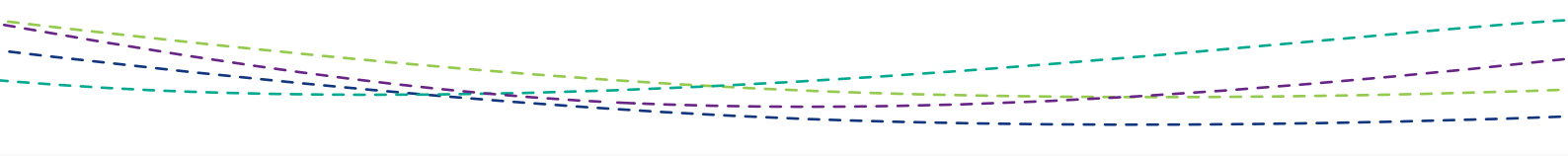


## **SOLUTIONS** in Asia

Urban mobility needs, policy barriers and the uptake of sustainable solutions in Asian partner countries



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## EXECUTIVE SUMMARY

Cities around the world have a need to establish sustainable transport systems, to provide efficient and safe mobility for their citizens with minimal environmental impacts. With limited opportunity to build new infrastructure, many cities need to increase the efficiency and capacity of their transport systems and are turning to innovative and technically advanced systems to contribute to this objective.

The take-up of urban mobility and transport solutions between global regions is particularly challenging as socio-economic conditions and policy frameworks differ substantially across the regions. Within Europe, a number of projects have successfully demonstrated take-up between cities, which confirms the value of collaborative learning and exchange of experiences within different cultures and planning practices.

Cities, regions and countries around the world often share similar urban mobility challenges with some cities being more or less progressive than others. While there are advantages to sharing best practices, examples and lessons learnt, it is beneficial for city officials and other relevant stakeholders to have a robust methodology in place, which they can follow to implement and harmonise successful urban mobility policies, measures and technologies.

### India

Over the last decade, cities across India have witnessed rapid urbanisation resulting in excessive motorisation. With over 15 million cars in India in 2015, car ownership in several cities like Delhi, Bangalore, and Chennai is now more than 100 cars per 1,000 inhabitants. While overall car ownership is low compared to other cities around the world, even the current levels have resulted in severe congestion and a deteriorated urban environment including road fatalities, air pollution, greenhouse gas (GHG) emissions, economic loss and so on. Among the major port cities of India, Kochi, on the western coast, is representative of other Indian cities in the urban mobility challenges it faces. Like other Indian cities, Kochi also has, until recently, lacked a single transit authority and has relied on multiple institutions to efficiently manage its transport needs.

The city, however, has recently benefitted from two developments. First, India's central government chose it as a Smart City, in a scheme where participatory funding arrangements support regional governments in developing urban infrastructure. Second, the city's metro rail authority was appointed as the agency for coordinating all transport development projects in Kochi.

Such developments have enabled the city to prioritise sustainable mobility to manage its growing transport demands. This project, having assessed Kochi's transport needs, constraints and financial support, developed comprehensive transport strategies for the city's corporation. These strategies stressed, among other objectives:

- The need to decrease the burden imposed by private vehicles
- Imposing restrictions on vehicles entering central area roads to create walkable spaces
- Managing parking in the city in conjunction with efficient public transport as an alternative
- An integrated approach to land use and planning
- Building the capacity of concerned public institutions on urban transport issues

### China

In China, like in neighbouring India, car ownership is rapidly increasing. The growth of the urban population is therefore accompanied by a deterioration of air quality and increased congestion.

SOLUTIONS recognised that investing in road infrastructure has only increased the demand for motorised travel, moving away from China's traditionally more sustainable travel modes such as walking and cycling. With health hazards caused by bad air quality gaining media coverage and public attention, the country has sought to regain this traditional modal share or increase it. In addition, the need to increase public transport, invest in electric vehicles and limit motorised vehicle demand has been gaining acceptance.

