

Kirstin Anderson-Hall,
Brandon Bordenkircher,
& Riley L. O'Neil
Twelve Tone Consulting
info@twelvetoneconsulting.com
7/9/2018

12

Electric Scooters: Regulation Breakdown



*“The key is to embrace disruption and change early. Don’t react to it decades later. You can’t fight innovation.”
- Ryan Kavanaugh*

INTRODUCTION

In the past, city dwellers had several transportation options available to them: walking, buses, trains, cabs, car ownership, and bike ownership. However, in the past decade, the sharing economy has made available even more affordable transportation options for city dwellers – rideshare (Uber & Lyft), car share (Car2Go &

Turo), and bike share (CitiBike & Divvy, which are both operated by Motivate).

Recent dockless bike launches have underscored the importance of cities passing policies regulating these disruptive modes of transportation sooner, rather than later, to limit their potentially negative impacts. To help guide cities looking to regulate these new transit options without stifling their benefits, Twelve Tone Consulting drafted a

policy report entitled [***Dockless Bike: Regulation Breakdown***](#). Although many cities have recently finished drafting and passing dockless bike regulations, the challenge is far from over. Cities are now being challenged with another disruptive transit technology: **Electric Scooters** (a.k.a. e-scooters).

Similar to their dockless bike relatives, riders (ages 18+) use a smartphone application to locate and unlock the e-scooters by scanning a QR code. The typical current cost to customers is \$1 to unlock the e-scooter and an additional 15 cents per minute to ride it. In this policy paper, we provide an analysis of e-scooter issues by critiquing the regulations of several cities and states that have either passed or are in the process of writing scooter regulations, and cities that have decided to give scooter vendors permission to operate *without* set guidelines. We begin the report with a list of e-scooter vendors and background information; the positive & negative externalities of e-scooters; cease & desist letters; approaches to e-scooter policy; our regulation breakdown; and, finally, a summary of our policy recommendations. The purpose of this policy paper is to provide cities with a policy framework that will allow e-scooter vendors to operate with minimal disruption while offering citizens an affordable and fun option to solve their first and last mile issues.

E-SCOOTER VENDORS

Several e-scooter companies currently operate within the United States. While their missions are similar, there are also unique quirks that cities should consider and become familiar with. When deciding which scooter company would be a good fit for your city, you may want to consider these questions:

- 1) What is important to our city and which scooter company encompasses our values?
- 2) Is our city adamant about the environmental benefits (e.g. reducing

carbon dioxide levels and reducing car usage)?

- 3) Is our city looking to solve first and last mile issues?
- 4) Is our city looking to fill transit gaps (i.e. transit deserts)?
- 5) Are there programs and options for our residents to potentially make money (e.g. becoming a “Lime Juicer,” “Bird Charger/Hunter,” or “Spin Charger”)?
- 6) What are the safety standards for riders and how does the company emphasize safe riding?

Below, we have laid out most e-scooter companies and highlighted key operational elements including location of company headquarters, geographic availability, core mission, unique characteristics, e-scooter replacement cost, and funding. It is our intent that this section will give city officials a 360 view of who these companies are, how they differ, and how they might be able to serve your citizens.

Company	Locations Available	Headquarters	Mission	Highlights	Cost to Replace	Funding/Investors
Bird	11 U.S cities	Venice, California	“Last-mile electric vehicle sharing company dedicated to bringing affordable, environmentally friendly transportation solutions.”	Drafted the “ S.O.S. Pledge ” promising daily scooter pickup, responsible growth, and revenue sharing with cities. Bird encourages competitors to act socially responsible by committing to the pledge as well.	\$500 (Hollister, 2018)	\$265 million and a \$2 billion valuation (Marinova, 2018).
Lime	59 U.S cities, 18 college campuses	San Mateo, California	“Our dock free smart mobility solutions reduce traffic congestion, promote healthy living, and solve the all-important challenge of the first and last mile.”	Lime offers four programs : Lime for Cities, Lime Business Network, Lime Campus Network, and Lime Community Network.	\$1,500 (Hollister, 2018)	\$382 million , via Andreessen Horowitz, GGV Capital, and Fifth Wall Ventures (Kokalitcheva, 2018).
Spin	30 U.S cities, 18 college campuses	San Francisco, California	“Provides your community with dockless bike and scooter-share options to get you where you need to go — whether you’re commuting to work, going to class, running errands on the weekends or exploring your city.”	Plan to work with cities and promise not to launch illegally (Sandler, 2018).	\$1,300 (Hollister, 2018)	\$8 million and is valued at \$43.2 million, via CRCM Ventures, Charlie Cheever, Grishin Robotics, Matt Brezina, and Exponent (Clark, 2018).
Skip (formerly Waybots)	2 U.S cities (San Francisco & D.C.)	San Francisco, California	“Passionately working on last-mile transportation for nearly a decade. We solve problems by listening to and working with agencies, community groups and riders.”	Position themselves as the safe option: wider riding platform, full suspension, and head/tail/brake lights (Constine, 2018). The only multi city vendor to not launch illegally (Sandler, 2018).	Information not found.	\$31 million with a \$100 million valuation via Menlo Ventures, Accel, Y Combinator (Marinova, 2018).
GOAT	1 U.S. city (Austin)	Austin, Texas	“Improving mobility in urban areas & on college campuses. We are the solution for a modern day, identifiable, transportation need. Working alongside local officials to make environmentally-friendly and effective changes is one of the most significant ways we can operate efficiently.”	“By combining our tech competencies with a sincere desire to do good for the people and communities we serve.” Goat plans to work with cities and promise not to launch illegally (Dickey, 2018).	\$1,000	Zero venture capital, currently operating out of their two-car garage in Austin (Wear, 2018).
ofo	25 U.S. cities	Beijing, China	“To solve the ‘last mile’ transportation problem in	Primarily a dockless bike company, looking to break into	\$300	\$2.2 billion with high-level Chinese investors like Matrix

