

Bike Sharing in the United States: State of the Practice and Guide to Implementation

September 2012

Prepared by Toole Design Group
and the Pedestrian and Bicycle Information Center
for USDOT Federal Highway Administration



U.S. Department of Transportation
**Federal Highway
Administration**



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ADVISORY COMMITTEE MEMBERS

Parry W. Burnap

Executive Director
Denver Bike Sharing

Julia Diana

Manager, San Antonio Bikes
City of San Antonio

Bill Dosset

Executive Director
Nice Ride, MN

Chris Eatough

Program Manager
BikeArlington

Nate Evans

Bicycle & Pedestrian Planner
Baltimore Department
of Transportation

Nicole Freedman

Director of Bicycle Programs
City of Boston

Lynn Harris

Senior Administrative Analyst
University of California – Irvine

Chris Holben

Project Manager
District Department of Transportation

Anne Hudak

Active Lifestyles Coordinator
Partners for Active Living

Scott Kubly

Managing Deputy Commissioner
Chicago Department of Transportation

Joshuah Mello

Assistant Director for
Transportation Planning
City of Atlanta

Josh Moskowitz

Project Manager
District Department of Transportation

Colby Reese

Vice President
Deco Bike

Cate Ryba

Media and Communications Officer
Mary Black Foundation

Jim Sebastian

Supervisory Transportation Planner
District Department of Transportation

Rebecca Serna

Executive Director
Atlanta Bicycle Coalition

Cindi Snell

Executive Director
San Antonio Bikeshare

Elizabeth Train

Executive Director
Boulder B-Cycle

Mitch Vars

I.T. Director
Nice Ride Minnesota

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Figure 1: Nice Ride
Credit: Nice Ride (Minneapolis/St. Paul, MN)

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GLOSSARY OF TERMS

BIKE SHARING

Bike sharing is a nonmotorized transportation service, typically structured to provide users point-to-point transportation for short distance trips (0.5 to 3 miles). It provides users the ability to pick up a bicycle at any self-serve bike sharing station in the network and return it to any other bike sharing station (including the origin).

BIKE SHARING STATION

A bike sharing station is the structure that holds the automated customer kiosk, and the docks that dispense the bicycles. A station can hold a minimum of one bicycle and up to a maximum number of bicycles by adding more dock platforms.

DOCK

The dock is the most basic component within a bike sharing station. The dock is a mechanism that retains a bicycle in an upright, locked position until released by the user.

CUSTOMER KIOSK

An electronic terminal which provides bicycle rental instructions, payment equipment (i.e. credit card device), and all other means necessary for the rental of bicycles.

‘LAST MILE’ TRIP

A bicycle trip associated with the connection between a transit hub (i.e. bus, rail) and the final destination.

MEMBER

A daily, weekly, monthly or annual user of a bike share program. Some bike share programs refer to daily, weekly or monthly users as ‘casual users’.

MEMBERSHIP DUES

Membership dues are the amount charged to each bike share customer which allows access to the bike sharing program.

RIDERSHIP FEES/USAGE FEES

The terms are used interchangeably to refer to any additional charges incurred by users of bike share systems after the first 30 to 60 minutes of usage. NOTE: some programs have begun to modify their fee structure by eliminating the free period.

REBALANCING/REDISTRIBUTION

The terms are used interchangeably to refer to the process in which bicycles are redistributed throughout the service area to ensure that each bike share station has an appropriate proportion of available docks and bicycles at all times (ideally around 50% bikes to 50% open docks) to ensure optimum service.

SERVICE AREA

The geographical area within a jurisdiction where a bike sharing program offers service for its users. For the purposes of this guide, the service area includes a 1 mile radius around each bike sharing station.

CHAPTER 1. EXECUTIVE SUMMARY

1.1 PURPOSE AND BACKGROUND OF THE GUIDE

With the introduction of new and more advanced bike sharing programs, and the continued interest and political support for them throughout many U.S. cities, it is important to provide an objective analysis of bike share programs, and to document early lessons learned. This guide is intended to serve as a resource for transportation planning professionals, as well as public officials considering implementation of a bike sharing program. The guide presents a snapshot of current municipal bike share systems where local jurisdictions (including cities, counties, etc.) are engaged in the funding, managing, administering and/or permitting of bike share implementing practices.¹

The objectives of this guide are to:

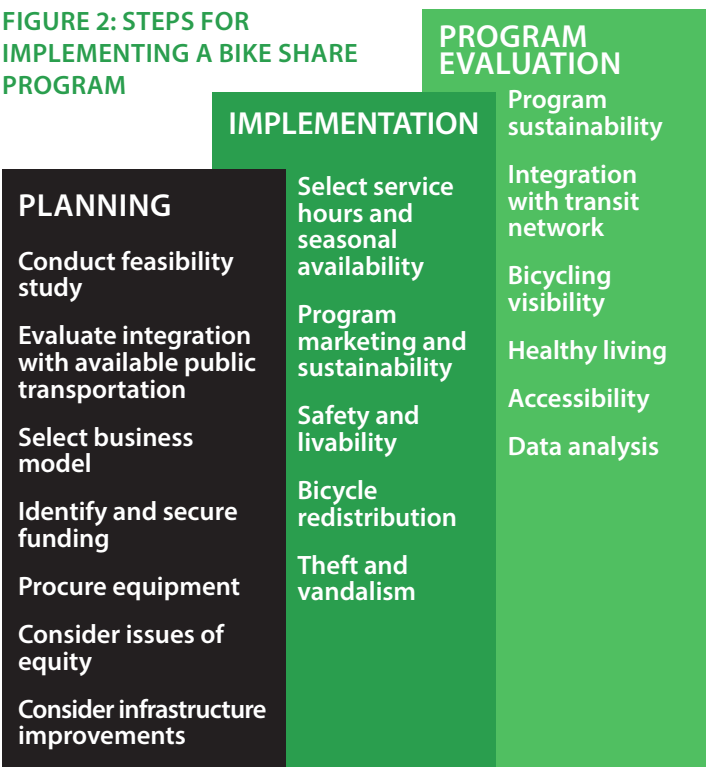
- Define bike sharing and provide an overview of the concept.
- Describe the steps a jurisdiction should take to plan, implement, and sustain a bike share program.
- Document existing models of provision, infrastructure considerations, and funding options for successfully implementing a bike sharing program.
- Describe metrics for monitoring and evaluating program success.
- Provide a baseline documentation of existing bike share programs in the United States in 2012.

1.2 WHAT IS BIKE SHARING?

Bike sharing is an innovative transportation program, ideal for short distance point-to-point trips providing users the ability to pick up a bicycle at any self-serve bike station and return it to any bike station located within the system’s service area.

While still very young, modern American bike share programs build on lessons learned from their European and Canadian counter parts, with some differences in technology and operations. In the context of this study, bike sharing differs from traditional bicycle rental

services in that it is typically used for short distance and duration trips that are often combined with public transit. Figure 2 delineates the steps jurisdictions should take for implementing a bike share program.



With increasing political and financial support for bike share programs in many major U.S. cities,² it has become important to document the early lessons learned by pioneering programs, and to provide an initial set of best practices for the next generation of bike share programs. Interest in bike share has been fueled by success in several cities, including Washington, DC, Denver and Minneapolis, where bike share has quickly become an accepted and popular transportation option. It will be important to track the progress of bike sharing implementation as new and more advanced programs are implemented in the next few years.

This guide has been organized in four sections to match with the program development process: Planning, Implementation, Program Evaluation and Additional Considerations. The following is a summary of the findings and recommendations in each of these areas.

1.3 SUMMARY OF RECOMMENDATIONS

BIKE SHARE PLANNING RECOMMENDATIONS

The planning stage determines the ultimate form of the bike share program. At this stage, a determination is made as to the optimal business model, related capital and operational costs, and potential funding sources. To effectively plan a bike share program, jurisdictions should consider the following:

i. **From their outset, jurisdictions should define the goals of implementing bike share programs in order to document their impact.** Although the primary goal communities set for bike share may vary, most seek a wide range of benefits (e.g. increase bicycling visibility, promote healthy and active living, provide transit connections).

EXISTING COMMUNITY GOALS FOR BIKE SHARE PROGRAMS

Promotion of healthy living
Increasing bicycling visibility
Integration with transit network
Promote financial sustainability
Increased access for underserved communities

ii. **Jurisdictions should select a business model that best fits their local political and financial context.** There are currently three general business models being utilized in existing programs. The appropriate business model will depend on the institutional capacity of the lead agency and regulatory framework within a jurisdiction.

iii. **Jurisdictions should consider all the costs attached to the planning, implementation and management of a bike sharing program.** The costs of starting a bike share program can be significant. As of March 2012, the capital costs for implementing a jurisdiction-wide bike sharing system ranged from an average of \$4,200 to \$5,400 per bicycle, including all system components, staff and administrative support. Operating costs ranged from an average of \$150 to \$200 monthly per bicycle.³

iv. **Jurisdictions should evaluate the feasibility and determine the optimal structure of a program**

before committing to implementation. In addition to gauging if the bike share program is feasible, the study should determine the optimal implementation model. It is important that this feasibility study take an impartial approach to the various models that are possible.

v. **Jurisdictions should consider initial capital investment needs as well as long term operating costs when pursuing different funding sources.** A wide variety of funding sources are being used to support bike share programs. A combination of Federal, State and local government funding, in addition to private sources, and membership and usage fees are currently being used by existing programs.

vi. **The general public and various stakeholders should be engaged throughout all phases of the program implementation.** To ensure success, jurisdictions should include all stakeholders in the planning, implementation and evaluation process.

ADDITIONAL CONSIDERATIONS

An extensive network of bicycle facilities is of great benefit, but may not be necessary prior to program roll out. While fully formed bike networks are not a prerequisite for success, there need to be bikeable areas and other visible signs that bicycling is encouraged within the jurisdiction.

