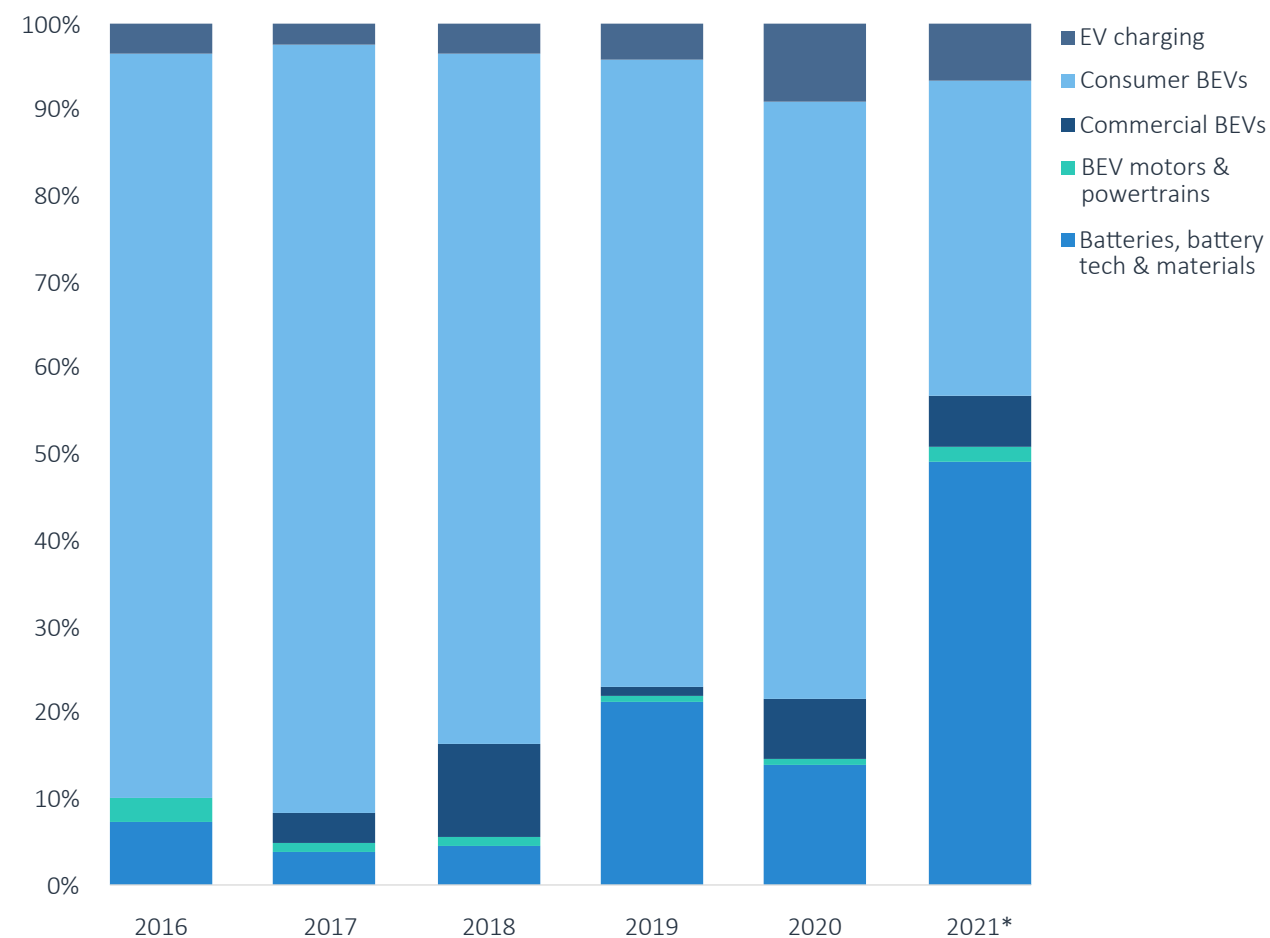
than 20% by moderating battery heat. **Premergy**'s system strategically reroutes power to secondary battery banks during high-load instances such as driving uphill. In April 2021, the company raised \$2.8 million of angel funding from undisclosed investors.

By adding dedicated batteries, charging stations could reduce charging fees and minimize the excessive power demands that would likely result from thousands of EVs charging simultaneously.⁵ US-based **Electric Era** is developing lithium-based battery cells that pair with fast charging stations to buffer the power draw on electrical grids, which helps charging stations avoid large fees from utility operators during high-demand periods.