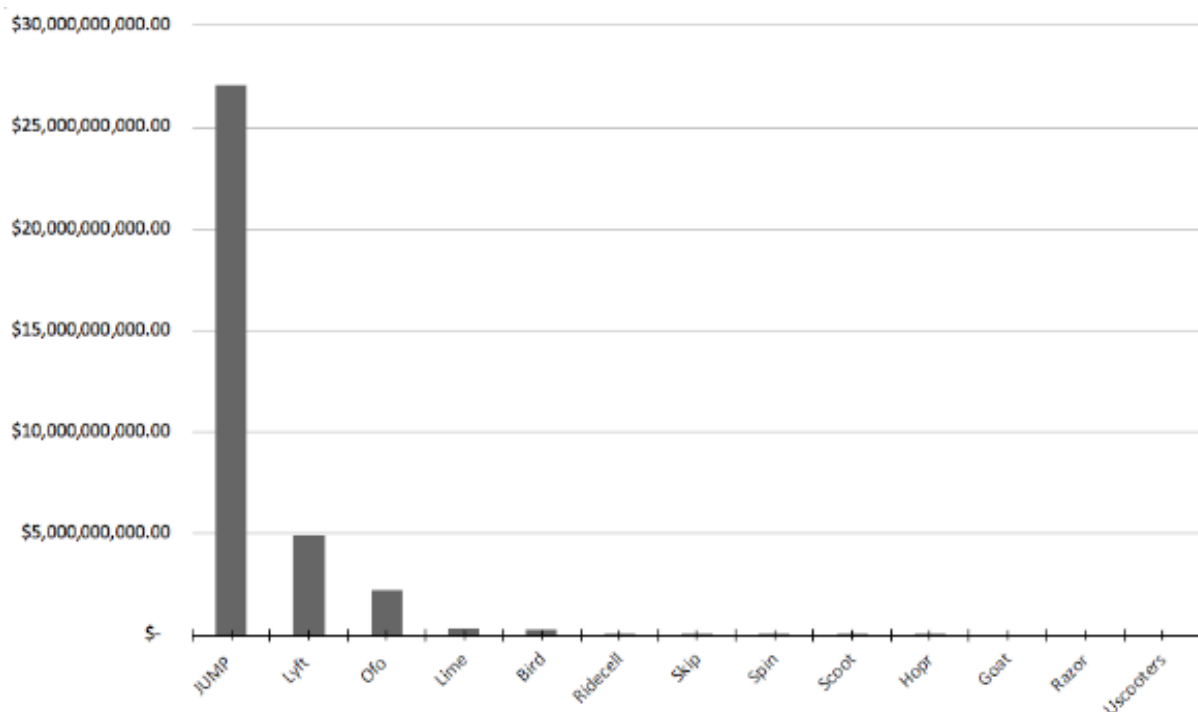
			urban areas and we see immense potential in the U.S. for ofo’s convenient, affordable and low-carbon way of travel.”	the e-scooter market. Known for attempting to sidestep local laws by passing statewide laws (Frothingham, 2018).		Partners China, ZhenFund, and GSR Ventures.
JUMP/ Uber	5 U.S. cities	New York City, NY	“Getting more people on bikes and transforming the way people move through cities.”	They were the inventors the smart bike, launched the first dockless bike share in the U.S., and introduced the first dockless electric bike fleet. They were recently acquired by Uber (Dickey, 2018).	\$1.600	\$27.1 billion with investors like Goldman Sachs, First Round Capital, and GV.
Hopr	15 cities, 14 universities	Miami Beach, FL	“Our mission is to provide open access to bike share, scooter share, ride share, and public transit.”	Launched, an open platform that enables easy access and payment to all transit modes available, both public and private. Users can access local bike share, ride share, car share, trains, buses, water taxis and more (Cawkell, 2018).	n/a	\$3.9 million by Super G Capital out of Newport Beach, CA.
Scoot	1 U.S. city	San Francisco, CA	“We make it easy, fast, and fun for you to get where you need to go in the city.”	Started in 2012 in San Francisco with electric scooters and have expanded in Europe with a multi-modal fleet of electric scooters and electric bicycles.	n/a	\$4.5 million via their three top investors Vision Ridge Capital Partners, Black Green Capital and Mahindra Partners.
Lyft/ Motivate	<i>Not yet launched.</i>	San Francisco, CA	“Our mission is to reconnect people through transportation and bring communities together.”	The second biggest rideshare company, looking to break into the e-scooter market. Recently acquired Motivate (operator of docking bike shares: Divvy, Citi, and Capital).	Information not found.	\$4.9 billion with lead investors such as California-based venture capital firms Andreessen Horowitz, Mayfield Fund, and Founders Fund.
Razor	<i>Not yet launched.</i>	Cerritos, CA	n/a	Leader of the scooter craze in the year 2000, currently looking to break into the e-scooter share market.	n/a	n/a
Ridecell	<i>Not yet launched.</i>	San Francisco, CA	“To change how people consume transportation.”	Expertise in carsharing, ridesharing, autonomous vehicles, and more.	n/a	\$45.8 million with their two top investors: BMW i Ventures and Cox Automotive.
Uscooters	n/a	El Paso, Texas	n/a	n/a	\$500	n/a

Investors & Partnerships

E-scooters comprise a potentially serious transit option that is beginning to take some of the nation's largest cities by storm. Large investments by venture capitalists have included the recent Uber/Jump acquisition and their recent foray into e-scooters via their San Francisco Scooter Permit proposal (Dickey, 2018); the Lyft/Motivate partnership (Merced, 2018) and Lyft's foray into e-scooters via their San Francisco Scooter Permit proposal (Marshall, 2018). These capital investments prove that shared micro-mobility (dockless bikes, e-bikes, e-scooters, etc.) is something municipalities should take seriously (San Francisco Chronicle, 2018). Below is a chart showing the breakdown of venture capital funding for each e-scooter vendor. When evaluating potential vendors to operate in your city, you will want to consider: how long the proposed company will be around and whether their business model is sustainable? As the chart below indicates, Jump/Uber have the biggest piece of the pie with \$27.1 billion in funding,

It's important for city officials to consider the business models of these vendors. Narrow margins, high startup costs and scale issues might suggest a natural monopoly, which means that the current competitors are merely using short-term venture funding to gain first-mover advantage, ultimately pushing competitors from the market. If this occurs, it may be difficult to regulate such a monopoly without an agreement at the outset. As recent acquisitions hint (i.e. Lyft/Motivate and Uber/Jump), these bigger companies may end up absorbing or purchasing the smaller e-scooter vendors. As of July, 9 2018, Lime has teamed up with Uber/Jump in NYC to offer Lime e-scooters via the Uber app. The concern here is, will the market be able to cover the marginal cost of a ride on a built-out system through a combination of user fees, sponsorship/advertising, vertical integration plays and (possibly) public subsidies. However, this could also be a revenue stream for municipalities, since fees could be charged

E-Scooter Vendors & Funding



company is voluntarily donating a portion of each ride fee to the municipality).

Scooter Equipment Specs














Many of these vendors purchase their scooters from the Chinese company Xiaomi/Ninebot/Segway, a company also known for its low cost smartphones and wearables (Murphy & Griswold, 2018). Even though many of these scooters are purchased from the same manufacturer(s) and have roughly the same equipment, there are several characteristics that set these vehicles and vendors apart, such as Motor Wattage, Max Speed, Mile Range, License Requirement, Lock-To technology, Handlebar Adjustment, Free Helmet, Gyroscope sensor (to monitor the axis), and Accelerometer sensor (to record/measure a rider’s speed). Cities

should consider these differences when negotiating with potential e-scooter vendors.

Community Relations

Many e-scooter companies are taking steps to create healthy relationships with the communities they operate in. Earlier this year, Bird released the “Save our Sidewalks (S.O.S.) Pledge,” which also addressed competitors at Lime, ofo, Mobike, and Jump. The S.O.S. Pledge asks for the commitment of daily scooter pickup and responsible growth, along with a commitment for revenue sharing with cities (i.e. \$1 donation a day per scooter). In the 4-page Pledge document, Bird C.E.O., Travis VanderZanden, suggested to “not only lean on technology, but also on social responsibility and cooperation within city governments.”

SCOOTER SPECS

Scooter Vendor	Motor Watt	Max Speed	Mile Range	License	Offer Free Helmet	Lock-To	Handle Bar Height Adjustment	Gyroscope (Axis Sensor)	Accelerometer (Speed Sensor)
	250	15mph	15 miles	Yes	Yes	No	No	No	No
	250	18 mph	35 miles	Yes	Yes	No	No	-	-
	250	15 mph	19 miles	Yes	-	Considering	No	No	No
	350	18 mph	30 miles	No	No	Yes	Yes	Yes	Yes
	-	-	-	No	Yes	No	No	No	No
	250	14.5 mph	18.6 miles	-	No	No (Tether)	No	No	No
	350	15.5 mph	-	-	No	No	No	Yes	Yes
	300	15 mph	12 miles	-	No	Yes	No	No	No
	350	15 mph	-	-	Yes	Yes	Yes	No	No
	250	15.5 mph	18 miles	-	No	No	No	Yes	Yes
	-	-	-	-	No	No	No	No	No
	-	-	-	-	No	No	No	No	No
	350	16 mph	18 miles	-	-	No	Yes	No	No

Twelve Tone Consulting info@twelvetoneconsulting.com

Other vendors have responded less than enthusiastically to the S.O.S. Pledge, referring to the S.O.S. Campaign as “[insincere](#)” given Bird’s strained relationship with the City of Santa Monica. Beijing-based ofo, which has recently submitted a San Francisco Scooter Permit application, called out Bird stating that the company has shown “a clear trend in operating first without prior approval” and using “bullying tactics to push an untested product and forego any community collaboration” (Lekach, 2018). ofo doubled-down by calling on Bird to commit to safety first and to follow *ofo’s* lead “in working with cities and wait for permission first to operate rather than placing unregulated e-scooters on the streets.”