Weather and topography can have an effect on service provision and ridership. Despite seasonal weather changes, bike share programs can be used throughout the year. Jurisdictions should however be mindful of how extreme weather conditions can affect ridership patterns, quality of service and life-cycle of the bicycles and stations.⁴ With regard to topography, slopes of more than 4% can be a major barrier for bicyclists and can have an effect on ridership and bicycle redistribution patterns throughout the service area.⁵

Additional information can be found on Chapter 3 of this guide.

BIKE SHARE IMPLEMENTATION RECOMMENDATIONS

The implementation stage includes the deployment and day-to-day activities of a bike sharing program. To



Figure 3: Deco Bike user getting to work.
Credit: Deco Bike (Miami Beach, FL)

ensure successful implementation, jurisdictions should consider the following:

- i. **Jurisdictions should consider deployment of stations in areas where increased population and job densities positively impact ridership.** Experience has shown that stations with close proximity to high population and job density locations receive the most ridership. Additionally, in communities with strong public transportation systems, deployment of stations should facilitate connectivity between transit and bike share.
- ii. **Jurisdictions should consider locating their stations no more than ½ mile apart to minimize the distance users must walk to access the service.** Station density is a determinant of ridership levels. The density of stations within a service area plays an important role in determining the relative level of ridership across the system.
- iii. **Stations should be placed in locations that are clearly visible from multiple approaches, in full consideration of the necessary space requirements**

and circulation to and around the station. Station location must balance the need to be in a highly visible location with the spatial requirements for the station. For example, it is important that bike share stations be located in close proximity and within view of transit station entrance/exits, if they are intended to serve those users.

- iv. **Affordable and strategic pricing scale should be determined to promote ridership and demand.** Jurisdictions implementing a bike share program should consider how pricing scales can encourage high turnover of bicycles and increased usage of the system for short-term trips.⁶
- v. **Service hours should be tailored to the system and the context.** Jurisdictions considering the implementation of a bike share system should adjust the hours of operation to the needs of the local community and the size/density of the system. Jurisdictions should note that it can be cost prohibitive to provide staffing to support a 24-hour bike share system if there are very few or no users at late hours.



Figure 4: Boulder B-Cycle
Credit: Robert D. Jones, Boulder B-Cycle (Boulder, CO)

ADDITIONAL CONSIDERATIONS

Theft and vandalism have not been a major issue in any of the programs studied. Existing U.S. systems studied reported very low rates of theft and vandalism. Most current systems include secure locking mechanisms which only allow users to unlock a bike with the use of a specialized key or code. Additionally, some equipment suppliers have included built-in cable locks on their bicycles for bicycle security at intermediate stops.⁷

Early evidence suggests that crash rates in existing bike sharing programs are low. Programs interviewed reported very low number of reported crashes.⁸ It is important to note that as bike sharing is still a relatively new transportation option in the U.S., there is limited experience with liability exposure and the topic has not been tested in courts. Further analysis will be needed as the number of programs grows and existing programs mature.

Refer to Chapter 4 of this guide for additional information.

BIKE SHARE EVALUATION RECOMMENDATIONS

Jurisdictions should evaluate system performance to gauge success and identify improvements that are needed. When evaluating programs, jurisdictions should consider the following:

- i. **Small bike sharing programs can be successful.** While higher concentration of jobs and population can enhance the ridership of a bike share system,⁹ early reports from existing small system managers indicate that bike share programs can be successfully implemented in jurisdictions with relatively modest density compared to their more urban counterparts. However, the long term prognosis for the success for small and suburban bike share programs will require additional assessment as these programs mature.
- ii. **Evaluating customer information and feedback is important for system improvement.** New programs should request customer feedback to improve system performance. Additionally, by taking into consideration public opinion, new bike sharing programs will be able to target new areas for potential expansion.
- iii. **Mobile and web applications enhance system functionality.** New programs should consider how sharing real-time ridership data with customers can boost system functionality and enhance user experience.
- iv. **Data analysis is important to help increase public support for the program.** New programs should consider the promotion of open data to help increase public support for implementation and potential future expansions of the program.

See Chapter 5 of this guide for more information.

ADDITIONAL CONSIDERATIONS FOR SUCCESS

As a relatively new phenomenon, there is limited availability of data on the implementation of bike sharing programs in the U.S. The following is a list of additional considerations:

- i. **Bike share programs should work hand-in-hand with other efforts to accommodate and encourage bicycling.** Bike share programs can increase the visibility of bicycling within a jurisdiction, helping to achieve larger mode-shift and climate change goals. Additionally, based on the experience of existing programs, bike share systems can give additional impetus to efforts to improve bicycle infrastructure.
- ii. **Bike share programs should promote helmet use.** Helmet use should be strongly promoted, and mechanisms should be used to increase access to helmets (i.e. making them available for discount purchase when applying for membership). Jurisdictions with mandatory helmet laws for adult bicyclists have additional implementation considerations to address. In general, it should be the responsibility of the individual to provide their

own helmet in order to participate in bike share.

- iii. **Bike share programs should strive for participation among low income and minority populations.** Bike share programs continue to face challenges reaching these populations, despite a number of innovative approaches. Long term success will depend in part on being able to show that bike share can serve everyone.
- iv. **Bike share programs should be integrated with other alternative transportation options to provide multiple choices depending on the direction and purpose of each trip.** Jurisdictions implementing bike share should integrate the system with other transportation options, such as car sharing and transit connections, so that users can go from rail, to bus, to bike, to car with relative ease. Recent reports indicate that bike share systems can have a positive impact on local bicycle retail business. San Antonio and Washington, D.C. are jurisdictions that have seen an increase in retail bicycle sales since deploying bike share systems.¹⁰

Additional information can be found on Chapter 6 of this guide.



Figure 5: Nice Ride users
Credit: Nice Ride (Minneapolis/St. Paul, MN)

CHAPTER 2. EVOLUTION OF BIKE SHARING IN THE U.S.

2.1 BACKGROUND

In 2008, Washington, DC became the first major city in the United States to implement a modern bike share program. Smartbike DC included ten stations and 120 bicycles and was implemented through a cooperative agreement with Clear Channel Outdoor, an advertising company.¹¹ In the spring of 2010, Denver became the second jurisdiction to implement a major bike share program through a successful public-private partnership. As of March 2012, nearly 20 bike share systems exist in small and large cities across the U.S., and over 20 are in active planning stages. With interest in bike share spreading over many jurisdictions throughout the U.S., it is increasingly important to document the lessons learned by the pioneering programs and to identify lessons learned for the next wave of communities that will implement bike share.

Specifically, the guide contains the following information:

- **Provides an overview of the concept of bike sharing.** The guide seeks to provide a common understanding of what a bike sharing program is, present a brief history and evolution, and describe current trends.
- **Identifies the steps for establishing a bike sharing program.** This document provides a “How-to-Guide” for moving a bike share program from an idea to reality. In particular, the guide provides insight into the existing implementation models, selection of service area, equipment selection, service hours, sustainability planning and liability considerations.
- **Explores the different funding mechanisms that are currently being used.** This guide identifies the innovative ways in which different systems have combined funding sources to finance the roll out and on-going operation of a bike share program.
- **Discusses additional considerations for implementing a bike share system.** This



Figure 6: Capital Bikeshare bicycle
Credit: Capital Bikeshare (Washington, DC Area)

includes a look at the potential challenges rising from mandatory helmet laws, how to address environmental justice concerns and the potential synergy resulting from integration with other modal options.

The following information gathering and analysis methods were employed to complete this guide:

- **A bike sharing advisory group was convened to provide oversight and guidance.** The group consisted of managers and planners from twelve different jurisdictions implementing or planning for the implementation of bike sharing programs in the U.S.
- **A literature review of previous U.S. and international bike sharing research was performed.** Additionally, several publically accessible bike share program feasibility analyses implementing bike sharing systems were evaluated.
- **Twelve existing and planned U.S. bike share programs were analyzed.** Telephone interviews were conducted with selected bike share program managers. Demographic and employment data from each of the cities identified for this study was reviewed. A cursory investigation of additional existing U.S. bike share programs was conducted.

To ensure the guide's applicability to the broadest possible audience, the bike share programs selected for the in-depth analysis varied in size of program, jurisdiction size, geographic representation, stage of implementation, and types of technology used. The following programs were selected:

East Coast

- Hubway (Boston, MA)
- Capital Bikeshare (Washington, DC/Arlington, VA)

Southeast

- Deco Bike (Miami, FL)
- Spartanburg B-cycle (Spartanburg, SC)

Midwest

- Nice Ride (Minneapolis, MN)

Mountain West

- Denver B-cycle (Denver, CO)
- Boulder B-cycle (Boulder, CO)

Southwest

- San Antonio B-cycle (San Antonio, TX)

West

- Zotwheels (University of California, Irvine)*

**Zotwheels was included to provide insights into university owned and managed programs. While this guide shares lessons learned from the Zotwheels program, the findings are focused on urban bike sharing programs.*

In addition to investigating nine operating bike share programs, three cities in the preliminary stages of implementation were included in the analysis to provide perspective of jurisdictions engaged in system planning. These jurisdictions included Atlanta, Georgia; Baltimore, Maryland; and Chicago, Illinois.¹²

In addition to domestic research, this Guide builds upon lessons learned by European and Canadian bike share programs. This guide builds on existing international research into bike share implementation including the *Optimizing Bike Sharing in European Cities – A Handbook* which documents the implementation of programs in Europe.

Appendix E of this guide provides a complete profile of each of the jurisdictions studied, and is organized to allow quick analysis and comparisons.



Figure 7: Hubway station
Credit: Hubway (Boston, MA)

2.2 WHAT IS BIKE SHARING?

Bike sharing is a nonmotorized transportation service, typically structured to provide users point-to-point transportation for short distance trips (0.5 to 3 miles). It provides users the ability to pick up a bicycle at any self-serve bike station in the network and return it to any bike station located near their destination. Bike sharing differs from traditional bicycle rental services in a number of ways:

- It is oriented to short-term, one-way use: 30 to 60 minutes rather than daily or weekly rental periods.
- The bicycle can be returned to any number of unstaffed bike sharing stations, as well as the original rental location.
- Generally, only one style of bicycle is available.¹³
- The rental transaction is fully automated and there is no need for on-site staff. Additionally, the hours of operation can be programmed or adjusted based upon a jurisdiction's unique needs.
- Because the bicycle is parked at a special docking station, the user is no longer responsible for the bicycle when the trip is finished, minimizing user liability and the responsibility for providing sufficient security.