Battery recycling will be a key element of creating sustainable, circular EV supply chains. After years of limited funding, battery recycling companies are gaining traction in the market as automakers seek to make their sourcing more sustainable. In July 2021, **Redwood Materials** raised a \$700.0 million Series C from investors including T. Rowe Price, Fidelity, Goldman Sachs, and Amazon, valuing the company at \$3.7 billion. In February 2021, **Li-Cycle** announced its plans to list on public markets through a SPAC merger at a \$1.7 billion post-money valuation. **Li-Cycle** takes manufacturing scrap, extracts materials such as lithium, cobalt, nickel, and graphite, processes the materials, and then sells them back to the battery supply chain. Whereas many competitors rely on high-temperature processes—which generate emissions as material is burned off—**Li-Cycle** uses a shredding method that minimizes energy intensity and emissions while maximizing recovery rates.

5: "EV Rollout Will Require Huge Investments in Strained US Power Grids," *Reuters*, Nichola Groom & Tina Bellon, March 5, 2021.

Figure 19. PROPORTION OF ELECTRIC VEHICLES DEALS BY TYPE



Source: PitchBook | Geography: Global | *As of June 30, 2021

Select company highlights



SELECT COMPANY HIGHLIGHT | RECURRENT



Founded
2020

Employees
14

Total raised
\$3.5M

Last financing
Raised **\$3.2M** in a seed round

Last financing valuation
N/A

Lead investors:
Wireframe Ventures, Vulcan Capital, Prelude Ventures, Powerhouse Ventures, Union Bay Partners, Ascend.vc, Pioneer Square Labs, AAA Washington

Overview

Recurrent provides independent, **CARFAX**-like reports on the health of used electric car batteries to dealerships and consumers. By leveraging a data-sharing fleet of over 5,000 electric vehicles, **Recurrent** has developed a machine learning model to statistically predict battery health and range for used EVs on sale at dealerships. **Recurrent** currently works with over 25 dealers in the US and monetizes through a monthly subscription.

The battery health and range of used EVs can vary drastically. For example, the range of a 10-year-old EV driven and stored in suboptimal conditions can be more than 50% lower than when it was new. While internal combustion engine (ICE) vehicles are priced primarily on mileage, driving and storage conditions are more relevant for EVs. As no existing solution on the market can assess these conditions, used EV buyers are often gambling on the battery health of the vehicle they purchase.

Recurrent straddles two crucial mobility trends: electrification and the digitization of auto commerce. As electric cars become more widespread and consumers increasingly buy cars online, independent battery reports could add value to both buyers and sellers as a key measure of price discovery.

Leadership

Co-founder & CEO: Scott Case
Co-founder & CTO: Kyle Rippey

Financing history

In November 2020, the company raised \$3.2 million of seed funding in a deal led by Wireframe Ventures. Vulcan Capital, Prelude Ventures, Powerhouse Ventures, Union Bay Partners, Ascend.vc, Pioneer Square Labs, and AAA Washington also participated in the round. The funds will be used for continued product development and to invest in the data science powering the reports. In June 2020, the company raised \$300,000 of venture funding in the form of convertible notes from Pioneer Square Labs. The notes were subsequently converted into equity.



SELECT COMPANY HIGHLIGHT | WHISPER AERO

Whisper Aero

Founded
2020

Employees
12

Total raised
\$7.5M

Last financing
Raised **\$7.5M** in a seed round

Last financing valuation
N/A

Lead investors:
Menlo Ventures, Connor Capital, Kindred Ventures, Abstract Ventures, Lux Capital, Levitate Capital, FootPrint Coalition

Overview

Whisper Aero is a US-based developer of electric propulsion technology for electric aircraft. The company quiets electric propulsion to enable the widespread deployment of advanced air mobility for commercial, military, and logistics applications. Currently, the company focuses on smaller aircraft such as military reconnaissance drones and package delivery unmanned aircraft systems (UAS). However, over the long term, Whisper sees a range of applications for its technology, including the passenger air mobility/air taxi market.

Quiet propulsion systems could be a key enablement technology for the adoption of advanced air mobility services such as drone-enabled delivery and air taxis. Widespread adoption of these services will require routing over dense residential areas, which will necessitate noise reductions. Whereas leading electric vertical aircraft manufacturers currently target noise reductions of 15 to 20 decibels, Whisper's solution blends propulsion noise into background noise to enable public acceptance of scaled aircraft operations. As the company's technology can be applied to a range of vehicles, Whisper provides targeted exposure to the electrification of aviation without the capital intensity and concentration risk of investing in a startup aircraft manufacturer.

