

CITIES FOR PEOPLE

IN PRACTICE



BY CHRIS BUSCH AND CC HUANG

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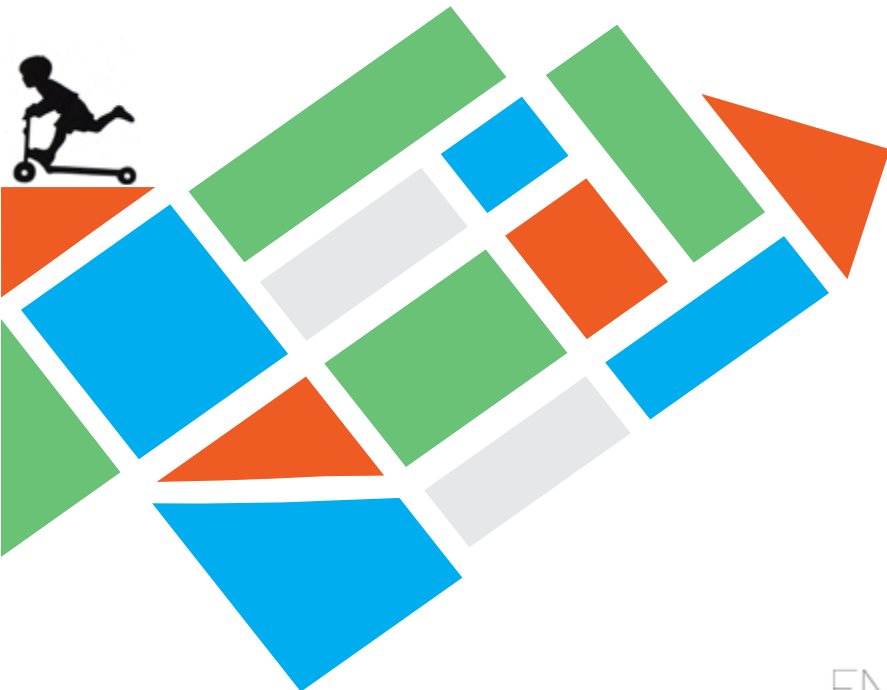
ABOUT ENERGY INNOVATION

Energy Innovation: Policy and Technology LLC is an energy and environmental policy firm. We deliver high-quality research and original analysis to policymakers to help them make informed choices on energy policy. We focus on what matters and what works.

Energy Innovation’s mission is to accelerate progress in clean energy by supporting the policies that most effectively reduce greenhouse gas emissions. Through customized research and analysis for decision makers, we uncover the strategies that will produce the largest results. We work closely with other experts, NGOs, the media, and the private sector to ensure that our work complements theirs.

ABOUT OUR URBAN SUSTAINABILITY PROGRAM

Energy Innovation helps cities create energy-efficient, high-quality communities by working with planners, mayors, developers, and other influential figures around the world, most notably in China, where urbanization is occurring at a stunning pace. Our goal is to equip key decision makers with best practices from around the globe so they can help build cities that are prosperous, livable, and sustainable.





Children walking on car-free streets in Vauban (Source: [Antoine Beliaeff](#) / CC BY 2.0)

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Exercise equipment in Liuyun Xiaoqu (Source: ITDP)

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Ultimately, the authors and Energy Innovation are responsible for any errors or omissions. As indicated through references in the text, this report uses two sources most extensively:

- Harrison Fraker's *Hidden Potential of Sustainable Neighborhoods* (2014) for the Vauban and Hammarby cases;
- ITDP's *Best Practices in Urban Development in the Pearl River Delta* (2012) for the Liuyun Xiaoqu case.



THE 8 PRINCIPLES

Our *Cities for People* reports use and advocate The 8 Principles from *Planning Cities for People*, a guide of urban form and transportation solutions to some of the most pressing challenges facing modern cities, including congestion, pollution, and urban sprawl. The 8 Principles are essential ingredients to sustainable, economically vibrant cities that deliver quality of life for people.

THE 8 PRINCIPLES

- 1. Walk.** Develop neighborhoods that promote walking.
- 2. Connect.** Create dense networks of streets and paths for non-motorized transit.
- 3. Transit.** Build extensive, high quality transit. Make connections between modes.
- 4. Cycle.** Prioritize bicycle networks that offer protected lanes.
- 5. Mix.** Zone for mixed-use neighborhoods.
- 6. Densify.** Actively encourage greater density around major transit hubs.
- 7. Compact.** Set growth boundaries and plan for compact regions with short commutes.
- 8. Shift.** Increase mobility by regulating parking and road use.



Photo by Gavin Anderson / CC BY 2.0



Green tram tracks in Vauban (Source: [Antoine Beliaeff](#) / CC BY 2.0)

CITIES FOR PEOPLE IN PRACTICE

Along with a host of other rapidly urbanizing countries, China is planning and building many new urban districts. This rapid urbanization presents an important opportunity. A multitude of studies find that it does not cost any more to build a city's block structure, streets, and sidewalks correctly at the outset. However, if these patterns are set incorrectly during initial construction, they are very costly to change. The 8 Principles from *Planning Cities for People* (see p. 5) distills the most important features of successful urban form and transportation. This report aims to provide developers, city governments, and other decision-makers with detailed examples of successful sustainable urban communities.

The 8 Principles present a compelling recipe for urban form and transportation to support development that is transit-oriented, walkable, and bike-friendly. Applying these principles will accelerate the shift away from auto-dependent and carbon-intensive development. This document presents three instances of cities for people in practice:

1. **Quartier Vauban (Freiburg, Germany)**
2. **Hammarby Sjöstad (Stockholm, Sweden)**
3. **Liuyun Xiaoqu (Guangzhou, China)**

The emphasis for each case study is first how the area achieved greater sustainability, and second what the impacts were. We find evidence of economic, environmental, and sociocultural benefits for each case. In sum, The 8 Principles deliver a powerful combination of more livable urban areas with a richer social fabric and a more vibrant economy.

Why these places? We profile Hammarby and Vauban because Chinese urban planners hold them in high regard. President Xi Jinping visited Hammarby in March 2010, where he declared, “sustainability is our common future” at the SymbioCity Forum. We profile Liuyun Xiaoqu because it is perhaps China's most exceptional example of development in accordance with The 8 Principles.

Scaling up. The main objective of this report is to help scale up these beneficial approaches to urban form and

Figure 1. Shopping in mixed-use Liuyun Xiaoqu at night (Source: ITDP)



transportation. Official Chinese government policy is also increasingly in line with The 8 Principles. For example, the State Council’s urbanization strategy, released in March 2014, was the first time that the government called for an emphasis on transit-oriented development. Other Chinese and international organizations are advancing a similar vision. By exploring cities for people in practice, we further illustrate the power and potential of The 8 Principles.

