

Kaili, China

EcoMobility SHIFT+ Assessment Report



Overview

The EcoMobility SHIFT+ is a methodology designed for cities to measure the performance in urban mobility and make informed decisions based on the areas that need improvement. Kaili is a central regional city of eastern China's Guizhou Province, the epicenter of the economic zone, and also rich in cultural diversity, predominantly the ethnic minority Miao and Dong group.

Kaili City gathered key stakeholders, including representatives from the Kaili Public Bus Group, traffic police, and other stakeholders, to form the EcoMobility SHIFT+ Working Group. The Group's task is to analyze the transport system and discussed the short- and long-term interventions. ICLEI's Sustainable Mobility team moderated the stakeholder discussions and provided tailored feedbacks to the city. The process is also supported by the China Academy of Transportation Sciences (CATS) under Ministry of Transportation of China.

The EcoMobility SHIFT+ indicator score for Kaili is 78%, shows that a positive enabling environment exists with good examples, although several challenges exist. The success is primarily due to the reliable implementation to execute plans and enforce transport policies with the support of the national government. Furthermore, the smaller size of the city increases management capacity and robustness, making each sustainable transport interventions more impactful.

Kaili serves as an example for many smaller cities in the world of how proactive planning makes sustainable mobility a reality, despite the increasing affluence of the residents.

Facts & Figures

Population

522,601 (2014)

Land area

1,570 square kilometers (km²)

Modal split

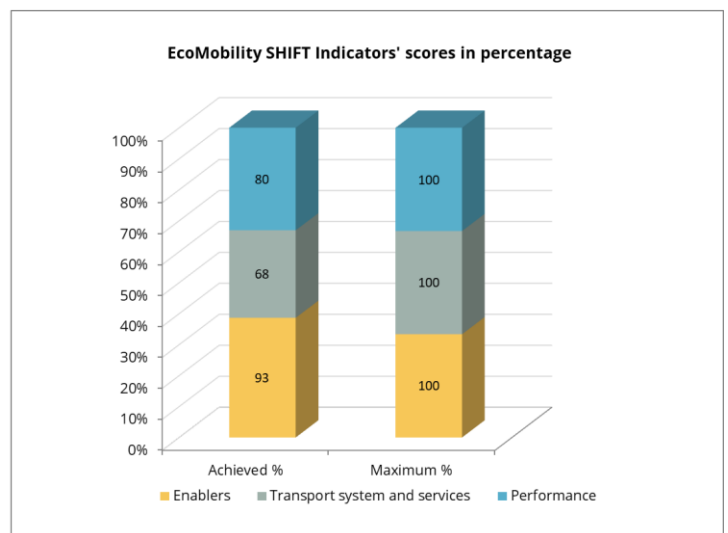
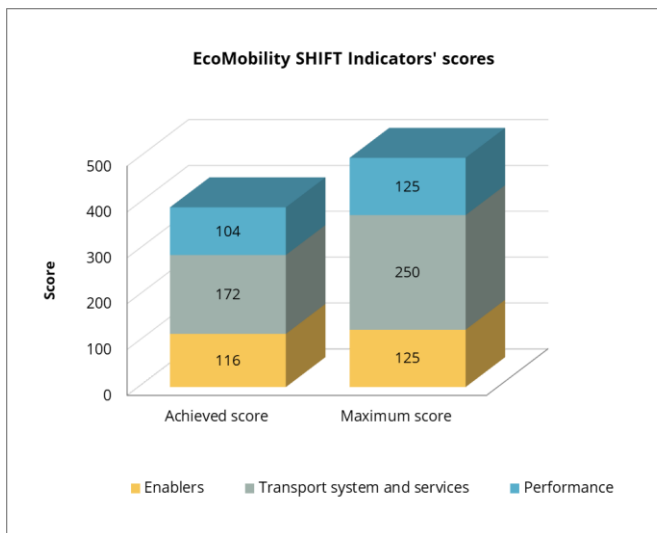
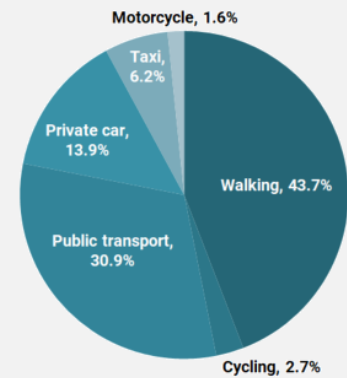


Figure 1: EcoMobility SHIFT+ Indicator scores and in percentage for each category

Overview of the 23 EcoMobility SHIFT+ indicators' ranking is presented below.

