

# Smart Transportation Planning in Freiburg, Germany

By:

Sumit Bindra

Dave Giel

Tommy Tran

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## **Section 1. *Introduction***

Freiburg is located in the southwest corner of Germany. It acts as the gateway into Germany for travelers from France and Switzerland. An historical city providing a great blend of “old city” culture and place, as well as being a pioneering city in the environmentally sound style of living, the city has much to offer. Oktoberfest patrons, architecture admirers, as well as the average tourist flock to Freiburg to enjoy its culture. What may go unnoticed in the Freiburg experience is the balanced and efficient transportation network. The citizens of Freiburg do not take transportation lightly. A concerted effort has been made since the Second World War to integrate the transportation system into the culture of the city, and not allow the transportation system to dictate the growth of the culture. These citizens had a vision and take great care in continuing the success of that vision. This document will provide insight into the transportation system which has garnered respect and admiration the world over.

The first section will talk about the five cornerstones of sustainable transportation planning in Freiburg which have contributed to the city’s success in finding a reasonable split between various forms of transportation. A description of the newly developed districts Vauban and Rieselfeld will follow, including an assessment of how these districts exemplify the vision of Freiburg. Lastly, the transportation system as it exists will be used to show the extent to which the city has succeeded in creating its vision.

## **Section 2. *Government Policies and their Effectiveness***

It is city government's declared goal to promote pedestrians, bicycles, and public transportation and reduce car traffic. The city believes that planning must be for the

people, not for cars. This does not mean that the car must be gotten rid of, but a reasonable split must be found between the various forms of transportation, so that car traffic can be reduced as much as possible in the center. In order to meet this goal public transport has undergone major improvements and has significantly contributed to the reduction of individual car use. The city has focused equally on other cheaper and cleaner modes of transportation: pedestrians and bicycles. The following subsections will concentrate on the five steps the city has taken to plan and develop a sustainable transportation infrastructure and urban environment.

### *2.1 Extension of Public Transportation Network*

The City of Freiburg is one of the German cities that did not principally base its town planning on 'car-friendliness.' The focus of inner-city traffic policy was placed on public transport due to the preservation of the historic city center. In 1972 the decision for the maintenance of the light rail system was made. As a consequence, the city center was pedestrianized in 1973 and in 1983 the first new tram route was opened.

Since then 17 miles of tram network and 168 miles of bus network have been developed. The *four* tram lines consisting of 58 vehicles, arriving every 5-10 min in rush hour carries 70 % of the total public transportation users. The *twenty-one* bus routes with 83 busses carry the remaining 30%. The tram network, carefully planned along the main arteries of traffic volume, has been constantly developed since 1970 and will continue to develop north and east of the city as the administration plans to collaborate with neighboring districts.

The transportation network is planned to integrate different modes. The major railway station for regional trains has stops for all local buses and trams. Other regional buses

also start from the train station. All supporting infrastructure is designed to provide trams with optimal conditions. New routes replace bus routes which nowadays are primarily used to feed the tram lines with passengers from suburban or remote areas. At certain points there are special transfer stations to the German Rail network, and short distances are guaranteed to other means of transport. Such transfer stations are also focal points of the local bus system. This makes the public transportation system more reliable and comfortable.

Public transportation facilities are also run in areas deemed for future development. An illustration of this is a route which connects the Rieselfeld District with the city center. The Rieselfeld tram has been running since 1997, when only about 1,100 people were living in the District. It is a political objective that the public transportation is so attractive here that people will no longer find it necessary to buy a second car. By the time the development of 4,000 housing units is completed, approximately 12,000 people will have access to an efficient tramway. During peak times the tram is running every two or three minutes, and after 7 P.M. the interval is 15 minutes.

The city of Freiburg and its surrounding districts are divided into traffic zones by three concentric circles. For a mere 41.5 Euro/month people can buy *The RegioKarte* – the regional travel pass to use 1770 miles of public transportation network in all the three traffic zones. The public transport is also prioritized at the traffic signals and gets a green light as soon as it hits them. All these measures have been highly successful and the number of public transportation passengers has almost doubled since 1984.

