

**PERSPECTIVES ON THE GROWING MARKET FOR PUBLIC BICYCLES**  
**FOCUS ON FRANCE AND THE UNITED KINGDOM**

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*Publication for the presentation at the European Transport Conference,  
Glasgow, Scotland, 11<sup>th</sup> October 2010*

**1 INTRODUCTION - ABSTRACT**

The "servicised" bicycle could perhaps be considered one of the more significant personal mobility innovations of the past decade. From a single public bicycles service operating in 2000 in Rennes, the number of services has grown to more than 460 worldwide (including major cities in middle-income countries) in the space of a decade. Due to the timely convergence of various social and technological trends, and despite the passage of five decades since the first pilot program, public bicycles services have affirmatively entered the transport policy agenda in recent years. Whilst Paris' Vélib' system is perhaps most widely-known, similar (and ever-more-refined) schemes are appearing on the streets of a wide variety of cities and towns, with an equally-diverse range of service models and a growing number of adaptations to suit different urban contexts.

In this paper, we first present a global review of the public bicycles concept and the pathway through which the present situation has arisen. We then analyse and contrast the French market's 32 operational services with the embryonic British market, in terms of operators, contracts, local authorities' initiatives and present lessons from Paris, Rennes, London and Blackpool. And we list successes and limits of public bicycles. Finally, we discuss each country's market potential and prospects for the future development of public bicycle systems generally.

## 2 PUBLIC BICYCLES SYSTEMS – WHAT ARE THEY?

### 2.1 Definition

Public bicycles are a mobility service, mainly useful in urban environment for local travels. Contrary to other types of rental services (**Table 1**), most of public bicycles services share the following features:

- *One-way*: a user can drop-off a public bike in another place than the one where he has picked up “his” public bicycle. Hence, he has the opportunity to rent a public bike only for the length of a single trip - and occasionally longer duration round-trip tours. Compared to traditional bike rental services, public bicycles pricing schemes are designed for very short-term use.
- *Automated*: As public bicycles are mainly available on many different places of the public realm, stations are generally not staffed. In contrary to other rental services, there is no check-in or check-out made by anyone regarding a bicycle’s fitness.
- *A price policy that encourages rapid turnover*: In most systems, the first half hour of usage is free for users, which encourages access for short duration uses. Then, the cost typically increases after the half hour, and the user is therefore incentivised to return the bicycles. There is rapid turnover of the public bicycles fleet after each use.

**Table 1: Main characteristics of 3 bicycles rental types**

	<b>Long term &gt; 1 week</b>	<b>Short and middle term: between half-a-day and one week</b>	<b>Very short term: from some minutes to some hours</b>
Type of rental service	Rental program for students, velostations	Cyclist shops and retailers, velostations	Public bicycles
Access to the bicycles	During opening hours of the shop	During opening hours of the shop	24h/24, 7d/7
Location for taking and depositing the public bicycle	The same place	The same place	Possibility to drop off the bicycle to another places
Check-in & Check out	Human contact	Human contact	Automatic
Typical sources of values for the users	To have a personal bicycle without buying one. To access to a dedicated repair shops	To have a bicycle adapted to specific needs as bicycle types, accessories	Transfert of responsibility for - theft risk - night and long term parking - maintenance

In English, there are two main semantic terms to describe this service: “*public bicycles*” and “*bike sharing*”. The two are generally used interchangeably.

However the authors favour the term “*public bicycles*” for particular etymological values (BEROUD, 2010). Public bicycles:

- are available to almost anyone, although a bank account or credit card is often required.
- are mainly implemented in the public domain.
- are formally considered to be a public service in two French case law.
- need at least coordination, and nearly always funding also, from local public government as this service is a network industry (BEROUD, 2007).

## 2.2 History and generations

The history of public bicycles could be thought of as comprising several generations of systems (DE MAIO, 2001). The distinctions are largely related to the service features enabled by various levels of technology (DE MAIO, 2009, SHAHEEN 2010), though the generations also relate to the incentives to share the bicycle and to keep the bicycle in a good state to enable subsequent users to use this bicycle (BEROUD, 2010). Though the differences between 1st, 2nd and 3rd generation systems are well-pronounced, systems generally can evolve in place from 3rd to 4th generation through incremental improvements to system technology and management techniques (**Table 2**). In fact, some services have characteristics of both 3rd and 4th generation systems. As there are several features which may be considered to distinguish the 4th generation from the 3rd, the taxonomy continues to evolve.

Table 2: The four generations of public bicycles (BEROUD, 2010)

	Generations			
	1st	2nd	3rd	4th
Encouragements to remain a fit bicycle	None	Financial with a coin trolley system (~ 2 euros)	Identification of the user, financial and time incentives	Discouragement to vandalism from users and non users
Examples	White Bikes in Amsterdam (1965)	Fonden i bycyklen in Copenhagen (1995)	Velo à la carte in Rennes (1998), Velo'v in Lyon (2005), Bicing in Barcelona (2007) and Velib' in Paris (2007)	Arnhem (2007), Bicimia in Brescia (2008), Grenoble (2010)
Principles	Bicycles are left on the public realm	Bikes are parked in docking stations	Informatic registration and identification thanks to new technologies of information and telecommunication	Surveillance and protection capabilities
Limits	Bicycles are stolen, painted, broken and not shared	Anonymous users kept the bicycles as the financial incentive is too low and there are no time incentive	Vandalism, empty stations and full stations	Public privacy, costs

As 3rd and 4th generations services encompass services which have found reasonably sustainable operating and business models, the remainder of this paper focuses on them.

### 3 STATE OF THE MARKET

#### 3.1 Some figures worldwide

The first 3<sup>rd</sup> generation service has been implemented in Portsmouth (UK) but it was stopped in 1998. The sole public bicycles service operating in 2000 in Rennes, has been joined by more than 460 others worldwide at the dawn of the 2010's (**Table 3**). Public bicycles services are rapidly appearing in the streets of cities across the globe. Transportation departments in many large cities which lack them are said to be monitoring developments closely.