EcoMobility SHIFT+ indicators' ranking

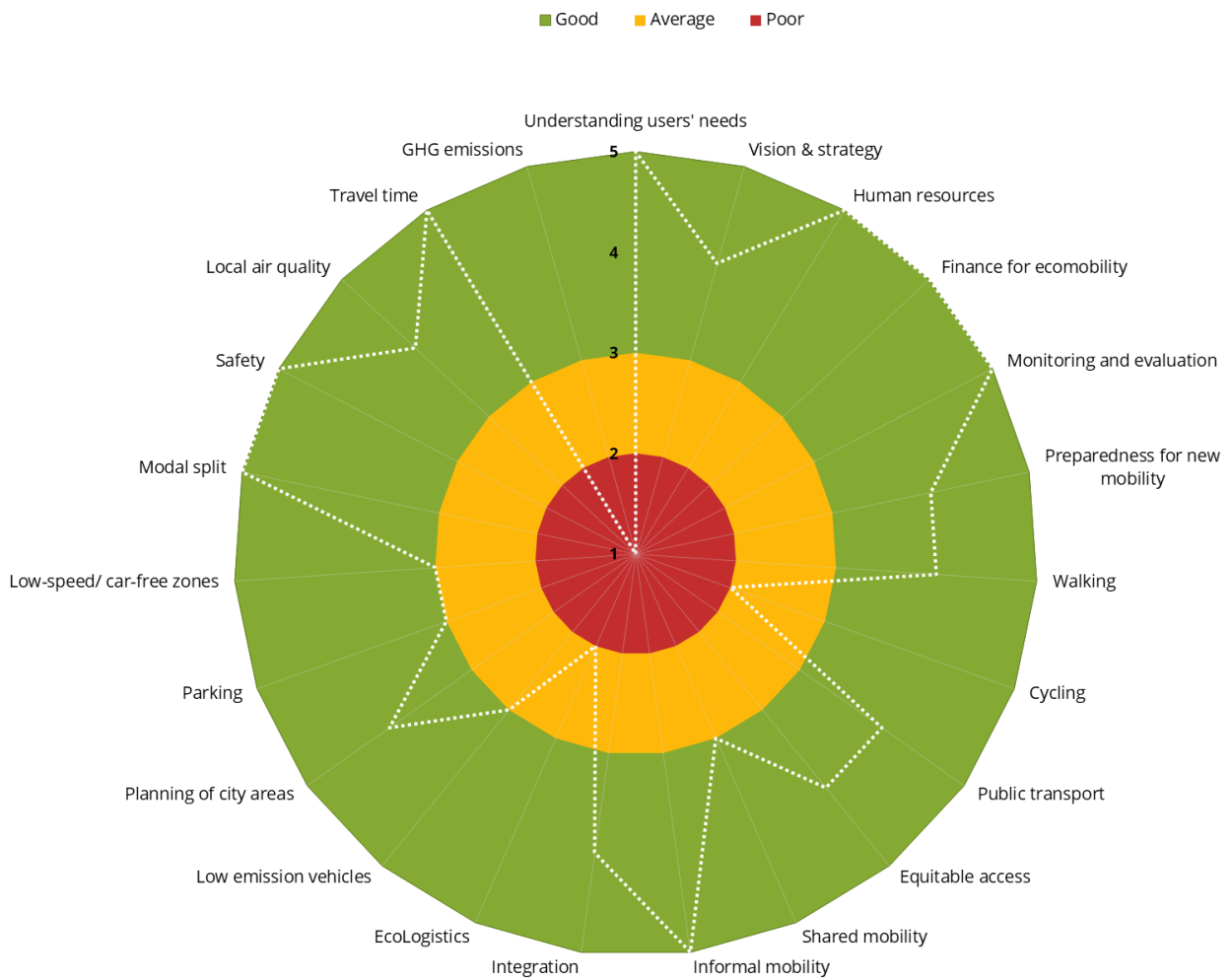


Figure 2: Overview of the EcoMobility SHIFT+ Indicators ranking

EcoMobility SHIFT+ Results based on category

Enablers

Kaili maintains an Urban Mobility Plan 2010 – 2030, which involves different agencies and city departments to implement. Such plans are strongly influenced by the national government’s policies and directions. Kaili was amongst the 50 cities selected to be the “National Bus City” by the Ministry of Transportation. As such, Kaili announced the “Public transport priority policy implementation and accelerating the construction of public transport network Circular 2018 – 2020” to achieve 100% public transport coverage within 500 meters (m), with more than 4.5 kilometers (km) of priority bus lanes; public bus speed of 18 kilometers/hour (km/hr) during peak time; and 100% of electric buses; 85% of general satisfaction; and achieving 60% of public transport usage in the modal split. The public bus forms the backbone of Kaili’s transportation system, and the city is currently working on creating walking streets in certain parts of the city.

Kaili carries out surveys or collects data to understand the transportation system, particularly before each policy planning. Since 2016, the city conducts an annual satisfaction survey of the residents towards the city’s transportation system. Under the Kaili’s Public Transport Priority Plan 2018 - 2020, a key priority is to adopt different media to raise public awareness on sustainable mobility as well as increasing transparency and publicity of significant public transportation construction projects.

The city’s Transport Department works very closely together with the Kaili Public Bus Company, Urban Planning Department and the Traffic Department. China Academy of Transportation Research under the Ministry of Transport of China also supports the city in developing sustainable urban mobility plans and improving the bus system and strengthening the active mobility network. In recent years, investment in public transport and active mobility network have increased significantly even as city roads are most or less well established.

The city is open to new mobility models and is actively promoting electric mobility. Shared bicycle is not officially introduced yet in Kaili, although it is common elsewhere in China because the city conducted a study to evaluate the readiness and suitability of the town. It was concluded that for Kaili’s population size and needs, shared bicycle or public bike-sharing is not suitable yet. Ride-hailing services such as Didi Chuxing are considered operating illegally as the Transport Bureau is currently still evaluating the safety and reliability before deciding to legalize.