## *2.2 Promoting Bicycle/Pedestrian Traffic*

One main finding to emerge from twenty years of traffic planning in Freiburg is that the role of bicycles in reducing individual motorized traffic. On a well laid bicycle path network, for distances less than five kilometers, cycles are a serious competitor to cars. Huge investments in the bicycle network has enabled an extension of the cycle path network from about 19 miles in 1992 to about 152 miles bituminized bicycle paths today. In addition, there is 103 miles of gravel cycle path, which are being used increasingly by commuters from small towns to the East and West for the daily journey from home to work. In order to solve the special parking problems for cyclists, approx. 5,000 new bicycle parking spaces have been made available in the city center, and an additional 1,000 parking spaces are available at the railway station to enable train passengers a direct transfer to bicycles.

## *2.3 Implementing Traffic Restraints*

For a long time, the contribution of a pedestrian - friendly city was ranked at the bottom of the priority scale in transport planning. During the last ten years it has become recognized more and more that the weaker traffic participants, particularly children and the elderly, are especially dependent on being able to cover their journeys on foot in safety and in comfort. By the designation of zones in which traffic is restricted to a walking speed and pedestrians are given priority, applying 18 mph speed limit zones in all residential areas and better design of pedestrian crossings could permanently improve the pedestrian's situation in the city. There are plans in place to expand the pedestrian city core to the main train station in the west and the river in the south by 2007.

Transportation planners practice traffic calming by using the natural stone surfaces traditional to Freiburg, the classic Rhine pebble pavements and, above all, the city's historic Bächle (gullies) in designing roads. Similar measures were gradually introduced in the districts around the city centre.

#### *2.4 Channeling Individual Motorized Traffic*

The need for Bündelungsstrassen (roads on which traffic can be concentrated) cannot be played down even after restrictive traffic calming and traffic avoidance measures, improvements in local public transport and encouragement of cycle use. Meanwhile, creating new routes at carefully chosen locations makes it possible to improve inner city street networks.

One example is the rerouting of Trunk Road 31 through the eastern end of the city. The politically controversial road was routed via two underpasses beneath the eastern part of the city, without any detrimental effects. This provided the opportunity to put in place road improvements and traffic calming measures meeting the objectives of sustainable urban development, within the framework of a local urban development scheme for Freiburg East. Continuing the route westwards through the projected city tunnel will divert traffic away from the city's centre and from one of the most striking locations, the bank of the River Dreisam.

#### *2.5 Parking Space Management*

Controlling parking is a key feature of the transport policy, so there is no free, uncontrolled parking in the city centre or the immediate area. The increase in private car traffic triggered an increasing demand for parking spaces. The result was an increasing

lack of parking spaces in areas for the residents of those residential areas since they couldn't find places to park their own car near their house.

Since the local council had repeatedly spoken out against providing new parking spaces in the city centre, only with the help of a sustained management of parking spaces could the parking problem in the inner-city sectors be alleviated. This included granting the residents of the respective district a special parking permit, which for a certain fees per year assured a residential parking space on the specially designated streets. A progressive fee was introduced for the remaining parking spaces, making long-term parking relatively more expensive.

Parking is subject to a sliding scale of charges and regulations, from the city centre outwards to encourage commuters to park-and-ride on public transport. The hourly charge in the city center (zone I) is 2 euro which drops to 0.5 euro on the outskirts (zone III). This was done to promote the people to park at the city's edges and then ride to the city center using the public transport facility.