To date, bike share systems in the U.S. have been implemented primarily in core urban areas.¹⁴ As of March 2012, approximately 40 systems in the U.S. are either operational or in the planning stages.¹⁵ For most existing U.S. bike share systems, the local government (i.e. town, city, county, etc.) has played a leading role either by initiating, funding, administering, operating or permitting the program.

2.3 WHY BIKE SHARING?

Bike sharing systems have evolved primarily as a means to make bicycle travel in urban areas available to a wider range of people. A shared bike service makes both spontaneous and planned urban trips possible by bike and can be an ideal complement to transit trips as it provides first mile and last mile connections. Moreover, bike sharing programs can contribute to reduced traffic congestion, reduced use of fossil fuels, reduced pressures on motor vehicle parking supply, and increased use of transit and other single occupant vehicle alternatives (e.g., rail, bus, car-sharing).¹⁶

Bike sharing can reduce the personal cost of urban transportation by offering an affordable public transport option.¹⁷ To this end, bike sharing pricing schemes typically offer the first 30-to-60 minutes of every ride for free, which encourages high turnover of the bikes and increases the probability that stations will have sufficient bicycles available to meet market demand.



Figure 8: Automated bike share station
Credit: San Antonio B-cycle

Bike sharing programs offer environmental, social, economic and public health benefits. Some cities are implementing a bike share program to reduce their car-related carbon emissions for “last mile” trips.¹⁸ Several existing bike share programs are providing detailed tracking of health benefits of trips taken via bike share, such as calories burned.¹⁹ Bike share programs can also support a variety of economic development initiatives including tourism and urban redevelopment. For example, Capital Bikeshare has responded to system demands by deploying stations around the National Mall and with proximity to local hotels to help provide additional transportation options for tourists and residents alike.

Finally, jurisdictions can benefit from the relatively lower implementation and operational costs, and flexibility as bike share programs can be installed and open for business in months rather than years.²⁰

2.4 BIKE SHARING IMPLEMENTATION IN THE U.S.

The history of bike sharing implementation in the U.S. has followed the evolution of bike sharing in European cities and can be traced through three generations:

1. **Free Bike Programs:** The free bikes generation started in Amsterdam (Netherlands) with the implementation of the white bikes program which offered free unlocked bikes throughout the city core for free public use. The first documented similar program in the U.S. was established in Portland, Oregon in 1994 by the United Community Action Network, a local nonprofit organization focusing on environmental issues.²¹ Unfortunately, due to a variety of issues, including theft and damages to the bicycles, the bike plan failed soon after its launch.
2. **Coin Deposit Systems:** Coin deposit systems started in the 1970-80's and offered bikes for hire throughout designated docking stations containing coin slots and small deposit boxes which reimbursed the coins when the bicycles were returned. The first coin-deposit system in North America was established in the Twin Cities in 1996. This Yellow Bike Project used 150 bicycles placed throughout a network of designated locations.²² While these improvements increased the chances for success of the programs, the bicycles were still vulnerable to theft because the system did not require any user registration prior to checkout. Furthermore, the coin deposits were small and did not guarantee that the bikes would be returned.²³
3. **Automated self-serve kiosks:** Modern bike sharing systems include automated self service kiosks at every station.²⁴ These “third generation” bike sharing systems also include a more comprehensive set-up for user registration, deposit, and route tracking as well as operations and bicycle re-distribution that respond to user patterns and demand. Most existing systems include physically distinct bicycles (design and color) and automated kiosks/docking stations with secure docking mechanisms and an electronic user interface for bike checkout. Advanced radio frequency identification (RFID) technology (i.e. Smartcards, magnetic fobs, etc.) and specialized wireless technology give users the ability to check out



Figure 9: Spartanburg B-cycle
Credit: Carroll Foster (hoteyephoto.com)

a bike whenever and wherever they find a stocked bike station. The introduction of RFID technology has also allowed existing programs to track bicycle usage and user information, helping curb bicycle theft which was a major drawback for prior system generations. Some third generation systems include GPS technology which allows them to follow ridership patterns in real time, and in turn, drive daily redistribution efforts and provide useful data for planning system expansion.²⁵

As expressed before, Washington DC was the first jurisdiction to implement a third generation bike sharing system in the U.S. in 2008. The system was called SmartBike and was replaced in 2010 by Capital Bikeshare. Denver, Colorado and Minneapolis, Minnesota later followed with their introduction of Denver B-cycle and Nice Ride programs respectively. All systems analyzed in this guide are in this third generation group.

2.5 EMERGING TECHNOLOGIES

- a. **Integration with transit:** In recent years, various jurisdictions have started investigating the use of a single integrated payment system to allow for the use of both transit and the bike sharing system. By integrating RFID technologies transportation planners hope to make it easier for users to access rail or bus services for longer distance trips and switch to a bicycle for the “last mile” trip. This integration can be extremely valuable as it has the potential to enlarge the “catchment” area of a transit station and help curb congestion and pollution rates by connecting more people to transit alternatives.



Figure 10: Electric bike
Credit: giel.com



Figure 11: ViaCycle station-less bicycle (Atlanta, GA)
Credit: ViaCycle.com



Figure 12: Hubway bicycle specialized shape
Credit: Hubway (Boston, MA)

- b. E-bikes:** Electric bikes or “E-Bikes” have gained popularity in some communities. E-bikes use an electric motor to provide pedal assistance when and where a small boost is needed (i.e. up hills or when carrying a heavier load). Most E-bikes include a rechargeable battery that lasts approximately 20 hours, depending on the usage patterns.²⁶ As of March 2012, the San Francisco Bay Area is in the planning stages for the implementation of a pilot program of regional bike share. This program intends to offer a combination of traditional and e-bikes, and will open up additional parts of the city that can be served by bike share and a larger potential customer market.²⁷ The program is being funded by a grant from FHWA’s Value Pricing Pilot Program, and will be administered by a local car sharing co-operative.²⁸ Finally, the University of Tennessee—Knoxville has been testing an electric bicycle sharing system.²⁹ Information on the success of the program was not available for inclusion in this report.
- c. Station-less bike sharing:** An additional emerging technology is the station-less bike sharing system. In this system, all that is needed are bicycles with an electronic locking system which uses GPS and

wireless communications (i.e. cell phone). All necessary security and checkout infrastructure is located on each bicycle, eliminating the need for kiosks, or specialized bike docking racks. The electronic lock, which is usually located at the rear of the bike, handles all check-in and check-out functions, transmitting the usage and location of each bicycle when needed, and monitoring maintenance needs and unauthorized use.³⁰ Current models require users to pre-register online, then walk to any bike share bicycle and quickly check it out by using a mobile phone to send a text message with their user PIN and the clearly labeled bicycle ID number.

Two factors have led to the growing level of interest as well as political and financial support for bike share throughout the U.S.: the rising popularity of bicycling as an urban travel mode, and technological innovations that have made it possible to nearly eliminate the problem of theft and vandalism in modern bike share programs. As technology continues to evolve, it is quite possible that the methods of implementing bike sharing programs throughout the world will evolve in new and interesting ways that make bike sharing a feasible and affordable option for a wide spectrum of users and trip types.

CHAPTER 3. PLANNING

As with any new transportation service, bike sharing requires an up-front planning phase prior to launching service. The characteristics of this planning phase have greatly varied among the communities throughout the U.S. that have implemented bike sharing programs. Some have conducted formal feasibility studies, while others have proceeded with various aspects of the planning process in a less formal structure.

The information-gathering phase should be conducted in an unbiased manner. While it is important to understand bike share vendors' perspective on implementation, it is also important to maintain a healthy separation between the jurisdiction's goals and objectives for the program, versus the vendor's preferences.

There are a several questions that should be considered prior to embarking on bike share implementation:

- 1. Is a bike share program appropriate for my jurisdiction?** In many cases, the answer to this question is assumed to be "yes," particularly if the program is being planned within a jurisdiction where there is strong political and financial support. However if political support is tepid and no clear champion for bike share exists within the community, a bike sharing program may be less feasible. To this end, public participation and support is of vital importance to the implementation of a bike share program. It is also important to point out that implementation of bike sharing in the U.S. has primarily been in core urban areas. There has been far less experience implementing bike sharing in suburban areas. Thus the best way to implement a bike share program in these communities has yet to be established.
- 2. What will the goals of this bike sharing program be?** It can be helpful to establish metrics for success early in the program, to ensure stakeholders are in agreement, and to structure the program to achieve the objectives. Some communities have set goals that are focused on economic sustainability. Other jurisdictions have set goals that relate back to additional transportation goals established through other planning processes (ex. goals to increase bicycling, and reduce carbon emissions).