To enable the country to meet these objectives, SOLUTIONS focused on the transferability of urban transport solutions from Europe and elsewhere to China. The project recommended:

- Increasing electric vehicle usage with the development of standards and enabling infrastructure
- Assessing the transferability and implementation of road-user charging schemes
- Implementing Bus Rapid Transit (BRT) projects
- Exchanging knowledge on Sustainable Urban Mobility Plans (SUMPs) and capacity-building

## INTRODUCTION

In December 2015, government representatives from around the world met in Paris for the 21<sup>st</sup> annual Conference of the Parties (COP) in order to review the implementation of the United Nations Framework Convention on Climate Change. The conference, known as COP21, reached, for the first time in over 20 years of UN negotiations, an unprecedented, legally binding and universal, agreement on limiting global warming to 1.5°C.

To meet the target, all countries will need to take important decisions and adopt actions for reducing their greenhouse gases emissions, the large majority of which are energy-related carbon dioxide (CO<sub>2</sub>) emissions. Reducing energy consumption and improving efficiency is one of the most effective ways of reducing emissions at a global level, which, in 2012<sup>1</sup>, reached approximately 34.5 billion tonnes annually.

The transport sector must play an immense role towards meeting the aforementioned target, as it accounts for almost 21% of global CO<sub>2</sub> emissions. The UN Secretary-General, Ban Ki-moon, also highlighted the importance of the sector earlier in 2015, issuing a challenge to “reshape the world’s transport systems” and “find new green solutions”.

Several cities around the world have successfully implemented sustainable urban mobility measures to enhance the efficiency of their urban transport systems, address major environmental challenges and improve the quality of life for their citizens. The local knowledge and experience gained by implementing such solutions is useful and significantly beneficial for other cities interested in introducing similar, positive changes.

The **SOLUTIONS in Asia report** – one of three regional project publications – presents the key findings from the assessment of urban mobility conditions in Brazil and China. The project conducted personal interviews with selected officials from these countries before hosting dedicated workshops where, together with participants, it discussed and assessed the local and national policy frameworks related to sustainable urban mobility and evaluated the transferability potential of mobility solutions. This report outlines the main urban mobility needs, policy barriers and drivers, and the consequent recommendations.

### THE SOLUTIONS PROJECT

The Sharing Opportunities for Low carbon Urban transporTation (SOLUTIONS) project aims to support the exchange of innovative and green urban mobility solutions between cities from Europe, Asia, Latin America and the Mediterranean. The project brings together a wealth of experience and technical knowledge from international organisations, consultants, cities and experts involved in transport issues and solutions.

The project’s overall objective is to make a substantial contribution to the uptake of innovative and green urban mobility solutions across the world, by facilitating dialogue and knowledge-exchange, promoting successful policies, providing guidance and tailored advice to city officials and fostering future cooperation on research, development and innovation. Project activities are organised around following six themes:

- Public transport
- Transport infrastructure
- City logistics
- Integrated planning / Sustainable Urban Mobility Plans
- Network and mobility management
- Clean vehicles

For more on the SOLUTIONS project, visit:  
[www.urban-mobility-solutions.eu](http://www.urban-mobility-solutions.eu)

The European Union and China recognise urban development as one of the key challenges for cities in the coming years, and “green” mobility as a key component of urbanisation. The SOLUTIONS project aims to facilitate exchange between EU countries and China in this field.

As part of the project, the European Commission Directorate-General for Research and Innovation and the China Center for Urban Development of the National Development and Reform Commission of China organised an EU-China workshop in May 2013 in Foshan, China, examining energy, mobility and urban planning.