**Table 3: Evolution of 3rd and 4th generation public bicycles running schemes worldwide in 1995, 2000, 2005 and 2010**

	Number	Comments
1995	0	None service of 3rd generation
2000	1	The sole running service is in Rennes (France) as Bikeabout in Porthmouth (UK) stopped in 1998
2005	128	They are only based in Europe. Among them, 75 are OV Fiets services in the Netherlands and 33 are C'entro in Bici services in Italian cities
2010	461	Public bicycles are present on 4 continents in 28 countries

In 2010, 92 % of public bicycles schemes are implemented in Europe (**Table 4**), though the largest system is in Hangzhou in China with 40.000 bicycles and 1.500 docking stations (SHAHEEN, 2010). Four continents – America, Australia, Asia, Europe – and 28 countries have systems operating in mid-2010.

**Table 4: Repartition of public bicycles among continents in 2010**

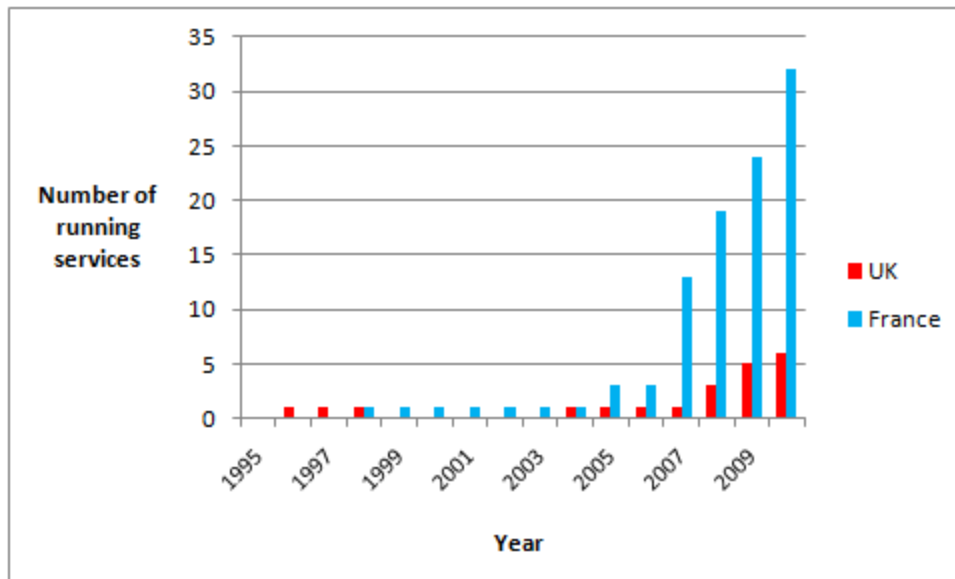
	Number of cities with public bicycles schemes	% of services in each continents
Europe	426	92%
Asia	19	4%
America	13	3%
Oceania	3	1%
Africa	0	0%
Total	461	100%

The 3rd and 4th generations public bicycles world market encompasses 203 000 bicycles and 13 500 stations in 460 cities (Numbers are approximate based on primary research by the authors).

For the remainder of this section, we focus on two European markets with different trajectories (**Chart 1**):

1. France: a world pioneer market of third generation expand.
2. UK: a rapidly-developing market with a large high-profile project.

Chart 1: Evolution of running services in France and in the UK from 1995 to 2010



### 3.2 Public bicycles In France

#### The cycling context: main figures

Cycling fell by half between 1976 and 1997, before stabilising for a period of some years. In 2008, the national cycling modal split is 3%. In urban agglomerations, it represents fewer than 5% of all trips. There has been growth in the 2000's in certain large cities as Toulouse, Rennes, Paris or Lyon-Villeurbanne, and the leading city is Strasbourg with 9% modal split. In almost all cities with significant levels of cycling, daily use is highest in historic city centres, with decreasing levels towards the periphery. 75% of bike trips are less than 20 min less than 3 km. Bike is adapted in urban areas where 2/3 of trips are less than 3km. (CERTU, 2010).

#### Public policies to support cycling

The three components of a cycling policy are:

- *Infrastructure*: the amount of the urban road network that has been adapted for cyclists is estimated at around 14 000 km or 0,29 m/inhabitants (ATOUT FRANCE, 2009)
- *Parking*: located right next to stations, cycle parks offer a combination of secure or supervised parking, and short or long term cycle hire with various services (information, repairs, etc). Installations of parking racks in the streets are located on train stations, street roads, at home.
- *Local authority services*: free lending, short or long renting, bike sharing service. There are also organisations which provide information, advise and develop communication plans (e.g., The “House of bicycle” in

Lyon, which is delivered as a public-private partnership between the City of Lyon and the “Pignon sur Rue” non-profit organisation).

### **Legal cycling framework**

In the 1960s', transport policies focused on car development. Cycling that was neglected is integrated step by step in public transport policies. It started in 1982 in the law of orientation for transportation that encourages the combination between bicycle and public transports. Then, road renovation, except motorways and quick lanes ring, has to integrate cycling infrastructure as cycle lanes or paths - law on air and rational use of energy, 30<sup>th</sup> Dec 1996-. In 2000, cycle lanes become parts of urbanism plans -- law on solidarity and urban renewal, 13<sup>th</sup> Dec 2000. In the later of 2000', cycle double-flow are allowed in 30 km/h areas -- street law review, order of 30<sup>th</sup> July 2008. And the sustainable development policy know as “Grenelle de l'Environnement” has been integrated in two successive laws: “Programmation for application of Environment roundtable”, law n° 2009-967, 3<sup>rd</sup> August 2009 and “National commitment for environment” from Environment roundtable, law n° 12/07/2010, article 51. In urban and suburban areas, the State will encourage, in urban travel plans and firms plans, the development of carpooling, car sharing, walking and cycling. And multiple local authorities can organize a public bicycles service. With the success of Vélib', employer can now can finance 50% of their employees subscription to a public bicycles schemes, as it was already the case for public transport pass -- law of financing of social welfare, article 20.