Proposed Seattle Bike-Share Implementation Phases

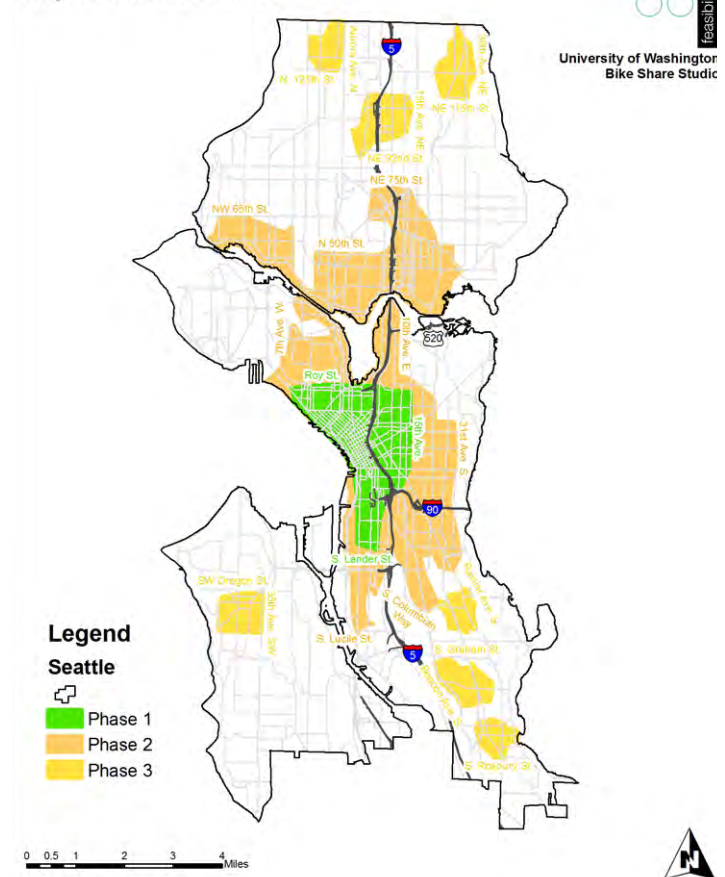


Figure 13: Heat map analysis of feasibility study conducted for the City of Seattle
Source: Feasibility Study for a potential bike share program in the City of Seattle

- In communities where funding for the program has come from health foundations or other similar sources, the goals of the program have been oriented to health outcomes. Finally, the goals of the program should be revisited periodically throughout implementation, as experience is gained, and new realities emerge.
- 3. What will the initial service area for the program be, and where will the stations be placed?** A critical task for bike share implementation is to determine the best area for deployment of a network of stations. Bike sharing programs are most successful in areas that have a mixture of land uses which tend to help generate a variety of trip

types throughout the day.³¹ Connections to other modes of transportation are also important – this gives users the ability to use bike share to increase the efficiency of transit trips, for example.³² More guidance on this aspect of bike share is provided below.

4. **How will the program be paid for, and how will it be operated?** These are two fundamental questions that have a great impact on the way bike sharing programs are implemented. To date, there has been a variety of funding and operating models in the U.S., and no clear consensus on what the “best” model is. This report describes the general spectrum of funding and operating models as of early 2012. Finally, an early review of local regulations can help

determine if the use advertising and/or sponsorship is allowed to help provide additional funding sources. More information is provided in Sections 3.3 and 3.4 below.

5. **Can the program be integrated with other transportation services, and if so, how?** Bike share is more convenient to its customers when it is seamlessly integrated with other modes of transportation, particularly transit and pedestrian trips. It is therefore important to place stations where they are accessible to people arriving or departing from transit stations and on foot. Future innovations in bike share are likely to improve the connection between transit, bike sharing and car sharing, so the user can easily choose the most efficient and effective mode of transportation given the particular set of circumstances.
6. **What is the timeframe for roll out, and what are options for future phases?** Establishing a schedule for roll out is a fundamental aspect of the planning process. This schedule should account for time constraints of various funding sources, as well as the time of the year and need to maintain momentum. Many systems envision a phased roll out that includes a core service area that will be expanded over time to include additional areas of the community.
7. **What are other local transportation issues, services and policies that could support or hinder success of the program?** Each community is unique, with its own set of transportation issues that must be taken into consideration when planning a new bike share system. This report explores various issues that have been a factor in existing programs (see Sections 3.6 and 3.7).



Figure 14: San Antonio B-cycle staff
Credit: San Antonio Bikes

3.1 SELECTING A SERVICE AREA

Higher use bike share stations tend to be located in higher density areas (i.e. those areas with higher population and job rates, and with higher levels of commercial activity), and with high levels of pedestrian activity. Topography is also an important consideration related to service area siting. Implementation of a system may be more complicated in jurisdictions with steep (or even rolling) terrain.³³ Jurisdictions with steep slopes may want to consider, to the degree that this is possible, initial implementation in parts of the community that are relatively flat. Finally, the size of the service area will be dependent on the size of the jurisdiction. Existing bike share programs in the U.S. that were part of this analysis include a service area coverage of 1.5 square miles (Spartanburg, SC) to 36 square miles (Washington DC area).³⁴

Many bike share programs have developed “heat maps” that help to define the initial service areas for the system. The following are typical factors in the development of these maps:

- **Population Density:** Higher population densities tend to support higher bike share demand by providing a pool of regular users. Higher population densities tend to correlate with reduced rates of auto ownership as well.³⁵
- **Employment Density:** Higher employment density yields greater access to potential bike share users. Employment density and location can also help determine how the pattern of morning commute may affect the distribution of bike share rides throughout the service area.
- **Proximity to Colleges and Universities:** Student populations can be a likely market for bike sharing programs because of their lower rates of automobile ownership. Universities located in urban settings tend to be surrounded by mixed-use development which further supports bike share usage.³⁶
- **Retail/Commercial Activity Density:** Commercial activity is usually included in the analysis because of its function as a trip attractor and its potential to have an effect on ridership and distribution of bicycles.

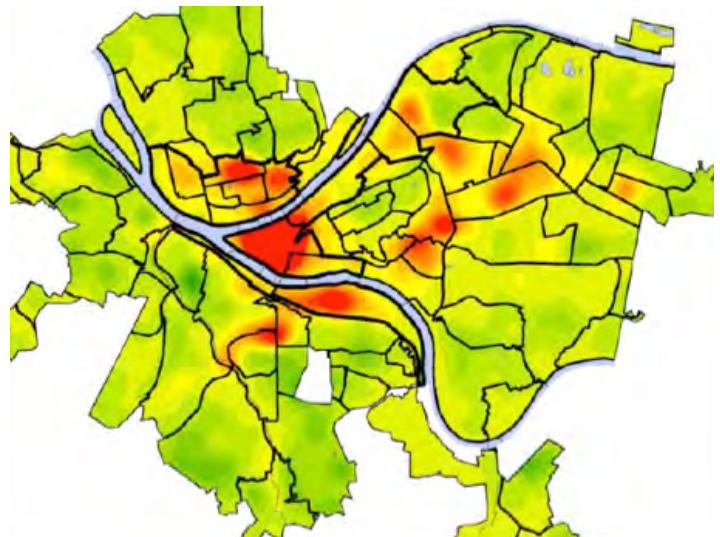


Figure 15: Heat map analysis (City of Pittsburgh)
Source: Feasibility Study for a potential bike share program in the city of Pittsburgh

- **Available bicycle infrastructure:** Bicycle lanes, bike boulevards, cycle tracks and shared use paths provide supporting infrastructure for bike share users and should be included in the analysis.³⁷
- **Proximity to tourist attractions and recreation areas:** Bike share rides generated by tourists have the potential of becoming a considerable source of revenue for a bike share system.³⁸ Some tourist areas are congested, putting pressures on existing transportation infrastructure. A bike share program increases mode share choices and providing quicker access to recreational areas.
- **Available Transit:** In large cities, bike sharing programs are often organized to provide better service for the first and/or last mile of a trip taken on public transit. The goal is to create a connected transportation experience with less time used for transfers and access to and from the transit service.
- **Topography:** Steep inclines can be a deterrent to bicycling. Slopes at a grade of 4% or higher are considered a major barrier for bicyclists.³⁹ Existing systems reported lower usage to stations that are located in higher elevations within the system, which creates challenges for redistribution.⁴⁰

In most instances, a phased approach to implementation may be the best way to ensure jurisdiction-wide access and buy-in necessary to get the program launched.

3.2 STATION DENSITY/SITING

Most existing U.S. systems include a range of 3.5 to 5 bike share stations per square mile of service area, although Deco Bike in Miami Beach has a station density of almost 14 stations per square mile.⁴¹ As a general rule in urban areas, bike share stations should be placed at approximately ½ mile from each other. This range is directly related to the distance a person would have to walk to a station.⁴² This may be problematic for permitting and spacing requirements. The ideal location in terms of demand does not always coincide with the ideal location in terms of physical space.⁴³ Lastly, financial considerations (i.e. capital and operational costs) have a direct impact on the number and separation between stations feasible for a jurisdiction.

Bike share stations should be placed in safe, convenient, and highly visible locations. If stations are intended to serve a transit stations or hubs, they should be visible from the entrance/exit of the station, and should not interfere with the normal use of the public space in which they are located, such as pedestrian travel along sidewalks and vehicular movements along roads. Bike share stations should not interfere with bicycle movements along trails or in nearby bicycle lanes or cycle tracks. Ideally, stations should be placed in close proximity to bicycling infrastructure (ex. bike lanes, shared use paths, etc) to increase connectivity to the jurisdiction’s bike network.⁴⁴

While most bike share stations are modular, there are certain minimum siting requirements. Figure 17 provides an overview of the appropriate dimensions

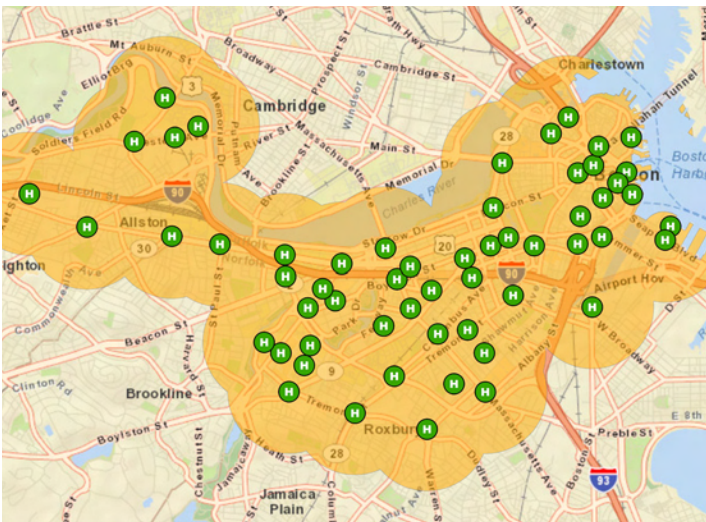


Figure 16: Hubway stations (Boston, MA)

for an 11 dock bike share station which requires an approximate space of 32 feet wide and 12 feet deep (these figures accommodate the station infrastructure as well as access space) depending on the type of technology employed. Additionally, stations with solar power require access to sunlight for a minimum portion of the day (around 4 hours), and a vertical clearance of at least 11 feet.⁴⁵ Table 1 summarizes typical spacing requirements and typical weight of each station.

