

bike share business plan

Sacramento Metropolitan Air Quality Management District

Technical Working Paper #1: Overview of Infrastructure, Locations, Technology, and Organizational Structures



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OVERVIEW

The Sacramento Metropolitan Air Quality Management District (SMAQMD) has requested a *Bike Share Business Plan* for a bike share system in the Sacramento area. This report describes the current practice of bike share in North American cities, highlighting key attributes of a bike share system and considerations for system implementation and operation.

Bike share programs have been in operation and evolving since the 1960s. Many of the earlier generation bike share models are no longer functioning, largely due to theft and vandalism. However, today's information technology (IT) based systems are flourishing in Europe, North America and other parts of the world. In the United States, most of these programs have been launched since 2010. Although fairly new, a good deal of system data has been gathered to date. Two recent publications have documented and analyzed U.S. bike share programs in detail:

- *Bikesharing in the United States: State of the Practice and Guide to Implementation* (FHWA, 2012)
- *Public Bikesharing Operations in North America* (Mineta Transportation Institute, 2012)

These reports are a valuable resource for the consideration of a Sacramento area bike share system. However, this report distills relevant information on a select group of bike share programs from comparable cities and systems: Boulder B-cycle, Capital Bikeshare (Washington D.C.), Denver B-cycle and Nice Ride Minneapolis. The following summarizes the main areas of focus:

System Typologies

The IT-based automated-kiosk bike share systems currently being deployed in the U.S. are known as "third generation" systems. A demand-responsive, station-less "fourth generation" system is another emerging model, but suffers some drawbacks related to visibility, access and system maintenance. There are four major bike share equipment vendors in the U.S, each with their own proprietary hardware and unique system features. Once installed, station density (per square mile) and the ratio of bikes to stations tend to be fairly consistent across different systems.

Program Management

There are two parts to bike share program management: equipment ownership and operations. Currently, there are three main management models in operation in the United States: the non-profit model, the

publicly owned/privately operated model, and the privately owned-and-operated model. Of these models, nonprofits appear to be the most popular because they limit the liability of the local jurisdiction and provide for flexibility. There are multiple responsibilities in operating a bike share system:

- Geographically redistributing bikes throughout the system
- Handling safety, theft and vandalism issues
- Providing customer service during hours of operation
- Maintaining the bikes and stations

Capital and Operating Costs & Funding Sources

U.S. bike share programs are funded by a combination of user fees; sponsorships; advertising; private donations; and Federal, State, and local funds; along with various loans; private foundation grants; and individual donations. Of these funding sources, user fees, sponsorships, and advertising are the most common. None of the programs reviewed generate sufficient revenue from user fees alone to support both their full capital acquisitions and ongoing operations and maintenance costs. However, several programs do appear to have financially sustainable operations after their capital acquisitions are fully or partially funded by other sources.

System Implementation

User fee structures typically involve both membership fees and usage fees. Fee structures are usually arranged to encourage short trips (and a greater turnover of bikes) by charging a small fee or no fee for trips under 30-60 minutes, and discourage longer term use by charging additional incremental fees thereafter. Membership fees differ, but can be charged on a short-term (daily or weekly) or long-term (monthly or yearly basis), and users can pay for their membership either by mail, web, or at a station kiosk. Other implementation considerations include education and marketing.

Lessons Learned & Rules of Thumb

Staff from Denver B-cycle share their top ten “lessons learned” and rules of thumb for launching and operating a bike share business.

Appendix A provides summaries of each of the four bike share systems reviewed in detail for this report. **Table 1** summarizes the key characteristics of these systems.

TABLE 1 - BIKE SHARE PROFILES FROM COMPARABLE COMMUNITIES

	Boulder B-cycle	Capital Bikeshare (Washington D.C.)	Denver B-cycle	Nice Ride Minneapolis
Opening date	May, 2011	September, 2010	April, 2010	June, 2010
Service area	4.7 sq. mi.	36 sq. mi.	12.6 sq. mi	33.3 sq. mi
Station density	3.2 stations per sq. mi in service area	3.9 stations per sq. mi in service area	4.1 stations per sq. mi in service area	3.3 stations per sq. mi in service area
Bikes (start/current)	110/120	1,100/1,710	400/520	1,200/1,330
Stations (start/current)	15/15	110/209	40/52	116/146
Equipment vendor	B-cycle	Public Bike Share System (PBSC)	B-cycle	Public Bike Share System (PBSC)
Equipment owner	Non-profit	Jurisdiction	Non-profit	Non-profit
Program operator	Non-profit	Private (Alta Bike Share)	Non-profit	Non-profit
Member fee	Annual: \$65 7 day: \$20 24 hours: \$7	Annual: \$75 30 day: \$25 3 day: \$15 24 hours: \$7	Annual: \$80 30 day: \$30 7 day: \$20 24 hours: \$8	Annual: \$65 30 day: \$30 24 hours: \$6
Usage fee	First 60 minutes free; \$4.50 each additional ½ hour	First 30 minutes free; additional minutes ≤\$2 per 30 minutes based on membership and total usage time	First 30 minutes free; 30-60 minutes \$1; each additional 30 minutes \$4	First 30 minutes free; 30-60 minutes \$1.50; 60-90 minutes \$4.50; each additional half hour \$6

Source: Operator websites and *Bikesharing in the United States: State of the Practice and Guide to Implementation* (FHWA, 2012)



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SYSTEM TYPOLOGIES

Bike share typically refers to a system in which individuals can enjoy the benefits of access to a bicycle on an as-needed basis without the burdens of private bike ownership, such as purchase and maintenance costs, storage, and parking. Self-service systems, characterized in the literature into three “generations” of increasing technological sophistication, allow users to pick up and drop off their bikes without the help of an attendant, and commonly provide multiple bike stations so that users may pick up a bicycle from one location and drop it off at any another in the system.¹ The “lending library” model is another approach under which a staff member helps the user borrow from a fleet of bikes, typically stored in a single location. These types of systems are summarized below.