### **Public bicycles in France**

The first public bicycles of 3<sup>rd</sup> generation has been implemented in 1998 in Rennes. The second services just appeared in Lyon and La Rochelle in 2005. Then, the success of Vélo'v, the Lyon's system, as well as election deadline, has encouraged many cities to have their service. In 2007, ten services were inaugurated included Vélib' in Paris. From 2008 to 2010, 19 others services has appeared. There has been only one switched provider and operators in Rennes.

As of September 2010, 32 public bicycles services are operating within 92 local authorities. Of these services, 18 operate under agreements amongst multiple local councils, whilst the remainders are wholly-contained within individual local authorities (**Table 5**). All services are publicly supported. There are three main types of contracts:

- The integration of public bicycles service in the street furniture contract
- The integration in the public transport delegation or a specific contract
- The service is operated by the local authority itself

Table 5: Main characteristics of noteworthy public bicycles systems in France

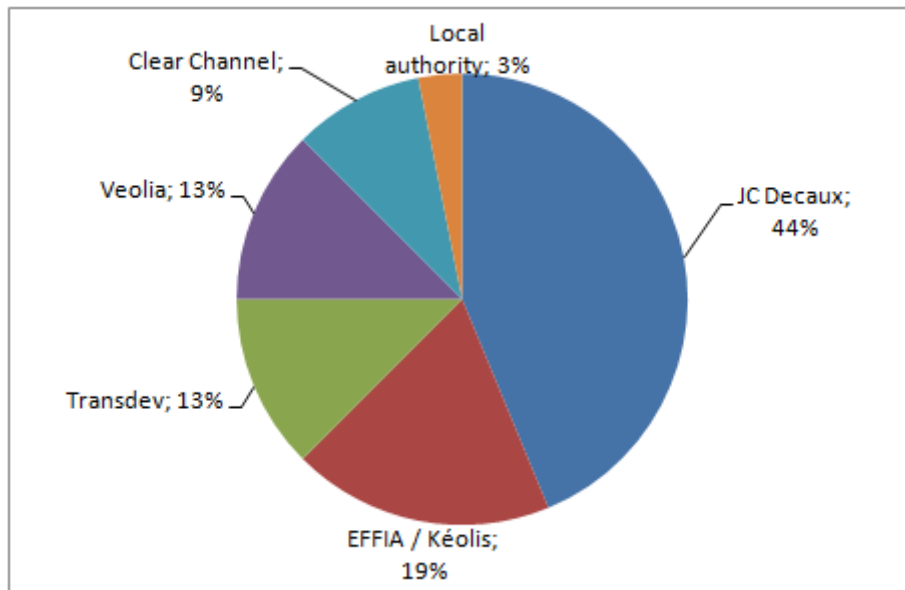
City	Name of the service	Year	Initiator	Provider	Operator	Nb. of bicycles	Nb. of stations
Rennes	Vélo à la Carte	1998-09	A	CC	CC	200	25
	Le Vélo Star	2009+		EFFIA	Keolis	900	81
Lyon	Vélo'v	2005	A	JCD	JCD	4 000	343
La Rochelle	Le vélo Jaune	2005-08	M	-	-	60	6
	Yélo	2009+		Flexbike	M	150	26
Paris	Véli'b	2007+	M	JCD	JCD	20 000	1 450
Montpellier	Velomagg	2007+	A	Smooove	Transdev	600	52
Toulouse	VélôToulouse	2007+	M	JCD	JCD	2 500	253
Chalon-sur-Saône	Réflex	2007+	A	Smooove	Transdev	150	29
Mulhouse	Vélocité	2007+	M	JCD	JCD	200	35
Besançon	Vélocité	2007+	M	JCD	JCD	200	30
Rouen	Cy'clic	2007+	M	JCD	JCD	250	20
Aix-en-Provence	V'hello	2007+	M	JCD	JCD	200	16
Orléans	Vélo +	2007+	A	Effia	Effia	350	33
Marseille	Le Vélo	2007+	A	JCD	JCD	1 000	130
Caen	V'éol	2008+	M	CC	CC	350	40
Nancy	Vélostan	2008+	A	JCD	JCD	250	25
Dijon	Velodi	2008+	A	CC	CC	350	33
Amiens	Velam	2008+	M	JCD	JCD	313	26
Nantes	Bicloo	2008+	A	JCD	JCD	700	79
Perpignan	BIP I	2008+	M	CC	CC	150	15
Cergy-Pontoise	Vélo2	2009+	A	JCD	JCD	360	41
Paris Banlieue	Véli'b'	2009+		JCD	JCD	3 300	300
Nice	Vélo bleu	2009+	A	Veolia	Veolia	1 750	175
Vannes	Vélocéa	2009+	M	Veolia	Veolia	180	20
Avignon	Vélopop	2009+	A	Smooove	Transdev	200	17
Plaine Commune	Velcom	2009+	A	JCD	JCD	450	50
Bordeaux	Vcub	2010+	A	Effia	Keolis	1 545	139
Créteil	Cristolib	2010+	M	JCD	JCD	130	10
Valence	Libélo	2010+	A	Smooove	Transdev	180	20
Pau	IDECycle	2010+	A	Effia	Keolis	200	20
Laval	Not known	2010+	M	Effia	Keolis	100	10
Calais	Véli'n	2010+	M	Veolia	Veolia	160	18
Saint-Etienne	Véli'Vert	2010+	A	Smooove	Veolia	300	30
Montélimard	Véloc	2010+	A	Effia	Keolis	15	1
<b>Total in 2010</b>						<b>41 483</b>	<b>3 567</b>

A: Agglomeration; M: Municipality; JCD: JC Decaux; CC:Clear Channel

Five operators and one local authority are sharing this market. There are two outdoor companies and three public transportation operators. The leader is JC Decaux in terms of services as well as bikes numbers (**Chart 2**).



Chart 2: Market share of public bicycles operators in France in August 2010



Within the 41 483 bicycles in France, more than half come from the Vélib' system. There are 5 cities with more than 1 000 public bicycles: Lyon, Marseille, Toulouse, Nice et Bordeaux. We observe that 70% of cities have between 100 and 500 bikes and only one city, Montélimard, have less than 20 bikes.