There are also two-side stations available from some bike share equipment providers. These stations can almost double the bicycles that can be stored in the footprint of a single sided station’s footprint. These two-sided stations will require access space on both sides to check out and return bicycles (See Figure 18).

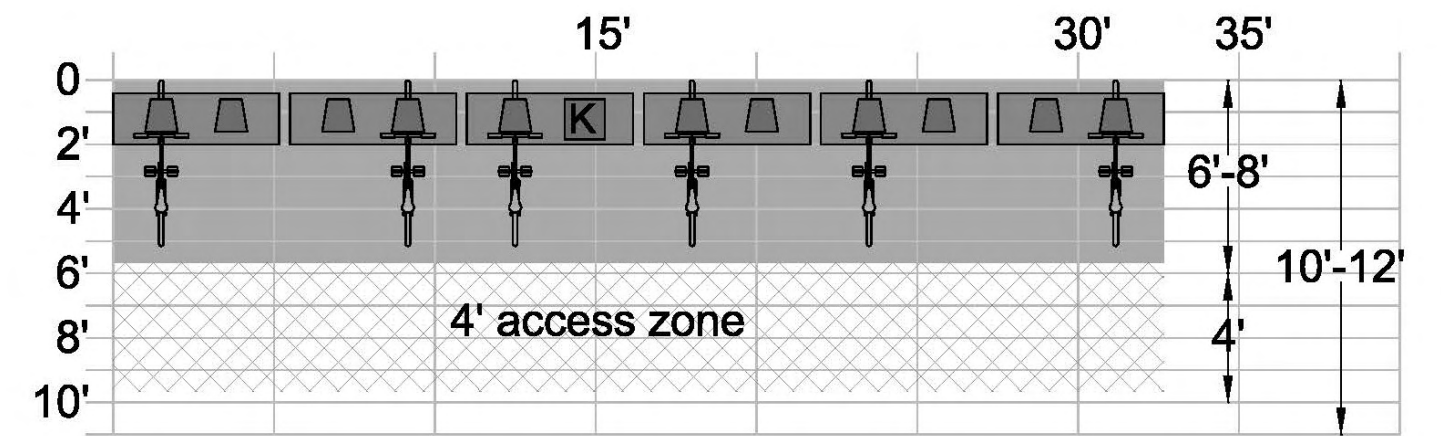


Figure 17: Station Dimensions for an 11 dock station. (NOTE: 'K' indicates the location of the automated customer kiosk)

TABLE 1 – STATION DIMENSIONS AND WEIGHT⁴⁶

Docks	Width	Station Depth	Access Depth	Total Depth	Weight
11	31' to 32'	6' to 8'	4 feet	10' to 12'	3000 to 5000 lbs
15	40' to 42'	6' to 8'	4 feet	10' to 12'	4500 to 5500 lbs
19	50' to 52'	6' to 8'	4 feet	10' to 12'	5500 to 6500 lbs

3.3 SELECTING A BUSINESS MODEL

As of early 2012, three types of business models have generally been used for bike share programs in the U.S.: jurisdiction owned and managed, nonprofit owned and managed, and for profit owned and managed. The characteristics of each particular model determine how the program will be financed, who will undertake day-to-day operations, and what type of bicycle and kiosk hardware will be deployed.

In addition to programs that align closely with the business models described in this Guide, there are some bike share programs that are hybrids between the models. Bike sharing is a new and dynamic transportation service, therefore new combinations and strategies are emerging with each new implementation project.

The following is a description of the three business models. They are also summarized in Table 2 on page 23.

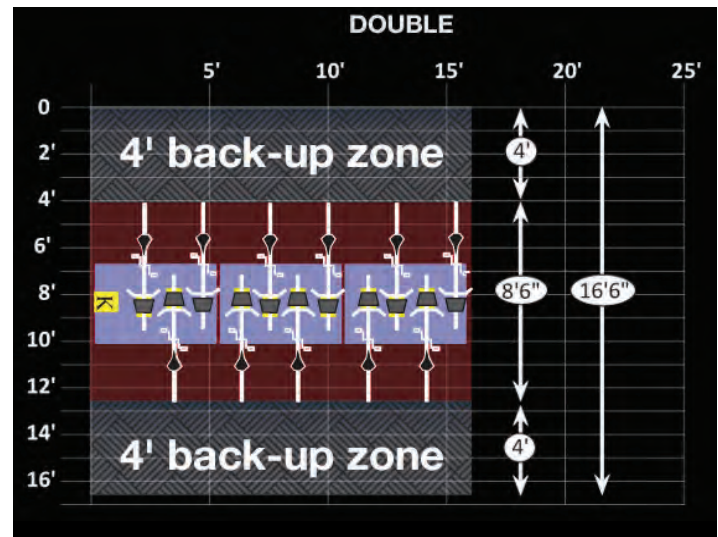


Figure 18: B-cycle double sided stations
Source: B-cycle

JURISDICTION OWNED AND MANAGED

In this model, the jurisdiction pays the up-front capital costs, and owns the infrastructure and equipment (i.e. bicycles and bike stations). The jurisdiction works with a private contractor which handles membership management, customer service, marketing, bicycle redistribution, data management, and maintenance of stations and bicycles. In this model, the government accepts financial responsibility for the program, while the private contractor accepts liability exposure.



Figure 19: Deco Bike
Credit: Deco Bike (Miami Beach, FL)

An identified variation of this model has allowed for advertising and sponsorship concessions. In this approach, the jurisdiction owns the equipment and shares the capital as well as the operation and management costs with a private contractor. This allows the operator to include advertising and sponsorship opportunities to fund the program and generate additional revenue which can be shared between the jurisdiction and the private contractor.⁴⁷

Funding: Systems subscribed to this model tend to include a mix of Federal, State and local grants, as well as private contributions in the form of sponsorships. Jurisdictions using this model have used Congestion Mitigation and Air Quality Improvement (CMAQ), and other Federal transportation program funding. Additional funding comes from revenues generated from membership and usage fees.⁴⁸

Benefits and shortcomings: Local government ownership can allow for greater control over the bike share station permitting process, station locations, definition of the service area and overall deployment. Additionally, systems using this model have been able to use profits to fund program improvements and expansion of service to additional areas.⁴⁹ The independent contractor accepts liability, thereby limiting the jurisdiction's exposure.⁵⁰

Since a portion of the funding is provided by Federal programs, navigating the funding process may take longer than other funding methods and may result in additional constraints including Federal environmental regulations (e.g. National Environmental Policy Act – NEPA) and Buy America provisions (see Section 3.4 for more information) which may create additional hurdles.

Finally, if advertising revenues are desired, the jurisdiction may encounter legal restrictions to advertising in public space, as some jurisdictions do not allow it. Also, as the cost-sharing goals for jurisdictions and vendors may not be fully aligned, local jurisdictions require additional financial management and negotiating skills to reach agreements that maximize public benefits and ensure that revenues are directed to enhancing the program.

Examples: Capital Bikeshare, the multi-jurisdictional system that operates in Washington, DC and Arlington County, VA, is an example of this type of model. In this partnership, both governments serve as co-owners of the equipment, sharing the costs and any revenues



Figure 20: Capital Bikeshare user
Credit: Capital Bikeshare

generated by system, while contracting all day-to-day activities to a third party operator.⁵¹ Another example of this model includes Boston's Hubway, which requires its operator to share a percentage of any profits, while being able to sell advertising on each bicycle and sponsorship for each station.

NONPROFIT OWNED AND MANAGED

In this model, a nonprofit organization manages operations and service. The nonprofit may have been explicitly created for the operation of the bike share program, or it may have already been in existence and added bike sharing service to its existing programs. Local jurisdictions have participated in two ways in this model: 1) the nonprofit organization receives start up funding and some funding for operations from local and State governments; and/or 2) the local jurisdiction acts as a fiscal agent to request Federal funding and passes funds to the nonprofit. This model removes most of the financial liability from the jurisdiction and places it on the nonprofit organization, which is responsible for both fundraising and managing operational revenues and expenditures.

Funding: Systems using this model tend to use a broad mix of funding sources. Examples include private funding from foundations, local/national energy conservation and/or health grants, and local business sponsorships.⁵² Through this model, the nonprofit organization may be tasked with providing a financial match to receive certain grants. Because the organization is a nonprofit,

revenues generated by membership and usage fees, as well as sponsorships, are typically reinvested into the program.⁵³

Benefits and shortcomings: Benefits include government relief from most of the financial liability. Additionally, nonprofit organizations are often better able than government agencies to attract and co-mingle funding from different sources. Nonprofit organizations tend to be more nimble, adapting the bike share system to user needs. They are generally not required to go through all the procedural hurdles that government agencies may be required to. However, due to the nature of nonprofit organizations and their reliance on intensive fundraising strategies as a source for revenue, a large percentage of staff time may be consumed pursuing additional funding.⁵⁴ This may in turn, slow implementation or expansion of the system.

Examples: Boulder B-cycle, Denver B-cycle, Nice Ride MN (Minneapolis/St. Paul), San Antonio B-cycle and Spartanburg B-cycle have favored this implementation mechanism.

FOR-PROFIT BUSINESS

In this model, a private company provides, owns and operates the service and government involvement may be limited to certain aspects of planning for the stations, such as the issuing of necessary public space permits. To cover permitting costs for the use of public space, the private bike share company may be required to provide a percentage of profits to the jurisdiction (around 10-25% of profits in one example studied).⁵⁵ To generate additional profits, the bike sharing company may sell advertising space on its bicycles and stations. It is important to note that several successful European bike share models including Paris and Barcelona use this approach.

Funding: All capital expenses and operating costs are managed by the for-profit company, relying on a mix of revenues including private investment, sales of advertising on bicycles, stations, and membership and usage fees.