FIRST AND SECOND GENERATION SYSTEMS

“First generation” bike share systems are free to all users and place unlocked bicycles, painted in a single, bright color, unsystematically throughout the area.² The White Bike Plan in Amsterdam, Netherlands, began in 1965, and was followed by programs in La Rochelle, France, Cambridge, United Kingdom, and Portland, Oregon.^{3,4} Bike theft and damage quickly became problems, however, and both the Amsterdam and Cambridge systems failed. Only La Rochelle’s Vélos Jaunes system, which enjoys strong community support, continues to operate today.⁵

The “second generation” of bike share systems continued to employ distinctively colored and designed bikes, but also addressed the theft problem with locked bikes on designated city racks, requiring a coin

¹ P. DeMaio and L. L. C. MetroBike, “Bike-sharing: Its History, Models of Provision, and Future,” in *Velo-city 2009 Conference*. Retrieved October, vol. 13, 2009, 2009.

² Susan A. Shaheen, Stacey Guzman, and Hua Zhang, “Bikesharing in Europe, the Americas, and Asia,” *Transportation Research Record: Journal of the Transportation Research Board* 2143, no. -1 (12, 2010): 159-167.

³ Ibid.

⁴ DeMaio and MetroBike, “Bike-sharing: Its History, Models of Provision, and Future.”

⁵ Shaheen, Guzman, and Zhang, “Bikesharing in Europe, the Americas, and Asia.”



deposit to unlock the bike.⁶ Throughout the 1990s, systems were launched across Europe and eventually spread to some U.S. cities. Unfortunately, the small deposits (typically \$3 to 4 USD) and anonymity of users meant that bikes were often used for long time periods or even not returned at all, resulting in a less reliable system – bikes were not available when and where users needed them.⁷

THIRD GENERATION SYSTEMS

The information technology (IT)-based, automated-kiosk bike share systems currently being deployed in the U.S. are known as “third generation.” These systems incorporate unmanned kiosks with electronic user interfaces that allow users to check bikes in and out with an electronic identification or payment method, such as a mobile phone, magnetic credit card, passcode, or radio-frequency identification (RFID) key. The electronic nature of the system allows docks to lock and unlock automatically, incorporates theft-deterrence via a membership with ID, credit card information, or a larger deposit, and informs operators of the status of the overall system, including the number of available docks and bicycles at each station. Furthermore, automatically collected usage data enable more sophisticated operational monitoring and program evaluation. Three major system vendors, Public Bike System Company, B-cycle, and DecoBike have provided hardware for systems currently operating in the U.S. The Collegiate Bicycle Company has also deployed a small campus system at UC Irvine, and Bike Nation has plans to deliver systems in Southern California. Details of these systems’ specific

Bike Lending Library Systems

A “lending library” is a manual check-in/out system, in which bikes are kept in a secure location and a staff member assists users with the checkout process. Users sign up for a membership online or in person, and are then eligible to borrow bikes from the library. Bicycles are typically checked out from and returned to a single location, and are often made available for longer time periods than under a third generation system. The Arcata Library Bike Program allows users to borrow a bike for up to six months in exchange for a \$20 refundable deposit. The long-term nature of a lending library makes them inherently different from a bike share system.

<http://www.arcata.com/greenbikes/>

⁶ Ibid.

⁷ Ibid.

hardware attributes are discussed under “Third Generation System Attributes,” in the following section.

FOURTH GENERATION SYSTEMS

Recent technological and operational improvements are also paving the way for a demand-responsive, station-less system. These systems place all the security and checkout infrastructure on the bike, so there is no physical location (i.e. station) from which the bikes are dispatched or returned. Instead, this system uses electronic self-locking bicycles in combination with GPS and wireless communication for all check-out and check-in needs. Users pre-register online, and then locate a nearby bicycle via smartphone or computer to unlock it. At the end of the trip, bicycles may be left in any public location for return.

Pros and Cons

There are several advantages to fourth generation systems over third generation systems. Since they do not require stations and the associated hardware, they are likely less capital-intensive to start than third generation systems with a comparable number of bikes. There are also fewer technical and logistical barriers to implementation; concerns about permitting, siting, and installing multiple kiosks do not apply. This can be of particular benefit in space constrained urban areas.



Deutsche Bahn (German national railway) Call a Bike
Photo: Aaron Naparstek

However, fourth generation systems also suffer some substantial drawbacks for both for the rider and the operator. Most notably, the third generation stations and kiosks are publicly visible and typically placed in prominent locations, which can encourage use and attract new users. In a fourth generation system, a rider can always find a bike using the GPS, but can never be sure just where that bike will be. Bikes in a station-less system are dispersed throughout the service area and may be returned in poorly visible or inaccessible locations. Clusters of multiple bikes in a known place increase reliability. From the operator’s points of view, for risk management purposes, a bike needs to be maintained on regular intervals (for example, Denver B-cycle bikes are serviced every 14 days). Collecting bikes that are in random locations for maintenance is more carbon intensive and expensive for operators. In addition, bikes may be left in problematic locations, such as blocking sidewalks.



Fourth generation systems are also difficult to manage in a large service area, as it is difficult to contain the bikes within a boundary. Educating users (particularly tourists and other single use riders) about what the service area boundaries are presents a major challenge. For this reason, fourth generation systems are likely more appropriate for a physically well-defined and possibly isolated campus with a population that can be easily communicated with.

Despite these challenges, the bike share market and technology is evolving quickly. Considerations for a number of technology based enhancements, such as market based pricing, billing integration with transit smart cards and carsharing systems, GPS tracking and system data “dashboards” may be integrated with both third and fourth generation systems. Just as no one imagined the rapid growth of third generation bike share a decade or so ago, it may be difficult to imagine what bike share will look like in five to ten years.

TABLE 2 BIKE SHARE SYSTEM TYPES & SAMPLE LOCATIONS IN OPERATION

System Type	Small-medium sized cities	Large cities	Multiple jurisdictions	Campuses
3rd Generation	Boulder B-cycle, CO San Antonio B-cycle, TX Madison B-cycle, WI	Boston Hubway, MA CitiBike, NY DECOBIKE, Miami, FL Denver B-cycle, CO Nice Ride (Minneapolis), MN	Capital Bikeshare, Washington D.C. Bay Area Bike Share, CA	UC Irvine
4th Generation		Berlin, Frankfurt, Munich, Germany		viaCycle, Georgia Tech
Lending Library	Santa Monica Bike Center, CA Arcata, CA			Bruin Bikes, UCLA

THIRD GENERATION SYSTEM ATTRIBUTES

System Hardware

Generally, third generation bike stations have two main parts: the automatic docks that lock the bikes in place and the electronic payment kiosk. Typically composed of two to four smaller modules, docks are six to eight feet wide and require an additional four to six feet of adjacent clearance for docking and removing bikes from docks. Usually, docks are oriented in a single line, but individual modules can also be configured in rows to accommodate bike loading from more than one side. Electronic payment kiosks may be wired or solar powered. Some stations may also include additional elements such as wireless communications features and panels or signage for maps, advertising, sponsor recognition, and so forth.