Figure 2. Hammarby waterfront and skyline (Source [geinography](http://geinography.com) / CC BY 2.0)



GLOBAL SURVEY OF THE 8 PRINCIPLES

The Institute for Transportation and Development Policy (ITDP) has developed a transit-oriented development (TOD) standard that reflects The 8 Principles and has applied it to projects around the world. The ITDP’s TOD standard uses a scoring system to award gold, silver, or bronze ratings. This is similar to the Leadership in Energy and Environmental Design (LEED) program that rates buildings by their energy footprints. ITDP has applied this TOD standard to dozens of cases around the world. To be eligible, projects must already be built, and they must be within one kilometer of a high-capacity transit line (e.g., Bus Rapid Transit or rail), or within 500 meters of a line that directly serves a high-capacity transit line.

ITDP has awarded gold ratings to nine projects, silver ratings to 17 projects, and bronze ratings to nine projects. ITDP awarded Liuyun Xiaoqu, Hammarby, and Vauban gold ratings. ITDP identifies TOD gold developments on every continent except Africa, though six of the nine are in Europe. Liuyun Xiaoqu represents the Asian continent. The Centro Internacional de Bogotá (Bogotá International Center) is currently South America’s only gold TOD district. The addition of an excellent Bus Rapid Transit (BRT) line, the renovation of a major park, and the addition of several high-rise buildings have revived Bogotá’s city center. North America’s only gold TOD district is Vancouver’s Olympic Village, a mixed-use, mostly residential community that features a growing number of retail shops and services. Three other Chinese examples earned silver and bronze ratings – Whampoa Garden in Hong Kong and Grand Gateway 66 in Shanghai obtained bronze ratings, while Jianwai SOHO in Beijing obtained a silver rating.

BRIEF PROFILES OF EXCEPTIONAL DEVELOPMENTS

In this section, we begin exploring three real-world examples of urban sustainability in practice. After a summary and synthesis of the case studies, separate chapters also provide detailed descriptions of each of the city’s experiences. The following table presents a quick data-driven look at how Hammarby, Vauban, and Liuyun Xiaoqu exemplify The 8 Principles.

Table 1. Applying The 8 Principles: Hammarby, Vauban, and Liuyun Xiaoqu

	HAMMARBY	VAUBAN	LIUYUN XIAOQU
WALK Develop neighborhoods that promote walking.	<ul style="list-style-type: none"> • 27% of trips are by walking and biking (Cervero and Sullivan, 2010). 	<ul style="list-style-type: none"> • 64% of trips are by walking and biking; • 70% of the district is green or open space (Fraker, 2014). 	<ul style="list-style-type: none"> • 70% of the district is green or open space.
CYCLE Prioritize bicycle networks that offer protected lanes.	<ul style="list-style-type: none"> • Special paths for biking, including a revitalized old quay (Hammarby Environmental Map, 2007); • Linked to Stockholm’s public bike share program (Foletta, 2011). 	<ul style="list-style-type: none"> • Every home has at least one bike parking space; • Community store that offers free labor on bicycle repairs (Field, 2011). • City center and central rail station can be reached within 12 minutes on bicycle from the residential areas (Field, 2011). 	<ul style="list-style-type: none"> • Access to Guangzhou’s public bike share system at nearby BRT station.
CONNECT Create dense networks of streets and paths that prioritize non-motorized transit.	<ul style="list-style-type: none"> • Blocks are small, 60-70 meters by 120-200 meters (Fraker, 2014). 	<ul style="list-style-type: none"> • Blocks are small, 80-200 meters by 80-125 meters. 	<ul style="list-style-type: none"> • Blocks are small, 50-150 meters by 40-80 meters.
TRANSIT Build extensive, high-quality transit. Make connections between nodes.	<ul style="list-style-type: none"> • Every residence is within 300 meters of a light rail tram (Fraker, 2014); • There are a number of ferry and bus connections; • Transit accounts for 52% of trips (compared to rates of 23% to 36% in surrounding areas) (Cervero and Sullivan, 2010). 	<ul style="list-style-type: none"> • Tram and bus lines serve the area; all residences are within 400 meters of a stop; • Transit accounts for 19% of trips. 	<ul style="list-style-type: none"> • Located south of the Tiyu Zhongxin BRT station and close to multiple metro stops, including the Tianhenan Station and the Tiyu Xilu Station; • Walking distance to the BRT station from the neighborhood is 300-500 meters.
MIX Zone for mixed-use neighborhoods.	<ul style="list-style-type: none"> • Buildings with commercial space on bottom two floors include housing on top floors; • 100 retail units and restaurants within district (Foletta, 2011); • Residential areas, private space, and public space are mixed. 	<ul style="list-style-type: none"> • Main commercial area includes residences on fourth floor and above. • Schools, businesses, shopping, and cooperatives all within a 10-minute walk (Field, 2011). 	<ul style="list-style-type: none"> • 900 retail shops and service outlets in the 0.32 square kilometer area.

<p>DENSIFY Actively encourage greater density around major transit hubs.</p>	<ul style="list-style-type: none"> • Density of 13,100 residents per square kilometer (Foletta, 2011). 	<ul style="list-style-type: none"> • Density of 12,200 residents per square kilometer (Field, 2011). 	<ul style="list-style-type: none"> • Density of roughly 9,600 residents per square kilometer (ITDP, 2014).
<p>COMPACT Set growth boundaries.</p>	<ul style="list-style-type: none"> • Located 3.7 km from center city Stockholm. 	<ul style="list-style-type: none"> • Located 4 km from center city Freiburg. 	<ul style="list-style-type: none"> • A long-established neighborhood; not a greenfield development.
<p>SHIFT Increase mobility by regulating parking and road use.</p>	<ul style="list-style-type: none"> • No free parking on weekdays between 9 am and 5 pm (Foletta, 2011); • Fuel station available for cars running on electricity, biogas, and ethanol (Hammarby Environmental Map, 2007); • 6% of households subscribed to a car sharing program (Facts on Hammarby, 2009) and 75% of vehicles use biofuels (Foletta, 2011). 	<ul style="list-style-type: none"> • Car ownership is only about 16%; • Only 17% of all trips are by car; • Residences do not have parking spots, and roads surrounding residential areas are car-free (Fraker, 2014); • 39% of Vauban’s households have a car sharing membership (compared to 0.01% nationwide in Germany) (Field, 2011). 	<ul style="list-style-type: none"> • There is little parking, reflecting the late 1980s vintage of the development; • Recent renovations have removed cars from alleyways.