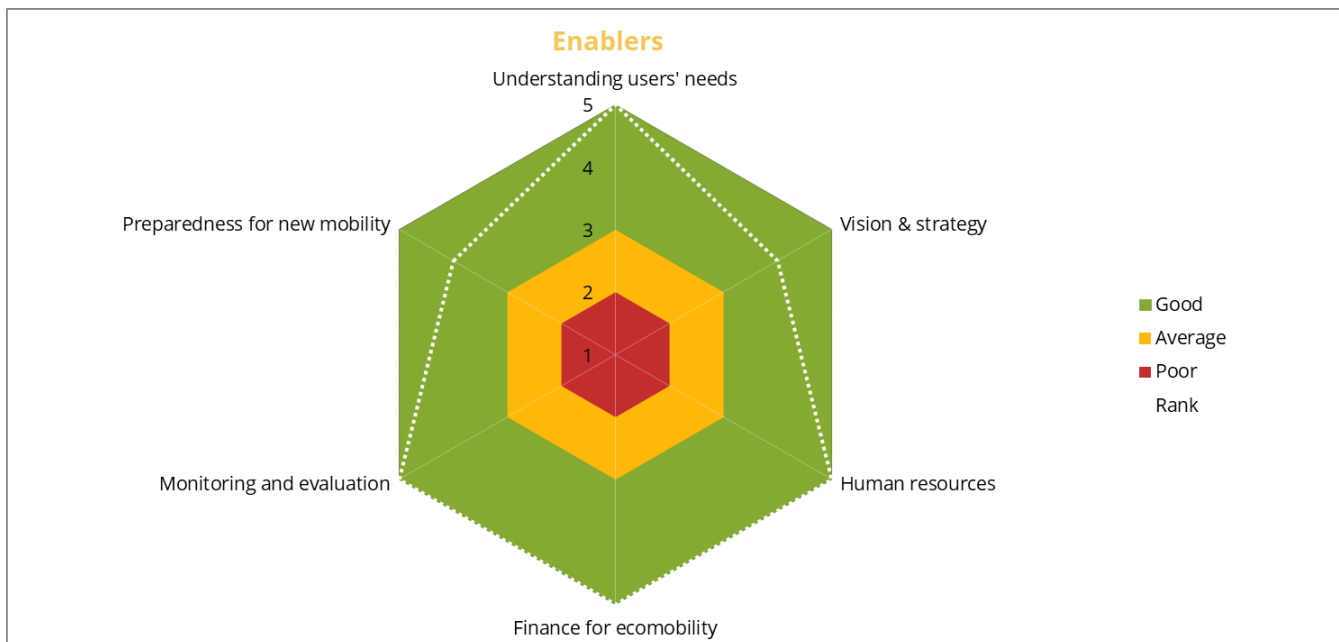


Figure 3: Enabler category’s indicators’ ranking

Transport system and services

The transport system and services category's indicators' ranking is presented in Figure 4 below.

According to the survey in 2016, walking is the primary mode of mobility in Kaili, representing 43.7%, while public transport is 30.9%. Private cars constitute only 13.9%, while taxis and motorcycles represent 6.2% and 1.6%, respectively. Bicycles form 2.7% of the modal split.

Walking and cycling

There are 84.6 kilometers of walking paths in Kaili, particularly within the city center. Since 2017, the city has been focusing on enhancing walkability and cycling conditions. One of the key projects is constructing a 60 km green network around the Bala River for walking, cycling, and beautifying to attract tourists. Another 33.1 km of cycling network is currently being constructed. Within the city center, a 9-km underground walkway with shops was also built. The city also places landscaping and planting of trees as a critical strategy to improve walkability. More efforts to enhance accessibility for people with reduced mobility are ongoing, especially for the blind.

Cycling in Kaili is very minimal not only because of the lack of cycling infrastructure but also legal boundaries too. For example, cyclists are not allowed to cycle on pedestrian crossings or walkways, although cycling lanes are not provided.

Kaili City established the "Sustainable City and Green Development Strategy" to improve air quality and urban health. One of the critical interventions is the creation of public squares and green parks. The city increased 260,000 square meters of green areas through 43 urban greening projects, including beautifying riverside landscapes, the creation of nine public squares and parks, vegetating mountains, and others. Today, Kaili maintains a total of 1,577 hectares of urban green space, with 36.68% of green area rate at built-up areas, 40.71% of the green coverage area, and 13.98 square meters of green space per capita.



Electric motorcycles occupying the walkways



Shops at the underground walkway (left); entrance to the underground walkway with shops to cross the main highway (right)

Public transportation: Integration, equity, and connectivity

Kaili City is named the “Model City for Bus System of Guizhou Province” for the public bus system as it is the main public transportation for Kaili City, although there are plans to develop the Kaili-Dudu tram system. Public transport is a strategic development for the city. Managed and operated by the Kaili Public Bus Group, a government-linked company, there are currently 28 bus lines in Kaili City with 522 stops and 62 bus platforms (77.9 km), with an annual passenger volume of 99 million. Under the “one city and 14 districts system”, Kaili’s public buses have expanded to serve all districts within the province with 715 buses and 71 lines.

Currently, 90% of the population within the city lives 500 m from a public transport stop, and the Public Bus Plan aims to reach 100% by 2020. Waiting time during peak period is 5 to 7 minutes, while the non-peak period is 10 to 15 minutes. Kaili developed a plan to create a network of bus priority lanes to improve further public transport and 4.5 km of new bus lanes. Furthermore, Kaili is constructing 14 green networks and connecting it with the public transport network, which will be completed by 2020.

The city leverages big data and technology to improve operational efficiency, integration, and convenience of commuters. The Municipal Public Transport Corporation researched and invested in a Kaili Intelligent Bus Management System which consists of three key components: (1) smart card system to support seamless transfer and integrated payment within the province; (2) 3G video real-time monitoring system to enhance safety; and (3) intelligent dispatching system to provide timely and efficient service. Kaili is effectively integrating the bus network within the Qiandongnan Prefecture to achieve bus integration within 16 counties across the state with the development of a State Bus Holding Group. By 2020, the integrated card payment system for all the counties within Qiandongnan Prefecture would be materialized, which makes differentiated pricing such as “segmented pricing” and “interchange discounts” scheme possible. Under the framework of Kaili Smart City, an Intelligent Transport Plan was developed for full integration, surveillance, electronic payment, and real-time monitoring of the bus network. This also helps the city to collect and share data amongst different departments for effective public transport planning and policy formulation. The public bus stops are beautifully designed but not all stops have real-time information yet as the city is upgrading this. A smartphone app is developed to provide real-time information and allow electronic payment.

This system results in the creation of a mobile app which provides real-time information and payment system. Since 2018, the system is also fully integrated with the popular social messaging app, WeChat, using a scan code system for cashless payment. The frequency of bus service within the urban area increased to every three to five minutes, and commuters are allowed free transits within one hour upon analysis of commuters’ travel patterns. Furthermore, free bus services are offered to retired military personnel, people with reduced mobility, and elderly above 70. Public transport fare is low, and the fare structure is distance-based, with a maximum charge of only 2 Chinese Yuan (0.26 Euro).

Some of the strategic public transport targets by 2019 are: achieving 85% passenger satisfaction, and public transport trips account for 60% of the modal split. Kaili City's exciting development demonstrates how a developing city leverages technology to leapfrog and provide an inclusive, efficient, and clean public bus system.



Public bus depot beside the high-speed rail station (left) and bus station that is designed according to the cultural elements (right)

Electric mobility and digitalization

In 2019, 151 electric buses started operations in Kaili City and expected to transport 33.7 million passengers per year. It is envisaged that it will reduce 11,290 tonnes/ annum of carbon emissions, setting a new achievement in the city's public transport industry.