Third generation station in Denver, CO including kiosk, docks, and bikes

Bicycles incorporated into third generation bike share systems share some common attributes. For better visibility, shared bikes generally incorporate unusual or distinctive designs, often with bright, uniform color schemes. Many systems favor design elements that provide users convenience or comfort: a step-through frame, which eliminates the top tube of traditional bicycles; enclosed chains, cables, and wires, which protect riders from dirt or grease and protect components; front and rear fenders, which prevent mud and dirt from splashing upward onto the rider; a wide, padded saddle; and an adjustable, non-removable seat post with simple height markings that allow users to quickly find their desired seat height when checking out a new bike. Additionally, safety features typically include hand brakes and front and rear lights activated by pedaling. The bikes are heavy and durable, limiting top speeds. They also feature few or single speeds, and gearing is light to make acceleration and hills easier, but also limits top speeds. Front racks or baskets and kickstands provide additional convenience.

Removal and return, or “docking” of bikes is generally uniform across hardware providers. Users can check out bikes with a credit card and access code, a membership card, or a key fob. Short-term users typically pay for a membership with a credit card at the kiosk, and receive an unlocking access code that releases a bike. At subsequent checkouts during the same short-term rental period, the original credit card can be inserted as identification to receive a new code without any additional charge. Long-term users may purchase memberships online and receive a membership card or key fob by mail that can be swiped at the station to release a bike. Upon reinserting the bicycle’s locking tab into the dock, the dock locks automatically, and the dock simultaneously records the check-in and emits a light and/or audible signal to confirm the bike is successfully returned.

Currently, the hardware provided by various vendors is not interoperable; the proprietary locking mechanisms, docks, and kiosks from one system will not work with those provided by another vendor. The major vendors provide similar bikes and stations; vendor-specific hardware variations for each vendor are described in **Table 3**.

Important Considerations for Selecting an Equipment Provider, from Denver Bike Sharing

- Assess all sub-vendors: experience, capabilities and reputation of bike manufacturer, software developers and station manufacturers.
- Business model viability: will they be around for the long haul?
- Is their supply chain reliable for parts for maintenance and repairs?
- Capacity for ongoing service and support .
- Bike sharing is IT. It will never be perfect so the co-problem solving relationship between operator and vendor is at the heart of continued smooth operations.
- Customer service & responsiveness – organizational development plan and capacity.
- The equipment provider is a long term relationship. The relationship does not end with the purchase. Open communication procedures, styles are critical.
- This is a competitive new rapidly changing market. And it is more than a business. The provider’s heart should be in the “movement.”
- Ask for them to provide a Made in America waiver for all components if they are made overseas with non-U.S. steel.

TABLE 3 BIKE SHARE VENDORS & FEATURES

Vendors	Vendor-specific hardware	Cities
Public Bike Share System (PBSC)	3-speed bicycles Chains partially enclosed Provides a rack with bungee cord rather than a basket	Manufacturer for equipment for bicycle share programs in 10 cities worldwide, including Washington DC, Boston, MA and New York City
B-cycle	3-speed bicycles Partially exposed chain Includes a cable lock for short-term locking when not docked at B-cycle stations	Has bicycles and docks in 12 cities across the United States, including Denver & Boulder, CO, Madison WI and Charlotte, NC
DECOBIKE	Typically 1-speed Partially exposed chains System's bar-like docks latch to the bikes on the frame above the front tire	Miami, FL Surfside, FL Bay Harbor, FL Long Beach, NY
Bike Nation	Bicycles have airless tires (more durable, require less maintenance, but have a heavier, less comfortable ride) Chainless, shaft-driven drive train (less need for ongoing adjustments and maintenance as the bicycle ages, but require more complex and expensive repairs; have slightly less pedaling efficiency than chain-driven systems)	Anaheim Los Angeles, CA (anticipated launch date late 2013)
Collegiate Bicycle Company	1-speed bicycles Modified baskets that act as a docking mechanism by which the bikes attach to the single-bar dock Exposed bike chains	ZotWheels, University of California, Irvine

Public Bike Share System (PBSC)



Source: Flickr user DDOTDC



Source: James D. Schwartz

B-cycle



Source: <http://denver.bicycle.com>

DECOBIKE



Source: <http://www.decobike.com>

Bike Nation



Source: <http://www.bikenationusa.com/>

Collegiate Bicycle Company



Source: <http://www.parking.uci.edu>

System Configuration

In the U.S., systems range widely in size, from as small as two stations and fourteen bikes (Spartanburg B-cycle) to as large as 150 stations and 1,670 bikes (Capital Bikeshare). Even larger systems are in the planning stage for Chicago (400 stations and 4,000 bikes), Los Angeles (400 stations and 4,000 bikes), and is currently being launched in New York (the pilot is starting with 330 stations and 6,000 bikes with plans to expand to 600 stations and 10,000 bikes). Existing systems typically have a mostly contiguous network of stations with short distances among the stations. In U.S. systems, stations are typically located at densities of 3.0 to 4.5 stations per square mile.

TABLE 4 BIKE SHARE SYSTEM CHARACTERISTICS

Bike Share System	Stations (start/current)	Bikes (start/current)	Service area	Station density
Boulder B-cycle	15/15	110/120	4.7 sq. mi.	3.2 stations per sq. mi in service area
Capital Bikeshare	110/209	1,100/1,710	36 sq. mi.	3.9 stations per sq. mi in service area
Denver B-cycle	40/52	400/520	12.6 sq. mi	4.1 stations per sq. mi in service area
Nice Ride Minneapolis	116/146	1,200/1,330	33.3 sq. mi.	3.3 stations per sq. mi in service area

Source: Operator websites and *Bikesharing in the United States: State of the Practice and Guide to Implementation* (FHWA, 2012)

Across the U.S., phasing strategies for unrolling successful bike share systems have differed, although they generally involve grouping of stations in some capacity. In Washington D.C., Capital Bikeshare began by introducing bike stations in the large core of the central city and a smaller, nearby cluster in Arlington, Virginia. As the system has gained ridership, it has been gradually expanded. Denver, Colorado’s B-cycle system has grown incrementally, starting in a few locations and expanding as organizers raise additional funds and establish new partners. Elsewhere, the San Francisco Bay Area’s bike share program is establishing a core of 50 stations in the City of San Francisco, with additional, smaller clusters of 10 to 12 stations surrounding several Caltrain commuter rail stations along the Peninsula to San Jose.