Leadership

Co-founder & CEO: Mark Moore

Co-founder & Mechanical Design Lead: Jacek Kawecki

Co-founder, COO & CPO: Ian Villa

Financing history

In January 2021, **Whisper Aero** raised a \$7.5 million seed round from Menlo Ventures, Connor Capital, Levitate Capital, Lux Capital, FootPrint Coalition, Kindred Ventures, Abstract Ventures, and other undisclosed investors. The company plans to use this capital to test, develop, and verify its prototype and launch integrations efforts.



SELECT COMPANY HIGHLIGHT | FENIX



Founded
2020

Employees
150

Total raised
\$5.0M

Last financing
Raised **\$5.0M** in a seed round

Last financing valuation
N/A

Lead investors:
Maniv Mobility, Emkan Capital,
Panthera Capital Investments

Overview

Fenix is a United Arab Emirates-based shared micromobility operator. In addition to one-time rentals, the company’s free-floating scooters are also available through weekly or monthly subscriptions. Its durable e-scooters incorporate swappable batteries for greater operational efficiency. **Fenix** also launched F10, an app that provides ten-minute grocery deliveries using couriers who operate out of the company’s network of dark stores, which serve as both charging and fulfillment centers.⁶ **Fenix** maximizes its drop rates by targeting dense cities, limiting delivery ranges to tight radii around the dark stores, and equipping its couriers with well-maintained, fully charged e-mopeds. The company also realizes cost synergies by sharing real estate costs between both businesses. **Fenix** dynamically allocates vehicles and labor between subscription, shared, and delivery businesses as needed to offset seasonality.

Large global mobility companies have struggled to penetrate the Middle East—where local operators have competitive advantages as they understand the nuances of local markets in ways global competitors may not. Along these lines, **Fenix** has developed a financial services platform offering digital wallets, micro-lending, and micro-insurance. This is a key value add for cash-heavy local markets where local currencies may not be supported by payment gateways. With its recent acquisition of Turkey-based Palm Teknoloji, **Fenix** continues to expand its footprint in the region.

⁶: “[Abu Dhabi-Based Micromobility Operator Fenix Launches 10-Minute Grocery Delivery Service,](#)” [TechCrunch](#), Rebecca Bellan, July 13, 2021.

Fenix sits at the intersection of two key trends in densely populated cities: ultrafast delivery and micromobility. Pioneered by startups such as **Getir**, **Gorillas**, and **Flink**, ultrafast delivery is quickly becoming the expectation as consumers grow accustomed to having food and items delivered within minutes. As ultrafast delivery becomes more widespread, increased car traffic from couriers will likely lead to concurrent heightened noise, congestion, and emissions in residential areas. Solving this problem will require looking beyond cars to multimodal transportation solutions such as micromobility. Going forward, we anticipate growth in ultrafast delivery to lead to significant investment in fleets of e-bikes and e-scooters for couriers.

Leadership

Co-founder & CEO: Jaideep Dhanoa

Co-founder & CTO: IQ Sayed

Financing history

In February 2021, the company raised \$5.0 million of seed funding in a deal led by Maniv Mobility and Emkan Capital. Panthera Capital Investments and other undisclosed investors also participated in the round. The company will use the investment for research & development and expansion plans.



SELECT COMPANY HIGHLIGHT | HALO

Halō

Founded
2019

Employees
7

Total raised
N/A

Last financing
N/A

Last financing valuation
N/A

Lead investor:
5G Open Innovation Lab

Overview

Halō is a US-based startup that recently announced a pilot with **T-Mobile** to enable remotely operated on-demand carshares. Through the pilot, electric cars ordered through the **Halō** app are piloted by remote operators and delivered directly to consumers. The vehicles are fitted with cameras, radar, and ultrasonic sensors and integrated with **T-Mobile**'s 5G network for low-latency remote operation, with automatic emergency braking as a failsafe.

Halō's remotely operated carshares could disrupt the dynamics of the mobility industry by offering the convenience of on-demand ridehailing with the flexibility of carsharing. Moreover, remotely operated mobility services could set the stage for telecommunications companies to assume a more prominent role in the future of mobility, as reliable, low-latency networks will be critical for enabling remote operation.

The unit economics of a remotely operated mobility service could be far superior to those of ridehailing. As the cars would be remotely operated only between trips, driving costs could be reduced to 10% to 20% of those of ridehailing. Additionally, **Halō**'s approach is highly scalable and avoids the immense capital expense, complexity, and timeline uncertainty of developing

and commercializing robotaxis. At scale, **Halō** expects to generate a contribution margin of 35% to 60%. Over the long term, the startup plans to further expand margins by automating relatively simple tasks such as highway driving and navigating slow, bumper-to-bumper traffic.

Leadership

Co-founder & CEO: Anand Nandakumar

Financing history

The company plans to fundraise to launch its pilot program in Las Vegas.



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