<sup>1</sup> [European Commission Joint Research Centre](#) (2013)

The workshop revealed a growing recognition in many Chinese cities that focusing on rapid road infrastructure expansion shifts away from China's traditionally more sustainable mobility patterns and modal shares, and which also results in increased energy consumption in the Chinese transport sector. This more expensive strategy increases travel costs and GHGs, results in deteriorated air quality and increases social costs from accidents. The workshop identified five particular areas for EU-China cooperation:

- Clean vehicles
- Network management and road-user charging
- Public transport
- Non-motorised transport
- Integrated planning and Sustainable Urban Mobility Plans

Future cooperation between the EU and China on sustainable transport policies should aim to identify the way in which a number of factors influence the transferability of sustainable transport measures, as there is a critical difference between a policy's potential and the extent to which this potential can be exploited. It also aims to disentangle the relationship between key socio-economic and institutional factors that affect measures' transferability.

Transferability depends on the characteristics of the measures themselves in relation to the specific context of the target city. This means that often there is no alternative to testing the transferability and the feasibility of implementation for each measure to the specific social, economic, environmental and political conditions in China and the EU, adapting them where necessary along the way.

For India, the study recognises the on-going efforts in Kochi of various agencies like Kochi Metro Rail Limited (KMRL) and learns from it. The project identified China's Hangzhou as a city Kochi could pair up with and learn from, and thus transfer Hangzhou's knowledge on sustainable transport

solutions to Kochi. Some key activities carried out during the study activities include:

- Introductory meetings with Kochi (including the KMRL) in October 2013
- A three-day visit to Hangzhou in November 2014 to learn about the city's initiatives
- An international technical workshop in March 2015 in Kochi to introduce city officials and departments to some best practices documented in the SOLUTIONS project.
- A visit by Hangzhou representatives to Kochi in August 2015

As multiple organisations are responsible for transport activities in Kochi, it was imperative to involve representatives from all relevant departments during the planning process of proposed measures and to implement a knowledge-sharing agenda. Over the duration of SOLUTIONS' involvement with the city, there were also a number of developments that affected the project. These were:

- National elections: February - May 2014
- Local elections: June - September 2015
- State elections: April - May 2016

Another interesting development was the launch of the Smart Cities Mission programme in June 2015 for which Kochi was selected in January 2016. The German government has offered to technically support the Smart Cities activities in Kochi.

## IDENTIFYING URBAN MOBILITY SOLUTIONS

The SOLUTIONS project consortium consists of leading climate, mobility and transport experts from local authorities, consultancies and research institutes. All project partners have vast experience and expertise from working on sustainable urban mobility projects all over the world.

At an early stage of the project, the SOLUTIONS team identified and reviewed a large collection of sustainable urban mobility solutions, evaluating their transferability to cities in Asia, Latin America and the Mediterranean region.

These were then "clustered" in six thematic areas and prioritised according to their relevance and transferability. However, it proved difficult to allocate some solutions into to a single cluster, as there were significant overlaps with other clusters.

Following an evaluation, SOLUTIONS produced the following final six thematic clusters, listed below (Table 1) together with their respective urban mobility measures and solutions.