A number of factors can play a role in determining the success and growth of a bike share system, including: stakeholder and partner support; local involvement; existing bicycle, transit, and walking mode share; cycling infrastructure; topography; and bicycle culture.

PROGRAM MANAGEMENT

MANAGEMENT STRUCTURE

Currently, there are three main bicycle share program models in operation in the United States: the non-profit model, the publicly owned/private operated model, and the privately owned-and-operated model. Of these models, nonprofits appear to be the most popular. Of the 19 information-technology (IT)-based programs in the United States, about 60 percent were nonprofit.^{8 9} The private vendor-operated model is currently emerging, with systems operating in Anaheim and Miami Beach and systems planned to launch in Long Beach, Los Angeles, and New York, likely within the next year.

Each operating model has a number of benefits and challenges:

- In the **non-profit model**, a 501 C(3) organization manages both the operations and service. Local governments may provide some capital or operations funding and can act as a fiscal agent to request Federal funds. The main benefit of this model for local government is that relieves them from financial liability. In addition, non-profits can act more nimble and respond to changing needs more quickly. However, the non-profit model requires ongoing fundraising efforts that require considerable staff time. In Denver, Denver Bike Sharing, a non-profit corporation, owns and operates the system, while B-cycle LLC, a privately held company, provides the equipment and stations. A similar arrangement exists with Minneapolis, Minnesota's Nice Ride Minnesota program and PBSC.
- In the **publicly owned/ privately operated model**, the jurisdiction is financially responsible for the program and owns the infrastructure and equipment. This model allows for greater local government control over the development and deployment of the system, and the private contractor accepts the liability which limits the jurisdiction's exposure. However, the capital funding typically includes federal sources which can complicate and delay the program launch, and local jurisdictions may have legal restrictions on advertising which can limit revenue potential.

⁸ IT-based programs represent the "third generation" of a bike sharing system, evolving from the "free bikes" system (first generation) and "coin-deposit" system (second generation).

⁹ Shaheen, Susan A., Ph.D., Martin, Elliot W., Ph.D., Cohen, Adam P., Finson, Rachel S. Public Bikesharing Operations in North America, Mineta Transportation Institute, pp.27-28, June 2012.

The Bay Area pilot bike share program decided against this model because the local agencies did not want to purchase the equipment outright for a pilot program that may not be sustained in the long-term. As shown in **Table 5**, Washington, D.C.’s Capital Bikeshare, stations and bikes are publicly owned but privately operated.

- The **privately owned and operated model** places all financial liability with a private company, and limits government involvement to discrete roles such as procuring public space permits. This market-driven model allows for a more flexible and responsive system, but reduces government control which may limit the ability to meet community goals such as access and equity. New York City’s Citi Bike, for example, incorporates bikes and equipment from PBSC with operations by NYC Bike Share, LLC and funding from Citibank and MasterCard.

There are also opportunities for partnerships with local bike shops and related businesses: in 2011, B-cycle partnered with Mellow Johnny’s, a local bike shop in Austin, Texas to host a demonstration of B-cycle’s bike share hardware, and the shop has expressed interest in supporting a bike share system there.¹⁰

TABLE 5 – MANAGEMENT STRUCTURES

		Equipment Ownership		
		Public	Private	Non-Profit
Operation	Public	N/A	N/A	N/A
	Private	Capital Bikeshare (Washington, DC) Hubway (Boston, MA)	Citi Bike (New York, NY) DECOBIKE Miami Beach (FL)	N/A
	Non-Profit	N/A	N/A	Denver B-cycle (CO) Boulder B-cycle (CO) Nice Ride (Minneapolis, MN)

¹⁰ http://www.austin360.com/blogs/content/shared-gen/blogs/austin/fitcity/entries/2011/07/13/bcycle_demo_planned_at_mellow.html

OPERATIONS

There are multiple responsibilities in operating a bike share system. The core tasks include geographically redistributing bikes throughout the system, handling safety, theft and vandalism issues, providing customer service during hours of operation, and maintaining the bikes and stations.

BIKE REDISTRIBUTION

Because of directional peaking in demand for bike share bikes, some stations become full or empty during peak operating periods. For example, during morning rush hour, stations near large employment centers may become full, meaning there are no docks for users to check in additional bikes. When this happens, system operators can rebalance the system by loading extra bikes into a truck or step van and delivering them to other empty or nearly-empty stations. Bike redistribution is a costly part of bike share system operation; in the case of Capital Bikeshare, nearly half of the operating costs in the first year were due to the need to redistribute bicycles among the stations.¹¹



Capital Bikeshare redistribution van in Washington, D.C.

SECURITY, SAFETY, AND LIABILITY

Although European systems such as Paris' Vélib have experienced difficulties with vandalism and theft, U.S. systems have had very few problems, as shown in **Table 6**. In their first season of operation, Capital Bikeshare, Nice Ride, and Denver B-cycle collectively lost only four bikes.¹² Requiring members to register and place a deposit or credit card hold before renting a bike provides accountability and a disincentive to steal or lose the bike. The mechanism that locks the bike to the dock is also secure; none of the lost or

¹¹ Holben, Chris, District Department of Transportation, Washington, D.C. Personal interview. 24 January 2011.

¹² Rixey, Rodney A. "Case Studies in Bike Sharing: Lessons for Santa Monica." 2012.

stolen bikes went missing while docked at the station. A cable lock built into the bike, as in the case of some B-cycle bikes, might help to prevent theft while the bike is not docked at the station, but is not as secure as the station dock.

Safety concerns have also been limited. The experience of the Capital Bikeshare system indicates that bike share users have fewer crashes—nearly half as many in the first season of operation—than the general population. None of the Capital Bikeshare crashes resulted in serious injuries, whereas some other bike trips resulted in serious injuries or fatalities.¹³

Nevertheless, bike share systems take steps to improve safety and limit liability. Members typically accept a liability waiver and safety warning when registering for the system. Regular system maintenance and the introduction of safe bicycling education programs can contribute to a system’s overall safety record. Insurance is also available to mitigate risk.