While Bird’s consumers will likely appreciate the ‘social good’ narrative woven into the S.O.S. Pledge, competitors find it a hypocritical nuisance and have moved forward with their own community engagement policies and programs. For example, Skip offers e-scooter “beginners training” and group rides that cover helpful ride and safety tips. Skip has also created an online community forum on Reddit, which could be beneficial as ridership grows. Bird utilizes Instagram to tout riders who use Bird - which includes celebrities - by engaging riders with hashtags such as #flockfriday, #lovebird, and #enjoytheride. For riders that are engaged in social media, this might be a good way to engage with riders and promote safe riding habits.

EXTERNALITIES

Positive Externalities

Beyond being fun to ride, e-scooters have a very specific role to fill when it comes to transportation in cities. Where bicycles might be better when servicing longer rides, e-scooters have the potential to solve shorter last mile transportation issues in cities (Sisson, 2018). Some vendors champion the lack of carbon dioxide emitted (Buchele, 2018) and their contribution to alternative

transportation culture outside of the traditional car. With the ability to travel at 20 mph, bypass traffic, eliminate the need to pay for car parking, and the option to end a ride and to park virtually anywhere, there is indeed a lot to like about this new transportation sharing mode (Marshall, 2018).

Negative Externalities

However, there have been problems. Recent reporting on e-scooters has been a mixed bag with stories of scooters knocked over or crowding the sidewalk (Lekach, 2018); users piling two people on one scooter (Mashaw, 2017); young riders riding without licenses (Sisson, 2018); users riding on the sidewalk (Keeling, 2018); vehicle collisions (Lien, 2018); riders running out of juice before arriving at their destination (Friedersdorf, 2018); homeless people taking the logos off and hotwiring the scooters (Kerr, 2018); and frustrated citizens destroying scooters, or worse, citizens smearing human feces on them (Emerson, 2018). Because of these problems and more, San Francisco (Keeling, 2018), Nashville (McGee & Rau, 2018), Denver (Garrison, 2018) and other cities decided to write cease and desist letters to scooter vendors operating in their respective cities.

Liability and insurance are other potential issues. Riders will need to be extra careful when taking an e-scooter for a spin because most vendors make the rider “solely responsible for any damage to the vehicle beyond simple wear and tear,” and the replacement cost for an e-scooter ranges from \$500 - \$1,500 (Hollister, 2018).

Additional negative externalities include issues of violence, fraud, and theft occurring within the e-scooter charging culture (Lorenz, 2018). These “chargers” (aka “Bird hunters” or “Lime juicers”), are a temporary workforce that makes their living by collecting and recharging e-scooters. These chargers roam the city searching for scooters to pick up off the street, bring them to their own home to

recharge the batteries, and then re-distribute them around the city the next morning. There have been reports of cutthroat competition between chargers, sometimes leading to one charger beating another charger's car with a scooter. Issues of fraud have occurred where a charger shows up at another charger's home and misrepresents him/herself as being an "official representative" of a scooter vendor in order to collect (or steal) scooters being hoarded by the other charger. Finally, perhaps the most nefarious example is that of criminals luring chargers into isolated areas in order to rob them (Lorenz, 2018). These issues may be challenging to regulate, but cities should at least consider them when drafting scooter legislation.

Legal Gray Area

In addition to the positive and negative stories, TechCrunch released a March 28, 2018 article stating that scooters are actually operating in a legal gray area. Due to e-scooters not explicitly being covered in San Francisco's Transportation Code, the San Francisco Municipal Transportation Agency decided to explore drafting scooter legislation to "create appropriate permits and requirements to regulate motorized scooter sharing in the public right-of-way" (Dickey, 2018). Honolulu is another municipality where e-scooters did not fit within the current legal framework and, therefore, ended up being outlawed (HNN Staff, 2018).

CEASE & DESIST

Cities such as San Francisco, Nashville, Denver, Scottsdale, and Charlotte have decided to shut down scooter operations and write *cease and desist* letters to scooter vendors operating in their cities. The basis for the cease and desist letters differs from city to city. In some cases, riders were not obeying local laws. In other cases, the vendors were unequipped to solve rebalancing issues (i.e. scooters knocked over or blocking the right-of-way). However, illegal launches due to a lack of up-to-date legislation was the most common reason.

In a video interview with [ABC Denver Channel 7](#), a Lime representative states: "I think for now, we're going to take a look see how everybody takes them and if everybody likes them, we'll go from there." This *laissez-faire* approach ended with a cease and desist letter only 3 days later. This is the quintessential example of why cities must be proactive rather than reactive in dealing with disruptive technologies. The following cities have temporarily banned e-scooters. The reasoning behind their cease and desist letters is explained below.

San Francisco, CA

E-scooters launched in San Francisco in March 2018, but by April 2018 vendors received cease and desist letters due to the city receiving 1,800 complaints of e-scooters blocking sidewalks and riders illegally riding on the sidewalk and bumping into pedestrians. 500 scooters were collected by the Department of Public Works before San Francisco developed a pilot program, which is slated to start in July 2018 (Mojadad, 2018).

Nashville, TN

The City of Nashville warned Bird to remove scooters within 15 days due to scooters obstructing sidewalks. Nashville officials also stated that they didn't have preemptive legislation in place to allow scooter vendors to operate at all (McGee & Rau, 2018).

Denver, CO

Denver ordered Lime and Bird to remove their scooters immediately due a failure by vendors to coordinate with the city prior to dropping off their scooters, as well as complaints about uncharged batteries and close calls. Vendors broke local laws by placing their products on city sidewalks when Denver law specifically states you are "not allowed to store goods, wares or merchandise in public" (Rose, 2018). In addition, riders were not following local laws. Denver's law states that scooters are not allowed to operate on the roadway, except to cross the

street at an intersection, and they are not allowed in bike lanes (Garrison, 2018).

Scottsdale, AZ

In Scottsdale, Bird was accused of breaking the law by (allowing/instructing?) its customers to ride and then park on sidewalks, and to operate the scooters on streets where the speed limit is more than 25-miles-an-hour. Bird had initially met with city officials and had agreed to comply with city laws. The city had allowed the company to operate in Scottsdale as long as they followed state and city ordinances. A spokesperson from Bird said the company thought it was operating lawfully under existing regulations, but the city thought otherwise. (Genovese, 2018).

Charlotte, NC

The City of Charlotte stated Lime's electric scooter program was shut down because it had "not been approved by the city" after only one day of operation (Harrison, 2018). The city has since amended their dockless ordinance to include e-scooters while specifically capping the number of e-scooters at a minimum of 50 and maximum of 300.

Honolulu, HI

Honolulu outlawed e-scooters and had them confiscated by police, claiming e-scooters were classified as mopeds (HNN Staff, 2018). Closer inspection of Hawaii's moped law reveals that a moped must have a "seat or saddle for the driver" and that "no person shall drive a moped except while sitting astride the seat, facing forward, with one leg on each side of the moped." These requirements are clearly not applicable to e-scooters because e-scooter have no seat and riders must stand at all times (Information for MOPED Owners and Drivers). The penalties in Honolulu are also very steep with up to \$1,000 fine and up to 30 days in jail (Ako, 2018). According to Donna Leong, Department of Corporation Counsel, the penalties could be issued twice, to both the rider and the vendor.