**Table 1 - SOLUTIONS thematic clusters and respective urban mobility measures and solutions**

| 1. Public transport                           | 2. Transport infrastructure              | 3. City logistics                            | 4. Integrated planning/SUMPs | 5. Network & mobility management | 6. Clean vehicles                                      |
|---|--|--|------------------------------|----------------------------------|--|
| BRT systems                                   | Dedicated bus lanes                      | Urban deliveries with cargo-cycles           | Stakeholder participation    | Parking management               | Registration restrictions / number-plate auctions      |
| Trolley bus systems                           | Intermodal interchanges                  | Low Emission Zones                           | Institutional cooperation    | Access restriction               | Managing electric two-wheelers                         |
| Metro systems                                 | Pedestrian infrastructure                | Forums, portals, labels & training           | Measure selection            | Traffic management               | Fuel economy / CO <sub>2</sub> standards               |
| Alternative-fuelled public transport vehicles | Non-motorised infrastructure             | Pick-up point networks                       | Monitoring and evaluation    | Multimodal journey planning      | Switching fuels: taxi fleets to EVs                    |
| Electric and hybrid public transport vehicles | Innovative, safe cycling infrastructure  | Vehicle and operation restrictions           |                              | Cooperative ITS systems          | Switching fuels: taxi fleets to LPG/ CNG               |
| ITS for public transport                      | Cycle highways                           | Urban Consolidation Centres                  |                              | Carsharing                       | Taxing vehicles based on emissions                     |
| Integrated public transport network planning  | Infrastructure for car- and bike-sharing | Reorganising municipal procurement           |                              |                                  | Clean vehicles in municipal fleets                     |
| Financing public transport                    | Pedestrianising city centres/ streets    | Rail/ waterways for urban freight deliveries |                              |                                  | Low Emission Zones                                     |
| Integrated fare systems                       |  | Urban truck lanes                            |                              |                                  | Informing about/ promoting clean vehicles              |
| Eco-driving for professional drivers          |  | Pricing measures                             |                              |                                  | Infrastructure for clean vehicles                      |
| Bus priority measures                         |  |  |                              |                                  | Clean modes of delivery in urban areas                 |
| Bike-sharing/ public bicycles                 |  |  |                              |                                  | Replacing private cars / motorcycles with clean models |



## CHINA

### NEEDS, GAPS AND PRIORITIES

The third largest country in the world, and the most populated, China has seen a rise in its population density and urban population. Several large Chinese cities were involved in the SOLUTIONS project, namely Beijing, Foshan, Hangzhou, Harbin, Shanghai, and Zhongshan.

Air quality is a big concern among Chinese officials. The general public is also showing growing interest in air quality issues, partly due to extreme situations in major cities (especially Beijing), but also by recent revelations of food and water quality standard compromises. National and local authorities are at pains to ensure they pursue efforts to reduce the emissions of local air pollutants. Some 200 Chinese cities are investigating potential Low Emission Zones. Congestion and air quality are already significant issues in many cities and are at the top of the agenda for most city officials working on urban mobility. As a result, many cities have already invested substantially in traffic and transport infrastructure, although the media strongly influences citizens with its perception of global models and success; many aspire to purchase their own car.

The shift from China's traditionally more sustainable mobility patterns and modal shares towards a rapid road infrastructure expansion creates more demand for motorised transport. This is expensive approach which increases energy consumption in the Chinese transport sector. Furthermore, the strategy increases travel costs and GHG emissions, results in deteriorated air quality and to increased social costs from accidents.

The realisation is growing that the demand-driven approach to transport planning will not deliver sustainable mobility and that cities need more innovative solutions.

### POLICY BARRIERS AND DRIVERS

With air quality being the greatest issue, the discussion in the Chinese workshop on clean vehicles had an important role, and focused on electric cars and two-wheelers – predominantly battery electric vehicles (BEV) and plug-in electric hybrid vehicles (PHEV) – along with the adoption of various other fuel options, such as compressed natural gas (CNG), liquefied natural gas (LNG) and biofuels. China has a strong interest in electric mobility and is already the world's largest producer of electric two-wheelers.

There is rapidly growing interest in developing infrastructure and systems for sustainable transport modes such as walking and cycling. China traditionally had a very high

#### COUNTRY PROFILE: CHINA



**Population:** 1.364 billion (2014)<sup>2</sup>  
**Area:** 9,596,961 km<sup>2</sup>

modal share of cycling; the current challenge is to maintain or regain this share. To facilitate this requires accessible and safe cycling infrastructure and supporting measures. With more cars on the road, safety issues associated with cycling also increase.

Providing and/or improving the attractiveness of modal alternatives – such as public transport, walking and cycling – is paramount in achieving high modal shares for these modes, limiting road-transport demand, and thus improving the transport system's overall sustainability. Ensuring slow but free-flowing traffic using Intelligent Transport Systems, combined with other demand-management measures is an area of mutual interest for the EU and China.