TABLE 6 – BIKE SHARE LOSS AND DAMAGE

Bike Share System	Bikes in System	Stolen/Lost	%	Vandalized/Damaged	%
Capital Bikeshare	1,110	2	0.18%	0	0.00%
Denver, B-cycle	500	1	0.20%	1	0.20%
Nice Ride Minneapolis	700	1	0.14%	3	0.43%
Biki (Montreal, QC)	3,000	12	0.40%	75	2.50%
Vélib (Paris, France)¹	20,600	4,000	19.42%	8,000	38.83%

Vélib reported 8,000 lost/stolen and 16,000 vandalized/damaged bikes in its first two years

TIME OF DAY

Bike share systems can operate at all times or only certain times of the day as necessitated by budget, community concerns, weather, and other factors. For example, Washington D.C.’s Bikeshare, Nice Ride Minnesota, and Denver’s B-cycle are available for use 24 hours per day, seven days per week. Elsewhere, systems operate from 5:00 AM to 10:00 PM, 11:00 PM, or midnight (as in San Antonio, Denver, and Boulder) or other limited hours.

¹³ <http://www.streetsblog.org/2011/06/16/from-london-to-d-c-bike-sharing-is-safer-than-riding-your-own-bike/>

CUSTOMER SERVICE

Typically, the vendor or operator provides a customer service call center and, in many bike share systems, the operator handles membership as well as other customer service functions. For example, Denver B-cycle, operated by Denver Bike Sharing, maintains regular customer service hours of 9:00 AM to 5:00 PM weekdays, while Capital Bikeshare's operator provides a 24-hour, 7-day call center in three languages.

MAINTENANCE

Although damage and vandalism to bikes is generally rare in existing American bike share programs, normal use of bicycles requires bike share operators to maintain their system. Many bicycle share systems have a central maintenance facility for major repairs; redistribution vehicles can be used to bring bikes to such facilities. Systems also employ field "checkers" to inspect bikes regularly and make minor repairs and adjustments at stations themselves. To address user-determined maintenance issues, many bike stations have kiosks with built-in buttons that notify a need for maintenance at a given kiosk or dock when pressed. Bike share bikes are purported to have a useful life of five years, but since most systems have been operating for two years or fewer, this is an estimate.



Capital Bikeshare maintenance station in Washington, D.C.



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CAPITAL AND OPERATING COSTS & FUNDING SOURCES

Bicycle share programs use a variety of sources to fund initial capital and ongoing operating expenditures. This section of the report summarizes by broad category the range of U.S. bicycle share business models currently in operation and describes how they are funded. Appendix A provides a series of case studies of bike share funding models in the U.S.

A few years ago, the most popular business models for bike share relied primarily on advertising revenues (on bikes, equipment, transit vehicles, and other public property) to fund the program. This model has been described as “street furniture” and is still used for Paris’ “Vélib” program. In the United States, recent examples of the advertising or street furniture model, such as the SmartBike DC program in Washington, DC, and the proposed San Francisco bike share program, have been either terminated (SmartBike DC) or have chosen a different model to pursue (San Francisco: publicly owned and operated).

How Much Does a Bike Share System Cost?

While the size and structure of bicycle sharing systems vary, costs per bicycle station tend to stay within a specific range. Capital costs for the equipment and installation range from \$35,000 to \$40,000 for a station with 11 docks and six bikes to \$53,000 to \$58,000 for a station with 19 docks and 10 bikes. Annual operating costs range from \$12,000 to \$28,000 per station or \$2,000 to \$2,800 per bike, including normal repairs and maintenance, customer support, and system rebalancing.

Source: *Bikesharing in the United States: State of the Practice and Guide to Implementation* (FHWA, 2012)

However, while the specific advertising model used in Paris and formerly used in DC has not been popular in the United States, publicly owned/privately operated systems with title sponsors have seen significant success. For example, the City of Boston partnered with New Balance to help launch the Hubway bicycle share program. On an even larger scale, the CitiBike program in New York City, a partnership between Citi Bank and the City of New York, is set to become the largest bike share operation in North America.

Bike share programs in the United States are funded by a combination of user fees; sponsorships; advertising; private donations; Federal, state, and local funds; along with various loans; private foundation grants; and individual donations. Of these funding sources, user fees, sponsorships, and advertising are the most common. None of the programs reviewed in the United States generate sufficient revenue from user fees alone to support both their full capital acquisitions and ongoing operations and maintenance

costs. However, several programs do appear to have financially sustainable operations *after* their capital acquisitions are fully or partially funded by other sources.

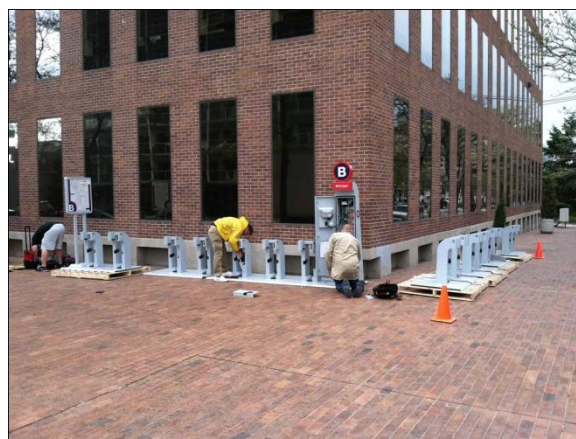
CAPITAL INVESTMENT AND FUNDING

Bike share systems require capital investment, or initial funding, for equipment purchase and installation. Funding for capital costs comes from a number of sources: federal, state and local public funding; private grants; and advertising and sponsorship sources. To date, most systems have utilized a combination of both public and private funding to cover capital costs.¹⁴

At the federal level, bike share systems have received funding through a number of programs, including the American Recovery and Reinvestment Act, the Energy Efficiency and Conservation Block Grant Program, the Federal Highway Administration (FHWA), the Congestion Mitigation and Air Quality (CMAQ) Improvement Program, the Federal Transit Administration (FTA)'s Bus and Bus Facilities Livability Initiative Program, and others. Such funding can cover the entirety of a system's capital costs, as in the case of CMAQ funding for Washington D.C.'s Capital Bikeshare, or only a small part, as in the case of Denver B-cycle, which received only 16 percent of its \$1.5 million capital funding from federal sources.¹⁵

There are also funding opportunities at the state and local level. For example, the Los Angeles County Metropolitan Transportation Authority has designated funds for bike share projects through its Call for Projects process.