HAMMARBY SJÖSTAD (STOCKHOLM, SWEDEN)

Hammarby is a large urban development project in Stockholm and one of the first modern efforts to build a holistically sustainable district. Hammarby has prioritized public transit and non-motorized transit. There is easy access to Stockholm via a light rail tram that has four stops along the main street. All Hammarby residences are within 300 meters of a tram stop. Paths and shortcuts for walking and biking make the access to the tram stops highly convenient. There is also a bike share program linked with Stockholm. The parking ratio (the number of parking places per household) is 0.65, which is similar to the overall parking ratio in Stockholm. Yet, rates of car use are low, and car ownership is decreasing due

Figure 3. Lakeshore in Hammarby (Source Arild / CC BY 2.0).



to the focus on convenient public transit, pedestrian paths, and bike paths.

Just like Vauban, Hammarby has emphatically embraced people-centered development. The result: tangible sociocultural, economic, and environmental benefits. While the quality of life and environmental improvements are clear, perhaps Hammarby’s most impressive attribute is how little it cost to construct—nearly the same as conventional construction methods. The high quality of life brought about from this marginal change in cost has led to high demand for housing units in Hammarby.

Table 2. Hammarby’s sociocultural, economic, and environmental benefits

ECONOMIC	ENVIRONMENTAL	SOCIOCULTURAL
<ul style="list-style-type: none"> • The district’s energy standards only increased developers’ costs by 2-4%. The solutions used were low-cost and replicable. • The district has a higher median household income and lower unemployment rate than Stockholm as a whole. • The commercial activity in Hammarby is lively. Vacant retail spaces are never empty for long. • The rents are also comparatively higher than other areas of Stockholm, showing that The 8 Principles improves market demand.¹ 	<ul style="list-style-type: none"> • Environmental impact is 30-40% less than for a typical district built in the 1990s. • Car use is 14% lower than in comparable districts in Stockholm. • Daily water use is 150 liters per person, compared with 200 liters per person in the rest of Stockholm. • When completed, the district aims to produce half of its own energy. 	<ul style="list-style-type: none"> • Each development phase has sold out almost immediately, showing the district’s quality of life is highly desirable. • The area has become a highly attractive place to live, especially for families and children.

QUARTIER VAUBAN (FREIBURG, GERMANY)

Construction of the Vauban district in Freiburg, Germany occurred between 1998 and 2010. Vauban has achieved extremely low rates of car use with only about 17 percent of trips originating in Vauban by car and 83 percent of trips involving either non-motorized or public transit. A range of incentives helped accomplish this. First, all residential areas are within walking distance of public transit. Second, Vauban paid attention to developing safe and convenient biking and walking paths. A single road for motor vehicles loops through the area, with most of the road space designated for pedestrians and bikers. The majority of Vauban’s residences do not have a car. For the households that choose to own cars, Vauban only offers parking in a few

Figure 4. Pedestrian only street in Vauban (Source: [Lieven Soete](#) / CC BY 2.0)



¹Higher rent is a positive indicator of quality, desirability, and demand. While higher rents are financially burdensome for tenants, they reflect on market dynamics, rather than a higher cost of construction. To reduce the cost for renters, additional developments that are similar

scattered, expensive lots.

The table below outlines the sociocultural, economic, and environmental benefits of the Vauban district. These benefits result from attention to efficiency and thoughtful urban planning, based on the

Table 3. Vauban’s sociocultural, economic, and environmental benefits

ECONOMIC	ENVIRONMENTAL	SOCIOCULTURAL
<ul style="list-style-type: none"> • The cost to construct Vauban was only 3-5% more than that of traditionally constructed developments; • Service, environmental management, education, and research sectors dominate Vauban’s economy; • Press reports indicate that property values have skyrocketed in the area. 	<ul style="list-style-type: none"> • Non-motorized transit accounts for 64% of trips. • Only about 16% of residents own cars and 57% of the car-free households sold their cars due to incentives from the district. 	<ul style="list-style-type: none"> • Attractive living spaces are a magnet for families and long-term residents, leading to a mixed and stable community; • The community is hospitable to children and seniors because of its safe and accessible commuting options, trans-generational apartments, and children’s centers; • The district is family oriented and an ideal place for raising children due to the emphasis on safe streets and outdoor recreation.

LIUYUN XIAOQU (GUANGZHOU, CHINA)

Liuyun Xiaoqu is a neighborhood in Guangzhou that exemplifies the potential of The 8 Principles to create neighborhoods that are livable and economically vibrant. The local government built the neighborhood in the 1980s to house workers in nearby enterprises. Starting around 2000, the government gave tenants leases to their flats, which spurred commercial activity in the neighborhood. The local government also took down gates and fences, facilitating walking and biking connections. Proximity to commercial activity, mixed-use zoning, nearby access to BRT and metro stations, and prioritized biking and walking networks make Liuyun Xiaoqu a great example of The 8 Principles in practice.

Table 4. Liuyun Xiaoqu’s sociocultural, economic, and environmental benefits

ECONOMIC	ENVIRONMENTAL	SOCIOCULTURAL
<ul style="list-style-type: none"> • According to ITDP, “Commercialization had already multiplied values several times before the renovation program [carried out for the Asian Games in 2009]. The approximately 900 area shops experienced a general increase in value of 30% following the re-opening [after public space renovations].” 	<ul style="list-style-type: none"> • Fewer car trips means reduced carbon emissions and local air pollution. 	<ul style="list-style-type: none"> • Proximity to commercial activity and improved quality of life from convenient access to amenities; • Better living environment for children and seniors due to new public spaces and recreation areas.

Figure 5. Well-utilized public space in Liuyun Xiaoqu (Source: ITDP)





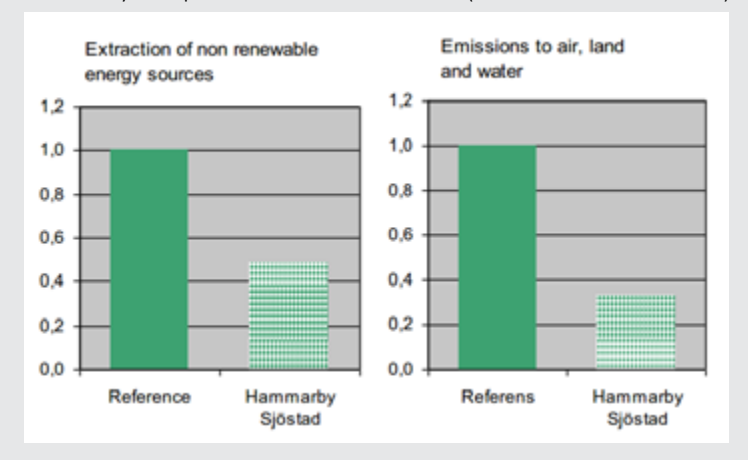
HAMMARBY

Downtown Hammarby (Source: [Hans Kylberg](#) / CC BY NC ND 2.0)

SUMMARY

Hammarby Sjöstad is Stockholm’s largest urban development project and one of the longest running efforts to build a sustainable district. Hammarby’s comprehensive sustainability program focuses on energy, water, and waste management. The district cleaned up and converted its formerly rundown port and industrial area into a modern, eco-friendly development. Hammarby has become a highly desirable place to live and work, especially for families with children. This case study hopes to provide information on the unique aspects of Hammarby that make it successful in terms of urban form and transportation.