Promoting clean energy vehicles is a national agenda that is also effectively implemented in Kaili City. To date, 100% of the public buses are green buses, and the city is actively promoting new energy vehicles based on hydrogen. According to the Guizhou Province Air Pollution Control Action Plan, upgrade and add 259 new energy vehicles will be added within the province by 2020. This move is also accelerating within Kaili, where the city is looking into buying new hydrogen buses.

Green buses (natural gas, electric, and hybrid buses) account for 100% of all public buses, of which new energy buses (hydrogen buses) are more than 60%. Kaili Public Bus Group is creating a network of electric charging stations for public use, although ownership of electric vehicles is less than 1%. There are currently 103 charging poles in Kaili.



Electric charging stations for public buses (left); electric bus charging at one of the charging stations in Kaili (right)

Urban planning

Due to the undulating terrain of the city, accessibility has been a significant challenge area for the residents in the past, often relying on walking and where possible, traditional trishaws and bicycles, making access to the key

focuses of the municipality. Since 2008, the city focused on improving rural access through the construction of road networks, including highways (1722 km), county roads (258 km), township roads (422 km), and village roads (680 km) implemented over four phases. In 2017, the goal of reducing travel time between the provincial capital, urban areas, and surrounding villages to 30 minutes was achieved, benefiting the rural poor to have faster access to job opportunities and social facilities through better quality and safer road network.

Within the city center, there is slight traffic congestion during the peak period. There is no car-reduced or car-free area in the city, except for freight delivery, where only a specific time window is opened for freight delivery within the city center. A plan was promulgated to create shared parking spaces in the residential area while limiting parking space in the city through price control. In each parking area demarcated, at least ten parking spots are reserved for new energy vehicles. The city participates with the World Car Free Day each 22 September, where free public transport is available for all car-drivers.

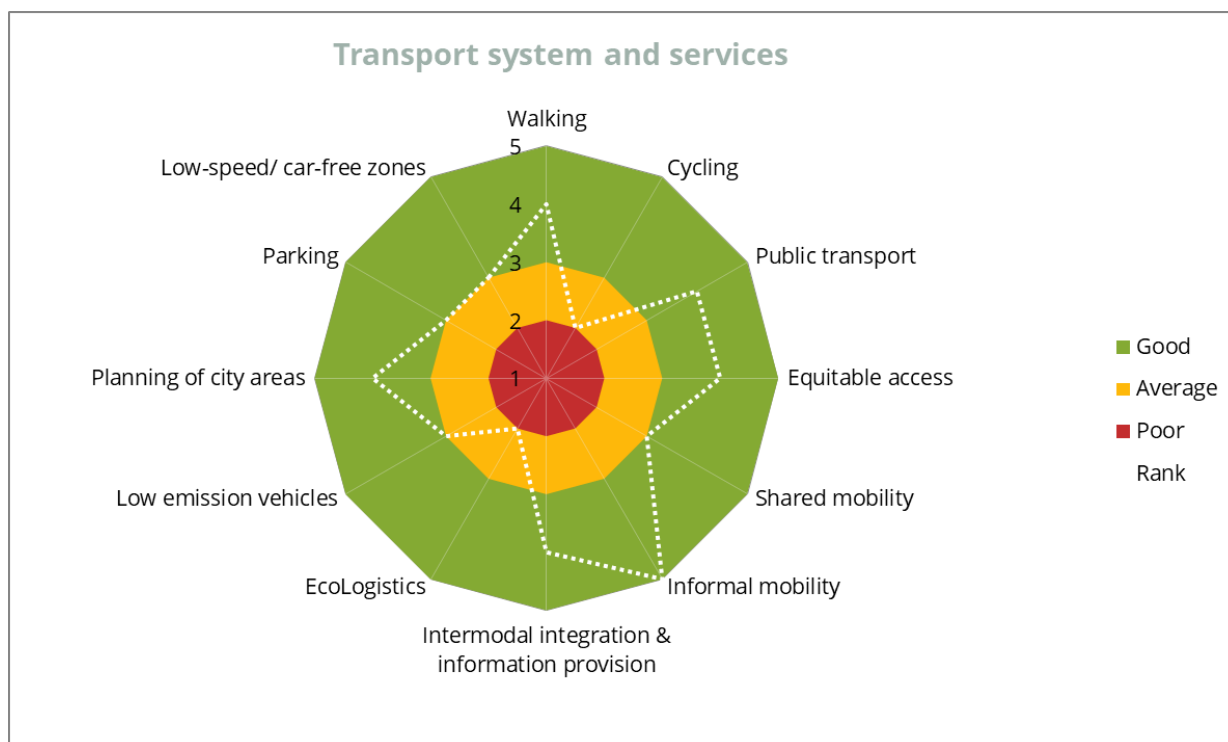


Figure 4: Transport system and services category's indicators' ranking

Performance

Most residents in Kaili travel in an ecomobile manner, with most walking (43.7%) or taking the public bus (30.9%) and some cycles (2.7%). Private cars constitute only 13.9%, while taxis and motorcycles represent 6.2% and 1.6%, respectively. In 2018, there are 61 traffic fatalities. Kaili's urban ambient air quality compliance rate reached 100% in 2017, of which more than 85% are excellent days. There is no GHG measurement yet. As the city is relatively compact, travel time across the city is not long, and most trips can be made within 60 minutes, even with public buses. Performance indicators' ranking is illustrated in Figure 5.

