

Kaohsiung City is committed to developing a world class culture of ecomobility. The City is establishing a people-centered transportation environment by creating a seamlessly integrated public transport network. The Mayor of Kaohsiung City furthered this cultural shift by hosting the 3rd EcoMobility World Festival from 1-31 October 2017. The immersive Festival experience demonstrated how ecomobility principles create more livable cities.

ICLEI Case Study #200 - November 2017

Kaohsiung City & EcoMobility 'in context'

With a population of approximately 2.77 million people, Kaohsiung City is a thriving port-city which serves as an industrial and commercial hub within the region. The municipal area expanded significantly in 2010 following an administrative merger between Kaohsiung City and Kaohsiung County. Following the merger, City leaders prioritized the development of a sustainable transportation network which ensured quality service provision for the entire city.

Accordingly, Kaohsiung City accelerated the development of a comprehensive public transport system consisting of Metro Rail Transit, Light Rail Transit, and Bus Rapid Transit. The City has also invested heavily in improving pedestrian and cycling infrastructure and introduced a popular public bike-sharing system.

One exemplar initiative within Kaohsiung City's public transportation network is the Metro Rail Transit System. The successful first phase of the Metro Rail Transit saw the establishment of two metro lines – the Red line and the Orange line – that have been effective in shifting usage away from other transit modes – primarily private cars and motorcycles – and have set the foundation for further sustainable transportation initiatives in Kaohsiung.

City leadership has been instrumental in overcoming the challenge of providing sustainable transport options within a context of rapid urban development and expansion. This context is further complicated by the air quality and emissions concerns linked to the industrial legacy of the region, which includes steel, ship-building and petrochemicals. Nonetheless, the City has been committed to transforming the transport sector. Through initiatives such as the MRT, as well as innovative and sustainable transit offerings - which include an electric bus fleet, solar powered boats, solar powered bus stations and eco-friendly intermodal stations - Kaohsiung City has distinguished itself for its ambition and commitment to sustainable urban transportation.

The City has put concerted efforts into making a shift toward an ecomobile culture within the municipality: Kaohsiung City presently serves as the Chair of the ICLEI EcoMobility Alliance and hosted the 3rd EcoMobility World Festival from 1-31 October 2017. Through its effective policies and actions, Kaohsiung City serves as a model for any city that is interested in encouraging a cultural shift towards ecomobility.



Facts & Figures

Population
2,779,000 (2014)

Land area
2947.6 km²

Modal split (2017)
Walking: 4.5%
Bicycling: 5.4%
Public transportation: 7%
Taxi: 0.2%
Personal automobile: 20.5%
Motorcycle/scooter: 61.3%
Other: 1.1%



Kaohsiung City has been a member of ICLEI since 1996 & Chair of the EcoMobility Alliance from 2015-2018

Description of activities

Kaohsiung City has targeted public transportation as an area where significant increases in usage can be achieved. The City's efforts to integrate its various public transit offerings into infrastructure which enables increased cycling and walking reflects meticulous urban planning that is motivated by a people-centered perspective.

This emphasis on quality of life underpins the "Live Your Best Life in Kaohsiung" policy, which is being implemented by the Kaohsiung Bureau of Transportation. The policy seeks to achieve a cultural shift towards sustainable urban transportation through the promotion of green and sustainable transportation within the city. The policy has five major goals: integration, reliability, eco-mobility, efficiency, and networking.

Kaohsiung City leaders understand that achieving a cultural shift takes more than infrastructure. In this respect, awareness raising and education is a fundamental aspect of their strategy, and this is reflected in their commitment to high-profile events such as the EcoMobility World Festival and public outreach initiatives such as the formation of an Ambassador Advisory Committee comprised of 182 residents and community representatives.

Designing a comprehensive public transportation network

In order to provide a suite of low-carbon mobility options that could appeal to as large a segment of residents as possible, Kaohsiung City undertook the provision of an integrated public transport network which includes a range of modalities. The most notable among these are: Metro Rail Transit (MRT), Light Rail Transit (LRT), Bus Rapid Transit (BRT) and other bus-operated transit, and DRT (Demand Responsive Transit). When combined with the public bicycle-sharing system, the above systems represent a comprehensive public transportation network. Through such measures, the City officials have targeted raising the average number of people using public transportation to 1,160,000 people per day by 2030.

Metro Rail Transit (MRT)

With the ability to transport large numbers of passengers at high speeds, MRT is the centerpiece of the Kaohsiung rapid transit network. The MRT has priority 'right-of-way' throughout the Kaohsiung metropolitan area. In 2016, the two operational lines – the Red and Orange lines – received an average daily ridership of 172,400; this was the largest ever ridership for the MRT and represents 4.5 per cent growth from 2015. In order to deploy the MRT rapidly, the Red and Orange lines, which officially began operation in 2008, were constructed through a Build-Operate-Transfer (BOT) agreement. Meanwhile, the City purchased the physical and operational infrastructure, easing the way for the private consortium economically to advance the project further. The total capacity of the two lines is 966,500 passengers per day.