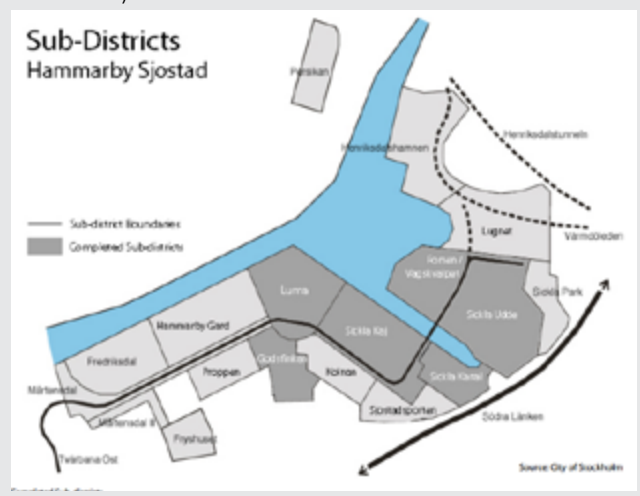
Figure 6. Emissions and extraction of non-renewable resources- Hammarby compared with reference case (Source: Törnblom 2014)



The following indicators show the success of the development:

- Environmental impact is 30-40 percent lower than for a typical district built at the same time;
- Car use is 14 percent lower than in comparable districts of Stockholm;
- Daily water use is 150 liters per person, compared with 200 liters per person in the rest of Stockholm;
- When complete, Hammarby will produce half of its own energy (Swedish Environmental Protection Agency, 2009).

Figure 7. Subareas of Hammarby where different groups of developers and architects are in charge (Source: City of Stockholm)



In total, emissions in Hammarby are 67 percent lower than in comparable districts due to improved public transport. Extraction of non-renewable sources is 51 percent lower.

Stockholm created the plan for Hammarby in 1997, calling for the construction of 11,500 residential units for about 26,000 residents and an additional 9,000 workers. In March 2013, the city hit its original goal by completing construction of 11,500 apartments (Törnblom, 2014). The district has about 250,000 square meters designated for commercial use, including offices, light industry, and retail. About 30 percent of the city’s building space is devoted to offices and industry (Hanson et al., 2014).

DEVELOPMENT PROCESS

Hammarby’s planning and construction management model enabled the simultaneous fulfillment of environmental, social, and economic goals. The district also set out to be a “car-free” area.

Creating detailed goals for each environmental objective: When developing the plan for Hammarby, the city of Stockholm established specific performance benchmarks. For example, instead of setting vague goals to “reduce car use,” the city of Stockholm aimed for specific objectives, such as “80 percent of residents’ and workers’ journeys should be by foot, bicycle, or public transit by 2010.” Additionally, Stockholm planned that all buildings constructed in Hammarby’s development would use no more than 65 kWh/m²/year (kilowatt-hours per square meter per year). The district ended up meeting their transportation target.

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The city government as lead developer: Since the city of Stockholm was the lead developer, it was able to push for energy and environmental standards in Hammarby that are more ambitious than the existing standards in Stockholm, which are already quite strong (Fraker, 2014).

Figure 8. Sunset over Hammarby (Source: Alexander Teglund / CC BY NC ND 2.0)



Project teams had multiple developers and architects that were collectively in charge of agreeing on plans for each subarea: Even though the city created an over-arching plan for the district, the project team for each subarea had the freedom to prepare separate plans within flexible bounds created by a performance-based design code. By assigning multiple developers and architects to each area, innovation and creativity was able to flourish, even within the somewhat stricter master design code. For example, a number of blocks (Holman, Kobben, Viken, Sundet, and Lugnavttnet) have won prizes in the city’s environmental competition for Best New Construction. In total, there were 25 architects and 25 developers involved in Hammarby’s development (Frane, 2007).

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Using solutions that would not increase life-cycle costs: The city wanted the Hammarby model and experience to be easily replicable for other cities. To achieve this, officials focused not only on environ-

Figure 9. City plan of Hammarby (Source: EcoWebTown)



mental targets, but also made sure that measures were cost-neutral or only slightly more expensive than conventional practices.

URBAN FORM AND TRANSPORTATION

Hammarby is an excellent example of smart urban form and transportation. It also shows how these two aspects of human settlements are deeply interrelated: the district offers multiple transit connections; it improves walkability by mixing residential, commercial, and retail uses; its small blocks and pedestrian pathways also contribute to walkability; and safe, dedicated, and extensive bike paths promote biking.

Figure 10. Hammarby residential area (Source: [Design for Health / CC BY / 2.0](#))



URBAN FORM

The dominant feature of Hammarby is its orientation around a lake. As shown in Figure 5, transit infrastructure is at the heart of the district. A tramline runs along the main streets (in gray) and all residents live within short walking distance (within one to three blocks) of a transit stop.

Commercial area: The 1,800-meter commercial frontage includes four tram stops and a covered main station. Even the designated commercial area is mixed-use. Commercial space is on the bottom two floors and residential space is on the top three or four floors.

Block identity and structure: In the area between the main street and the lake, the blocks follow a consistent structure: main street, block, open space, block, and then water's edge. Each block possesses its own identity. Public space separates the blocks from each other. Almost every housing unit is located within one block of a park and three blocks of the lake.

Small blocks: In general, Hammarby's urban form is similar to that of inner-city Stockholm. The blocks are small and the dimensions are 60-70 meters by 120-200 meters. These small blocks, as well as the mixed-use elements of even the commercial space, encourage walking by providing direct routes that reduce walking distances.

Green space: Attention to green space and attractive walking paths allows Hammarby to offer an exceptional quality of life while also achieving desirable density. During planning, the committee decided on a few specific goals and guidelines (Box 1) that would ensure the quality and utility of the green spaces. The

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Figure 11. Green space in Hammarby (Source: City of Stockholm)



green space treatment varies from natural wetlands to structured quays and even has small harbors for boating. This layout provides a rich and varied recreational experience along the water’s edge. It also makes the green space multi-functional and can act as an amenity for running, walking, cycling, and relaxing.

Density: Hammarby is quite dense, averaging 13,100 residents per square kilometer (by contrast, Beijing’s density is 11,500 and Stockholm’s is 4,400). It is predicted that Hammarby’s density will increase to 15,500 residents per square kilometer by 2017, the completion date for the project. The average height of the buildings is about six stories; along the transit corridor, some structures are seven or eight stories.

TRANSPORTATION

Located just two miles from the center of Stockholm, Hammarby is well-integrated with the city center. Moreover, almost all residents use public transit to get into the city due to its accessibility (Goel, 2013). Through transit-oriented development, Hammarby also has lower car use and higher non-motorized transport use than other areas in Stockholm County, as shown in Figure 8.