Benefits and shortcomings: The financial liability rests primarily with the for-profit business. Capital financing for implementation and expansion may be assembled and deployed more quickly, thus these systems may be able to respond to market demands more quickly.

As this model is oriented to market-driven deployment



Figure 21: Boulder B-cycle
Credit: Mat Barlow - Boulder B-cycle

of stations, expansion of the network is likely to happen only where it will result in profitable service. Finally, this model typically involves limited local government oversight which may result in a reduced ability to ensure that the service meets certain accessibility and equity goals the jurisdiction may have.

Example: Miami Beach's Deco Bike is the U.S.'s first

example of this model, with a local business running the service in a locality that receives a percentage of all profits in exchange for public space usage and permitting.

CHARACTERISTICS IN COMMON BETWEEN MODELS

While the models have core distinctions, there are several shared characteristics, including the following:

- Jurisdictions have encountered siting and permitting issues, although some business models allow for more efficient expedition of public space permitting. Finding the appropriate space for a station and filing the appropriate permitting paperwork can be burdensome, and in some cases it may curtail the deployment of a particular bike share station.
- Federal funding for bike share programs may be subject to additional regulations which may delay deployment of program (see Section 3.4 for additional details).
- Because some jurisdictions do not allow certain types of advertising on publicly-owned equipment, or in public space, some revenue sources within each business model may be precluded from the funding mix. Some jurisdictions have moved to amend their

local ordinances to allow for advertising on bike share equipment.

- Jurisdictions considering regional deployment should consider cross-jurisdictional agreements delineating individual jurisdiction responsibilities, profit sharing, and cost burdens prior to deployment. This agreement will also help divide the proportionality of costs and revenue between jurisdictions and the operator.

Although there is limited historical data, as most U.S. systems have only been in service for a short time, there may be a relationship between the size of the program and the selection of the business model. Early evidence suggests that small to medium size bike share systems (2 to 50 stations) tend to use the nonprofit model. Some larger systems (50 or more stations) have had more government involvement with the program. This may be related to funding, as large jurisdictions often have more direct access to large transportation funding sources.

Table 2 provides a description of how each model relates to ownership of equipment and day-to-day operations. The table is organized to enable comparisons between existing models.



Figure 22: Deco Bike
Credit: Deco Bike (Miami Beach, FL)

TABLE 2 – BIKE SHARE BUSINESS MODELS

Model	Ownership	Operations	Operating Procedures	Revenue Sources*	Potential Benefits	Potential Short-Comings	Examples+
Jurisdiction Owned and Managed	Jurisdiction	Independent contractor	<p>Provide bike sharing services under supervision of local public authority.</p> <p>Net revenues are reinvested into the program.</p> <p>Jurisdiction provides majority of capital funding.</p> <p>Contractor may use advertising and sponsorship to maximize revenues.</p> <p>All capital costs are covered by jurisdiction.</p> <p>Jurisdiction and contractor share net revenues.</p>	<p>Federal, State and local grants.</p> <p>Advertising and sponsorship.</p> <p>(Various sponsorship options including title sponsor, local businesses, advertisements on bike share equipment and communications, etc.)</p> <p>Membership and usage fees.</p>	<p>Greater control over permitting and deployment of stations.</p> <p>Reinvestment of profits is controlled.</p>	<p>Jurisdiction is financially liable for costs of program.</p> <p>Assembling funding sources may require more time.</p> <p>Some jurisdictions do not allow advertising on public space.</p> <p>Requires contract negotiation skills.</p>	<p>Capital Bikeshare (Washington, DC and Arlington County)</p> <p>Hubway (Boston)</p>
Nonprofit Business	Nonprofit organization	Nonprofit organization	<p>Nonprofit entity may be created to provide services under support of jurisdiction.</p> <p>Jurisdiction may provide some of initial capital while nonprofit charged with providing additional funding.</p> <p>Most operating costs are assumed by nonprofit.</p>	<p>Federal, State and local grants.</p> <p>Local/national foundation grants.</p> <p>Local business sponsorship.</p> <p>Membership and usage fees.</p>	<p>Reduced financial liability for the jurisdiction.</p> <p>Reinvestment of profits is controlled.</p>	<p>Reliance on fundraising for private grants can slow down deployment and expansion.</p> <p>Limited jurisdiction oversight.</p>	<p>Boulder B-Cycle</p> <p>Denver B-Cycle</p> <p>Nice Ride MN</p> <p>San Antonio B-Cycle</p> <p>Spartanburg B-Cycle</p>
For-Profit Business	Private company	Independent contractor	<p>Provide bike sharing services with minimal government involvement.</p> <p>Jurisdiction does not provide funding, only certain aspects of planning for stations.</p> <p>Percentage of profits is shared with jurisdiction in exchange for use of public space and permitting costs.</p>	<p>Private investment.</p> <p>Advertising and sponsorship on bicycles and bike sharing stations.</p> <p>Membership and usage fees.</p>	<p>Startup capital may be assembled more quickly.</p> <p>Flexibility to adjust the system to reflect changes in market.</p>	<p>Limited jurisdiction oversight.</p> <p>Requires contract negotiation skills.</p>	<p>Deco Bike (Miami Beach)</p>

* The revenue sources identified are not limited to each particular model.

+ Existing programs are placed in the category that most closely matches their characteristics. However, many of the programs studied for this Guide did not fall completely within a single category.

3.4 IDENTIFYING AND SECURING FUNDING

There are four basic types of funding: private, public, membership and usage fees, and selling of advertising/sponsorships. While programs have reported using multiple funding sources, generally, public funds and private foundations grants have been used to cover capital costs. Membership and user fees, as well as advertising/sponsorships revenues have typically been used to cover on-going operational costs. A balanced financial plan (covering initial capital investments as well as long term operating costs) is an important early task for new bike share programs. The following is a detailed description of each of the four types of funding.

PUBLIC FUNDING

Public funding represents a large portion of the total funding allocated for many of the programs reviewed for this Guide.⁵⁶ While various sources of public funding were identified (including Federal, State and local funds), most were derived from Federal sources in the form of transportation funds and health and sustainability grants. Some of these Federal grants provide dedicated funding for long periods of time (two to five years).⁵⁷

Jurisdictions accessing Federal funds should be aware that this type of funding may include additional requirements including “Buy-America” provisions which provide for a “a domestic manufacturing process for any steel or iron products (including protective

coatings) that are permanently incorporated in any project; alternate bid provisions; minimal usage criteria for non-domestic products; and a waiver process based on public interest or the availability of domestic products.”⁵⁸ This provision may curtail the procurement of bicycles and some parts of bike share stations if they are not manufactured in the U.S.

Additional requirements may include environmental assessments (i.e. NEPA studies) and accessibility considerations (i.e. requiring that the program considers how to serve people with disabilities as well as minority and low income communities). Additionally, Federal funds can be less flexible in terms of timeframe and delays are common – this can make deployment more difficult, particularly given the high profile nature of bike share roll out in many jurisdictions. Furthermore, the selection of a particular business model may impact a program’s eligibility for Federal funding, since certain funds may only be accessed by government agencies. Finally, Federal funds can only be used for capital costs and therefore cannot be utilized for system operations.

Table 3 provides an overview of public funding sources used by existing bike share programs reviewed for this Guide.

PRIVATE FUNDING

Seven of the twelve programs reviewed for this Guide used private funding to cover a portion of capital costs and/or day-to-day operations. Private gifts and donations are an important funding source in

TABLE 3 – EXISTING SOURCES OF FUNDING USED BY PROGRAMS STUDIED FOR THIS GUIDE⁶⁴

FEDERAL					STATE and LOCAL
U.S. Department of Transportation (USDOT) ⁵⁹		Centers for Disease Control (CDC)	Department of Health and Human Services (HHS)	Department of Energy (DOE)	
Federal Highway Administration (FHWA) ⁶⁰	Federal Transit Administration (FTA) ⁶¹				
Congestion Mitigation Air Quality (CMAQ)	Job Access Reverse Commute (JARC)	Health and Obesity Prevention Grant	Communities Putting Prevention to Work ⁶²	Energy Efficiency Conservation Block Grant ⁶³	Public Health Grants
Surface Transportation Program: Transportation Enhancements (TE)					
Transportation, Community and System Preservation Program (TCSP)	Bus Livability Pilot Programs				Local Transportation Funds
Transportation Investment Generating Economic Recovery (TIGER) Grant	Paul S. Sarbanes Transit in Parks Grant Program				
Nonmotorized Transportation Pilot Program					

jurisdictions implementing their programs through the nonprofit model. For example, Boulder B-cycle⁶⁵ and Denver B-cycle⁶⁶ reported receiving between 5-10% of their funding from private gifts and donations.

Private funding can come in many different forms and can support different aspects of a bike share system. Private funding includes grants from private foundations, as well as private gifts and donations from individuals, sponsorships, and private investment. Currently, the biggest sources for private funding include health related organizations and private local foundations supporting active living initiatives.⁶⁷

CUSTOMER FEES

There are two revenue-generating streams within the customer fee structure of bike sharing programs. These include membership revenue and usage revenue. Existing bike sharing systems have implemented various types of memberships (ex. annual, monthly, weekly or daily memberships) and related fees, in addition to incremental usage fees which are dependent on the total usage time.

Among the programs studied for this guide, membership prices range between \$40 to \$85 for one-year memberships; \$15 to \$60 for a monthly pass; \$15 to \$30 for a three-day or weekly pass (some cities offer three day passes in lieu of weekly passes); and \$5 to \$8 for daily memberships. Annual and monthly memberships are typically purchased by local residents, while weekly and daily memberships target tourists and visitors.⁶⁸

With regards to usage fees, the majority of operating systems offer the first 30-to-60 minutes of every ride for free, which encourages usage of the system for short trips.⁶⁹ Following the free period, a user is required to pay an additional incremental fee for each additional half hour thereafter. This fee structure encourages turnover of the bikes and increases the probability that stations will have a sufficient number bikes to meet demand. Figure 23 features an example of an existing usage fee structure.⁷⁰

Jurisdictions implementing a bike share program should consider the impact of pricing strategies on turnover of bicycles and increased usage for short-term trips. Competitive pricing will increase usage, which may in turn generate increased revenues that can be reinvested into system optimization.