### **Section 3. *Vauban and Rieselfeld – Extension of the city's transportation policies***

#### **3.1 *Vauban and Rieselfeld – Development and Transportation Planning***

Vauban and Rieselfeld are two districts developed by the city of Freiburg as new residential developments. The city exhausted the allotted residential land in their zoning plan, and instead of developing new lots, decided to rezone vacated army barracks (Vauban) and a natural waste water filtering area (later remediated to be Rieselfeld) into residential areas. The city created a design process focused on utilizing the input of the public. The Rieselfeld planning utilized a planning contest, with the three best proposals

being chosen and molded to form the basis of the city design. Planning for Vauban utilized a more open forum style communication between the public, involved organizations and the city officials. These processes allow the districts to be planned with the values of the citizens in mind. The citizens shared the same values as the city as a whole in that they chose the following bases for design:

- Residential Patterns
- Energy
- Planning for Women
- Ecology
- Transport
- Housing

More specifically, in terms of the transportation, the citizens desired an emphasis on public transportation as well as non-motorized transportation. This is the basis for the transportation planning in Freiburg and its two newly developed districts.

### **3.2 Vauban and Rieselfeld – Smart Transportation Planning**

The development of the districts conformed to the five measures of successful smart transportation planning:

- Extension of Public Transportation Network
- Promotion of Bicycle/Pedestrian Traffic
- Implementation of Traffic Restraints
- Channeling Individual Motorized Traffic
- Parking Space Management

#### **3.2.1 Extension of Public Transportation Network**

Each district provides tram service through the center along the main streets. Each tram line provides three stops and is part of the Freiburg tram network. Bus services also run on the same route. Due to the geometric design of the districts, walking from a tram or bus stop to the outskirts of the district takes roughly five to seven minutes.

### ***3.2.2 Promotion of Bicycle/Pedestrian Traffic***

The close proximity of all destinations in each district is a large motivator for non-motorized methods of transportation. Bicycle paths are provided for much of the district, both on-street and off-street. These paths also connect to the larger Freiburg bicycle route network. Bicycle racks are also provided at main destination areas. Pedestrians are catered to very well. There are many pedestrian only streets in the districts. In addition, roads that do allow cars operate with 30 km/h or less speed limit on many roads, but more impressively, a 5 km/h speed limit on many other roads in the district. This provides a safer environment for pedestrians.

### ***3.2.3 Implementation of Traffic Restraints***

Traffic calming devices are used as well, such as textured streets and the blending of streets into open, socially-centered areas. Bicycle crossings at intersections also act as traffic calming devices. The traffic calming devices enhance the experience for non-motorized travelers.

### ***3.2.4 Channelization of Individual Motorized Traffic***

Also enhancing the experience for non-motorized travelers as well as providing control over automobile traffic is the channelization of individual motorized traffic. The districts provide many pedestrian only streets in order to eliminate completely modal conflicts. The city also restricts parking on residential streets. The only traffic on residential streets will then be the picking up or dropping off of residents by other parties.

### ***3.2.5 Parking Space Management***

Since parking is not allowed on residential streets, residents must use the parking garages on the periphery of the districts. Rieselfeld offers underground parking on the

periphery, while Vauban offers standard garages on the district extremities. These garages and underground lots provide the parking management for residents and commuters. For the Rieselfeld shoppers visiting the main streets and not staying for extended periods of time, there are a few garages along the main street. Vauban only offers parking on the periphery.

#### **Section 4. *The Five Tenets of Smart Transportation Planning***

Freiburg follows the five tenets of smart transportation. These tenets include using broadly defined goals; planning for desired outcomes, giving priority to cheaper, cleaner, and more efficient modes of travel; developing solutions for maximizing access, not mobility; and supporting a diversity of modes for different needs and context. Not only does Freiburg follow these tenets, they do it so well that the city can be considered a model for others to follow.

##### **4.1 *Broadly Defined Goals***

For example, the city uses many broadly defined beneficial goals. They wish to become an environmental capital of Germany, and hopefully set an attractive “green” precedence for other cities around the world. By doing so, they hope to attract environmentally friendly businesses and develop Freiburg as an economic capital in Germany. This, in addition to being an environmentally friendly city, will help to improve the quality of life around the city. Freiburg is also a very cultural and historic city; by preserving its features, Freiburg will be able to maintain many different contexts and senses of place. Finally, Freiburg wishes to become a “city of short distances” such

that all people, including women, children, and the elderly, are able to traverse the city and attain access everywhere.