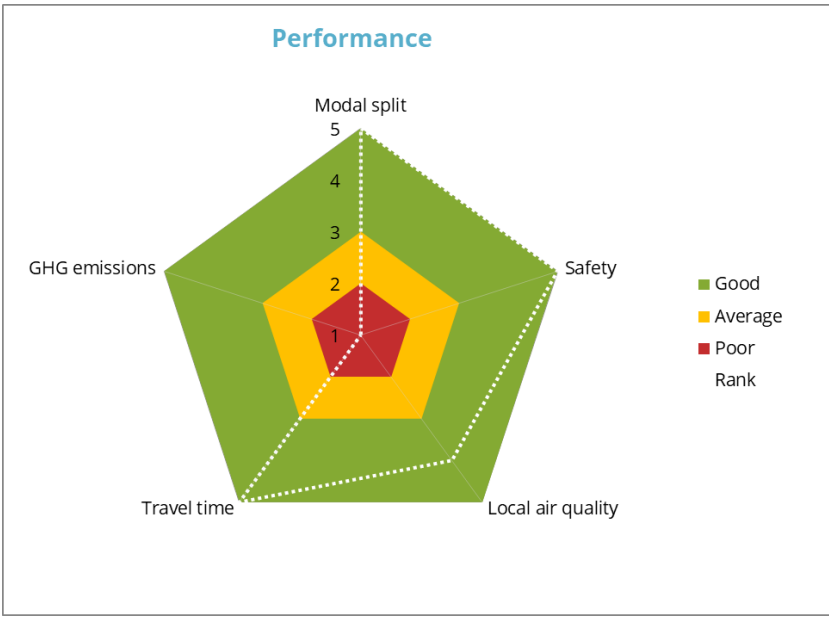


Figure 5: Performance category indicator ranking

Proposed actions

In general, Kaili City is proactive in developing a sustainable mobility system and actively supports public buses as the backbone of the transportation system. The developing city gives room to plan and sustain the modal split, which is still based on ecomobile modes. The SHIFT+ Working Group committee members invited the different stakeholders for discussion, and the following areas were identified as critical areas to strengthen further.

There are different transport policy interventions to improve the sustainable mobility network while discouraging the use of personal automobiles. Various instruments can be adopted to manage supply and demand. Table 1 describes the different policy instruments and examples of Kaili's corresponding implementation.

Table 1: Different policy instruments and example of Kaili's implementation

Instruments	Examples	Kaili's implementation
Planning instruments	Landuse planning and urban planning to reduce the need to travel by improving access to goods and services to where people are. Vehicle access restrictions such as car-free zones	Many plans especially public bus right-of-way, new B.R.T., green network
Regulatory instruments	Standards and regulatory measures to restrict certain motorized vehicles, road space allocation (e.g., speed limit, parking, emission limits)	Enforcement is relatively rigorous for speed and emission limits Cyclists are not allowed to use pedestrian lanes and crossings
Economic instruments	Financial means to discourage the use of motorized vehicles by charging taxes, fees or levies (e.g., road pricing, fuel tax) while investing and subsidizing sustainable transport infrastructure Non-financial resource provision such as allocating public land for sustainable transport projects	Lacking except for parking charges The state and municipal authority provides public land and space for sustainable transport project such as building the new interchange terminal
Information instruments	Provide easily accessible information on alternative transport means and the cost of travel between different modes to influence behavior Creating standards, knowledge, education, awareness campaigns can be included	Online applications that are extensively used for transport information Kaili adopts stricter vehicle standards for emission control Excellent data analysis and monitoring
Technological instruments	When travel with motorized vehicles is unavoidable, adopt for cleaner fuels and vehicles	Kaili places many efforts in electrifying of public fleets

(Adapted from G.I.Z. 2009, Transport Demand Management)

Enhancing active mobility network

A continuous network for walking and cycling is necessary throughout the city, especially considering design pathways for walking and cycling. Legal barriers that prohibit shared-use of walking and cycling paths could be reconsidered, and pedestrian safety can be ensured through proper design. This could attract more people to bicycle, especially within the inner city where it is flat and comfortable for walking and cycling. The current cycling network is centered around touristic or recreational purposes, but once it is also designed for daily mobility, last-mile connectivity from public transport stations can be strengthened.

Figure 6 portrays a complete street idea of how walkways, cycling lanes, public transport lanes can coexist so that streets are for people and not for cars.