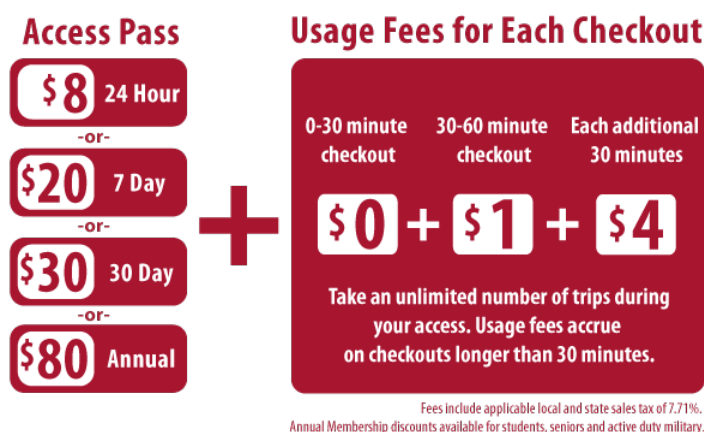


Figure 23: Pricing Structure for Denver B-cycle
Source: Denver B-cycle

ADVERTISING/SPONSORSHIP SALES

Some bike share programs allow the use of advertising on information panels located on stations kiosks throughout the service area.⁷¹ Additional advertising space may be allowed on bicycle fenders (i.e. half-circles measuring approximately 24 inches in diameter) and baskets (see Figure 24). Where such advertising is desired (and permitted by law), new programs should identify potential donors and an appropriate outreach strategy for securing this type of funding.

Local ordinances addressing advertising and sponsorships often impact a jurisdiction's ability to install advertising on the bicycles and/or stations. Jurisdictions considering this funding strategy should investigate their local ordinances early in the process to find out if advertising/sponsorship is allowed in the public right of way and if a public request for proposals is required to secure partnerships with advertising/sponsorship companies. Where local ordinances prohibit or restrict advertising on public property or within the right of way, some jurisdictions are working to amend these rules.⁷² Additionally, if FHWA funds are used there may be restrictions on outdoor advertising.⁷³

Some bike share programs use sponsorships to obtain additional funding. By leveraging sponsorship agreements with local businesses in exchange for recognition, programs are able to increase their available resources. For example, the City of Boston secured a system-wide sponsorship agreement which provides funding for the first three years of the program.⁷⁴ In contrast, Minneapolis secured smaller scale sponsorship



Figure 24: Deco Bike basket advertising
Credit: Deco Bike (Miami Beach, FL)

agreements, enabling the system to cover some capital expenses and operation and management costs.⁷⁵ Boulder B-cycle and Denver B-cycle secured sponsorship agreements for individual bike share stations from local businesses, which are then permitted to advertise on those stations. These types of agreements cover 25-30% of operation and management costs of the program.⁷⁶

3.5 EQUIPMENT SELECTION AND PROCUREMENT

Another step in the planning process is the selection of equipment, including bicycles, docking stations, and communications and data tracking technologies. In the United States, the selection of equipment and technology has usually been coupled with the selection of the vendor through a competitive process.⁷⁷ Some jurisdictions release public requests for proposals detailing specific equipment and technology needs

and wants (among other things). In several situations, jurisdictions that lie adjacent to others have joined into regional agreements with the same vendor to extend service into their jurisdiction.⁷⁸

A key consideration to equipment selection is what type of power supply will be used to operate stations. Currently there are two types of power supply available: 1) alternating current (AC) hard-wired into the power grid, and 2) solar power. The type of power supply impacts total capital costs. Bike share stations using solar panels tend to be more expensive to purchase,⁷⁹ but can be more cost-effective over time as AC-powered stations require additional infrastructure and time for deployment, and cannot easily be moved to other locations. Solar-powered stations are easier to relocate in response to market needs⁸⁰ but are not as easy to locate due to their need for a daily dose of direct sunlight in order to maintain power. In contrast, AC-powered stations can be placed in shady locations without access

to direct sunlight, as well as inside other structures within the built environment.

The costs for procuring the equipment and installing each bike share station (inclusive of the costs for 6 to 10 bicycles

TABLE 4 – APPROXIMATE EQUIPMENT COSTS⁸¹

Station Size (Docks)	Bikes	Equipment and Installation (includes bikes)	Approximate Annual Operating Costs
11	6	\$35,000 to \$40,000	\$12,000 to \$15,000
15	8	\$45,000 to \$48,000	\$18,000 to \$21,000
19	10	\$53,000 to \$58,000	\$24,000 to \$28,000

depending on the total size of the station), are presented in Table 4, along with an approximate range for annual operating costs per station (including redistribution, staff, and customer service support). The costs presented include the average costs for equipment and installation and may vary depending on the variables discussed above, as well as the size of the system and vendor differences.

3.6 CONSIDERING BICYCLE INFRASTRUCTURE IMPROVEMENTS

Many communities considering bike share may ask, “How extensive does our existing bicycle facility network need to be to successfully support a bike share program?” Among the cities analyzed for this Guide with bike share programs in operation, all but one had a concise network of on-street and off-street bikeways in place prior to launching bike share. However, among these cities, the bicycle network was by no means “perfect” – contacts from these cities have been quick to point out that numerous gaps and barriers exist within their bicycle infrastructure.⁸² Additionally, based on the experience of existing programs, bike share systems can give additional impetus to efforts to improve bicycle infrastructure. Planning judgment suggests it is better to locate bike share programs in portions of the community that have at least some visible bicycle infrastructure and could be considered bicycle-friendly.

As a bike share program grows, it is also important to implement complementary bicycle education and encouragement programs. Bike share programs can work hand-in-hand with programs that teach adult bicycle safety skills, helmet promotions, safety awareness campaigns targeting unsafe motorist and



Figure 25: Capital Bikeshare user
Credit: Capital Bikeshare (Washington, DC Area)

bicyclist behaviors, and similar efforts.

3.7 CONSIDERING ISSUES OF EQUITY

Bike sharing can serve as an affordable mobility option for low income and minority communities.⁸³ However, use of bike share systems by these communities has so far been limited in the U.S., despite their increased reliance on public transit and historically low rates of auto ownership.⁸⁴ The reason may be that low income residents often have more difficulty obtaining credit cards,⁸⁵ thus they are not able to access bike share as an alternative because a credit card is required to check out a bicycle.

To counter low usage rates by low-income and minority communities, some jurisdictions are experimenting with additional programs to facilitate access. For example, Capital Bikeshare has developed a partnership with a local banking institution to offer access to free checking account in addition to reduced-rate memberships, which bypasses the need for credit cards.⁸⁶ Programs in Boulder and Denver have worked with their local housing authority to offer reduced-rate or free memberships when new tenants sign a lease on an apartment near a bike sharing station.⁸⁷ Finally, Hubway has worked with local health officials to offer subsidized memberships to eligible users.⁸⁸

While there is early indication that these initiatives are having a positive impact on the number of low-income and minority residents accessing the program, additional time and assessment is needed to gauge their success. Future bike share programs should consider minority and low income populations early on, and tailor their strategies accordingly.

CHAPTER 4. IMPLEMENTATION

After the successful completion of the planning phase, a jurisdiction is ready to begin implementation of the program. Generally, the implementation process addresses the issues discussed below.

4.1 SELECTION OF SERVICE HOURS AND OPERATING SEASON

When selecting the hours of operation, an implementing agency should consider the needs of the local community while being mindful of how these will affect the costs of implementing a program. Hours of operation should reflect the travel habits and patterns of the users, as well as the capacity of the program operators.

Of the systems observed for this Guide, those with nonprofit operations tended to offer service hours from 5 a.m. to midnight every day. Their customer service hours were consistent with typical office hours.⁸⁹ Programs managed by for-profit companies tended to offer bicycle access 24 hours a day, with customer service available between 8 am to 6 pm.⁹⁰ In contrast, systems managed by government agencies generally enabled customers to check out bicycles, and have access to a customer service representative 24 hours a day, unless the program is closed for the season. The costs of providing live customer service should be considered when evaluating different service options.

Jurisdictions should also consider the operating season of the bike share program. Although some programs close for the winter months (particularly those in colder climates), others operate year round. While this can reduce operation and maintenance costs, it creates the need for aggressive ‘spring opening’ strategies to reorient customers to bike share.

It is important to note that programs operating year round, have opted to shut down system operations as necessary during inclement weather (i.e. hurricanes, winter storms, severe storms). Future research is needed to study the effect seasonal of closure on bike share membership and utilization rates.



Figure 26: Nice Ride customer
Credit: Nice Ride (Minneapolis/St. Paul, Minnesota)

4.2 PROGRAM MARKETING AND SUSTAINABILITY PLANNING

The ongoing success of a bike share program depends in large part on encouraging people to use and support the system. New programs should begin marketing early, once the initial planning phase is over and a timeline is set for program implementation. Early promotion helps to capitalize on the initial “buzz” about the program, and to build interest and excitement about the launch.

The grand opening for a bike share program should be carefully planned to gain the maximum amount of press and community interest. Special events with local elected leaders and social rides should be considered to promote the initiative. New programs should continue to engage the public throughout the implementation period. This ongoing promotion is needed to build membership levels, as well as to support future phases of the program.