#### **4.2 *Planning for Desired Outcomes***

Furthermore, Freiburg plans for desired outcomes. Their mission statement is to “promote pedestrians, bicycles, and public transportation and reduce car traffic”. They are not entirely anti-car; that is they do not wish to completely rid the city of vehicular traffic, but they believe “a reasonable split must be found between the various forms of transportation.” They have done so by enacting restraints to vehicles in various parts of the city. For example, a few pedestrian-only zones have been created, such as the Fussgängerzone in the downtown area, which deny vehicular traffic. There are also residential areas with very strict speed limits, as slow as “walking speeds” or about 5 km/hr (3.12 mph). Furthermore, there are sections in the city, such as Vauban, where parking is only allowed on the outside edges; even allotting private property for parking is outlawed. Besides restraining modes they wish to reduce, they wish to promote other cleaner and more efficient modes. By doing so, Freiburg hopes to strive towards their goal of maintaining a reasonable split among the different modes of transportation.

#### **4.3 *Priority to Cheaper, Cleaner, and More Efficient Modes of Travel***

To boost pedestrian, bicycle, and public transportation, many facilities and government programs have been enacted. For example, a bicycle facility has been created next to the train station that can service and park bicycles. Furthermore, there are various other facilities, such as a pedestrian and bicycle only bridge that crosses over the rail lines near the train station. There are also many sections of the city that are only accessible by pedestrians or bicyclists. These areas usually can be accessed by tram or

bus stops a short walking distance away. For example, the center of the Vauban district does not allow access with vehicles; residents are not even allowed to park their cars in the center. Even so, there exists a main tram and bus line that runs straight through the district. By combining various restraints on the automobile and improving access with other modes, Freiburg has shifted its modal split to more evenly distributed levels; it has shifted towards more cleaner, cheaper, and more efficient modes of travel.

#### **4.4 *Maximizing Access, Not Mobility***

To further incorporate these cleaner and efficient modes, Freiburg has created zones and districts where access is prioritized, not mobility. For example, downtown Freiburg is a bustling commercial zone including restaurants, shops, and stores. Additionally, there is an Open Farmer's Market located on the Münsterplatz; an area adjacent to the city's historic Münster Cathedral open Monday through Saturday during the morning and afternoon; where many of the towns residents, as well as tourists, have access to common foods, goods, and services, as well as many cultural and historical recreational activities. Another example, located in Rieselfeld, includes a very family-friendly environment where schools, community centers, religious centers, and access to other goods and services can be maintained within a small district. Both of these districts have no or minimal vehicular traffic, while maintain a strong pedestrian and bicyclist presence.

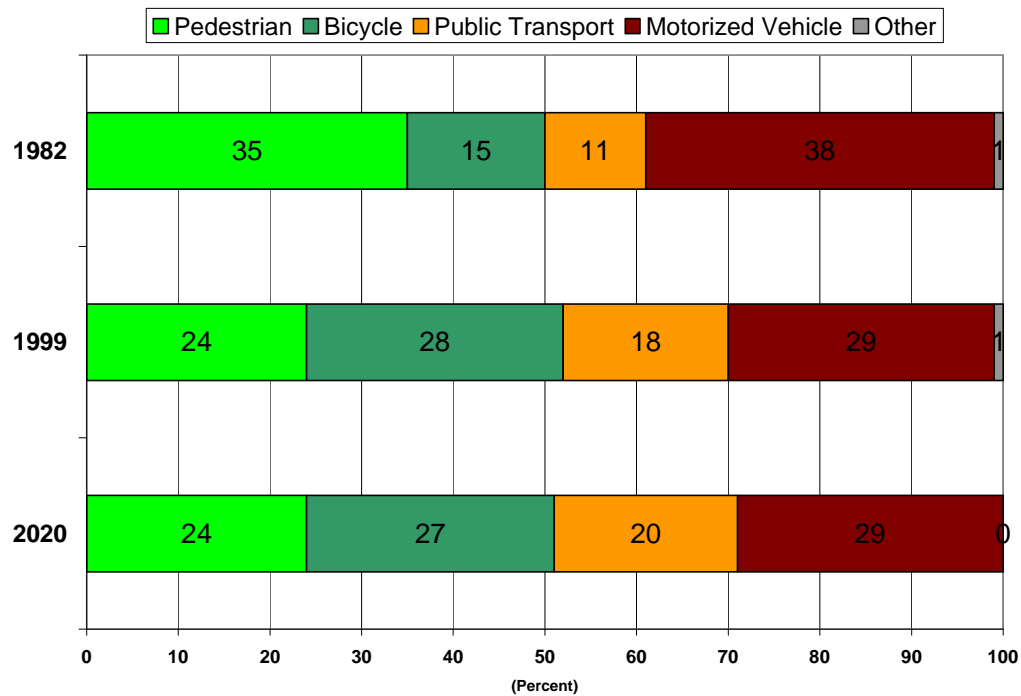
#### **4.5 *Supporting a Diversity of Modes for Different Needs and Context***