Additionally, private grants and sponsorships can provide needed funding. Eighty-four percent of Denver B-cycle's startup funding came from sponsors, including Kaiser Permanente, which was designated the



Station installation at 19th Street / Logan Street in Denver, CO

¹⁴ Alta Planning + Design. "City of Providence Bike Share Feasibility Study Final Report."

¹⁵ Alta Planning + Design. "City of Providence Bike Share Feasibility Study Final Report."

system's "presenting sponsor." Nice Ride Minnesota received roughly a third of its \$2.75 million startup costs from Blue Cross Blue Shield of Minnesota's tobacco settlement fund.¹⁶

OPERATING FUNDING SOURCES

MEMBERSHIP AND USE FEE REVENUES

Once a system is implemented, operating revenues contribute substantially to the total cost of operation. Typically, these revenues come from daily, weekly, monthly, or annual membership fees and per-use charges assessed to system users. In the case of Capital Bikeshare, revenues totaling \$2.47 million from September 2010 to April 2012 covered almost all of the system's \$2.54 million operating expenses.¹⁷ In 2010, Denver Bike Sharing reported revenues of \$390,000 from its membership and use fees.¹⁸ Long-term members typically make the majority of trips, while short-term members pay the majority of usage and membership fees. For example, in the Denver Bikeshare's 2011 season, annual members constituted 34% of membership fees, 9.6% of usage fees, and made 60% of trips, while 24-hour members made up 65% of membership fees, 87% of usage fees, and made only 39% of trips.¹⁹



CitiBank sponsored bikes in New York City
Photo: Noah Kazis

¹⁶ Alta Planning + Design. "City of Providence Bike Share Feasibility Study Final Report."

¹⁷ <http://www.usnews.com/news/articles/2012/04/17/bike-sharing-systems-arent-trying-to-peddle-for-profit>

¹⁸ http://www.denverbikesharing.org/files/DBS_2010_Annual_Report.pdf

¹⁹ Burnap, Parry. "Denver Bike Sharing." *NACTO U.S. Bike Sharing Workshop*. 22 March 2012.



TITLE SPONSOR / STATION SPONSORSHIP

Currently, most bike systems' operating revenues do not fully cover costs of operations; thus, additional funding from public agencies, private grants, or advertising and sponsorships are usually required to sustain operations. New York City's Citi Bike, for example, currently seeks to be the first fully privately funded bike share system in the country. Together with user revenue, sponsorship funding from Citibank (\$41 million) and MasterCard (\$6.5 million) is projected to cover both capital and operations costs; any additional profit will be split between NYC Bike Share and the City.²⁰ In its 2010 operating season, NiceRide collected about \$230,000 in station sponsorships, dedicating one side of the map panel to thank a station sponsor who contributed \$10,000 or more.²¹ Denver B-cycle received 26% of its 2010 revenue and 40% of its 2011 revenue from sponsorships.²²

²⁰ <http://a841-tfpweb.nyc.gov/bikeshare/faq/#how-much-is-the-sponsorship-worth-and-how-long-is-it-for>

²¹ Rixey, Rodney A. "Case Studies in Bike Sharing: Lessons for Santa Monica." 2012.

²² Burnap, Parry. "Denver Bike Sharing." *NACTO U.S. Bike Sharing Workshop*. 22 March 2012.

SYSTEM IMPLEMENTATION

Typically, bike share systems undergo a pilot test prior to the official launch of the full system to ensure proper functioning of the bikes and kiosks, and can be arranged with the system vendor as part of the Request for Proposal Process. Other pre-launch considerations include determining an appropriate fee structure, educating the public, and marketing.

FEE STRUCTURES

Currently, user payment procedures frequently involve two parts: membership fees and usage fees, as shown in **Table 7**. Membership fees differ, but can be charged on a short-term (daily or weekly) or long-term (monthly or yearly basis), and users can pay for their membership either by mail, web, or at a station kiosk. After users become members, they can typically check out a bike for free for the first 30 to 60 minutes with an additional fee charged every 30 minutes thereafter. DECOBIKE is the only bike share operator that does not require some type of membership fee. Instead, users may check out a bike based on hourly rates, or can purchase optional bike passes that offer an unlimited number of rides under 30 or 60 minutes.

Since membership and usage fees usually require a credit card transaction, some systems have sought ways to provide services to those without credit cards or bank accounts. For instance, Capital Bikeshare partners with Bank on DC, a program that helps low-income users without bank accounts obtain a debit card and access the system. Membership fees are also frequently discounted for students, seniors or military personnel.

TABLE 7 –SAMPLE MEMBERSHIP AND USAGE FEES

	Membership Fees			Usage Charges	
	Annual	Multi-day	24 Hours		
Program	Boulder B-cycle (Boulder, CO)	Annual: \$65	7 Day: \$20	\$7	First 60 minutes free; \$4.50 each additional ½ hour
	Denver B-cycle (Denver, CO)	Annual: \$80	30 Day: \$30 7 Day: \$20	\$8	First 30 minutes free; 30-60 minutes \$1; each additional 30 minutes \$4
	Capital Bikeshare (Washington, DC)	Annual: \$75 Annual w/ monthly installments: \$84	30 Day: \$25 3 Day: \$15	\$7	First 30 minutes free; additional minutes ≤\$2 per 30 minutes based on membership and total usage time
	Nice Ride (Minneapolis, MN)	Annual: \$65	30 Day: \$30	\$6	First 30 minutes free; 30-60 minutes \$1.50; 60-90 minutes \$4.50; each additional half hour \$6

EDUCATION

Because bike share is a relatively new concept, bike share system implementation typically incorporates an education component to raise awareness and understanding of the system’s capabilities and availability. Education on proper system use, user responsibilities, and safe bicycling is also important. A number of elements can make up such a component. Clear signage facilitates the system’s use for new and veteran users alike; a web presence can provide answers to vital questions and describe the system to those unaware of its capabilities; community outreach, social media, and word of mouth also are effective.