Two currently operating scooter companies that have yet to be issued any cease and desist letters are Skip (formerly Waybots) and GOAT. Skip, GOAT, and now Spin, all say they plan to work with cities *prior* to launching, as opposed to launching first and then asking for forgiveness later (Sandler, 2018). This is a great idea and it will be interesting to see how their strategy plays out. However, we have noted that on a whole, vendors are launching first and then asking for forgiveness later. This new approach promises to steer vendors in the right direction and put them in the good graces of municipalities, but only time will tell.

APPROACHES TO E-SCOOTER POLICY

There have been a few different approaches to e-scooter policy, including statewide legislation; combined dockless bike & e-scooter pilot programs; separate dockless bike & e-scooter pilot programs; amended dockless bike pilot programs; and an absence of any e-scooter pilot programs. How government officials decide to regulate e-scooters depends on the city's specific needs and concerns. The examples outlined below cover a variety of pilot specifications and the reasons why different specifications were considered.

California (Statewide E-scooter Legislation)

The California legislature introduced statewide e-scooter legislation [A.B. 2989](#). This bill would closely align e-scooters with current laws for e-bikes. Main takeaways from the bill include: 1) it defines e-scooters as a **stand-up scooter**; 2) it creates a new category of vehicle with an allowed top speed of 20 mph (as opposed to the previous allowed speed of 15 mph); and 3) it allows each city to decide where e-scooters can be ridden (e.g. on sidewalks and/or streets).

Palo Alto, CA (Combined Dockless & E-scooter Pilot Program)

The [City Council of Palo Alto](#) authorized its City Manager to draft a one-year dockless

bike pilot program; however, shortly after the authorization, the council was approached by an e-scooter vendor. The council then added e-scooters to its pilot program which requires them to follow the same guidelines as dockless bikes (e.g. safety requirements, parking guidelines, provision of low-income rates, and cash payment options). Not all municipalities have been lucky enough to line up dockless and e-scooter legislation and because of this, some cities found it necessary to amend their dockless legislation.

Charlotte, NC (Amended Dockless Bike Pilot Program)

Some cities, like the [City of Charlotte](#), have decided to retroactively add an e-scooter pilot program or amend their dockless pilot program to include e-scooters. Charlotte amended its Bike Share Permit Requirements to allow current vendors, with the necessary permits, to add e-scooters to their fleets without requiring additional permits. Even though new permits are not necessary, current vendors are required to follow the new guidelines. Their new M11 requirement states that a maximum fleet of 500 bicycles (minimum 200) is allowed while allowing an additional maximum fleet of 300 (50 minimum) e-scooters.

San Francisco, CA (Separate Dockless Bike & E-scooter Pilot Programs)

Cities like San Francisco have passed a separate e-scooter ordinance after issuing cease and desist letters to vendors. San Francisco decided to create a 12-month pilot program and to grant five e-scooter vendor permits (there were 12 vendors that applied). During the first six months, a total of 1,250 e-scooters were allowed. If all goes well, vendors will be allowed a total of 2,500 e-scooters. The permit application requires a potential vendor to describe its plan to keep sidewalks clear of clutter, provide user education, share data, offer a low-income plan, address sidewalk riding and parking, and other requirements (Maguire, 2018).

Santa Monica (No E-scooter Pilot Program)

[Santa Monica](#) allowed e-scooters to operate without a pilot program for an entire year (Sept 2017 - Sept 2018). In the fall of 2017, e-scooters were launched without notice and without proper permits. Eventually vendors applied for business licenses and vending permits, but it wasn't until June 2018 that Santa Monica passed its e-scooter & dockless bike pilot program (Linton, 2018). The 16-month pilot program will go into effect in September 2018 and requires e-scooter and e-bike companies to apply for a permit, pay an annual fee of \$20,000, and pay a \$130 fee per-device. Vendors are currently paying for a permit of \$50 a year and a \$60 impound fee for e-scooters obstructing the public way. One highlight of the pilot program is the requirement for real-time data sharing to track rebalancing and usage (Newton, 2018).

Chicago, IL (Proposed E-scooter Pilot Program)

Chicago, which recently passed its own Dockless Bike Share Pilot Program in 2018, is now considering its own e-scooter guidelines. The scooter guidelines were proposed by 1st Ward Alderman, Joe Moreno, as an attempt to get ahead of the inevitable scooter invasion. The Alderman's recommendations include an *Electric Scooter Share License*; minimum of 100 e-scooters; a requirement that companies pay a daily \$1-per-vehicle fee (to guarantee at least \$100 per day from each vendor to go towards better infrastructure (which is an idea borrowed from Bird's *Save Our Sidewalk* campaign); a 20 mph maximum speed limit; bike lane & trail use only (no sidewalk riding); parking requirements (upright on street furniture but not fire hydrant, call box, bus bench, or utility pole); and no more than 50% of a vendor's e-scooters can begin the day located in the downtown central business district (Spielman, 2018).

REGULATION BREAKDOWN

When it comes to regulating e-scooters there are a few main points to consider: Definition

& Mechanical Requirements (what is an e-scooter and it's specifications?), Where to Ride (where are they allowed to operate?), When to Ride (banned before sunrise and after dusk), Parking Options, Lock-To Technology, Charging Workforce Operation Standards, Low Income Plan, and Permitting & Fees (how have other cities decided to allocate these funds?). We believe covering these topics will help give cities an adequate starting point when considering their own pilots.

Definition

The definitions and rules pertaining to scooters differs across U.S. cities, and when it comes to e-scooters, definitions and rules are vague at best. [Honolulu](#) is a great example of a municipality struggling to define, or understand, what an e-scooter is due to its state's DMV definition. All e-scooters currently operating in the U.S. (Spin, Lime, Skip, Bird) are *motorized stand-up/foot scooters* and therefore, any ordinance describing e-scooters as having a seat or requiring riders to sit is inapplicable to this new transit mode. Defining these trendy devices is necessary due to their disruptive behavior and unseen potential to serve first-last mile issues, [California](#) DMV has made some adjustments.

Confusion occurs without proper definition and guidelines for these devices (e.g. Honolulu), but to be fair most state DMV definitions aren't that clear. The best approach we have seen for defining scooters is by [Oregon DOT](#). Oregon's document is clear, emphasizes limitations like max speed vs allowed speed for scooters and depicts a clear picture of what a scooter looks like (which would clarify that these e-scooters are stand-up/foot scooters). We believe Oregon has set clear scooter rules and guidelines to give other states/municipalities a good baseline of where to start.

When to Ride

Some companies have designated hours of scooter availability. In many SF Scooter

Permit applications, vendors proposed their scooter availability times: [Lime states](#) they will be available every day from 7am until 8pm; [Lyft's](#) state their availability for 2 hours before sunrise until 2 hours after sunset; [ofo's](#) proposed hours of availability are 6am to 8pm; [Razor's](#) hours from 7am to 8pm. These proposed availability hours for scooters are due to Operations & Maintenance teams needing to collect and charge the scooters, but these hours of availability might be a good consideration for other municipalities due to safety issues.

Research shows that Bicyclists overestimate their own night-time visibility to drivers (Wood, et al, 2013). The study determined that riders underestimate the benefits of retroreflective markers on moveable joints (i.e. their arms & legs). Seeing that these e-scooters are not equipped with these extra safety precautions and most casual riders don't walk around with retroreflective markers, limiting scooter availability hours could be a beneficial consideration.