The City is planning to further develop its MRT network to provide even better coverage throughout the city. A new metro line, named the Yellow line, has been proposed to extend the area covered by the Red and Orange lines.

Light Rail Transit (LRT)

The Kaohsiung LRT (*Image 1*), also known as the Kaohsiung Tram, is a recent addition to the Kaohsiung public transportation network. Built, owned, and operated by the City, the first phase of LRT in Kaohsiung includes 8.7 km line serving 14 stations in-and-around the central business district. Construction on the first phase began in 2013 and has been completed in 2017. Following the implementation of the first phase, a second phase – totaling 13.4 km linked across 22 stations – will be integrated with the existing infrastructure in order to form a circular route. LRT in Kaohsiung is being designed to be free of overhead wires and provides a fast, safe and sustainable transport service in the center of the city.

Bus services

Kaohsiung's bus network is currently comprised of a total of 163 routes and 952 vehicles. These are subdivided into ten BRT routes, 15 main lines, 40 secondary lines, 96 local neighborhood bus lines, and five tourist lines.

In December 2013, the City completed a Bus Route Network Optimization Plan with the goal of ensuring that passengers receive comprehensive and frequent bus services. To support high service quality, user-trip planning is assisted by measures such as real-time bus information, interactive screens, a smartphone app, automated telephone system and transit websites. An increased number of shuttle-bus routes, which are designed to deliver passengers to a central transfer point so that they can make an onward journey, have also been implemented to provide further connectivity across the transport network.



Image 1: The catenary free Kaohsiung LRT provides service to the center of the city

Source: Kaohsiung City Government

The definition of comprehensive service has also been extended to inclusivity. To ensure that public transport services are accessible to all residents and visitors, including those with disabilities, the City has introduced a fleet of 145 rehabilitation buses.

In order to capitalize on the availability of low-carbon technologies and minimize transport related greenhouse gas (GHG) emissions, the City is looking to convert and substitute its existing fleet with electric buses. Kaohsiung City established its first fleet of electric intercity buses in 2013, when it introduced 11 low-floor electric buses. As of 2016, the City operates 27 electric buses across two express routes and one main route. The City is also utilizing fuel-efficient double-decker buses for its tourist lines to help further reduce GHG emissions.

During the EcoMobility World Festival in October 2017, two driverless minibuses that can accommodate up to 15 riders were open to the public. City officials see a potential future role for autonomous buses in providing shuttle service to MRT and LRT stations.

Demand Responsive Transit System (DRTS)

The Kaohsiung Transportation Bureau has recently launched its first DRTS. Currently operating primarily in remote areas, the system is designed to gradually replace buses with taxis, as the average load of buses in these areas is insufficient given the operating and environmental costs. Moreover, it also enables the City to provide service to rural areas that are less accessible to buses. As of July 2017, Kaohsiung's DRTS service has also pioneered the provision of night rides, which in some remote areas includes an "at-door drop-off" service.

Walking

Kaohsiung City is attempting to increase the modal split of walking within the city, specifically for short trips and within busy areas. In order to facilitate this shift, City officials have undertaken a number of initiatives aimed at making pedestrians in Kaohsiung feel safer. These include banning scooters from sidewalks in some areas and designating pedestrian walkways from motorized traffic and bicycle routes with green pavement (*Image 2*).