### Case study: Vélib' in Paris – the largest scheme in Europe

*The implementation process:* Political leadership in Paris noted the success of the Lyon's system, which came into service in 2005. The General Secretariat of the Council of Paris coordinates the Vélib' project with supports from the offices of the deputy mayors whose sectors were concerned: highways, urban planning, finance, and from the Mayor's office. The project was steered by the Public Road Service and Transport Division and the territorial highways sections. Collaboration also has been done with State entities and ABF (Architects of French Buildings) who has responsibilities for the protection of buildings and streetscapes. ABF provided advice regarding the location of Vélib' stations so that historic streetscapes were not adversely affected. Also the APUR (Parisian Urbanism Office) conducted studies to help determine network sizing and station location. When locating the stations, special care was also taken to avoid creating obstacles for pedestrians, including people with impaired mobility.



Picture 1: Vélib' in Paris (©: Mobiped, 2010)

The launch of Vélib' provided an opportunity to consult with cyclists' associations and with police headquarters in order to raise Vélib' users' awareness of the importance of appropriate behaviour -- respecting the rules

of road and other users. With this aim in view, Paris city hall conducted a communication campaign to ensure that road users as a whole (car driver, bus drivers, taxi drivers and delivery) are aware of the need to share road space with Paris' new cyclists.

*The supply:* The service is accessible to all bank-account-holders -- both Parisians and tourists. A large number of bikes (20 000) is spread across a dense network of stations covering every part of Paris (1 450). The development of the service inside Paris continued until the end of 2008 with particular focus on providing denser coverage at points where higher transport flows are generated (ex: near railway stations, universities, etc). In 2009, the service extended to 30 towns bordering the city within a 1 500 meters-wide band. Now, there are 23 300 bicycles and 1 750 stations.

*The contract:* The contract, awarded to the outdoor advertising firm JC Decaux, defines a set of quality criteria (maintenance of bikes and stations, redistribution of bikes between stations, etc). For quality-control purposes, indicators are checked each month enabling contractual bonuses/penalties depending on achievement of service quality objectives. The Vélib' contract covers the installation and management of the public bicycles service, and the installation of street furniture providing information (general, local, and eventually advertising). The problem of vandalism is a real challenge, as during the first year of operation roughly 20% of bikes were damaged (VILLE DE PARIS, 2010). Between 4% and 25% Paris municipality finances 400 Euros/bike to be replaced if of bikes are out of order. (VILLE DE PARIS, 2008; VILLE DE PARIS, 2009)

*Price policy:* The Vélib' price structure is designed with a relatively steep price gradient to encourage the use of the service for short trips (20 min on average), in line with current bike use in Paris. Facilitating longer-term usage through a flatter price structure has been ruled out at present to avoid competing directly with private-sector bicycle rental services and to ensure rapid turnover of the Vélib' fleet (**Chart 3**)

*The use:* Vélib' bikes are rented, on average, between 50 000 and 70 000 times/day. Sunny summer days see peaks of almost 110 000 rentals. One half of the long-term subscribers (one year) use their Navigo, the public transport pass. Short-term subscriptions (one-day or seven-day) account for 83% of Vélib' use, while annual subscriptions account for 17% (VILLE DE PARIS, 2010).

A user survey of March 2008 shows that 36% of users residing outside the capital. 27% of long-term subscribers use regularly Vélib' for trips between home and workplace, 13% of them within the context of their business. Vélib' users are increasingly relying on the service as a mean to complement other non-private-car modes of transport. 28% use Vélib' to start or finish a journey that starts or finishes with Metro, train or bus. 46% of users report use their private car less often (compared with 28% in 2008) and 18% make journeys that they would never have made before.(VILLE DE PARIS, 2010)

*The operating:* Many of JC Decaux's service vehicles used by maintenance staff are electric power-assisted or run on natural gas. Velib' is operated by a staff of 400 (bike maintenance and redistribution, call centre, centralised management, etc). (VILLE DE PARIS, 2010)

### **Case study - “Le Vélo Star” in Rennes – The first world scheme renewal**

*The previous service:* In 1997 Rennes municipality and Rennes agglomeration together tendered for advertising notice boards and bus shelters. In their response, Clear Channel proposed to include a public bicycles service, in exchange for a reduction in fee from 5% to 2.5% of gross revenues. Clear Channel was awarded the contract, and Vélo à la Carte began operating on the 6th June 1998. The service was initially composed of 200 bikes, 25 stations, a management centre, and a dedicated vehicle to bikes between stations. In October 2006 stronger, re-designed bicycles were introduced to take advantage of lessons learned during the previous years of operation. By May 2009, at the end of the 11 year-contract, one million trips had been served, and the system was withdrawn in anticipation of tendering for an updated service.



Picture 2: Le Vélo Star in Rennes  
(©: Mobiped, 2010)

*The new service:* The region's urban travel plan for 2007-2017 proposed implementing a new bike sharing service, as part of a strategy to raise the bicycle mode share from 3 to 4%. It was decided that Rennes Agglomeration, the transport authority that also deals with cycle lane infrastructure, would organise and oversee the future bike sharing service. In the bid for offer, the agglomeration requested a service which would provide at least 2 500 rentals/day after 18 months. In June 2009, VéloStar is created with now 900 bicycles and 81 stations (BEROUD, 2010). The public transport operator Kéolis was then chosen to operate the service. In June 2010, after a year of operation, there were 4 813 subscribers performing 1652 rentals/day (1.83 renting/bike/day).

### 3.3 Public bicycles in the UK

#### **The UK's cycling context: main figures**

The most recent data for Great Britain show cycling's share of journeys to be approximately 2% (DfT 2009). Following a multi-generation period of decline – Britons cycle fewer than one-fifth as many miles today than in the 1950s, despite population growth – the aggregate amount of cycling stabilised sometime during the 1990s and is now increasing (DfT 2009a). Taking population growth into account, however, one finds that this does not directly translate into more cycling by the average Briton – per capita cycling journeys have been broadly stable in the 2000s, though per capita mileage has trended upwards (42 miles per year in 2008 versus 36 in 2002) as the average length of a cycling journey has increased (DfT 2009).