Where to Ride

Cities must consider where e-scooters are allowed operate: sidewalks vs. streets, as well as other zones like multi-use trails. Most municipalities ban e-scooters from riding on sidewalks and only allow them to operate in the street or bike lane; however, that may not be the safest option in rural areas and there are other areas to consider, which is why the California legislature introduced their statewide legislation.

California state legislation allows local officials to decide where e-scooters will be allowed to operate (e.g. on sidewalks or streets). This is due to its rural areas where there is no parallel bikeway for a user to ride on (Curry, 2018). This would allow riders on busier corridors to move to the sidewalk, and excuse rural riders from sharing roads with cars in sprawled areas that lack bike lanes, lack proper signage and usually consist of faster speed limits. Denver, Colorado actually *outlaws* e-scooters from riding in their streets

and *requires* riders to ride on the sidewalk. One of the reasons Denver officials issued their cease and desist letters to e-scooter vendors is because riders kept riding in the streets.

In addition to sidewalks and streets, other operation zones for cities to consider include multi-use trails. Cities like Atlanta faced problems of e-scooter riders on their Beltline (Keenan, 2018). San Diego faced issues of riders on their boardwalk, which led to an accident sending a mother and daughter to the hospital (Ojeda, 2018). These highly dense areas that are full of pedestrians are an accident waiting to happen if motorized vehicles are allowed to zoom around at 15-20 mph on the boardwalk.

Parking Options

The rise of micro-mobility options has created substantial parking issues (e.g. bikes and e-scooters blocking the right of way). There are a few ways operators and cities have been experimenting to create better parking including requiring vendors to: 1) apply for a space within the “furniture zone,” and 2) apply for a “corral” in a traditional car parking spot. With these basic requirements in place, cities can then decide whether to take a long-term or short-term approach to parking.

One short-term option is to paint an area in the “furniture zone” to indicate a parking spot for e-scooters and bikes. However, if this option is selected, there is a good chance that a pedestrian, a rider, or the weather (e.g. wind) will knock down one of the scooters or bikes, setting off a chain reaction knocking down several more bikes and scooters. A long-term solution is for cities and vendors to work together to install physical parking infrastructure (i.e. bike racks). If micro-mobility vendors, like Zagster, have the capital to install physical structures, it might be beneficial for cities to utilize that capital to finance more micro-mobility parking (Greenfield, 2018). Installing physical parking structures with private capital on private

property shows that some vendors are willing to invest in the community with the goal of continuing to operate in the city for years to come.

As multi-modal options become more common, bike and e-scooter corrals could evolve to serve ride sharing services as origin/destination drop off locations where you conveniently can hop on a scooter for your next leg of the trip, or vice versa. In their San Francisco Scooter Permit proposal, Lyft introduced a “hypothetical” rendering of a potential multi-modal hub.

Lock-To Technology

U.S. cities like Chicago, IL (Wisniewski, 2018), Austin, TX (Widner, 2018), Boulder, CO (Castle, 2018), and Bloomington, IN (Davis, 2018) have made lock-to technology mandatory in order to help combat issues of vandalism, clutter, and community backlash. These mandatory lock-to requirements have positioned certain dockless bike companies, like Zagster and Jump, to be the only vendors able to legally operate in these cities. As of July, 9th 2018, ofo has pulled out of Chicago to protest the lock-to requirement in the dockless pilot that limited their fleet to a mere 50 bikes and allowed up to 350 lock-to bikes per vendor (Wisniewski, 2018). Consequently, a few e-scooter vendors are now following the lead of these trailblazing companies.

Skip is the only current vendor with lock-to abilities. However, in their San Francisco Scooter Permit proposals, Hoppr and Scoot have mentioned that they possess the capability. Since there have been so many issues reported with knocked over and vandalized scooters, the lock-to requirements will likely become more and more appealing to municipalities. Spin is one company that indicated it will equip its fleet with lock-to technology *only if it is required* to do so.

Another option for municipalities is tethering technology. In their San Francisco Permit proposal, ofo proposed tethering technology

that would allow their e-scooters to be tied to a physical object (keeping it upright), but with the ability to unhook it if the scooter must be removed due to an emergency or if it falls down (San Francisco Chronicle, 2018). Chicago and Austin are the first of potentially many cities likely to emulate the lock-to requirement and/or tethering technology in policies and legislation, but only time will tell.

Charging Workforce Operation Standards

There have been issues reported such as violence, fraud, and theft related to e-scooter chargers, juicers, and Bird hunters due to cutthroat competition (Lorenz, 2018). This temporary workforce makes their money by picking up e-scooters off the street, bringing them to their homes for recharging, and then re-distributing them around the city the next morning. One option for resolving these issues is to more carefully regulate who can become a charger. If these chargers are classified as *independent contractors* for e-scooter vendors, they are an extension of the e-scooter vendor and any problems (e.g. violence, fraud, and theft) should be handled by the e-scooter vendor who has contracted with the individual(s) to perform the charging services. Cities should make these liability standards clear and should consider implementing fees/fines for any issues that may arise pertaining to this temporary workforce.

Another option for preventing the problems of violence, fraud, and theft related to vigilante chargers, is to hire a fleet of full-time (or part-time) employees to do the charging. In their San Francisco Permit proposals, Hopr, Lyft, and Razor have proposed hiring official Charging Operation Teams. Requiring companies to hire regular employees and, in some cases, to pay for their benefits, may be financially burdensome. Some e-scooter companies are more financially equipped to do this while other companies with less financial backing may find such a requirement to be infeasible.

Low-Income Plan

Residents in many communities experience difficult commutes due to poor city planning, systematically racist policies, and overall lack of public transportation resources. If a reliable means of transportation is not readily accessible, it will obviously affect the day-to-day lives of residents in areas that are underserved by modes of public transportation. In the long-term, according to the Smithsonian, the lack of affordable and accessible transportation stifles the ability of individuals to move out of poverty by making it difficult, if not impossible, to obtain good paying jobs. Further, the lack of affordable/accessible transportation severely limits access to healthcare and other important social services (Jiao & Bischak, 2018).

Dockless bike vendors have already begun to expend considerable effort in attempting to address the mobility gap in their respective communities. One such effort has been made to supply free bikes (donated to “bike libraries”) to riders of all races and socioeconomic backgrounds. Efforts have been made to partner with companies like PayNearMe so riders without a credit/debit card can access the bikes with cash. Some companies have offered subsidies to allow low-income riders to use their products. Companies submitting applications for a San Francisco Scooter Permit have been required to include a plan for making the scooters accessible to low-income users. San Francisco (SF) transit official, Tom Maguire, explained that the intention of the new permit and pilot program is “to prioritize public safety, build in equity, and focus on accountability” (Maguire, 2018). Furthermore, Maguire emphasized that the conditions SF has asked vendors to meet (in permit requirements) correlate with real challenges and goals that the city hopes to achieve. All SF e-scooter proposals will benefit low-income customers in some capacity once approved and implemented.

Below are some outstanding proposals submitted by prospective SF scooter vendors that we believe are progressing in the right direction and will potentially yield long-term positive results:

Lime has proposed 50% off all rides for users who qualify for SFMTA Lifeline (SF monthly transit pass), CalFresh (food stamps), or individuals who qualify for PG&E Care (utility discount). In addition, once its scooter vehicle count reaches 1,000, Lime has proposed a \$10 prepaid card for a total of \$100 in rides for anyone who qualifies for the aforementioned programs.