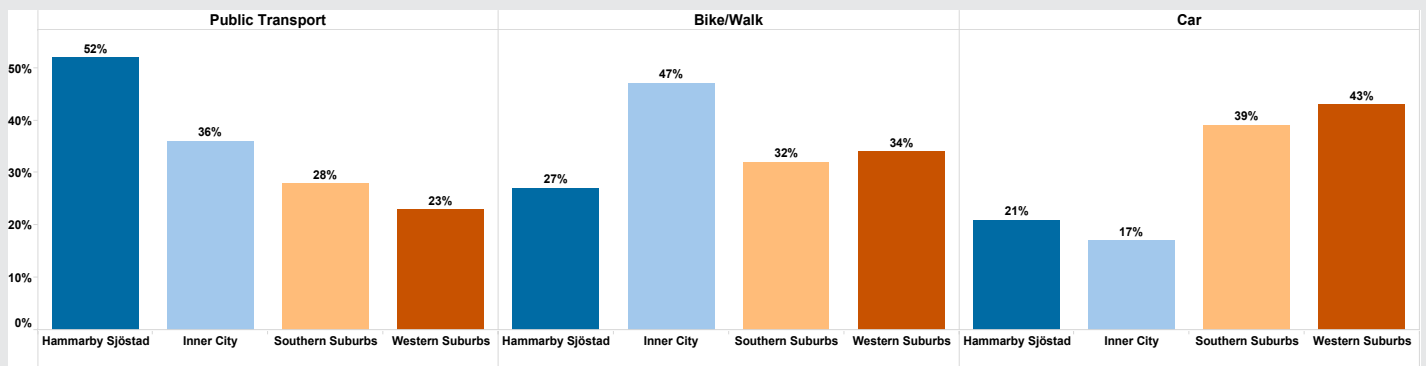
Hammarby’s goal was to have 80 percent of all trips originating within the district use a mode other than cars. Hammarby has nearly achieved this target: 79 percent of trips are by transit, bike, or walking. According to urban planners from Sweco, an important reason for this accomplishment was that the city prioritized Hammarby’s transit system in the planning and fully constructed a high-quality transit system before the first residents started moving in (Hanson et al., 2014).

Easy access to Stockholm: Major investments in the road and transportation infrastructure connect Hammarby with the rest of Stockholm. A new light rail tram makes four stops along the main transit spine of the development and connects at each end directly to the Stockholm underground. Every residence is within 300 meters of a stop in this system, and the frequency of trams is every 12 minutes. The small-scale blocks, which feature generous sidewalks, paths through parks, and pedestrian shortcuts, also make access highly convenient. It takes about 20 minutes for residents living in any area of Hammarby to get to Stockholm (Hanson et al., 2014).

Box 1. Goals and Guidelines for Green Spaces in Hammarby (Fraker, 2014)

- The green space should transform the brownfields into attractive mixed-use residential districts with parks and public spaces;
- There should be at least 15 square meters of courtyard space and a total of 25-30 square meters of courtyard and park space within 300 meters of each apartment;
- Natural areas of particular value should be protected;
- If green space is already developed, ensure that there are biotopes that increase the area’s biodiversity.

Figure 12. Mode splits for journeys in Stockholm County (Source: Cervero and Sullivan, 2010)



Public transit: Thanks to a significant investment by the city, a modern public transport system serves Hammarby Sjöstad. This system includes the Tvärbanan light railway, new bus lines, and a ferry on Hammarby Sjö Lake, between the district’s southern and northern tips. Three bus lines stop in the neighborhood or are in close proximity. A free, year-round ferry crosses the lake every 15 minutes, from early in the morning until late at night.

Biking: Careful attention to non-motorized transportation paths has also encouraged the shift away from dependence on private cars. Hammarby also supports biking, and is home to one of the 85 docking stations in Stockholm’s public bike share program. Residents often bike to the ferry station to get to Stockholm (Hanson et al., 2014).

Walking: As described above in the section on green spaces, the city has also carefully planned the walking spaces. The continuity of the walking paths, the prioritization of walking over driving, and the substantial amount of foliage and green space that surrounds the paths convey this. Views of the waterfront make the walking ex-

Figure 13. Waterfront in Hammarby (Source: Joakim Westerlund / CC BY 2.0)



Figure 14. Transportation system map of Hammarby (Source: ITDP)



perience more interesting as well. There are also eco-ducts that go over the highway and connect the district to a nearby nature preserve.

Parking and car control: Car ownership rates are 43 percent lower than in the city of Stockholm as a whole and 25 percent lower than the nearby green-oriented Sundbyberg district. Efforts to promote car sharing have also reduced car ownership. For example, car ownership rates were 66 percent in 2005 and 62 percent in 2007 (Hanson et al., 2013). There are also 25 to 35 vehicles available for car-pool in the area, 75 percent of which run on biofuel (Folletta, n.d.). The district does not have overly restrictive parking policies: its parking ratio is 0.65 spaces per housing unit, considering all types of available parking. This is the same as for Stockholm overall. Hence, for Hammarby, it is not necessarily direct limits on car ownership or parking that encouraged other forms of transportation, but the successful efforts to make non-motorized and public transit a convenient and pleasant experience.

BENEFITS

Social desirability: Each development phase has sold out almost immediately (Fraker, 2014), an indicator that use of The 8 Principles contributes to the establishment of desirable neighborhoods. There is strong demand for real estate in Hammarby and this translates into rents that are higher than other areas of Stockholm (Cervero and Sullivan, 2011).

Economic gains: Residential unit rents are higher in Hammarby, one indicator of the economic value created by the project. Commercial areas are also successful, with close to full occupancy. Small additional costs, which come out to only a 2 percent to 4 percent increase for developers, yield not just environmental benefits but also energy savings. These energy savings produce net economic benefits after paying back initial capital costs. (Energy Cities EU, n.d.).

Environmental improvements: As outlined above, reduced dependence on fossil fuels for transportation and for buildings will greatly reduce greenhouse gas emissions and local air pollution.

Figure 15. Canal in Hammarby (Source: [Hans Kylberg](#) / CC BY 2.0)





Public space in Vauban (Source: [Antoine Beliaeff](#) / CC BY 2.0)

SUMMARY

Built between 1998 and 2010 in Freiburg, Germany, Vauban scores a platinum rating according to the LEED-Neighborhood Design (LEED-ND) protocol. ITDP also gave Vauban a TOD gold standard rating. Vauban’s most notable sustainability achievement is the extent to which residents have freed themselves from dependency on car travel. The district is home to 5,500 people and 600 jobs are located on-site. From the outset, Vauban has endeavored to be a beacon of people-centered development (Box 2).