By doing so, Freiburg has created a city with districts that support a diversity of needs and contexts. Freiburg has a historical and commercial center located downtown next to the train station, a family-friendly environment in Rieselfeld connected with a

tram and bus line, and a student-friendly environment in Vauban, also connected with a tram and bus line. All three districts have their own unique needs and contexts, but they are still connected with a bus or tram line only a few minutes apart.

#### 4.6 Success from Smart Transportation Planning

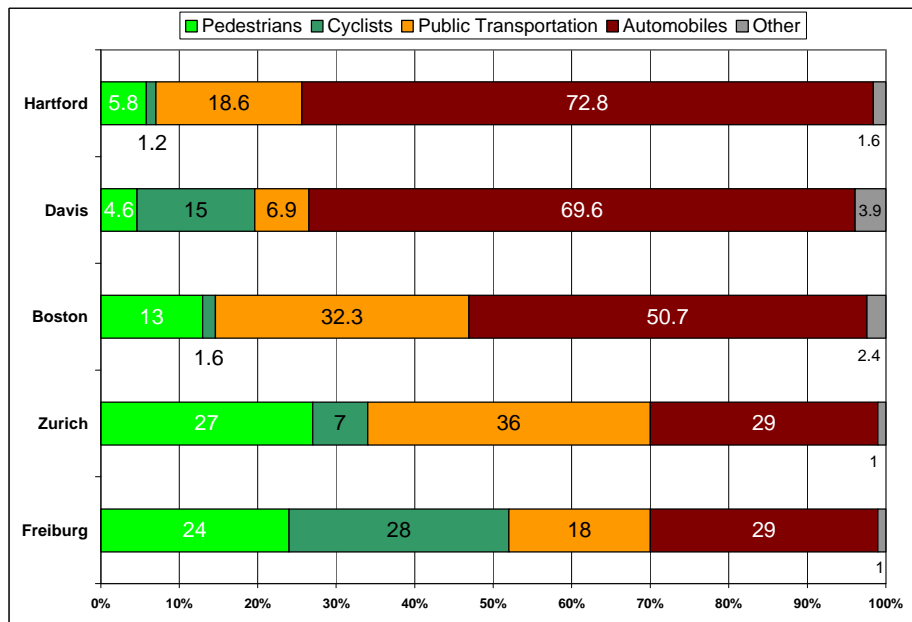
How does one measure the success of the city due to these changes in its transportation system? There are many factors to consider, some of which are more difficult to measure than others, but there are a few that stand out. One of these factors includes the modal split of the city.