Skip's low income eligible users can potentially receive up to two free rides per day. The most intriguing element of Skip's proposal is its application to become a service provider eligible for Clipper Card payments. A Clipper Card is an all-in-one transit card for the Bay Area that may be used as a payment alternative for Skip scooter users by the end of 2018.

ofo's low-income plan for riders can be accessed with proof of low-income status as evidenced by emailing (or physically mailing) proof of enrollment in any one of San Francisco's many social programs. Riders can also purchase a prepaid ofo card at partner locations. Potential scooter users who cannot afford smartphones, but who have a phone with basic texting capabilities, can first register their number with ofo and then proceed to unlock a scooter by texting "START," and then lock it by texting "STOP," which will end the ride.

Lyft has proposed an "Uplyft Community Pass" for \$5 a year which includes unlimited free 30-minute rides within a proposed service zone. The Uplyft Community Pass will be available to Bay Area residents who qualify for CalFresh, SFMTA Lifeline, or PG&E Care. Lyft is currently exploring the option of cash payments accepted through their community partnerships program, which would allow individuals to purchase coupon

vouchers with unique codes to unlock scooters. To ensure that the Uplyft Community Pass is an option available to all eligible San Francisco residents, Lyft has consulted with TransForm (a transportation equity nonprofit organization) to help build a strong and effective community outreach strategy.

Key elements of Lyft's strategy include consulting with trusted community leaders, addressing the need for socioeconomic diversity, achieving ridership demographics that reflect the local community, and increasing first and last mile connectivity in transit deficient communities. Lyft understands the importance of involving and listening to the communities they wish to serve; and this philosophy is apparent in their community engagement approach. Lyft's grassroots community strategy is a component that many organizations have unfortunately forgotten, but it is deeply woven into the very fabric of San Francisco's cultural and political identity.

Permitting & Fees

There are many factors for cities to consider when deciding the amount to charge for an annual Permit Fee, Vehicle Fee (daily/annual), Permit Review, fines for Removal & Relocation of Bicycles/Scooters, and Performance Bonds. We have compiled the information in the chart "*Dockless & E-Scooter: Municipal Pricing/Fees*" to build upon information that was included in the City of Los Angeles' pilot proposal. This information should provide city officials a good idea of what other municipalities have decided to propose and it should provide a good starting point for their own proposals. Other considerations not featured in this chart include, but are not limited to, the creative allocation of dockless bike/e-scooter fines. For example, some cities may choose to use the income to build better bike/scooter infrastructure, promote a cleaner environment, or promote safer transportation.

Dockless & E-Scooter: Municipal Pricing/Fees

CITY	Annual Permit Fee	Vehicle Fee (Annually/Daily)	Permit Review	Removal & Relocation of Bikes/Scooters	Performance Bond
Seattle, WA (Bike)	\$149	\$15 per (Annually)	\$209/hr or \$1,672/8 hr shift	city crew hourly rate + 15%	\$80 per - \$10,000 max
D.C.	NO FEE	NO FEE	NO FEE	NO FEE	None
Palo Alto, CA (Bike/Scooter)	NO FEE	NO FEE	NO FEE	NO FEE	None
San Francisco, CA (Bike)	\$12,208 - \$19,558	NO FEE	NO FEE	NO FEE	None
San Francisco, CA (Scooter)	\$25,000	NO FEE	\$5,000 (One time application fee)	NO FEE	\$10,000 total. Vendor must replenish to \$10,000 if it falls below \$,5000.
Bellflower, CA (Bike)	No Fee	NO FEE	NO FEE	NO FEE	None
St. Louis, MO (Bike)	\$500	\$10 per (Annually)	NO FEE	NO FEE	None
Durham, NC (Bike)	\$250	\$10 per (Annually)	NO FEE	\$50 per	\$80 per - \$10,000 max
Charlotte, NC (Bike/Scooter)	NO FEE	NO FEE	NO FEE	NO FEE	none
Chicago, IL (Bike)	\$250	\$50 per (Annually)	NO FEE	NO FEE	None
Chicago, IL (Scooter Proposal)	NO FEE	\$1 per (Daily)	NO FEE	NO FEE	None
Plano, TX (Bike)	\$500	NO FEE	NO FEE	NO FEE	\$5,000 in escrow per 1,000 bikes
LA, CA (Bike/Scooter Proposal)	\$500	\$50 per (Annually)	NO FEE	Maintenance Laborer \$28.32/hr	\$80 per
Austin, TX (Bike/Scooter)	NO FEE	\$30 per (Annually)	NO FEE	NO FEE	\$100 per bike
Santa Monica, CA (Bike/Scooter)	\$20,000	\$130 per (Annually)	NO FEE	NO FEE	NO FEE
Scottsdale, AZ (Bike)	NO FEE	NO FEE	NO FEE	NO FEE	NO FEE
Nashville, TN (Bike/Scooter)	\$500	\$35 per vehicle (Annually)	NO FEE	NO FEE	\$80 per vehicle, with a cap of \$100,000
St. Louis, MO (Bike)	\$500	\$10 per (Annually)	NO FEE	NO FEE	NO FEE
Houston, TX (Bike)	\$250	\$10 per (Annually)	NO FEE	\$80 per bike	\$80 per bike, with a cap of \$20,000
Durham, NC (Bike)	\$250 (\$100 renewal)	\$10 per (Annually)	NO FEE	\$50 per bike	\$80 per bike, with a cap of \$10,000

SUMMARY & NEXT STEPS

The purpose of this policy paper is to: 1) provide cities with a policy framework for allowing e-scooter vendors to operate; 2) offer citizens an affordable and fun option for solving their first and last-mile issues; and 3) assist cities in facilitating a safe and clutter-free environment. As new transportation options become available (i.e., autonomous cars), cities must be vigilant in addressing the new technology, which, quite often, operates in a legal gray area. Being up-to-date on the latest technologies may be difficult for cities, but it is *imperative* if they want to beat these new technologies to the punch.

Urban areas within the United States possess unique characteristics. Cities must evaluate how a new transportation technology will mesh within the broader fabric of their respective communities. One city's approach

to a disruptive technology may not work for another city. For e-scooters, we found many gaps when comparing state-by-state or city-by-city definitions and regulations.

Moving forward, 12 Tone plans to create a repository of all State DMV/DOT scooter definitions and to promote the use of a national standard for these micro-mobility devices. Considering the impressive rate at which new micro-mobility technology is being created and produced, national standards for new transportation devices will assist cities and states to effectively respond to the new technologies in a timely fashion. States and cities shouldn't be tasked with re-inventing the wheel when it comes to defining and addressing the new technologies.

Cities should find creative ways to address and allocate fees around micro-mobility devices. For example, driver education

programs across all U.S. cities are ancient and could use more funding when it comes to teaching future generations about sharing the road with micro-mobility vehicles. It should also be a no-brainer for fines and fees to be spent toward better cycling infrastructure that will ultimately be used by dockless bikes, e-scooters, and other personal mobility options. Micro-mobility is the future. The battle to get cars off the road is an existential battle. Climate change is real. This trendy option may serve as an essential mode of transportation in the future with a larger

environmental impact than people can now comprehend.

Yes, many e-scooter vendors ask for forgiveness, not permission. Before your city deploys e-scooters, please consider this report and use it to create a dialogue with vendors and other community stakeholders. Thoughtfully regulate the devices and enjoy them...they really are a fun alternative to get you where you want to go.

AUTHORS



Kirstin Anderson-Hall

Principal, *Twelve Tone Consulting*

akirstinhall@gmail.com

A Southern California native with an interest in social impact, civic engagement, technology, and how all three can intersect for the greater good. She has a Master's Degree in Political Communications from American University and is well-versed in all things Beyoncé.