Another measure discussed both for improving the attractiveness of several modal alternatives and to regain the very high share of cycling was bike-sharing. Based on European concepts, many Chinese cities are establishing systems within a very short time-frame, yet at very high level of quality and quantity. A number of cities in China such as Zhongshan, Hangzhou and Foshan, have introduced bike-sharing schemes based on the Parisian model.

Several Chinese researchers and city officials mentioned a growing interest in Light Rail Transit (LRT) as a logical next step from Bus Rapid Transit (BRT); some of the key

<sup>2</sup> <http://data.worldbank.org/country/china>



infrastructure, such as dedicated lines and high-capacity stations, is already in place as part of the BRT system. However, the operational funding of these systems is a key problem for public transport services in Chinese cities. The infrastructure cost is less problematic, as loans from domestic banks are readily available and land sales provide a sizeable income for infrastructure investment. The exchange between cities in Europe and China could cover not only technology and policy issues, but also operational and funding structures.

Since a systemic approach to mobility policy and planning is gaining recognition among Chinese mayors, the Sustainable Urban Mobility Plan (SUMP) concept presented in the workshop was well received; a number of Chinese researchers and city officials acknowledge the need to adopt a more participatory planning approach and emphasised the opportunity for exchanging knowledge between Europe and China in this area.

**SOLUTIONS AND RECOMMENDATIONS**

China has significant potential to reduce how much energy vehicle fleets consume by using existing technologies. One example is electrification to allow more efficiency gains, in particular optimised logistics, consolidation centres and last-mile distribution using low-emission vehicles. Another is non-motorised transport from a variety of perspectives, including both soft (e.g. awareness-raising and driving behaviour/attitudes) and hard measures (e.g. infrastructure design) - although more research is required.

BRT is well adapted to large, dense cities where it can accommodate for lots of travellers. Experience with such systems from the UK and France is available and can transfer to China after adapting to Chinese conditions. Public transport, in particular BRT, will be a key topic in the exchange between Asian, European and Latin American cities.

To improve the attractiveness of modal alternatives and reduce energy consumption, it is important that measures such as congestion charging, parking policies, and additional travel demand management and energy efficiency improvements complement traffic management systems. Such measures could include improving the public transport system to make it a more reliable and affordable alternative to cars, coupled with measures targeting the car-fleet's efficiency, traffic management systems and road-user charging schemes. By using IT systems that prioritise public transport at traffic lights, introducing smartcard ticketing, managing parking and creating car- and bike-sharing schemes, preferred transport modes can be more attractive and efficient.

Cities can also improve the energy efficiency of their vehicle fleets by adopting technology and policy tools. Local solutions, such as the plate quotas from Beijing and Shanghai, and national and supra-national measures from Europe, such as registration taxes and feebate schemes, are also promising.

There are a number of resources regarding designing and implementing sustainable mobility measures available to

Public transport, in particular Bus Rapid Transit, will be a key topic in the exchange between Asian, European and Latin American cities

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city officials. In Europe, platforms such as the Transport Research & Innovation Portal, Eltis or CIVITAS are very popular for exchanging knowledge. Chinese cities have already contributed to Eltis by translating European experiences and by submitting Chinese experiences to the website. SOLUTIONS will facilitate the continuation of this exchange.

Similar approaches could further tap into Chinese knowledge and experiences and support intra-Chinese exchange, but also to allow European cities to further learn from China. While these knowledge platforms only provide a high-level assessment of measures and their implementation, this already provides some very valuable insights. The adaptation of policies to the specific conditions in a city is the next necessary step toward fostering adoption.

For research and exchange funding, having definite discussions with Chinese counterparts about existing programs and their structures are very important. As a next step, harmonising these programs with the European Union's Horizon 2020 programme, and most likely vice-versa, would be very desirable. In addition, evaluating proposals and reciprocity would be very helpful if joint collaboration is to remain at the same quality as current similar EU FP7 projects in cooperation with Chinese partners and even more so if research cooperation is to be intensified.