One important strategy is the use of recognizable branding and marketing materials. Recognizable



Figure 27: Nice Ride t-shirt
Credit: Nice Ride (Minneapolis/St. Paul, Minnesota)

branding (including colors, taglines and images) has enhanced programs by making them easily identifiable throughout the jurisdiction. For example, Nice Ride has created a spectrum of merchandising products including t-shirts, hats and socks that not only help promote the Nice Ride brand, but also generate profits that are reinvested (See Figure 27).⁹¹

New programs should capitalize on social media outlets such as Facebook, Twitter and blog posts to promote the program. For example, Capital Bikeshare used Facebook, Twitter and posts in local blogs to announce plans for expansion and to generate public input on locations for future stations.⁹² Capital Bikeshare also reported using an online discount site called Living Social to increase membership and ridership numbers, nearly doubling its annual membership in the spring of 2011 by offering half-priced memberships online.⁹³ However, other programs such as Nice Ride in Minneapolis had less success with this strategy, recording only a small increase in the number of members.⁹⁴

Partnerships with bike shops can benefit bike share programs. During early stages of implementation, some bike shop owners have been concerned about the potential competition from bike share. However, anecdotal evidence suggests that bike sharing may actually benefit local bicycle shops because they get additional business from customers in search of protective gear and other

accessories. Furthermore, some bike shops see bike share as a means of re-introducing adults to bicycling and expanding the customer base of people in the market for new bicycles.⁹⁵

4.3 CONSIDERING SAFETY AND LIABILITY

Jurisdictions implementing bike share programs should make safety a top priority. Fortunately, given the relatively short period of data available for bike sharing implementation in the United States, bike share programs have experienced very low crash rates compared to crashes among bicyclists riding their own (non bike share) bicycles.⁹⁶ The following hypotheses may explain the low crash rates:

- Heavier bikes with more robust tires and low gearing may cause riders to go at slower speeds, which may reduce the number and severity of incidents.
- Drum brakes make slowing the bicycle easy and efficient.
- Integrated flashing lights in every bike can help increase visibility of bicyclists on the road.
- Most bike share bicycles are designed with low step over height (no top tube) which makes it easy for the rider to regain their balance quickly.
- Some bike share riders are relatively inexperienced, and thus may ride more cautiously.

For example, as of March 2012, Deco Bike users logged in more than 1.9 million miles since the program's inception without any recorded crash incidents.⁹⁷ New programs should however continue to study this issue as the popularity and prevalence of bike share grows in the United States.

Early reports suggest that the introduction of bike share programs has caused an increase in the levels of overall bicycling. Consequentially, this can lead to increased visibility for bicyclists – motorists become more accustomed to sharing the road with them. Safe driving and education programs promoting public awareness of the do's and don'ts of sharing the road should be a priority for new programs.⁹⁸ Some existing bike share programs worked with local bicycle groups to offer safe riding classes and publish citizen guides

for safe bicycling.

New programs should promote helmet use and safe riding practices. While none of the programs surveyed for this guide require the use of helmets by users over 16 years of age, all encourage and promote the use of protective gear. Some jurisdictions provide free helmets to bike share program members at social and promotional events. Others forged partnerships with local bike shops and businesses to offer discounted helmets.⁹⁹

Examples from international bike share programs have suggested that mandatory helmet laws may reduce ridership because they make impromptu trips less convenient.¹⁰⁰ New technologies including vending machines for purchasing or lending helmets on site are on the horizon, however these have not yet been field-tested and it remains a question as to whether customers will use helmets from a vending machine.¹⁰¹

As with any publicly accessible transportation program, there are liability issues associated with bike sharing. The Public Health Law Center at the William Mitchell College of Law in Saint Paul, Minnesota developed a brief fact sheet on liability issues for bike share programs.

The document contains general recommendations for limiting a bike share owner or operator's liability, including: "purchasing insurance to cover claims against the owner or operator; requiring users to sign waivers or otherwise release the program from liability for injuries; maintaining bikes and equipment; and educating users about proper bicycle use."¹⁰²

4.4 REDISTRIBUTION OF BICYCLES

The continual redistribution of bicycles throughout the system is a critical aspect of implementation that directly impacts bike share users. Redistribution is also affected by travel patterns within a jurisdiction, and is especially common in scenarios where bike share is used heavily for commute trips. Ridership patterns are also affected by proximity to jobs, housing and activity centers, as well as the topography of the jurisdiction.

Redistribution can become an issue particularly when bike share stations are full (no empty bicycle racks to receive a bike at the end of the trip) while others are empty (no bikes). Either scenario is a problem for bike share users, who expect to have access to a bicycle at any kiosk, and to be able to return a bicycle to an empty dock



Figure 28: Capital Bikeshare vans used to redistribute bicycles around stations
Credit: Flickr.com

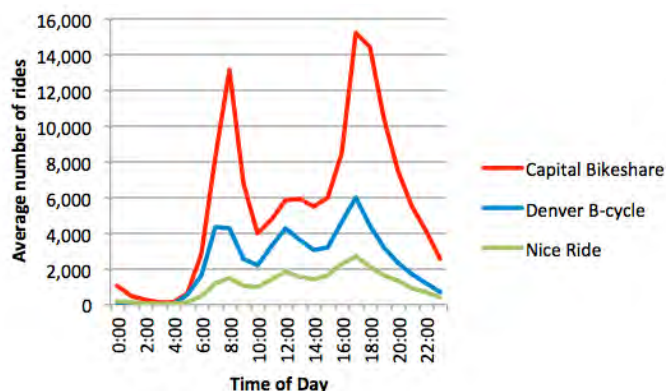


Figure 29: Average number of rides (Weekday), April-June 2012

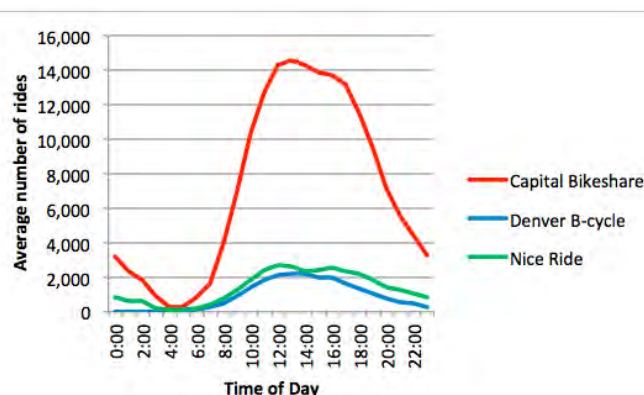


Figure 30: Average number of rides (Weekend), April-June 2012

within a short distance of their destination. To alleviate this inconvenience, some jurisdictions have added redistribution requirements to their contracts with their operators. For example, Capital Bikeshare requires that “during any day, no station has all empty docks or all full docks for more than three hours, between the hours of 6 a.m. and 12 a.m. (midnight); and for more than six hours between the hours of 12 a.m. (midnight) and 6 a.m.”¹⁰³

Existing bike sharing programs have exhibited characteristics of other more traditional transportation modes (i.e. rail, bus, single occupancy vehicles), which suggests that bike sharing has been used for commuting purposes and leisure rides alike. For example, ridership patterns during the work week (Monday through Friday) exhibit the same peaking characteristics during the morning and afternoon rush hours (7:00-9:00 a.m. and 5:00-7:00 p.m.) as other commuting modes (i.e. transit and single occupancy vehicles) do. Also during weekdays, bike share ridership experiences a third middle of the day peak which suggests that workers tend to use bike sharing to reach their lunch destinations. During the weekends, bike sharing ridership exhibits a more normalized pattern, where most rides occur during the middle of the day (peaking at around 1 p.m.). Figure 29 and 30 note the average number of rides for Capital Bikeshare, Denver B-cycle and Nice Ride during weekdays and weekends throughout the months of April through June 2012.

New programs should also consider how commuting patterns can affect the service provision of bike share programs. Existing programs reported experiencing some of the same characteristics of traditional transit (i.e. high morning and afternoon peaks

throughout weekdays) which has lead to redistribution complications including empty and full stations. To counter these challenges, bike share programs have used various redistribution methods including trucks/ vans to transport bicycles from one station to another, in addition to rewarding riders who help to manually redistribute the bikes and therefore help the program meet demand.¹⁰⁴ The truck/van based method is used in larger systems (50 or more stations) with larger service areas, where the operator used multiple vehicles (usually a van or truck) to respond to ridership demand around the service area.¹⁰⁵ It is important to note that



Figure 31: Bike powered trailer for bicycle redistribution
Credit: San Antonio Bikes

jurisdictions utilizing this rebalancing method are likely to incur additional costs (which tend to be factored into O&M costs, depending on contract negotiations with the operator) which can increase the overall operating costs for running the program. Other jurisdictions including San Antonio B-cycle reported using a bike-powered trailer to redistribute bicycles (see Figure 31).¹⁰⁶ Finally, new programs should consider how traffic congestion can affect the redistribution patterns and efforts, as the vehicles used to transport bicycles (i.e. trailer, van, truck) from one station to another can be delayed due to traffic jams, as reported by some existing programs.¹⁰⁷

New programs should assess the possible cost implications of a particular rebalancing method. Station density should be considered when determining the redistribution patterns. The closer the stations are from each other, the easier it will be for a rebalance to transfer bicycles from one bike share station to another, potentially decreasing the rebalancing costs. Rebalancing needs are difficult to predict prior to implementation, therefore some jurisdictions have taken a “wait and see” approach to determining the extent to which rebalancing is needed.

4.5 CONSIDERATION OF THEFT AND VANDALISM

Theft and vandalism have not been major issues in existing U.S. bike sharing programs. Current systems include highly secure locking mechanisms in their bicycles and station docks, which only allows users to unlock a bike with the use of a specialized radio frequency ID (RFID) key or an access code (see Figure 32). Another emerging feature is the use of tracking mechanisms including the use of integrated GPS transmitters that which allow for the tracking of the location of bicycles throughout the service area. In addition to helping in the rare case that a bike is stolen, this information can be useful both for planning bike share future system expansion as well as overall bicycle network infrastructure improvements.

Other issues helping deter the theft of bicycles within bike share programs are the specialized shape, size and branding of bicycles which make each bicycle immediately identifiable (see Figure 33). In addition,



Figure 32: Nice Ride docking mechanism
Credit: Nice Ride



Figure 33: Hubway bicycle.
Credit: Hubway

unique parts that are not transferable to conventional bicycles further deter theft of components. Finally, some bike share equipment suppliers are now including built-in armored cable locks on each bicycle, which allows users to secure their bikes for short periods of time if no docking station is near their intermediate stop.

New programs should take advantage of specialized bicycles and branding in addition to implementing systems that include secure locking mechanisms within each bicycle dock located at bike share stations.