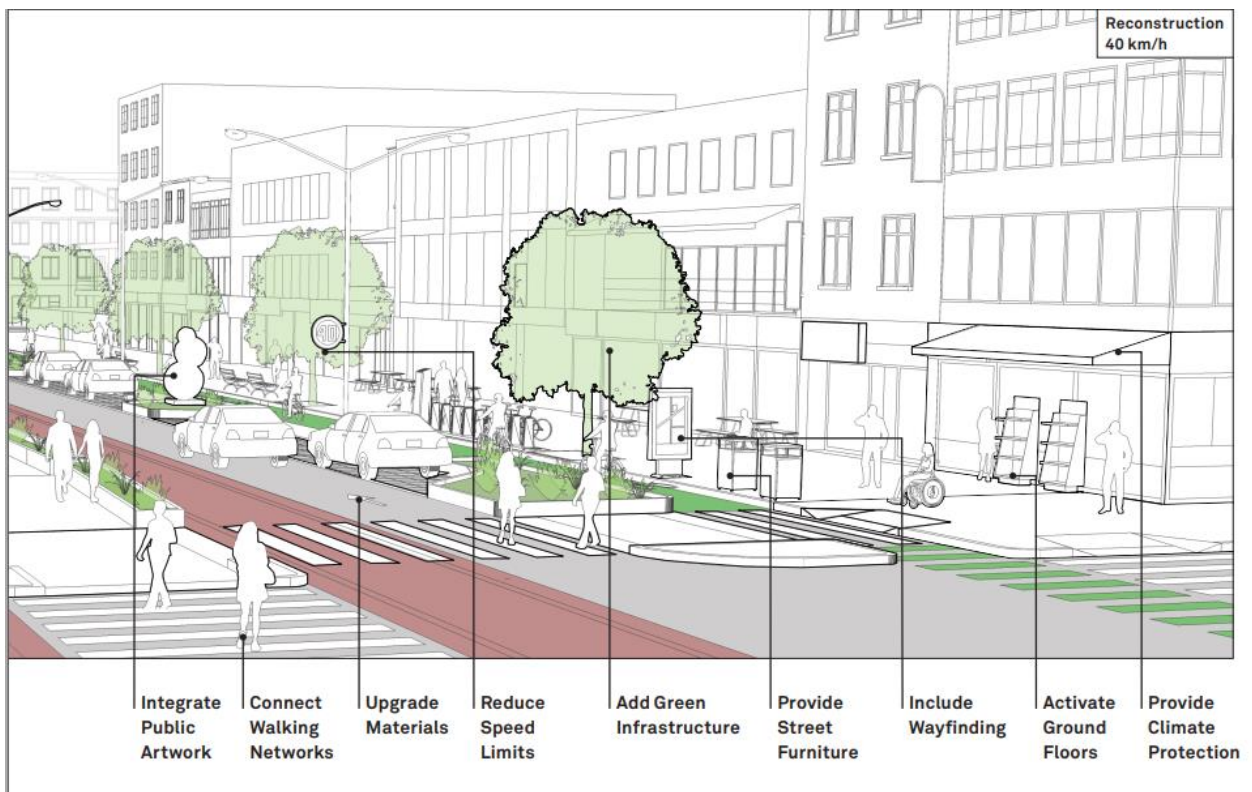
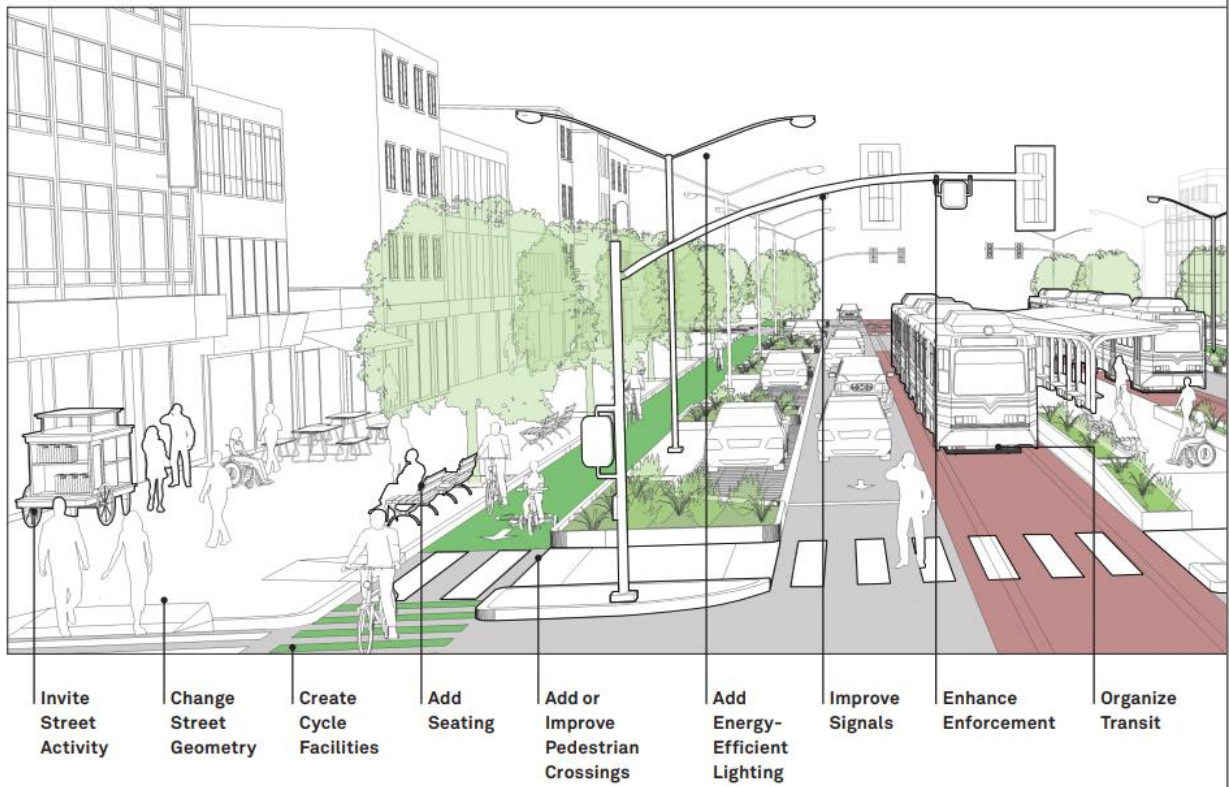


Figure 6: Complete streets (Photo source: NACTO)

Equitable access and connectivity

The current software platform of the public transport system is excellent for a small- to medium-sized cities, such as route planning, mobile or online passenger ticketing, geolocation, real-time information system, surveillance, and others. The next upgrade that could be considered is improving physical accessibility and connectivity, particularly for people with reduced mobility. This could mean public buses and bus stops that are designed for people in wheelchairs and even pedestrian crossways that are friendly for the blind.

In more rural areas, the top concerns for public transport commuters are the availability and the cost, making automobile ownership as one of the highest. More than 40 cities globally are trialing on-demand electric buses in underserved rural or sparsely populated areas or during odd times of the day. Similar to commercial on-demand services (DiDi), which focus on the journey of individual passengers, on-demand public transport focuses on groups of passengers traveling sharing journeys to a hub for a subsidized price. Coordinating on-demand bus services with public transport schedule allows for seamless transfer as last-mile services. One of the key benefits is to deliver public transport at a reduced cost, for both operators and passengers. For example, BerlKönig offers on-demand van service between the inner city and surrounding suburbs of Berlin, Germany, and it also integrates with the city's public transport network. To sustainable operations, it is essential to consider the service area, price, and operational models.

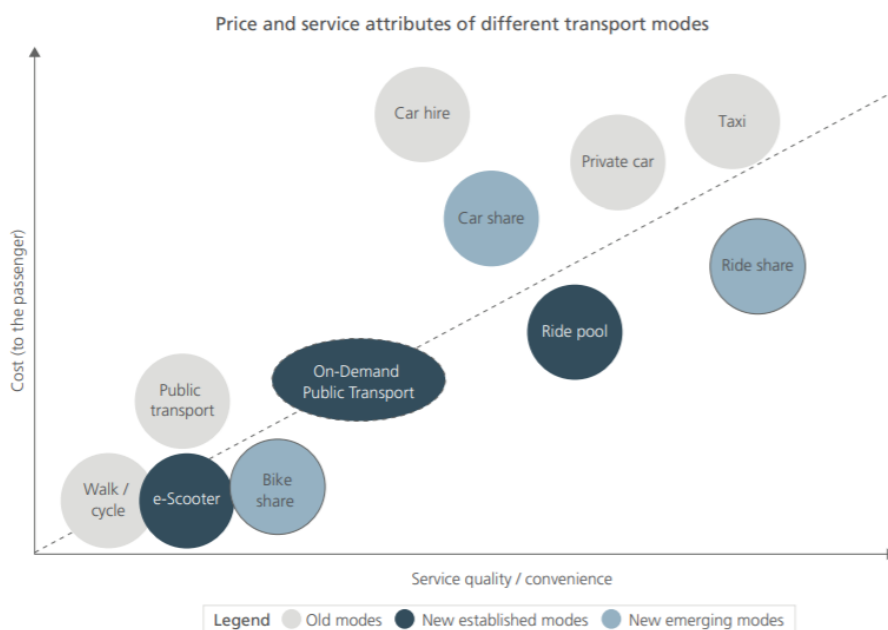


Figure 7: Comparison of price and service attributes of different transport modes (L.E.K 20191)