Image: Bradley Schroeder | Flickr | CC BY-SA 2.0

Based on European concepts, many Chinese cities are establishing bicycle-sharing systems within a very short time-frame, yet at very high level of quality and quantity

Specific, transferrable measures that Chinese cities can consider implementing to tackle their urban mobility problems are listed below:

| Measure                                      | SOLUTIONS Factsheet* |
|--|----------------------|
| <b>Public transport</b>                      |                      |
| BRT systems                                  | 1.1                  |
| ITS for public transport                     | 1.6                  |
| Integrated public transport network planning | 1.7                  |
| Bus priority measures                        | 1.11                 |
| Bike-sharing and public bicycles             | 1.12                 |
| <b>Transport infrastructure</b>              |                      |
| Dedicated bus lanes                          | 2.1                  |
| Intermodal interchanges                      | 2.2                  |
| Pedestrian infrastructure                    | 2.3                  |
| Innovative and safe cycling infrastructure   | 2.5                  |
| Pedestrianising city centres and streets     | 2.8                  |
| <b>City logistics</b>                        |                      |
| Low Emission Zones                           | 3.2                  |
| Forums, portals, labels and training         | 3.3                  |
| Pick-up point networks                       | 3.4                  |
| Vehicle and operation restrictions           | 3.5                  |
| <b>Integrated planning / SUMPs</b>           |                      |
| Stakeholder participation                    | 4.1                  |
| Institutional cooperation                    | 4.2                  |
| Measure selection                            | 4.3                  |
| Monitoring and evaluation                    | 4.4                  |
| <b>Network &amp; mobility management</b>     |                      |
| Parking management                           | 5.1                  |
| Access restriction                           | 5.2                  |
| Traffic management                           | 5.3                  |
| Carsharing schemes                           | 5.6                  |

\* SOLUTIONS Factsheets are available on [www.urban-mobility-solutions.eu](http://www.urban-mobility-solutions.eu)

## INDIA

### NEEDS, GAPS AND PRIORITIES

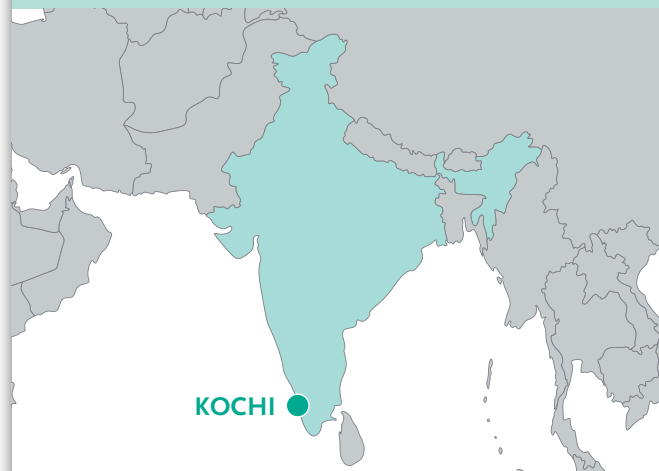
The second most populated country in the world, India has one of the largest urban systems and some of the most populated cities in the world. Kochi, one of the major ports in India, is located along the Arabian Sea and is the second most important port city on the western coast of India (the first being Mumbai). The city is well connected to other parts of the country with air, road, rail, and waterway connections. The port has influenced the location of number of large-scale industries around the city.

The population of the Kochi urban agglomeration (UA) has grown rapidly over the past 30 years - 38% from 2001 to 2011. Kochi comprises an area of 95 km<sup>2</sup> (municipal limits); the UA spans 331 km<sup>2</sup>. The densest part of the city is along major arterial roads, but Kochi has grown in largely unplanned fashion, with major growth along the key arterial highways towards the east.