DEVELOPMENT PROCESS

The city government has officially recognized Forum Vauban, a citizen’s associations, as a participatory planning body to coordinate Vauban’s planning process. This group played a key role in setting standards. By focusing on a few key performance metrics—while still allowing creativity and diversity within these guidelines—Vauban has crafted an organically structured urban neighborhood that is both livable and low-carbon.

The city government as landowner and manager: This allowed the city to press for more ambitious sustainability measures, as in Hammarby. It also enabled tolerance for any risk that was associated with the “learning while planning” process.

Learning while planning: The master planner was open to allowing the development plan to evolve based on the changing standards of the Baugruppen (“building groups”) and Forum Vauban. Hence, the Baugruppen and Forum Vauban were able to improve on and develop their ideas without an initial plan locking them in.

Baugruppen and collective innovation: The division of design authority among the 40 different Baugruppen allowed for innovation and created a sense of real ownership around each area. Each Baugruppen was responsible for its own subarea in Vauban. Forum Vauban acted as a higher-level community to the Baugruppen to share best practices, trade ideas, and collaborative solutions. Each Baugruppen also had its own program, goals, and architects. The district launched a competition to see which Baugruppen could achieve the greatest energy savings. This competition led to the construction of more than 100 units of passive housing and 75 units of the Plus Energy homes (Fraker, 2014).

Box 2. Sociocultural Goals for Vauban (Fraker, 2014)

Vauban prides itself on having:

- A balance of living and working areas;
- A balance of social groups;
- A mixed-use district center with shops for daily needs;
- A primary school and kindergarten;
- Family and child friendliness in the design of the public space;
- A neighborhood center for meetings, events, and guests;
- A farmer’s market.

URBAN FORM AND TRANSPORTATION

The results of Vauban's urban form and transportation strategies are spectacular, with only 17 percent of all trips occurring by car. The numbers below demonstrate this success:

- Non-motorized transit: 64 percent;
- Public transit: 19 percent;
- Parking space per resident < 0.5;
- Cars ownership: 160 cars per 1,000 residents;
- Car sharing: 39 percent of Vauban's households had a car sharing membership (compared to 0.1 percent nationwide in Germany).

URBAN FORM

Basic city structure: Like Hammarby, residential areas are a quick walk away from the central transit corridor, Vaubanelle. Moreover, to make non-motorized transit a first-class transportation option, the majority of the area's surface transportation network is exclusively for non-motorized transit (see "Car-restricted roads" in Figure 14). The car-restricted roads allow short trips by car, capped at 5 km/hour, for drop-offs and pick-ups (Eindhoven Energy Institute, 2010). Vauban has also emphasized mixed-use development; Schools, businesses, shopping, and food cooperatives are all within a 10-minute walk. About 600 jobs exist on-site, with about 500 in business locations and another 100 people working out of their homes.

Commercial area: The commercial street at the entry of Vauban acts as the main connection to Freiburg. The commercial area is also mixed-use, with commercial space on the first three floors of each building, townhouses above, and solar panels on the roof.

Block structure: Vauban's distinct block structure features U-shaped roads on both sides of the city that are car-restricted. Homes in these areas are also car-free residences.

Figure 16. Tram in Vauban with tracks integrated with green space (Source: [micagoto](#) / CC BY NC 2.0)



Green space: Vauban also achieves an incredible interweaving of green space that delivers appropriate blend of density and livability. The city even laid the tramway tracks directly onto grass instead of pavement. A small stream that runs parallel to the track serves two purposes; it channels storm water, serving as natural flood control, and it prevents pedestrians from crossing anywhere except at crosswalks. Horizontal and rooftop green space augments ground-level parks. More than half of the buildings have some sort of green roof to provide insulation, retain rainwater, or collect solar energy (Fraker, 2014).

Figure 17. Biking in Vauban (Source: Alain Rouiller / CC BY-SA 2.0)



Density: Vauban is also quite dense, with 12,200 residents per square kilometer, or 5,500 residents

Figure 18. Plan of Vauban (Source: eRich Lutz)



over 45 hectares.

TRANSPORTATION

Even compared to Rieselfeld, a neighboring district also designed with sustainability in mind, Vauban scores higher on measures of non-motorized travel. For example, 30 percent of trips in Rieselfeld are by car compared to only 16 percent in Vauban (Field, 2011).

Public transit: A 10-minute light rail trip connects the district to the city center. All residences are within 400 meters of a tram stop. A bus line serves the area and transportation links are still being expanded (soon a regional rail line will stop at the edge of Vauban). With its emphasis on low-carbon transportation, the city completed the tram service before allowing any further development on Vauban to ensure that residents were engrained with low-carbon habits from the beginning (Grant, 2008). Moreover, early completion of the tramline provided confidence to investors regarding the future of the development (Grant, 2008).

Car control and parking: Car control is a central element of Vauban's strategy. Residential streets allow cars only for picking up and dropping off, not for parking. A parking spot in one of the four lots at the edge of the district costs \$40,000 (Fraker, 2014). There are also traffic-calming measures, such as limiting car speeds to about 30 km/hour.

This car-free lifestyle is fundamental to development of a low-carbon community and it has important childrearing benefits. Profiling the district, The New York Times recounted one father's experience in Vauban: "He is glad to be raising his children away from cars; he does not worry much about their safety in the street" (Rosenthal, 2009).

Figure 19. Family biking on car-free street (Source: [Antoine Belaieff](#) / CC BY 2.0)



Figure 20. Children playing on car-free streets (Source: [Alain Rouiler](#) / CC BY 2.0)



In Vauban, 160 residents per every 1,000 own cars, compared to 374 in Freiburg, which is known as "the green city." Most impressively, more than half of the car-free households moved to Vauban and sold their vehicles because of the "carrots and sticks" offered by

the district (Gorges, n.d.). In 2002, 81 percent of residents from car-free households said they found that life without a car was either “easy” or “very easy” (Field, 2011).

Walking and biking: Beyond the car control measures discussed above, Vauban has a host of measures to ensure high rates of walking and biking. For example, every home has at least one bike parking space a community store offers free labor on bicycle repairs. This type of urban design has also changed residents’ habits: 41 percent of car owners use a bicycle more than they did before moving to Vauban (Field, 2011). Residents can reach the city center and the rail station within 12 minutes on bike from residential areas (Field, 2011).

BENEFITS

Vauban’s strategy for creating a sustainable and healthy urban lifestyle has generated numerous benefits for residents:

A mixed and stable community: Vauban has attracted a significant number of families and long-term residents due to its appealing, accessible, and safe environment. The district illustrates that design can make a huge difference in how residents use available space. Neighborhoods that are conducive to community interaction provide places for children to play and for adults to socialize. In Vauban, 25 percent of residents are laborers, lower-ranking employees, or civil servants, 55 percent are management level, and 20 percent are self-employed professionals. Finally, 10 percent of the housing is reserved for lower-income residents, which accomplishes the original target in this regard (Melia, 2002).