City design and placemaking

The main city center is the central development, and new growth tends to be at undeveloped greenfield, inducing the need to own a car. Transit-oriented planning at the existing developed area or new areas is essential.

In a micro-scale, tactical urbanism can be adopted to improve the quality and livability of existing urban areas. This is a deliberate and phased approach that is easy but reaps high rewards. For example, creating public space in the residential district, open streets that are safe for people with reduced mobility, changing road designs to reduce car speeds.

In general, controlled land expansion and new developments that are aligned with a sustainable transport network that is not just road-based but people-oriented and sustainable are crucial. Within each district, villages, and neighborhoods, evaluations can be conducted to identify improvements that can be made, such as walking networks, safety audits, and unobstructed cycling lanes, etc. In Shanghai's Chang Ning District, local improvements are identified to create an underground passageway for pedestrians, pedestrian crossings that are disabled-friendly,

¹ L.E.K. 2019. On-Demand Public Transport Special Report: Key learnings from global pilots

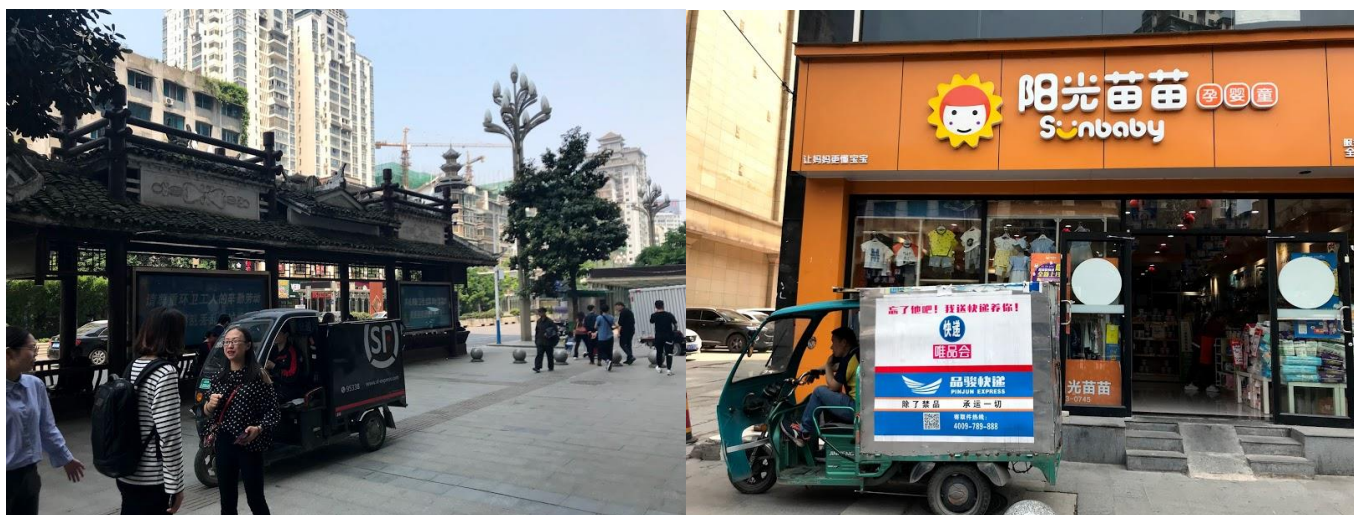
tree canopy that is suitable for summer and winter conditions. These reforms are necessary to transform growth-oriented urbanization into a people-oriented one and to achieve more sustainable and balanced growth.

Parking management and reducing parking demand

Reducing parking spaces in the inner city is one of the most effective ways to control car ownership. Public spaces for people can replace open parking spaces.

EcoLogistics

There are sporadic initiatives for urban freight but no integrated and strategic manner of approaching this issue. With freight and online shopping increasing in China, the demand for delivery will increase, and according to global statistics, 40% of the GHG emissions from the transport sector come from the freight sector.



Electric minivans used for last-mile freight delivery in the city (left); electric logistics delivery van occupying walkways that are reserved for pedestrians

Electrification and climate change

There is much progress in greening or electrifying public transportation as well as setting up public charging stations for electric vehicles. The transition towards electrification can be maximized with the shift towards renewable energy as the energy source. This can be complemented with the measurement of greenhouse gas emissions to understand the full impacts.

Best Practices: Inspiration from Barcelona, Spain

Marc Iglesias Perez, Project Director of Sustainable Mobility and Transportation of Barcelona Metropolitan Government, Spain, shared 12 strategies of how Barcelona Metropolitan Government (A.M.B.) adopted sustainable mobility as a strategy to improve air quality and combat climate change, under the “Metropolitan Program against Air Pollution.” This program is a package of 33 specific measures in the fields of mobility, which causes 80% of the pollution with a budget of 46 million Euros.

Barcelona Metropolitan is about the size of 363 km² with 3,239,337 inhabitants. About 50% of the air pollutants are from road transport but increases in the main urbanized areas to about 70 to 80%. Each day, 8.8 million trips are made in Barcelona Metropolitan, of which 71.5% is made in sustainable modes, i.e., 40% walk, 2.3% cycle, 0.22% use micro-mobility, while 30% take public transport including buses, metro, and railway lines. Private cars consist of 22% and 6% for motorcycles.