Brandon Bordenkircher, MPA

C.E.O., *Twelve Tone Consulting*

Brandon@twelvetoneconsulting.com

A passionate government affairs professional with years of tech policy, political organizing, and research experience. His master's capstone is a study on local governments' response to disruptive technologies (i.e. the sharing economy).



Riley L. O'Neil

Principal, *Twelve Tone Consulting*

Riley@twelvetoneconsulting.com

A Chicago native and thoughtful advocate for dynamic transportation centered around active modes such as public transportation, walking, biking, skating, etc. DePaul alumnus with a Masters of Sustainability & Urban Development and a Fellow at DePaul's Chaddick Institute.

ACKNOWLEDGEMENTS

The writing of this report was a collaborative effort by Brandon Bordenkircher, Riley L. O’Neil, and Kirstin Anderson-Hall of *Twelve Tone Consulting*. We are especially grateful to the following people for providing comments, insights and additional writing:



[Ric Kolenda, Ph.D.](#)

Advisor, *Twelve Tone Consulting*

ric@kolenda.com

An avid urban cyclist and all-around lover of cities, whose research interests include addressing urban inequality and the gig economy. He is currently serving as a Professional Lecturer in DePaul University’s School of Public Service.



Editing by **[Sharon Laszlo](#)**

Contributor/Advisor/Editor, *Twelve Tone Consulting*

sharonlaszlo@yahoo.com

Sharon is an Indiana native with a Bachelor of Science in Nursing from Indiana University Northwest. She has a passion for writing, editing, and studying law and history.



Formatting by **[Mallory Livingston](#)**

Contributor, *Twelve Tone Consulting*

Livingston.mallory@gmail.com

Mallory is a Chicago native, with a passion for urban development and corporate social responsibility. She currently works at the Chaddick Institute for Metropolitan Development as she completes her Master’s in Public Policy at DePaul University.

info@twelvetoneconsulting.com

www.linkedin.com/company/twelve-tone-consulting/

medium.com/@TwelveTone



REFERENCES

- Ako, D. (2018, May 17). City cracks down on Lime scooters. Retrieved from <http://www.kitv.com/story/38218707/city-cracks-down-on-lime-scooters>
- Buchele, M. (2018, May 06). Are electric scooters eco-friendly? It depends on what they're replacing. Retrieved from <https://www.austinmonitor.com/stories/2018/05/are-electric-scooters-eco-friendly-it-depends-on-what-theyre-replacing/>
- Castle, S. (2018, June 13). Boulder moves to allow dockless bike sharing over companies' concerns. Retrieved from http://www.dailycamera.com/ci_31942415/boulder-council-moves-allow-dockless-bike-share-over
- Cawkell, S. (2018, March 22). HOPR App Gives You Access to Bike Share, Ride Share, and Public Transit. Retrieved from <https://momentummag.com/hopr-app-gives-access-bike-share-ride-share-public-transit/>
- Clark, K. (2018, May 15). Lime eyes another \$500M while Spin weighs funding offers worth 'tens of millions'. Retrieved from <https://pitchbook.com/news/articles/lime-eyes-another-500m-while-spin-weighs-funding-offers-worth-tens-of-millions>
- Constine, J. (2018, May 17). Boosted Boards founders launch heavy-duty scooter renter Skip. Retrieved from <https://techcrunch.com/2018/05/17/skip-scooters/>
- Curry, M. (2018, June 13). Not Exactly One Bill to Rule Them All. Retrieved from <https://cal.streetsblog.org/2018/06/13/not-exactly-one-bill-to-rule-them-all/>
- Davis, K. (2018, June 28). Dockless Bike-Sharing Startup Pace Launches Parking Platforms in Chicago. Retrieved from <https://www.americaninno.com/chicago/inno-news-chicago/dockless-bike-sharing-startup-pace-launches-parking-platforms-in-chicago/>
- Dickey, M. R. (2018, April 09). Uber acquires bike-share startup JUMP. Retrieved from <https://techcrunch.com/2018/04/09/uber-acquires-bike-share-startup-jump/>
- Dickey, M. R. (2018, April 17). San Francisco will regulate electric scooter sharing. Retrieved from <https://techcrunch.com/2018/03/28/san-francisco-will-regulate-electric-scooter-sharing/>
- Dickey, M. R. (2018, May 30). GOAT launches electric scooters in Austin. Retrieved from <https://techcrunch.com/2018/05/24/goat-launches-electric-scooters-in-austin/>
- Dockless Bike Share Pilot Project. (2018). Retrieved from https://www.cityofchicago.org/city/en/depts/cdot/supp_info/dockless-bike-share-pilot-project.html
- Friedersdorf, C. (2018, May 30). Fly On, My Sleek Electric Bird. Retrieved from <https://www.theatlantic.com/technology/archive/2018/05/fly-on-my-sleek-electric-bird/559340/>

- Frothingham, S. (2018, March 23). Bike share organization expels ofo because of Florida lobbying. Retrieved from <https://www.bicycleretailer.com/industry-news/2018/03/23/bike-share-organization-expels-ofo-because-florida-lobbying#.WzVsANhKj-Y>
- Garrison, R. (2018, June 02). Denver tells electric scooter companies they can't operate in city. Retrieved from <https://www.thedenverchannel.com/news/local-news/denver-tells-e-scooter-companies-theyre-in-violation-of-city-code-orders-them-to-seize-operations>
- Genovese, J. (2018, May 17). 'Bird' scooters to continue operations in Scottsdale after cease and desist. Retrieved from <https://www.abc15.com/news/region-northeast-valley/scottsdale/scottsdale-issues-cess-and-desist-on-bird-scooters>
- Greenfield, J. (2018, June 11). Pace Plans to Install Bike Racks, Rent Adaptive Cycles, Help Launch Bike Library. Retrieved from <https://chi.streetsblog.org/2018/06/11/pace-plans-to-install-bike-racks-rent-adaptive-cycles-launch-bike-library/>
- Harrison, S. (2018, May 9). Lime started scooter share program without approval, so city has shut it down. Retrieved from <http://www.charlotteobserver.com/news/politics-government/article210767719.html#storylink=cpy>
- HNN Staff. (2018, May 18). Controversial scooter share program ends in Honolulu after 1 week. Retrieved from http://m.hawaiinewsnow.com/hawaiinewsnow/db_352775/contentdetail.htm?full=true&contentguid=bAfiuaOY&pn=&ps=#display
- Hollister, S. (2018, May 31). The electric scooter war continues. Here's how they work (FAQ). Retrieved from <https://www.cnet.com/news/electric-scooters-bikes-dockless-ride-share-bird-lime-jump-spin-scoot/>
- Information for MOPED Owners and Drivers. (n.d.). Retrieved June 02, 2018, from <https://www.hawaiimoped.com/wp-content/uploads/2014/09/mvso-Information-for-MOPED-Owners-and-Drivers.pdf>
- Jiao, J. & Bischak, C. (2018, March 16). Dozens of U.S Cities Have 'Transit Deserts' Where People Get Stranded. Retrieved from <https://www.smithsonianmag.com/innovation/dozens-us-cities-have-transit-deserts-where-people-get-stranded-180968463/>
- Keeling, B. (2018, April 16). SF issues cease and desist order for motorized scooters [Update]. Retrieved from <https://sf.curbed.com/2018/4/16/17244850/scooters-cess-desist-san-francisco-letter-stop-motorized>
- Keenan, S. (2018, May 23). Bird scooters are banned from the Beltline, but Atlantans don't seem to care. Retrieved from <https://atlanta.curbed.com/2018/5/23/17381274/no-birds-allowed-on-beltline>
- Kerr, D. (2018, May 30). The mad, twisted tale of the electric scooter craze. Retrieved from <https://www.cnet.com/news/the-mad-tale-of-the-electric-scooter-craze-with-bird-lime-and-spin-in-san-francisco/>