Strong inter-personal differences in cycling patterns lie beneath these headline figures. Though the average Briton cycles less than once a fortnight, those who cycle at least once a week do so an average of six times weekly (representing a quarter of their journeys). Twice as many cycling journeys are made in July as in December (DfT 2009). Research amongst Londoners has found that “people are more likely to cycle if they are male, under 40, white or with medium to high household income,” and that roughly two-thirds of Londoners say they never cycle (TfL 2010). This latter figure is marginally lower than the proportion of all Britons who report that they do not presently cycle (69%) (DfT 2009).

There is a large degree of spatial variability as well – the 17% growth (from 2002 to 2008) in per capita cycling mileage nationally results from a combination of a more-than-doubling in Greater London and a much more modest increase elsewhere in Great Britain (DfT 2009). London’s transport authorities report that cycling’s share of journeys has increased roughly by 70% in the 2000s through 2008, though it remains only 2% (3% in Inner London and 1% in Outer London) (TfL 2010). Nearly half of cycling in both London and the rest of Great Britain is done for commuting purposes (either to work or school/university), resulting in a highly-peaked hourly profile of cycling travel on a typical day.

### **Cycling’s legal framework**

Central government and local councils in the UK actively encourage cycling for reasons such as encouraging healthy and safe lifestyles and reducing car use. Britain’s first cycle lane is said to date from 1934 (MANCHESTER GUARDIAN 1934), and inclusion of cycling facilities has become commonplace in recent years on road improvement schemes. In recent years central government has sponsored pilot programmes called Cycle Demonstration Towns, in which annual cycling investment was set at £10 per capita (the prevailing rate is approximately £0.70), and operates within the context of an “Active Travel Strategy” to encourage cycling (CYCLING ENGLAND 2009, DfT-DoH 2010). Travel plans (area-wide, workplace, residential, etc.) required by PPG [Planning Policy Guidance], 13 have become important tools for Councils to encourage cycling as part of the land use planning process, and employers can loan a bicycle to their employees as a tax-free benefit (DCLG 2001, DfT 2009b).

### **Public bicycles in UK**

The first public bicycle schemes appeared in the UK in the 1990s in Cambridge and Portsmouth. The experiment in Cambridge, a 1<sup>st</sup> generation, made use of re-painted stolen bicycles for its fleet and failed in short order as the unlocked and unmonitored bicycles disappeared (DE MAIO 2009). Portsmouth University’s BikeAbout system is the first 3<sup>rd</sup> generation service worldwide. The service was limited to College users, though it was more capital-intensive as it incorporated magnetic-card technology to identify users.

There was a lull in activity in the UK with 5 services running in 2010 (**Table 6**), whilst public bicycle schemes were slowly introduced in other parts of the world and systems and technologies evolved. Public bicycles re-appeared in

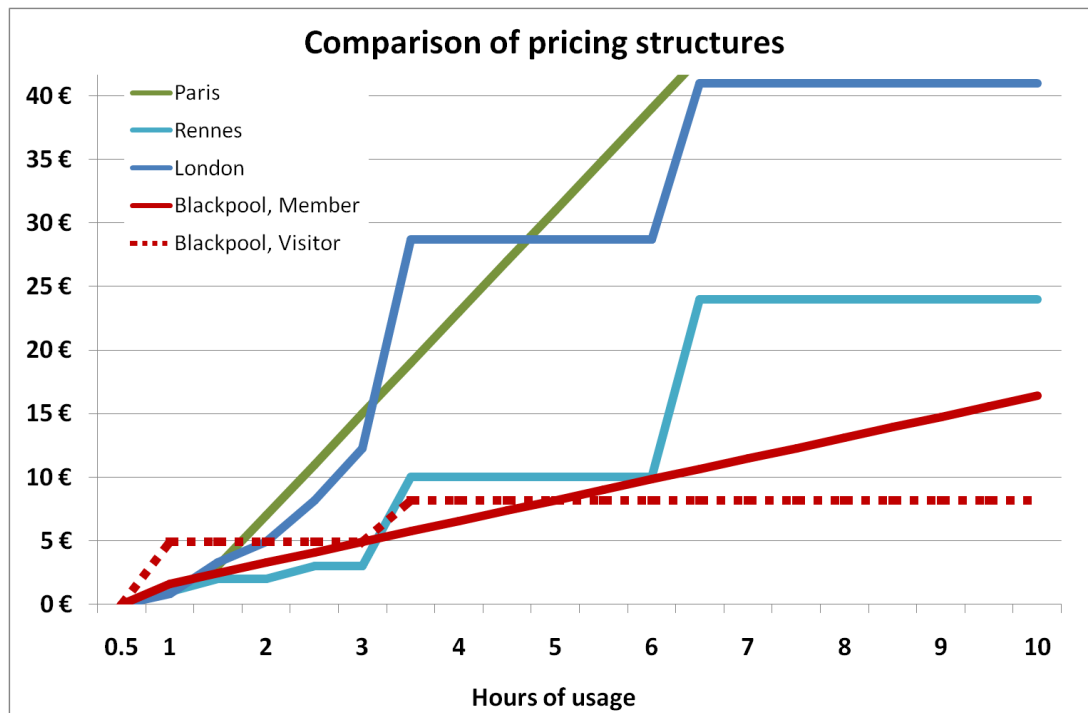
the UK in the mid-2000s with the OyBike pilot programme in London's Hammersmith & Fulham borough, and several years later in the form of small-scale systems in Bristol, Cardiff and Blackpool. By the close of the 2000s, successful public bicycle programmes abroad had catalysed interest in other large cities in the UK, with London launching its large-scale 4<sup>th</sup>-generation scheme in 2010 and at least five others also considering public bicycles systems (Edinburgh, Birmingham, Newcastle, Liverpool, and York). (PIDD 2010)