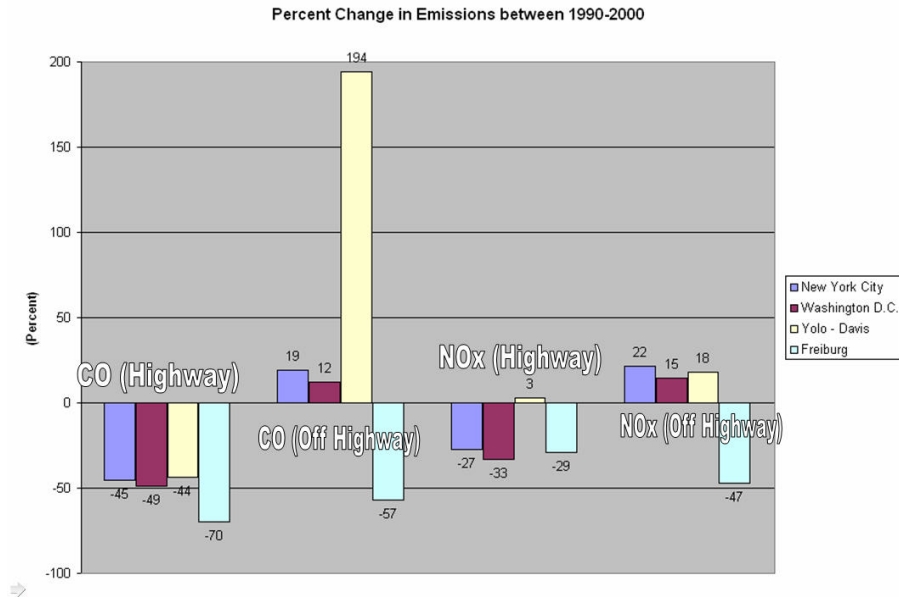
As you can see from the above, Freiburg’s modal split has improved drastically over the years. In the past, Freiburg could be considered a typical auto-dependant city. The following few decades show a dramatic improvement, in which there exists an almost perfect and even distribution among the different transportation modes. One could take four residents at random, and have a good chance that each of them used a

different mode of transportation to get to work. What other city could have such a great distribution?

When compared to other cities, there are only a few those come close. Zurich's pride is its public transportation system, as well as Boston and its own system. Additionally, Davis claims to be the bicyclist's capital of the United States. These notions pale in comparison to Freiburg. Although Zurich claims to have one of the best public transportation systems, it is no where near as diverse as Freiburg's multi-modal and integrated transportation systems.



Another way to show the success of a city's transportation system is through the environment and pollution.



By comparing Freiburg to other cities, one can see the changes in the environment and how it scales to others. For example, pollution in New York City has generally decreased on highways, but dramatically increased off the highway. This may lead to the conclusion that traffic may be moving off the highway and onto the city’s side streets. This pattern may be seen in other cities, such as Yolo County in California. Freiburg on the other hand, has had its pollutants and emissions decline in all aspects, both on the motorways and off them. This leads to the conclusion that Freiburg’s environment is improving overall. One can also believe that Freiburg is fulfilling its goal of becoming the environmental capital of Germany, or possibly the world.

Although we cannot further prove the success of Freiburg and its transportation system, we have illustrated many improvements it has undergone over the years. One of Freiburg’s objectives was to maintain a reasonable split between the different modes of transportation. It has already done that, although only a few changes may be necessary in the future.