While historically Kochi mainly depended on walking, cycling and inland water transport, and the city centre has a dense fabric of streets where walking is still prevalent, the outward expansion of the city has led to an increase in travel distances and higher demand for motorised mobility. The use of personal vehicles is expanding rapidly (vehicle ownership grew by 12.2% from 2002 to 2012) with declining use of public transport and increasing income levels. Trips for work and education comprise of 73% of total trips made in the city. Although public transport users and pedestrians account for 60% of all trips, there are few dedicated pedestrian facilities in the city and a complete absence of cycling facilities. Most roads have no defined footpaths, and where they are present, they are either poorly maintained or encroached upon by parked vehicles. People often have to walk on the carriageway on narrow roads immediately next to motor vehicles, risking their safety.

The increase in capacity and the improvement in quality of the transport system has not been compatible with transport demand, which is always increasing the need for both for road space and parking, and it is difficult to depend only on road- and car-based transport options and solutions. The rate of growth in private vehicle ownership, combined with the inadequate road network is unsustainable, and with this increase in the dependency on private vehicles, traffic on most of the road network in Kochi has been experiencing delays, which in turn affects the fuel economy of public and private vehicles. With the increasing demand for road space and narrow road widths, Kochi UA is in a difficult position in developing cost-effective transport infrastructure.

#### COUNTRY PROFILE: INDIA



Population: 1.295 (2014)<sup>2</sup>  
Area: 3,287,590 km<sup>2</sup>

Bus transport plays a vital role in meeting the travel needs of city population and together with ferries and auto-rickshaws largely meet the demand for public transport in Kochi. However, the existing public transport system has insufficient capacity for the interurban and suburban routes, as a result of the unhindered development of vast areas as urban extensions, unscientific planning in urban infrastructure development, and the absence of proper links to various forms of transport. Furthermore, the absence of bus bays and supporting infrastructure also causes buses to stop haphazardly, which is a concern for passengers and other drivers.

Likewise, as for other cities in India, planning, implementing and maintaining city transport facilities in Kochi involves multiple agencies. The local governments in Kerala state enjoy some degree of autonomy and have direct control over the developments; however, the state or national government usually controls larger infrastructure projects. While 64% of the land given to roads is for local streets which the Kochi Municipal Corporation maintains, the responsibility for the rest lies with other departments like the public works department, national highways, and Greater Cochin Development Authority.

In July 2012, the state government approved a metro rail project for Kochi, together with integrated water

<sup>3</sup> <http://data.worldbank.org/country/india>

transport, and created the Kochi Metro Rail Corporation (KMRL) to complete it. The KMRL acts as the umbrella transport authority for the city, coordinating all transport improvement projects in the city. A sovereign loan from the French Development Agency funds the metro rail project, while KfW, the German government-owned development bank, is financing the integrated water transport project.

### POLICY BARRIERS AND DRIVERS

Planning reforms at city level are mainly developed under master planning process; the city development plan, revised every 5 years, outlines the structure for various projects to be planned and implemented. Individual detailed project reports are mandatory for prioritised projects.

The key barriers to any strategy are finance, public acceptability and concerns of the public. Urban development schemes led by the national government have been supporting governments to improve their infrastructure through participatory funding.

However, urban transport in Kochi is fragmented, with different departments involved in a single urban transport project, and the coordination between departments further delays the planning and implementation process. In the case of Kochi, the KMRL acts as a unified metropolitan transport authority, minimising institutional barriers.

Temperatures in Kochi also vary by season. The humidity, in particular, can have a negative impact on people using non-motorised transportation (NMT). As such, transport infrastructure should include green cover and shade where possible to protect people from sunlight and humidity.

Kochi's recent selection as a Smart City by the national government as part of their Smart Cities Mission programme could provide support to sustainable mobility in the city. As part of the application, Kochi included major components of a NMT network and bike-sharing in selected areas of the city. It also proposed developing the Vytilla Mobility Hub that will connect the metro corridor with the proposed water transport network to facilitate interchange and better mobility across the city.