MARKETING

Marketing is also a part of many bike share system implementation plans. Currently, bike share’s novelty helps it attract free press; Denver Bike Sharing’s 2010 annual report, for instance, declared that over 775

news stories ran on the system in the previous year.²³ Social media sites such as Facebook and Twitter allow new possibilities for user interaction, and deals provided through social discount sites such as Groupon and Living Social have been successful. In Washington D.C., Capital Bikeshare has attracted 8,000 new members via its social discount site promotions.²⁴

Promotions and contests are often part of existing systems' marketing efforts. Capital Bikeshare, for instance, held a "Winter Weather Warrior Contest," which awarded its most frequent user during winter months with a free membership extension, additional memberships for friends, and gift card prizes. Another prize was awarded to those who used the bicycle system every day during the same period. In Denver, "Tour de B-cycle" provides those who visit all local B-cycle stations in one day with recognition and prizes.

Other marketing opportunities exist as well, including cross-promotions with sponsors, user experience video contests, and joint promotions with other modes of transit and respective websites.

²³ http://www.denverbikesharing.org/files/DBS_2010_Annual_Report.pdf

²⁴ Weber, Erik. "GGW debates: Is CaBi getting a good deal on Living Social?" <http://greatergreaterwashington.org/post/10024/ggw-debates-is-cabi-getting-a-good-deal-on-living-social/>. 12 April 2011.



*Technical Working Paper #1: Overview
of Infrastructure, Locations, Technology,
and Organizational Structures*

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LESSONS LEARNED

Denver Bike Share describes their top “lessons learned” on the business, the system and their market:

ON BUSINESS

Insurance is not a barrier

The loss of equipment is minimal.

Legal support is essential

The bike share business is contract intensive. Denver B-cycle incurred \$90,000 in legal fees in the first year.

Provide customer service “in-house”

Local staff can better understand the perspective and location of the customer, and are an essential and effective bridge between customer experience, shop and maintenance staff and technology vendors. IT-savvy staff is also critical. The after-hours call center staff is part of the team; take care of them, keep them trained and up to date.

ON THE SYSTEM

Bike share is much more about IT than about bikes

The performance metrics for new technology still evolving

Connectivity and server time only tell part of the story. Issues that arise are not on or off, up or down – it works or it does not. Issues are never random, but they feel random. They tend to be spatially and temporally intermittent.

Every technology glitch is felt throughout the business. Technology issues require customer service time to unravel and affect finances.

Rebalancing bikes is not a perfected science

It requires a combination of data, intuition and awareness.

The optimal ratio for docks to bikes is two to one

Completely modular, off grid stations are best

ON THE MARKET

Both annual and short-term member groups are essential

Annual members help us achieve our mission by using bikes for transportation, but do not generate as much revenue. Casual members are less concerned about usage fees so they subsidize our mission.

The two part fee structure confuses people – even after three years!

A two-pronged marketing strategy needed to attract both casual and utilitarian riders

Fine-tune your marketing message

Social marketing can be used to achieve behavior change. Traditional marketing is critical to selling the product at a right price to the right people. Find a middle ground in the messaging between fun/hipster and providing a serious transportation option.

Achieving a broad, diverse customer base is complicated

It is not just about the credit card.

BIKE SHARE “RULES OF THUMB”

Denver Bike Sharing describes their guidelines for successful system planning:

Macro Environment - characteristics of good station sites

- Mixed land use (retail and residential, destination variety).
- High population density (employment and/or residential) within a three block radius.
- Connection with public transit stops (bus and rail).
- Bike infrastructure to/from station or positioned next to a “slow moving” street if cross-street is arterial.
- Proximity to other bike share stations. Density creates system reliability and availability for users. Isolated clusters of stations see lower use compared to stations that are part of the core system.

Micro Environment - characteristics of good station sites

- Existing surface should be “station ready” (concrete, bricks, pavers, asphalt).
- Power or solar access is available and adequate (approximately six hours of solar exposure, or ability to run power to the station).
- Physical space is available – on the sidewalk, in-street, parking lots, etc.
- Corner locations are easier for users to find than mid-block locations.

Station Density

- Position stations two to four blocks apart in the densest areas, and up to six to eight blocks apart in the least dense areas.

Station Size

- A good average station size is 15 docks. The minimum station size Denver now installs is 11 docks. The more docks a station has, the easier it is for the operations team to keep it in balance (open docks and available bikes), meaning less gas spent attending to the station, and is more reliable for users.

Station Relocation

- The bottom 10 percent of stations (ranked by check-outs) are reviewed annually and evaluated for either a) relocation; b) a need to increase station density in the area; or c) increased marketing efforts in the area to generate use.

Demographics

- Average Denver Bike Share Annual Member is 38 years old; 79 percent come from one or two member households; 82 percent have no children in the household.
- In Denver, 50 percent of walk up users come from out-of-state. 33 percent of walk up users live in Denver. It's important to have locations at tourist destinations, as this group incurs usage fees and generates positive cash flow throughout the operational year.
- Consider the top five responses Annual Members give for using bike share:
 - 56 percent – a social event or a date
 - 55 percent – a restaurant, bar or pub
 - 44 percent – commuting to or from work
 - 35 percent – a sporting or entertainment event
 - 33 percent – work-related meeting or errand

APPENDIX A: CASE STUDIES



BOULDER B-CYCLE

Boulder's B-cycle was launched on May 20, 2011, and currently maintains 110 bikes throughout 15 stations. The majority of Boulder B-cycle's docking stations are located around the heavily trafficked, commercial district surrounding Pearl Street, which is northwest of the University of Colorado at Boulder (CU Boulder) campus. There is one station officially on the CU Boulder campus at the University Memorial Center student union; other stations serving the campus are located just off campus.

In 2011, Boulder's B-cycle had 1,170 annual members and had sold more than 6,000 24-hour access passes. League of American Bicyclists ranks Boulder as "platinum" on their Bicycle Friendly Community Ranking, which is the highest ranking in the country, because of their 300+ miles of bike lanes, routes, designated shoulders and paths, as well as topography.

Boulder B-cycle charges \$65 for an annual membership; however, student annual memberships are available for \$40.

Capital expenditures (initial fleet of bikes, stations) totaled approximately \$525,000 and were funded primarily by grants (\$446,250), including \$250,000 through an Energy Efficiency and Conservation Block Grant, funds from the City of Boulder, and gifts from individuals (amounting to approximately \$100,000) and local businesses and residents (\$78,750).