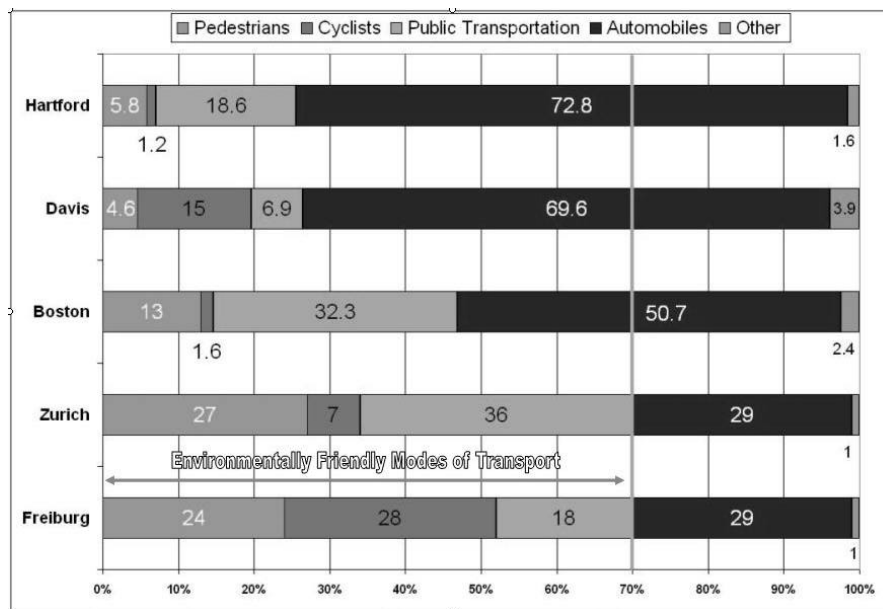
## **Section 5. Conclusions**

The Freiburg public transport company, VAG, serves a population of approximately 227,000 people (including approximately 60,000 commuters from the region). Within two decades the number of public transport passengers has more than tripled to 104,700,000 passengers. In 1997 trams had been used for 44,654,400 journeys and buses had transported 20,249,500 people. In 1984 the total number of public transport trips was 29,000,000. The introduction of the new regional card proved to be an important factor for the increase in transport figures. Within the first year the number of daily trips in Freiburg and the region increased by 26,400 journeys whereas the number of car trips fell by 29,000.

Freiburg's growth in car trips in 15 years (from 1976 to 1991) was only 1.3%, yet total trips increased 30%. Freiburg's growth in mobility was supplied principally by increased transit and bicycling. Between 1976 and 2005 the percentage of trips by car reduced from 60% to 29%. The change in modal split resulted in 4,000 cars less per day in the city center. Despite a growing number of inhabitants (increase of 25,000) the absolute number of cars entering the city center fell from 236,000 to 232,000. Almost 70% of the population lives within 500 meters of a tram stop. The average distance between two tram stops is 452 meters and the average distance between two bus stops is 646 meters. More than 90% of the students at the University of Freiburg are using public transport or their own bicycle. Freiburg is the only city in Germany which can report such a turn-around.

The figure below shows the comparison of the modal splits of Freiburg to some of the other cities around the world. No more than 13 % of the total trips in USA are on foot

whereas as much as one-quarter of the trips in Freiburg involve pedestrians. Davis, California: the bicycle capital of USA has 15% trips ridden on bicycle; on the other hand Freiburg has 28 % of its trips on bikes. The total trips using any of the environment friendly modes of transportation (pedestrians, cyclist, public transportation) is 70 % in Freiburg and Zurich out of which 52 % are pedestrians and cyclist in Freiburg where only 34 % trips correspond to those two modes in Zurich. This implies that Freiburg has to invest far less in developing and maintaining its public transportation network, saving the city millions of dollars.



Has Freiburg met its broadly defined goals? One can consider a goal already achieved: becoming the environmental capital of Germany. Freiburg already has a strong, green and friendly environment, especially with districts such as Vauban and Rieselfeld. These districts attract green businesses into the city, supplemented with a strong university and research, which can eventually drive Freiburg into a strong economic capital of Germany as well. Freiburg has preserved its historical features downtown, and created a “city of small distances”. Areas can be accessed by all people

by many different modes of transportation; women, children, elderly, rich, and poor all people have a choice between which modes they can take to access many different parts of the city. Freiburg is neither auto-dependent, nor dependent on any singular mode. It has found a good system where all modes are integrated and combined to meet many different needs and contexts. This great system can be considered a model for other cities to follow, as it can improve a city's economy, environment, and overall quality of life.

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**Section 7. Credits**

Section 1. David Giel

Section 2. Sumit Bindra

Section 3. David Giel

Section 4. Tommy Tran

Section 5. Sumit Bindra and Tommy Tran