Integration of children and seniors into the community: Vauban’s mostly car-free streets are welcoming for seniors and children. For older citizens who are no longer able to drive, there is easy access to nearby goods, services, and public transit. Vauban has intentionally built facilities to integrate families, with particular consideration for both children and seniors. The neighborhood will accommodate more than 300 people over the age of 60 through trans-generational apartments. Given that 30 percent of the 5,100 residents are younger than 18, there are two facilities for toddlers and five childcare centers.

Low-cost: Vauban has accomplished its goal of cost-effective sustainability. Quartier Vauban cost about 500 million Euros to build, which is only about 3-5 percent more than traditional construction (Energy Cities EU, n.d.). Fraker (2014) found that the substantial gains in home energy efficiency only added roughly 3 percent to the overall cost of the house.

Property values have skyrocketed: A few years ago, a three-bedroom flat in Vauban might have cost 250,000 euros, but that price has now doubled, according to press reports. Top floor flats are particularly in high demand (Balaram, 2014).

Figure 21. Bike to bus connection in Vauban (Source: [Antoine Belaeff](#) / CC BY 2.0)





Nightlife in Liuyun Xiaoqu (Source: ITDP)

SUMMARY

When it was first built in the mid-1980s, Liuyun Xiaoqu was a gated, single-use residential block. The gates severed connections to nearby areas and communities. The single-use zoning hindered access to amenities and other services because residents would have to walk long distances to get anywhere. Today, Liuyun Xiaoqu is one of China’s best examples of development according to The 8 Principles.

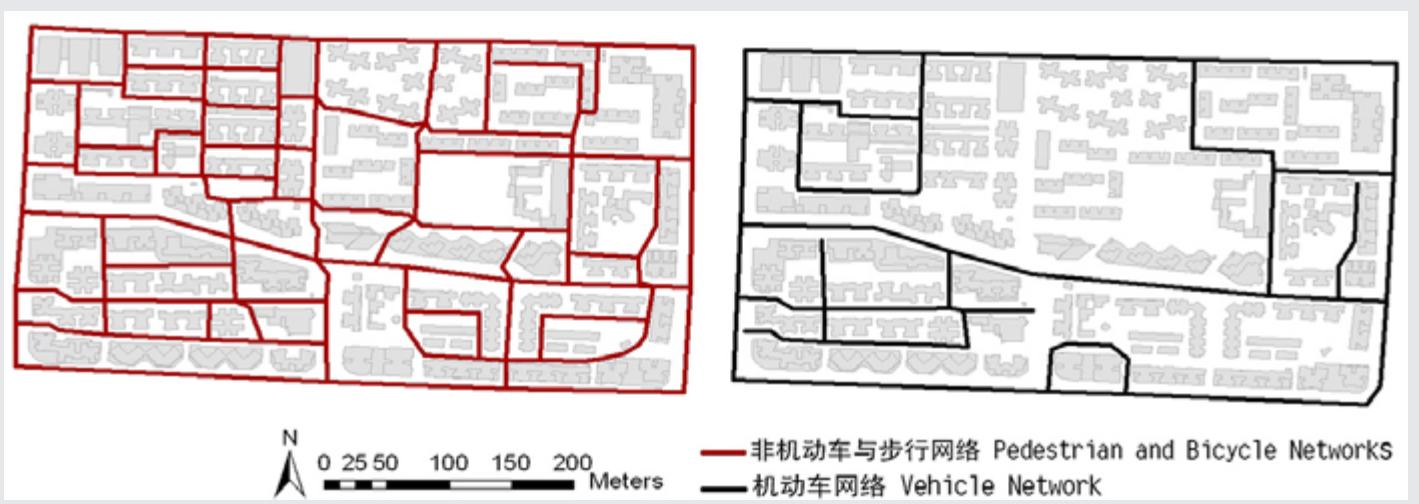
The district’s character began to change in 2000, when the government gave tenants the title to their apartments. Shortly thereafter, owners of the ground-floor apartments realized they could convert their residences to commercial uses. Since then, the area has developed a wide array of local offerings of goods and services. Today, virtually all ground floor units are dedicated to commercial use, and upper floors continue to serve as residences. The government took down the original gates to improve connections to thriving commercial areas nearby. In 2009, the city government invested in public space improvements in preparation for Guangzhou’s hosting of the 2009 Asian Games.

The following information is adapted from ITDP’s *Best Practices in Urban Development in the Pearl River Delta* (ITDP, 2012). The focus is on the neighborhood’s accomplishments in urban form and transportation.

URBAN FORM AND TRANSPORTATION

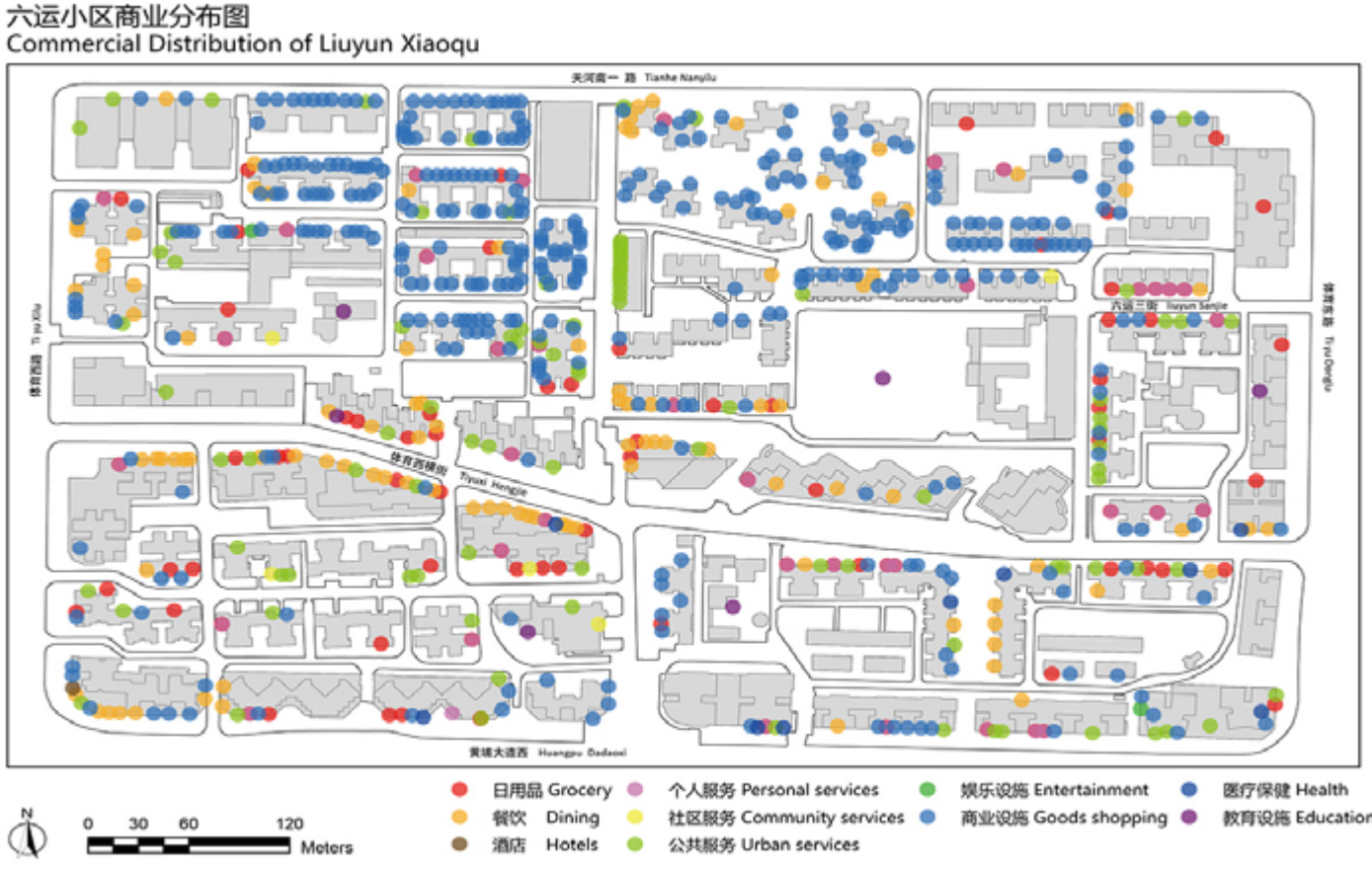
The total site is 22.5 hectares, with a floor-area ratio of 2.6. About 70 percent of Liuyun Xiaoqu is open space, with a population density of approximately 9,600 residents per square kilometer. Efforts to