**Table 6: Main characteristics of noteworthy public bicycles systems in the UK**

City	Name of the service	Year	Initiator	Provider	Operator	Nb. of bicycles	Nb. of stations	Source
London	Barclays Cycle Hire	2010+	Transport for London	Bixi	Serco Limited	6,000 planned	400 initially planned	TfL 2008
Dumfries	Bike2Go	2010+	Dumfries and Galloway Council	HourBike	HourBike	30	9	Steere 2010, Dumfries and Galloway 2010
Blackpool	Hire-a-Bike (Pilot)	2009	Blackpool Council	HourBike	HourBike	50	9	Steere 2010
	Hire-a-Bike (Large Scale)	2010+				300 (500)	40 (70)	Hourbike, 2010
Cardiff (Waldram 2010)	Cardiff Smart Bike	2009+	Cardiff City Council	OyBike	OyBike	70	10 (35 initially planned)	Waldram 2010
Reading	OyBike	2008+	First Great Western (Railway operator)	OyBike	OyBike	10	2	Pester 2010
London (Hammersmith and Fulham Borough)	OyBike	2004-09	Hammersmith and Fulham borough	OyBike	OyBike	70	~25	Noland and Ishaque 2006, Oybike 2010
Portsmouth	Bikeabout	1996 - c 1998	Portsmouth University	Dixon-Bate	Portsmouth University	100	3	Black and Potter undated
Bristol	Hourbike	2008 - 10	Bristol council	Hourbike	Hourbike	18	8	Rkaina 2010
<b>Total in 2010</b>						<b>6 460</b>	<b>461</b>	

The level of technological sophistication varies as well, with open-ended access to users' credit cards, as in London's system, requiring a higher level of security procedures. The trade-off, though, is that open-ended card access allows provides additional functionality to users. Pricing may also be either flat or graduated (such as in London – **Chart 3**), with graduated pricing encouraging more rapid turnover than flat-rate hourly pricing schemes.

Chart 3: Pricing regimes in various cities' public bicycles systems\*



\* British pounds converted to euros @ 1.22 €/£

All public bicycle systems operating in the UK use distinctive bicycles, some of which are designed to be aesthetically-pleasing (e.g. London's system), the others however are designed with visually-striking colouring to discourage thieves.

### Public sector support

Public bicycle schemes in Great Britain have been underwritten by either public sector entities (local councils, National Health Service trusts, local transport authorities, etc.) or major institutions with complementary interests (railway operating firms, universities). National health trusts, to take one example, have sponsored the provision of public bicycles as a public health measure. (HOURBIKE 2010)

At one level, the absence of privately-sponsored initiatives is due to the absence to date of suitable market conditions in which revenue streams are sufficient to allow a public bicycle scheme to operate without external subsidy. However, the spatial needs (i.e. docking stations in high-visibility, easily-accessible public space, as well as a cycle-friendly streetscape) also imply a high degree of public-sector involvement, irrespective of the nature of the system financing.

A transport service similar in some respects – car clubs – is now (though not in its infancy – see DfT 2004) largely provided by the private marketplace in the UK, without direct public subsidy to operators. The private firms do interact with the public sector on a regular basis to, among other things, gain permission for access to public parking spaces, which are in some instances provided at sub-commercial prices when a local council wishes to encourage provision. (TfL 2008a) In some cases, such as in Westminster, Central

London, a local authority has directly underwritten a car club system as an area-wide concession to a private operator in a business model similar to that of public bicycles in Britain. (KAVANAUGH and O'DOHERTY, 2009)

**Table 7** lists several service features which distinguish the UK's various public bicycle systems. Several systems are characterized by relatively high degrees of private-sector control, which imply flexibility in adapting to changing market conditions, though the incentives faced by the operator may differ from public goals.

**Table 7: Comparison of service features in the UK**

Features	Advantages	Limits	Example
Aesthetically-pleasing bicycle design & colour scheme	Appeals to image-conscious consumers	Increased risk of bicycle theft	BCH
Fixed hourly [versus graduated] pricing system	Ease of customer estimating their usage fees in advance	Less ability for the operator to manage usage patterns to optimise bicycle utilisation	Blackpool (fixed hourly pricing) Barclays London (variable pricing)
Operator maintains open-ended access to users' credit card data	<ul style="list-style-type: none"> <li>- Freedom for pay-as-you-go pricing without user actively topping up their account</li> <li>- Ease of operator recovering monetary losses in the case of user-caused damage</li> <li>- Could facilitate reservations (by providing operator a means to charge users for all reservations, even in case when a bicycle is not engaged)</li> </ul>	Required data security measures involve additional operating costs to the operator	Barclays London

### Case Study: Barclays Cycle Hire [BCH] in London

Following small-scale field testing of public bicycles earlier in the 2000s (Noland & Ishaque 2006), London's cycle hire scheme – branded “Barclays Cycle Hire” in accordance with a marketing agreement – is presently being implemented by Greater London's transport authority, Transport for London [TfL]. Plans for the scheme now known as BCH were initially announced by the then-Mayor in early 2008, continued through a change in administration, and resulted in a public service launch in Summer 2010 (RUSSELL 2008). Minor start-up delays, some due to the system owner's TfL not also owning the public space needed for hubs and hence requiring it to enter local councils' planning processes – resulted in the service becoming available several months later than originally intended. A decision was also taken to undertake a “ramping-up” process to launch the



**Picture 3: Barclays Cycle Hire**  
(©:www.london-insider.co.uk/, 2010)

service, in which only pre-registered users were initially permitted to use the system for the initial period of operation. Casual users will be invited to use BCH following successful trialling with this limited user base (LYDALL 2010a).

TfL underwrites and owns BCH, reported to have cost £140 million to plan and implement, whilst a firm called Serco operates it under contract to TfL (the same firm also operates TfL's Docklands Light Railway) (LYDALL 2010a). The technology and infrastructure for BCH is being provided to London by a firm called Bixi, the system operator for Montréal's public bicycle system. Under an agreement with TfL, Barclays bank will sponsor the scheme for its initial five years for £25 million in exchange for branding rights to BCH as well as London's developing "Cycle Superhighway Network," which will consist of 12 radial road routes between Central and Outer London which are being re-designed with dedicated cycle lanes (LYDALL 2010b). It is hoped that the system will eventually become financially self-sustaining.