Image 2: Pedestrian-friendly 'green pavement' in Kaohsiung City

Source: Kaohsiung City Government

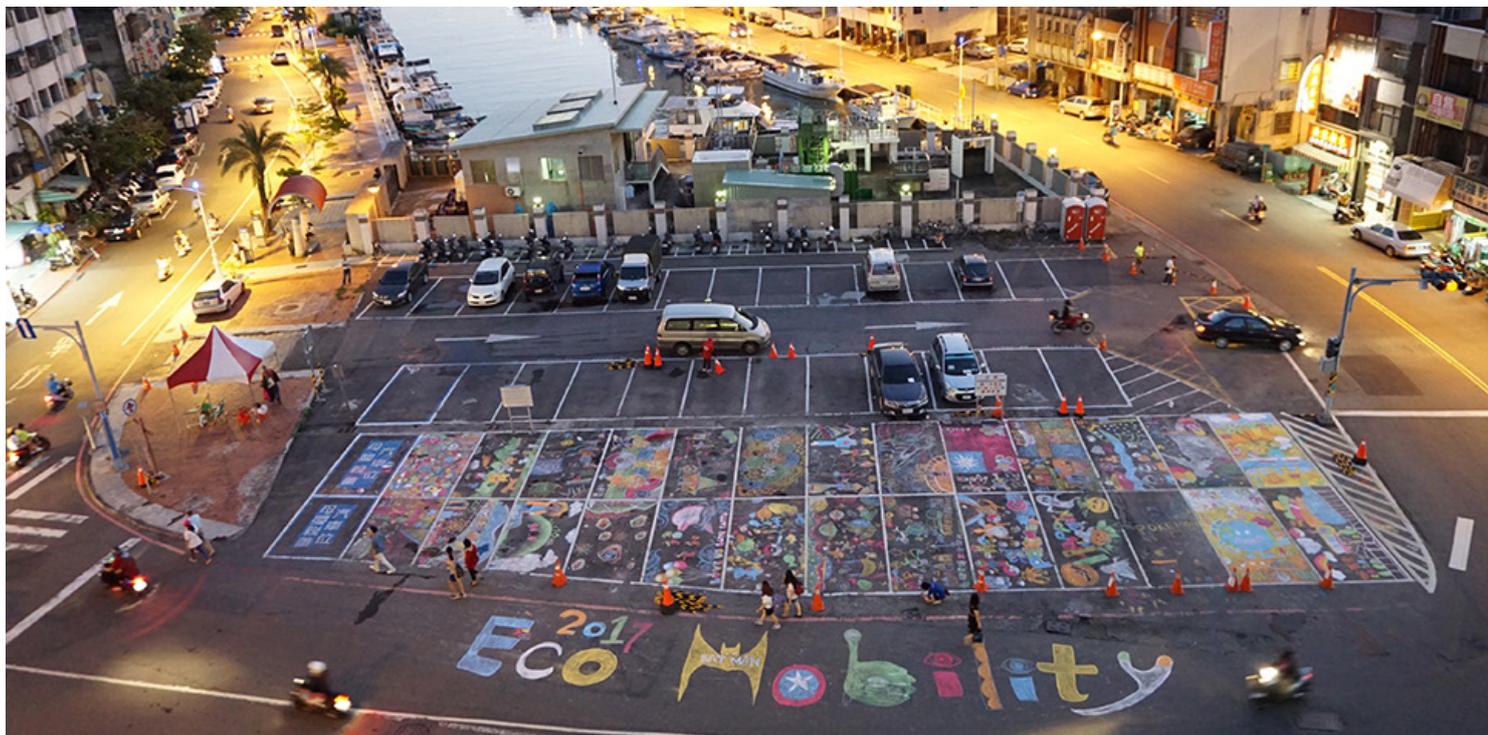


Image 3: Residents showing their spirit in anticipation of the 2017 EcoMobility World Festival

Source: Kaohsiung City Government

Cycling

Kaohsiung City launched its bike-sharing system in 2009. The system, known as C-Bike, is managed through a public-private partnership and currently consists of a fleet of 4500 bikes distributed across more than 160 rental stations. In addition to being an excellent form of sustainable transport, bike-sharing can also help to provide further connectivity to major nodes of the public transport network.

To further facilitate cycling as a preferred mode of transport, Kaohsiung City has expanded its network of bike lanes to 755 kilometers. This number is projected to reach 1,000 km by 2018, which should help the City expand upon the 5.4 per cent attributed to cycling within the current modal split. The City's efforts have not gone unnoticed; Kaohsiung has been internationally recognized as one of the "5 best biking cities in Asia" (CNN, 2010) and "10 bike-friendly cities around the globe" (Mother Nature Network, 2013).

Forthcoming actions: Facilitating culture change

The forthcoming actions planned by Kaohsiung City encompass a wide range of themes, attest to their ambition, and expand on the significant body of initiatives undertaken over the past decade. With significant infrastructure now in place, increased focus is being placed on facilitating a cultural shift towards ecomobile transportation.

EcoMobility World Festival 2017

Kaohsiung City hosted the 3rd EcoMobility World Festival, prepared in cooperation with ICLEI, from 1-31 October 2017 (*Image 3*). The month-long Festival was a *mise en scène* of the future of urban mobility, wherein participants experimented with creative ecomobile solutions aimed at creating more livable cities. The experience was designed to showcase the extent to which integrated, socially inclusive and healthy transport options can improve quality of life.

To facilitate this experience, the City transformed a historic urban area of Hamasen (Hamaxing) into a car-free area for one month. All motorized vehicles were removed from the neighborhood in order to provide a live demonstration of how cities can take a bold step towards a sustainable culture of urban transportation.

A legacy of the Festival and the EcoMobility World Congress (2-4 October 2017), are the Kaohsiung Strategies for the Future of Urban Mobility. They shall inspire local governments to transforming their transportation systems and address key mobility challenges of today and tomorrow..