Ongoing operational expenditures on stations, bikes, and B-cards are funded through sponsorships (64 percent), as well as membership and usage fees (36 percent).²⁵

²⁵ Information compiled from several sources, including personal interview with Bob Koenig of Boulder B-cycle, August 2012; US Department of Energy; and the 2011 Boulder B-cycle Annual Report.



CAPITAL BIKESHARE (WASHINGTON, D.C.)

Currently the largest bike share program in the United States, with more than 1,670 bikes dispersed across 175 stations, Capital Bikeshare also is perhaps the most successful. When the program launched in 2010, stations were initially located primarily throughout D.C.'s northwest quadrant, with stations in Arlington County, Virginia's Crystal City and at least one station in each of D.C.'s eight wards. Capital Bikeshare has since grown within D.C. and Arlington County and expanded into Alexandria, Virginia; 50 stations will be installed in Montgomery County, Maryland in 2013. Capital Bikeshare is operated by Alta Bicycle Share, operates year-round, and has exceeded 200,000 members.²⁶

Capital Bikeshare uses several funding sources, although it collects nearly all of its funds needed for daily operations from user fees. D.C.'s \$6 million capital costs were largely covered by federal grants such as one from the U.S. Department of Transportation's Federal Highway Administration under their Congestion Mitigation and Air Quality (CMAQ) Improvement Program. To start the Arlington program, funding was received from the Virginia Department of Rail and Public Transportation, Arlington County transportation funding, and sponsorships by the Crystal City Business Improvement District (BID) and the Potomac Yard Transportation Management Association.



Capital Bikeshare bike in Washington, D.C.

A large part of Capital Bikeshare's success has stemmed from investment in bike infrastructure, such as bike lanes, in conjunction with station construction. In addition, Washington, D.C., enjoys enormous numbers of tourists each year, many of whom come to sightsee on the National Mall and nearby Tidal Basin. Because parking has long been in short supply in the area, Capital Bikeshare has been able to educate visitors of the convenience of the system and therefore has seen membership from non-residents grow dramatically.

Capital Bikeshare operates in three jurisdictions and, although no formal agreement governs revenue and cost sharing, financial coordination through an informal partnership has been amicable. Each jurisdiction

²⁶ Capital Bikeshare Web site (capitalbikeshare.com).

purchases its own stations and bikes; a Council of Governments rider clause in contracts with Alta Bicycle Share ensures all jurisdictions are able to get the same pricing terms. Jurisdictions also contribute to the system's direct operating costs in proportion to the number of bikes they own. Other costs, such as for equipment upgrades and marketing promotions, are agreed to on a case-by-case basis, proportional to the number of stations, docks, bikes, or members in the jurisdiction, as appropriate. New membership revenues are assigned based on the location of the station where the member registers, or based on the home address of a member who registers online or by mail. Usage fees are assigned based on the station where the trip begins. Montgomery County will join the cost- and revenue-sharing partnership 30 days after its stations are installed, likely in September 2013.

DENVER B-CYCLE

Denver's B-cycle is operated by Denver Bike Sharing, a nonprofit founded to promote health, quality of life, and preservation of the environment. The program was launched on April 22, 2010, and at the beginning of 2013, consisted of 83 stations. The initial seed money for the project came from the host committee of the Democratic National Convention, which donated \$1 million from a budget surplus to create a large-scale bicycle share system.

In 2011, Denver Bike Share sold 2,675 annual memberships and 42,320 short-term memberships (e.g., 24-hour passes, 7-day, 30-day). The League of American Bicyclists ranks Denver as "silver" on their Bicycle Friendly Community Ranking primarily because of Denver's limited biking infrastructure.

Of Denver Bike Sharing's total operating expenses, membership and usage fees cover 29 percent and 17 percent, respectively. Remaining operating costs are covered by sponsorships (49 percent), operating grants (five percent), and gifts (one percent).

Government funds used by Denver Bike Share include an Energy Efficiency and Conservation Block Grant (EECBG) for \$210,000, Transportation Community Preservation Program (TCPP) grant revenue, as well as funds from Colorado's Vehicle Registration Tax and FASTER Program.²⁷

²⁷ "Denver Launches First Large-scale Citywide Bicycle Sharing Program in the U.S.," Denver B-cycle Web site (denver.bcycle.com), April 22, 2010.



NICE RIDE MINNEAPOLIS

Nice Ride Minnesota was launched on August 3, 2010, and consists of 146 stations and more than 1,300 bicycles. The program stretches across Minneapolis and St. Paul and is operated and overseen by Nice Ride Minnesota. Minneapolis has extensive bicycle infrastructure and is ranked a “Gold” Bicycle Friendly Community by the League of American Bicyclists for the quality of its bicycle network, supporting facilities and programs. The program comprises more than 4,000 annual members and more than 35,000 casual members.

The initial Phase 1 capital costs for Nice Ride Minnesota totaled \$3 million, including \$45,000 per kiosk.²⁸ The funding sources for the initial capital costs included Federal funds, corporate sponsorship, and the City of Minneapolis. These funds included a \$1.75 million one-time contribution from the Federal Government’s Non-motorized Transportation Pilot Program (NTP), which was made available through Bike Walk Twin Cities, a program administered by Minneapolis’ Transit for Livable Communities, \$1 million from Blue Cross Blue Shield (using proceeds from the historic tobacco settlement), who is Nice Ride Minnesota’s title sponsor, and \$250,000 from the City of Minneapolis Convention Center Fund. The annual operating costs in 2010, the first year of operations, totaled about \$300,000.

The Phase 2 expansion in 2011, which increased the system by 51 new stations, received commitments from Blue Cross Blue Shield (up to \$1.5 million), Bike Walk Twin Cities (\$500,000), Central Corridor Funders Collaborative (\$250,000 for stations near light rail stations), and the Macalester College High Winds Fund (\$30,000). In addition, Transit for Livable Communities (TLC) committed \$1 million for Phase 2 capital from the NTP.²⁹

²⁸ Schlabowske, Dave, Communications Director, “Bike Sharing, what is it and how does it work?” Bicycle Federation of Wisconsin, Bicycle Blog, February 10, 2011.

²⁹ “Nice Ride Minnesota Announces Phase 2 Funding,” Nice Ride Minnesota Web site, March 1, 2011.