BCH has a relatively complex pricing structure, with different levels of participation (ranging from a casual user such as a tourist to a "member" who pays an upfront fee) and graduated hourly pricing (**Chart 3**). Members also have a less cumbersome procedure for accessing a BCH bicycle, as they receive a chip-enabled device to allow them to unlock a bicycle. Casual users, by way of contrast, will access a bicycle only after interacting with the hub's computer and entering personal information.

Pre-implementation market analysis identified the "last-mile" leg of commuters' daily travel as a major source of demand for the prospective public bicycle system. Specifically, researchers found that commuters using National Rail services would find the public bicycles attractive as an alternative to at-capacity Tube/bus services to connect between the Central London rail terminals and their workplaces (TfL 2008). A strategic decision was taken to not locate BCH hubs at the Central London rail terminals initially, as this demand would be difficult to efficiently serve, though system expansions may address this potential user base in future. In practice, though, docking stations are located within several hundred meters of the Central London rail termini, despite the decision not to directly integrate the services.

### **Case Study: Blackpool Hire-a-Bike**

Blackpool Council and the local NHS [National Health Service] trust have sponsored a public bicycle system in this North West England resort city. The system is being provided on contract by the HourBike firm, in an arrangement in which the bicycles and infrastructure are owned by the Council, who is also primarily responsible for marketing the system and inducting/training new users (STEERE 2010).

The system was piloted in 2009 with 50 bicycles at nine locations. Due to Blackpool's urban structure, the system seeks to provide service to two



distinct user groups – Blackpool residents on the one hand, and resort tourists on the other. This bifurcated pattern is reflected in the spatial distribution of hubs – of the original nine hubs, six were located along the seafront promenade, whilst three were located further inland in proximity to residential neighbourhoods.



Picture 4: Hire-a-Bike in Blackpool (©: [www.blackpoolrentals.com](http://www.blackpoolrentals.com), 2010)

The system is being expanded to 100 hub locations in Summer 2010, with field installation ongoing in late July. It was decided to implement a fixed hourly pricing regimen (£1/hour). Blackpool council staff provides advice and training to encourage prospective users.

In common with other public bicycle systems, the Blackpool system does not generally allow users to reserve a bicycle in advance. During Blackpool's annual Ride the Lights event (held on a September evening) in 2009, however, users were permitted to reserve bicycles. Hourbike reported a successful event, with full recovery of bicycles afterwards, and plans a similar routine for this year's event. There are no plans at present, however, for permitting advance bicycle reservations in more general circumstances (STEERE 2010).

#### 4 ADVANTAGES AND LIMITS

A survey made by the sustainable development French ministry show that the socio-economic balance sheet -- a.k.a. cost-benefit analysis -- is broadly neutral (COMMISSARIAT GENERAL AU DEVELOPPEMENT DURABLE, 2010). However, the authors of that study recognise that the data used for the calculations are incomplete.

Several of the advantages and limits of public bicycles are as follows (BEROUD, 2010).

##### 4.1 Advantages

- It offers an alternative to three main barriers to cycling: theft, home parking and maintenance
- It is a strong marketing tool for cycling
- It increases the practice of cycling and improves the image of cycling. 96 % of users report that they would not have travelled by bicycle in the absence of the Vélo'v system.
- It is broader than other investments in individual areas of cycling policy: infrastructure, equipment, information, marketing, education and traffic laws
- It contributes to the multimodal and intermodal sustainable mobility supply
- It calms road traffic and increase the safety thanks to a noticeable fleet of bicycles in the streets
- It is more efficient for the use of the public space than car parking.

## 4.2 Limits

- The impact on aggregate daily mobility is limited. In Lyon, Vélo'v represents 1,2 % of the mobility travels inner Lyon – Villeurbanne and 0,5 % of the mobility travel of the Greater Lyon.
- It generates a very modest modal shift from car drivers. In 2008, the modal shift represented less than 0,01 % of car travel within inner Lyon-Villeurbanne.
- It does not solve issues of private theft, home parking facilities and maintenance of personal bikes.
- It could attract vandalism.
- There are large network and scale economic efficiencies which limit the success of small-scale systems, and systems to date have generally required public funding.

## 5 PERSPECTIVES

### 5.1 The French market (**Table 8**)

France's largest cities -- those with more than 300 000 inhabitants -- each have public bicycles systems today. Amongst cities between 100 000 to 300 000, more than half also have services, three have forthcoming schemes -- Lille, Angers and Limoges -- and two are developing automated bicycle rental systems with different service features. These last two cities -- Strasbourg and Grenoble -- happen to lead the nation in terms of cycling mode share; the automatic rental services which they are implementing will not offer the possibility of one-way usage. In Strasbourg, bicycles will be available inside buildings. In Grenoble, they will be in the public domain in slatted wooden boxes that could be used for rental and private bicycles parking.

Amongst French cities with 50 000 to 100 000 inhabitants, 23 % have public bicycles systems. A service in Ajaccio, in Corsica, will soon be running. Among cities under 50 000 inhabitants, there is only one local authority which has initiated a service: Chalon-sur-Saône. All others are suburb cities which have been added to a system first implemented by a nearby larger city.

Table 8: Breakdown of cities in France with and without public bicycles

Cities	With public bicycles		Without public bicycles		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
> 1 million of inhabitants	1	100%	0	0%	1	100%
300 000 to 1 million	4	100%	0	0%	4	100%
100 000 to 300 000	17 (20)	57%	13 (10)	43%	30	100%
50 000 to 100 000	19	23%	65	77%	84	100%
20 000 to 50 000	29	9%	290	91%	319	100%
< 20 000	24	0%	36 214	100%	36 238	100%
<b>Total</b>	<b>77</b>	<b>-</b>	<b>36569</b>	<b>-</b>	<b>36676</b>	<b>-</b>

After rapid development catalysed by the consecutive success of Lyon and Paris in the last five years, one may expect that the French market may stabilise in coming months and years. Moreover, the duration of the existing service contracts, typically over a decade, combined with uncertainty on the part of non-equipped cities regarding which rental service is most appropriate for them, will serve to limit expansion beyond existing services. Within cities with “mature systems” such as Paris and Lyon, use appears to have stabilised, with near-flat usage levels in 2008-2009 (SLIMANY, 2010).