Motorcycle replacement subsidy scheme

With more than 60 per cent modal share, motorcycles and scooters are an unmissable feature of the Kaohsiung cityscape. Kaohsiung City officials see this as segment where technological substitution can have a positive effect on transport related GHG emissions. Accordingly, they launched a trial replacement subsidy scheme for Hamasen under the umbrella of the EcoMobility World Festival. Under the Scheme, residents are encouraged to replace fossil-fuel-powered motorcycles with electric motorcycles or bicycles (*Image 4*).

Electric-car (K-Ecar) sharing system

In a public-private collaboration with Unicar Company, Kaohsiung City signed its first ever electric-car sharing contract on 25 May 2017. The service, which will be known as K-Ecar, will look to begin operations at a handful of locations within one year and has set an ambitious target of having 50 stations and at least 84 electric cars providing one-way rental service by 2019. Demonstration vehicles were showcased at the EcoMobility World Festival.

Improving the end-user experience

Measures to improve the design and function of bus and tram stop facilities are also underway. These include the installation of new cantilever bus shelters or temporary shelters for passengers and encouraging a greater number of artistic installations and performances to provide a more pleasant atmosphere in public transportation facilities. The City is also seeking to provide incentives and enhanced services for public transit riders, including facilitating the provision of fourth generation of broadband cellular network technology (4G) service at certain stations, offering complimentary test rides and providing iPASS card fare discounts.



Image 4: A resident of Kaohsiung trying out an electric scooter

Source: Kaohsiung City Government

Results

The number of public transportation users has increased consistently, and in 2016 the average daily ridership of the MRT exceeded 170,000 passengers for the first time ever. Annual increases in bicycle ridership have also been recorded, in large part because of the addition of the C-bike rental system (*Image 5*) and improvements to cycling infrastructure within the city.

The development of rapid transit systems – and the MRT system, in particular – has significantly shortened the commuting and traveling time of both residents and visitors, and allows them to experience a safe, reliable, convenient and comfortable transport service. The establishment of additional rapid transit systems - including BRT routes and metro systems - along with the development of a circular LRT network around the CBD of Kaohsiung has further supported the shift towards sustainable transport and has gone a long way to profiling the city as both a regional and global leader in sustainable transportation.



Image 5: Need to get around town? Rent a C-Bike!

Source: Itzel Obregon - ICLEI World Secretariat

This status as a global leader is a position that Kaohsiung City has actively set out to achieve. The City is currently the Chair of the EcoMobility Alliance, a network of advanced cities with the common goal of creating and implementing urban mobility strategies that prioritize people and the environment. Through participation in the Alliance, Kaohsiung displays leadership, accountability, and commitment to sustainable transportation, and engages in peer-to-peer learning and exchange with other committed and ambitious local and regional governments.

The EcoMobility Alliance has distinguished itself as a global actor through both the origin and nature of its members and its geographical scope. As of October 2017, the EcoMobility Alliance consists of 22 Alliance Cities, various Alliance Partners, and is maintained by a Secretariat that is hosted by ICLEI. On a rotating basis, one of the Alliance cities acts as the Alliance Chair and hosts the Chair Office, which plays an important function for both representation and coordination. www.ecomobility.org/alliance

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Challenges and lessons learned

The significant investments in infrastructure and services which Kaohsiung City has made over a relatively short period of time have necessitated the need for innovative financing models. The first phase of the MRT, the Red and Orange lines, was initially approved in 1991, but failed to move forward because of disputes between the Kaohsiung City and Kaohsiung County governments.

Approaching the construction of the MRT through a BOT agreement enabled the City to acquire the capital investment necessary to get the project off the ground. Now that the feasibility of MRT in Kaohsiung has been established, Kaohsiung City has been able to work alongside higher levels of government to co-finance the Blue line expansion.

The persistent use of personal motorized transportation, specifically motorcycles and scooters, remains a primary challenge for the City. While the provision of sustainable transportation choices is necessary to shift user preferences, Kaohsiung City and the Kaohsiung Bureau of Transportation must strike a balance between affordable pricing schemes and generating sufficient revenue for continued service delivery and development.

Although a significant amount of the effort towards creating a culture of sustainable transport has been centered on awareness-raising campaigns and incentive measures, the City has also demonstrated its willingness to use disincentive measures. One example is the implementation of parking fees near public transport stations, which has subsequently resulted in a 15 per cent increase in total ridership.

The City is further targeting the challenge and opportunity of parking management reform by developing a range of strategies to increase parking supply. These strategies outline the City's strategic perspective on parking lots, parking-pricing and implementation of relevant traffic control measures. Short-term solutions include building off-street parking lots on idle public lands, increasing roadside parking spaces, coordinating with local schools and adjusting parking rates. The intended result of these strategies will be to increase the road space available for pedestrians and bicycles.

References and further reading

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