- Kokalitcheva, K. (2018, May 15). Lime is raising up to \$500 million as e-scooter wars heat up. Retrieved from <https://www.axios.com/lime-500-million-1526410337-93c2524a-2d22-4f56-bb9a-c626798320f4.html>
- Lekach, S. (2018, April 17). E-scooters aren't getting stolen, the real issue is sidewalk litter. Retrieved from <https://mashable.com/2018/04/17/electric-scooters-sidewalk-litter/>
- Lien, T. (2018, May 24). Bird's scooters have flooded the streets of major cities. But can the start-up control misbehaving riders? Retrieved from <http://www.latimes.com/business/technology/la-fi-tn-scooter-safety-20180523-story.html>
- Linton, J. (2018, June 13). Santa Monica Proposes Regulations For E-Scooters, E-Bikes. Retrieved from <https://la.streetsblog.org/2018/06/08/santa-monica-proposes-regulations-for-e-scooters-e-bikes/>
- Lloyd, S. A. (2018, March 19). Seattle experiments with designated bike-share parking spots. Retrieved from <https://seattle.curbed.com/2018/3/19/17140640/seattle-bike-share-parking-ballard>
- Lorenz, T. (2018, May 20). Electric Scooter Charger Culture Is Out of Control. Retrieved from <https://www.theatlantic.com/technology/archive/2018/05/charging-electric-scooters-is-a-cutthroat-business/560747/>
- Maguire, T. (2018, May 01). A New Permit and Pilot Program for San Francisco's Scooters. Retrieved from <https://www.sfmta.com/blog/new-permit-and-pilot-program-san-franciscoscooters>
- Marinova, P. (2018, June 13). A Comprehensive Look At How We Got to Peak Scooter Mania. Retrieved from <http://fortune.com/2018/06/13/bird-electric-scooters-funding/>
- Marshall, A. (2018, May 01). The Love of the People Isn't Enough to Keep Shared Electric Scooters Rolling. Retrieved from <https://www.wired.com/story/shared-electric-scooters-rolling/>
- Marshall, A. (2018, June 02). Lyft Wants to Dominate Transportation, and That Means Bike Share. Retrieved from <https://www.wired.com/story/lyft-bike-share-motivate-acquisition/>
- Mashaw, M. (2018, April 21). Bird Electric Scooter App Launches in Santa Monica and Expands to Austin, San Diego, San Francisco, San Jose, and Washington DC. Retrieved from <https://www.expslore.com/blog/bird-electric-vehicle-scooter-share-startup-app-santa-monica?format=amp>
- McGee, J., & Rau, N. (2018, May 09). Bird scooters company receives cease and desist letter after two days in Nashville. Retrieved from <https://www.tennessean.com/story/money/2018/05/09/nashville-tells-bird-scooter-service-cease-and-desist-after-two-days/594466002/>
- Merced, M. J. (2018, July 02). Lyft Follows Uber Into Bike-Sharing Lane, Buying Owner of CitiBike. Retrieved from <https://www.nytimes.com/2018/07/02/business/dealbook/lyft-citibike-motivate-bike-share.html>

- Murphy, M., & Griswold, A. (2018, April 19). Rebranded Chinese scooters are taking over San Francisco. Retrieved from <https://qz.com/1257198/xiaomi-makes-the-bird-and-spin-scooters-taking-over-san-francisco/>
- Murphy, M., & Griswold, A. (2018, April 21). Electric scooters are flooding California, and they'll be on your sidewalks soon. Retrieved from <https://qz.com/1257997/electric-scooters-are-flooding-california-and-theyll-be-on-your-sidewalks-soon/>
- Newcomer, E., & Stone, B. (2018, July 09). Uber Will Rent Scooters Through Its App in Partnership With Lime. Retrieved from <https://www.bloomberg.com/news/articles/2018-07-09/uber-will-rent-scooters-through-its-app-in-partnership-with-lime>
- Newton, D. (2018, June 13). Santa Monica City Council Unanimously Rejects Hard Cap on E-Scooters, Moves Forward with 16-Month Shared Mobility Pilot. Retrieved from <https://la.streetsblog.org/2018/06/13/santa-monica-city-council-unanimously-rejects-hard-cap-on-e-scooters-moves-forward-with-16-month-shared-mobility-pilot/>
- Ojeda, A. (2018, June 27). Mother, Daughter Seriously Injured in Boardwalk Scooter Crash. Retrieved from <https://www.nbcsandiego.com/news/local/Serious-Injury-Scooter-Accident-Boardwalk-Mission-Beach-486629121.html>
- Poe, R. (2018, June 20). The Memphis-Bird electric scooters agreement: What you should know. Retrieved from <https://www.commercialappeal.com/story/news/government/city/2018/06/19/memphis-bird-electric-scooter-agreement-4-things-know/714342002/>
- Rose, J. (2018, June 8). Bye-bye, Bird? Retrieved from <https://www.bizjournals.com/denver/news/2018/06/08/bye-bye-bird-denver-starts-impounding-dockless.html>
- San Francisco Chronicle. (2018, June 16). The 12 scooter companies that plan to roll through San Francisco. Retrieved from <https://www.sfchronicle.com/business/article/The-12-scooter-companies-that-plan-to-roll-12999364.php#photo-15731477>
- Sandler, R. (2018, June 03). 'We're the only company without a cease and desist order': Why Skip thinks it can win the scooter war. Retrieved from <http://www.businessinsider.com/skip-scooter-ceo-interview-2018-5>
- Sisson, P. (2018, February 14). Electric scooter company founded by former Lyft, Uber exec is taking over the Westside. Retrieved from <https://la.curbed.com/platform/amp/2018/2/14/17010034/bird-electric-scooters-transit-venice-santa-monica>
- Spielman, F. (2018, May 29). Could motorized scooter-sharing be Chicago's next big thing? Retrieved from <https://chicago.suntimes.com/politics/could-motorized-scooter-sharing-be-chicago-next-big-thing/>
- Trautman, T. (2018, April 26). I rode electric scooters in SF for a day. Here's why we need more of them. Retrieved from <https://www.sfchronicle.com/bayarea/article/I-rode-electric-scooters-in-SF-for-a-day-12841624.php>

- Wear, B. (2018, June 04). Garage band of dockless scooter engineers works to rev up GOAT. Retrieved from <https://www.mystatesman.com/news/local/garage-band-dockless-scooter-engineers-works-rev-goat/Ml8MjSmzM7Ygs5E6Ok11WP/>
- Widner, C. (2018, May 14). Zagster rolls into Austin as city issues emergency rules. Retrieved from <https://austin.curbed.com/2018/5/14/17350292/austin-dockless-rules-zagster-lock>
- Wisniewski, M. (2018, May 08). Dockless bike companies protest Chicago's lock rule: 'No other city has required this'. Retrieved from <http://www.chicagotribune.com/news/local/breaking/ct-met-dockless-bike-lock-debate-20180503-story.html>
- Wisniewski, M. (2018, July 09). Ofo pulls its dockless bikes from Chicago because of locking rules. Retrieved from <http://www.chicagotribune.com/news/ct-biz-ofo-dockless-bike-20180709-story.html>
- Wood, J. M., Tyrrell, R. A., Marszalek, R., Lacherez, P., & Carberry, T. (2013). Bicyclists overestimate their own night-time conspicuity and underestimate the benefits of retroreflective markers on the moveable joints. *Accident Analysis & Prevention*, 55, 48-53. doi:10.1016/j.aap.2013.02.033