Figure 22. Map of non-motorized path network and vehicle network (Source: ITDP).



beautify remaining open spaces, largely carried out as part of preparation for the Asian Games, have succeeded in creating enjoyable public areas. Small parks and recreation areas create places for people to gather, talk, or exercise. Proximity to commercial activity and the general mixed-use zoning of

Figure 23. A walkable mixed-use neighborhood (Source: ITDP).



the neighborhood mean that a household can meet their daily needs without resorting to car travel (or public transit, for that matter).

Figure 23 shows the roughly 900 shops and services available in Liuyun Xiaoqu. The area's relatively small blocks (no larger than 50-150 meters by 40-80 meters) create more direct walking and biking routes, thereby increasing their convenience. Well-crafted public spaces and ground-floor retail create a more enjoyable and interesting walking experience.

Figure 24. Liuyun Xiaoqu (behind two large towers) and the surrounding area. The nearest BRT station- a long covered station being visited by multiple orange buses at the moment the photo is taken- is evident in the foreground (Source: ITDP).



In terms of transportation, the district itself has nearby access to high-capacity transit, including BRT and metro stations (Figure 23). Liuyun Xiaoqu offers a well-developed network of paths exclusively for non-motorized modes of transportation. Figure 22 shows the area's extensive pedestrian and bike paths and, for comparison, the less extensive road network for motor vehicles. Liuyun Xiaoqu has few parking opportunities for cars, mostly because construction of the area happened before motorization took off in China. However, there have still been recent efforts to make public spaces geared toward people. The local government has cleared vehicles and put in physical barriers in alleys that were once used for car parking.

Figure 25. Commercial street in Liuyun Xiaoqu (Source: ITDP).



BENEFITS

By implementing The 8 Principles, Liuyun Xiaoqu provides social, environmental, and economic benefits for its residents.

Social benefits: An important social benefit is the conservation and re-establishment of traditional Chinese street life. Car-dominated streets are less inviting for social interactions. Moving cars are dangerous, especially for children and the elderly, but the quiet paths of Liuyun Xiaoqu pulse at a slower pace and this invites people back into the streets.

Environmental benefits: We do not have specific transport mode data for the district. Nonetheless, all the conditions are in place to enable a shift to walking, biking, and transit. Reduced dependence on cars from the urban design choices translates into lower oil consumption, less motor vehicle exhaust, and improved air quality.

Economic benefits: ITDP observes: “Commercialization had already multiplied values several times before the renovation program [carried out for the Asian Games in 2009]. The approximately 900 area shops experienced a general increase in value of 30 percent following the re-opening [after public space renovations].” Energy Innovation staff visited this neighborhood in June 2014 and confirm it to be a thriving, sustainable community.

Figure 26. Pedestrians on car-free street in Liuyun Xiaoqu (Source: ITDP).





Family on rainy day in Liuyun Xiaoqu (Source: ITDP)

This report tells the story of three sustainably developed communities, located in Guangzhou, China, Stockholm, Sweden, and Freiburg, Germany. By emphasizing public transit, walkability, and travel by bicycle, these neighborhoods are providing increased mobility and a higher quality of life. The 8 Principles provides a roadmap to accomplish this.

By developing according to The 8 Principles, the communities profiled in this report are thriving:

- **In Hammarby, demand has been so strong that each new phase of construction has sold out almost immediately.** The environmental impact is 30-40 percent less than other developments built at the same time. Car travel accounts for only 21 percent of trips made by Hammarby's residents. Most impressively, the higher standards only increased costs for developers by 2-4 percent.
- **In Vauban, the design of the district has successfully demoted the car and promoted transit, walking, and biking.** The result is that only 16 percent of the residents own cars and non-motorized trips account for 64 percent of all trips. With safe streets, outdoor recreation opportunities, and attention to the location of child services in the district, Vauban has attracted and retained many families. Because Vauban is an ideal living environment for families, this has encouraged long-term residency, contributing to social stability. The cost of construction was only 3-5 percent more than traditional construction methods and demand for both residential and commercial building space has been strong.
- **In Liuyun Xiaoqu, vibrant commercial space now dominates ground floor space after conversion of the area to allow mixed use.** As a result, ground floor building area increased in value by 30 percent. The introduction of mixed-use, public space improvements, and improved transit connections have improved quality of life through better access to goods and services, transit, and recreational areas. The neighborhood is now much more walkable and has become a suitable environment for children and the elderly to live due to its mixed-use nature and people-centered urban design.

Beyond environmental, social, and cultural benefits, places designed according to The 8 Principles perform better economically. Mixed-use and population density create a built-in customer base for local businesses. Quality of life and vibrant cultural spaces attract talented people, supporting further economic growth, creating a virtuous cycle. In a world of rapidly growing cities facing a host of challenges such as congestion, pollution, blight, and crime, these are a powerful combination of benefits. Developers and city governments everywhere should incorporate The 8 Principles into their planning practices as these principles can provide a foundational structure for urban success.

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