Low Emission Zones

Barcelona maintains a car-free zone in the inner city where most areas are pedestrianized. It is now demarcating the outer zone as low emission zones (LEZ) where only approved vehicles are allowed to enter, but Park and Ride options are provided. This will be implemented through a few phases until 2025. The first phase will be implemented at different municipalities as Ultra Low Emission Zones (ULEZ) as well as within the urban ring in Barcelona City as LEZ. By 2025, a Metropolitan Low Emission Zone (MLEZ) will be implemented covering a larger area. What this means is that all vehicles are differentiated by the level of pollution and provided with a label. For example, diesel cars will be banned by 2030, and vehicles that emit pollutants above the set threshold are not allowed to be on the road.

To complement this, the city demarcated park and ride spaces where drivers could also reserve a parking place through a smart application. LEZ is a widespread policy instrument in Europe which targets to regulate access to urban cores and restrict traffic of the most polluting vehicles while promoting the shift to more sustainable transport modes and decarbonize the transportation system.

Metropolitan Green Card

For residents of the metropolitan who give up their vehicles that are without an environmental label, a Metropolitan Green Card will be provided, which entitles them to three years of free public transportation within the Metropolitan Transport Authority zone. The goal is to encourage residents to retire old and polluting vehicles and use public transport. As of 1 January 2019, more than 3 million applications were accepted, particularly from the older generation (between age 40 and 60).

Actions for a Clean Mobility

The public bus system is one of the primary transport modes, representing about 11% of the trips. A.M.B. purchased 450 new low-emission buses in 2019 to promote clean, hybrid, and electric vehicles. Furthermore, A.M.B. created a high-performance metropolitan bus network by adding new high-frequency bus lines in the metropolitan areas as an alternative to private cars. To speed up public buses, A.M.B. is currently working on upgrading the traffic light system to give priority to the public buses through sensors. On-demand buses are also launched as the first metropolitan on-demand buses to join the center of Tiana with the hospitals.

This is complemented by the creation of a metropolitan cycling network that is more than 55 km. To encourage citizens and companies to buy electric bicycles, the city subsidizes 250 Euro for each bike, and to date, more than 3,300 bicycles were subsidized. Since 2019, new diesel taxis are banned.

In general, A.M.B. provides incentives to encourage residents to use the preferred modes of mobility as well as deter unfavorable and unsustainable transport modes through preventive policy instruments. Smart mobility options are formulated to complement the public transportation system.

Table 2: Summary of policy changes or strategies and the corresponding impacts for Kaili City

Instruments	Policy changes/ strategies	More accessible	More efficient	Greener	More equitable	Safer	Impact for Kaili*	Remarks
Planning instruments	Integrated land-use and transport planning	++	++	++	++		4	Integration between existing and new development
	Strengthen and upgrade the quality of existing urban areas		++		++		3	
	Parking management (reducing demand)		++	++	++		5	Better bicycle parking, especially for dockless bikes
	Traffic calming measures		++	++	++	++	4	
	Car-free or car-reduced zones		++	++	++	++	2	
	Improve public transport services that are inclusive and accessible for all	++	++	++	++	++	5	Inclusive planning for people with reduced mobility
	Enhance pedestrian and bicycle infrastructure (network, safety audit, signage, comfort)			++	++	++	5	Improving safety and separation of lanes, preventing automobiles; adopting complete streets
	Freight management and consolidation		++	++		++	4	
Regulatory instruments	Managing carpark demand and charging		++		++		4	
	Regulate ride-hailing drivers					++	3	
	Fine illegal and inappropriate parking		++			++	4	Ban motorized vehicles on walking and cycling lanes
	Remove law that bans cyclists on pedestrian lanes or crossings	++	++		++	++	5	
Economic instruments	Parking pricing		++	++	++		5	
	Fuel tax		++	++	++		5	
Information instruments	Wayfinding for pedestrians and cyclists	++	++				3	
Technological instruments	Cleaner vehicles that are based on renewable energy			++	++		4	Esp. for public buses
	Intelligent technology system to prioritize public buses over private cars		++	++	++	++	4	On-demand bus services for more rural area

*1 being the lowest impact, while 5 being the highest

Key Takeaways or Recommendations

Transportation in Kaili is not a huge issue as the city has proactively taken prudent steps to guide the development of the public bus system and, more recently, improving walking and cycling. This is also reflected in the vast majority of residents adopting a sustainable form of mobility. However, with the growth of the middle class, car ownership would increase. Within the framework of Avoid-Shift-Improve (A.S.I.), Kaili needs to concentrate on interventions that avoid car growth and improve sustainable mobility. This could mean designing a compact and mixed land-use city design by capitalizing on the existing growth center and strengthen the walking and cycling environment in these areas so that the use of a car is not even needed with urban growth.

The data presented in this report is mainly provided by the city but different sources, such as desktop study, stakeholder engagement, and interview, are also adopted.

In summary, critical considerations for Kaili include:

- Potential of cycling as a mobility mode instead of recreational activity
- Priority for the public bus through the upgrade of the traffic light system and inclusive design that are friendly for people with reduced mobility
- Good land-use and transport planning that considers connectivity between districts, developments and areas which include walking, cycling, public transport network – this is vital as Kaili expands and develop
- Car-reduced zone and reduction of parking space within the urban core
- An efficient and modest road network

About EcoMobility SHIFT+

The EcoMobility SHIFT+ scheme is developed by ICLEI-Local Governments for Sustainability to provide local authorities with a useful tool to *assess, analyze, and act* to improve sustainable mobility. By working with the public and private stakeholders, this tool analyzes the ecomobility performance and status quo to identify short-term and long-term interventions and making informed decisions. The backbone of this system is 23 indicators categorized into three main dimensions: Enablers, Transportation System and Services, and Performance. This is a powerful tool for policymaking by capturing and synthesizing complex data into meaningful information.



About CitiesSHIFT: Capacity building and networking for climate- and people-friendly mobility project

Funded by Hewlett Foundation, the overarching goal of this project is to support cities to identify challenges and opportunities of urban mobility system in the hope that the city could shift towards more ecomobile modes of travel, i.e., walking, cycling, public, and shared transport. Six project cities from China, India, and Uganda participates in this project Scan the Q.R. code and download the reports about the project and project cities.



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