## 5.2 The UK market (Table 9)

Contrary to France, the UK market is still in the first steps of growth. Of the twelve cities between 300 000 and 1 million inhabitants, all but London lack public bicycles services. There are a further 54 cities of more than 100 000 inhabitants; only two have public bicycles schemes. One may suppose that the high-profile of London’s new system will catalyse the national market. The evidence supporting this are the reports of second-tier cities’ transport staff said to be monitoring the degree of success in London (PIDD 2010).

Table 9: Breakdown of cities in the UK with and without public bicycles

Cities	With public bicycles		Without public bicycles		Total	
	Count	Percentage	Count	Percentage	Count	Percentage
> 1 million	1	50%	1	50%	2	100%
300 000 to 1 million	2	17%	10	83%	12	100%
100 000 to 300 000	2	4%	52	96%	54	100%
50 000 to 100 000	0	0%	126	100%	126	100%
<b>Total</b>	<b>5</b>	<b>-</b>	<b>189</b>	<b>-</b>	<b>194</b>	<b>-</b>

### 5.3 Factors affecting market potential

As they have grown, public bicycles systems have rapidly evolved in terms of system sizes, technologies, service models, and usage characteristics. Meanwhile, cities, service providers and other stakeholders face emerging challenges:

- *Administration:* Consortia of local councils and levels of government or individual local authorities? The governance mainly depends on where authority and interest lies regarding mobility issues as cycling, public space, mobility and land use master plans. We may see suburban councils integrate more closely with central cities in the early stages of service planning. Innovative technologies may also allow systems to operate on a peer-to-peer basis (e.g. Sobi) independent of subsidy or coordination with local government.
- *Cost:* The costs of public bicycles systems are relatively large in comparison to other forms of cycling investments, but conversely relatively small compared against automobile and/or public transportation investments. Further information from actual experiences with capital/operating cost levels will emerge as systems grow and mature, thus enabling cities to consider systems of their own with a lower degree of financial risk. The limited cost transparency of certain financial models (e.g. advertising-for-public-bicycles agreements in Paris and Lyon) can be expected to be relaxed over time as public awareness grows. London's experience highlights the possibility of corporate sponsorship in the portfolio of financing methods, though the applicability to smaller cities is not yet clear. Falling prices for the relevant technologies may be expected to lower the unit costs, though labour will remain a significant factor in unit costs.
- *Tendering:* As the economical synergies between advertising, public transportation, and public bicycles systems are not yet clear, a single form of tender which is optimal for different cities has yet to emerge. Integration with advertising or public transport implies competition being limited to the small number of existing operators (and their partners). In general terms, there are complex trade-offs between the size of public subsidy, degree of cost transparency, acceptance of risk associated with negative outcomes such as theft/vandalism, control over system evolution, and level of competition for tenders.
- *Vandalism:* Local authorities, service providers, operators, users and non-users each have a role in minimising vandalism to public bicycles. The optimal allocation of risk is not clear, as shifting it completely onto providers and users may limit growth, whilst local authorities bearing the full financial risk invites problems such as moral hazard from both providers/operators and users. Technology can be expected to play a part, such as monitored visual surveillance (Brescia, Italy), area-location capabilities (Montreal, Canada) or physically-protected lockers

(Bikedispenser systems in the Netherlands). These features may well define the forthcoming 4th generation of public bicycles systems.

- *Service models:* Finding an available bicycle at the beginning of a journey, and an available parking slot at the end, are users' basic expectations. However, they are the main limits of public bicycles services. Several potential solutions exist such as offering small financial incentives to users in exchange for returning bicycles in up-hill docks, providing real time information about the availability of parking and bicycles by mobile phone services or the Internet, or simply expanding the number of slots and/or bicycles at particular stations. In the future, the ability to make advance reservations of a bicycle and parking slot may emerge, though this presents major logistical challenges. Local and cross-system experience will provide the necessary feedback regarding demand for and ability to permit reservations or implement financial incentives. Conversely, waiting for a bike at an empty station may continue to be a fact of system operation akin to waiting for a bus at a bus shelter. Further, electric-assist bicycles which are currently being field-tested may facilitate new usage patterns, though the logistics are a major challenge.
- *Multimodality:* Criticism of London's system has included the lack of integration with the ubiquitous "Oyster" public transport smartcard system while Vélib is well integrated. As systems mature, one may expect that just as smartcards operable on different public transport systems within the same geographic region have emerged in recent years, this inter-operability will extend to public bicycles systems as in Switzerland.
- *Life cycle impacts:* As even the oldest systems have been operating for only several years, experiences regarding life cycle costs are very limited. Continued monitoring of field experience is needed to assess the global impacts, addressing both system operation and use.
- *Environmental:* Whilst cycling is a near-zero-emissions activity, this is not true for other aspects of system operation such as re-allocation of bicycles to align with demand patterns and power supply to hub kiosks. Some systems have begun to incorporate solar panels, electrically-powered re-allocation vehicles but these remain the exception rather than the rule. As requirements for sustainable outcomes increase, this may change over time.

## 6 CONCLUSION

Originally motivated by utopian visions of civic-mindedness, public bicycles have evolved into a hybrid between personal and public transportation and an accepted way of encouraging and enabling cycling.

France is one of the most well-developed markets internationally, whilst the UK is an emerging one at present. Service models vary widely, as does system scale, and some cities in France are now planning alternative forms of publicly-supported bicycle rental.

The degree of success which meets London's new system can be expected to go a long way towards shaping developments in other UK cities. If the UK experiences implementation rates which match those seen today in France, one would see approximately 40 new systems in UK cities of more than 100 000 residents, in addition to the five presently operating.

Perhaps the crucial development occurred in the early 2000s as systems gained the ability to identify users and ensure that they accept responsibility during use. Technological development continues apace, today including surveillance and real-time monitoring and management capabilities, and innovation can be expected to continue for the foreseeable future.

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- <http://bike-sharing.blogspot.com>
- [www.cityryde.com/category/blog/](http://www.cityryde.com/category/blog/) and the CityRyde map

#### **French links:**

- [www.mobiped.com](http://www.mobiped.com)
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