Bus transport plays a vital role in meeting the travel needs of city population and together with ferries and auto-rickshaws largely meet the demand for public transport in Kochi







## SOLUTIONS AND RECOMMENDATIONS

Based on an assessment of high-priority transport needs, insight gained through meetings with diverse group of stakeholders and timely inputs from various partners as part of project, the project team developed a comprehensive set of transport strategies for Kochi. The proposed strategies and measures address Kochi’s overall goal to establish a more balanced multi-modal transport network. They are intended to help Kochi move toward and retain the share of public transport and walking, improve facilities for cycling and other sustainable transport modes, and complement the city’s ongoing efforts to improve its transport system.

The SOLUTIONS proposed strategy can be summarised as follows:

1. The major emphasis should be reducing the burden imposed by private vehicles
2. High priority for public transport projects, local funding availability for all such modes
3. Imposing curbs on vehicles entering central roads, provide dense public transport network and create walkable and barrier free public spaces
4. Parking management through dynamic pricing complemented with better public transport to provide a viable door to door option
5. Understand and facilitate alternative last mile options, such as bike sharing and clean technology IPT modes.
6. Regular update of transport studies to understand developments in travel demand
7. Adopt an integrated approach to land use and transport planning
8. Capacity building of municipal officials and other involved departments on urban transport issues

A clear implementation direction and policy approach is required to take up the measures proposed under the project. The key steps proposed to support the further engagement and implementation process are:

- Carry out further engagement with the municipal corporation, KMRL officials and other stakeholders that can be included in the process
- Provide technical assistance for implementation support to the municipal corporation and KMRL if they agree to take up any pilot demonstrations of proposed measures which can be taken as separate component

- Support can be extended to gaining support from potential funders to develop terms of reference to implement prioritised measures such as bike-sharing, on-street parking management and clean vehicles.
- Facilitate further interaction with leading city (Hangzhou).

Specific, transferrable measures that Indian cities can consider implementing in order to tackle their urban mobility problems are:

| Measure                                      | SOLUTIONS Factsheet* |
|--|----------------------|
| <b>Public transport</b>                      |                      |
| BRT systems                                  | 1.1                  |
| ITS for public transport                     | 1.6                  |
| Integrated public transport network planning | 1.7                  |
| Bus priority measures                        | 1.11                 |
| Bike-sharing and public bicycles             | 1.12                 |
| <b>Transport infrastructure</b>              |                      |
| Dedicated bus lanes                          | 2.1                  |
| Intermodal interchanges                      | 2.2                  |
| Pedestrian infrastructure                    | 2.3                  |
| Innovative and safe cycling infrastructure   | 2.5                  |
| Pedestrianising city centres and streets     | 2.8                  |
| <b>City logistics</b>                        |                      |
| Low Emission Zones                           | 3.2                  |
| Forums, portals, labels and training         | 3.3                  |
| Pick-up point networks                       | 3.4                  |
| Urban Consolidation Centres                  | 3.6                  |
| <b>Integrated planning / SUMP</b>            |                      |
| Participation                                | 4.1                  |
| Monitoring and evaluation                    | 4.4                  |

\* SOLUTIONS Factsheets are available on [www.urban-mobility-solutions.eu](http://www.urban-mobility-solutions.eu)



## CONCLUSIONS

A master planning process develops city planning reforms; the city development plan, revised every 5 years, outlines the structure for various projects to be planned and implemented. Individual detailed project reports are mandatory for prioritised projects.

The key barriers to any strategy are finance, public acceptability and concerns of the public. Urban development schemes led by the national government have been supporting governments to improve their infrastructure through participatory funding.

The mobility challenges faced by cities in China and India, ranging from difficulties in the development of cost-effective transport infrastructure to health hazards due to the environmental deterioration caused by vehicular demand for urban roads, have made sustainable transport solutions desirable. In addition to improvements to public transport systems and improving the modal share of walking or cycling, these cities reflect a consensual need to restrict the entry of motor vehicles on their busiest or central thoroughfares.

Public concerns, institutional structures or finances have, in some cases, constrained the implementation of sustainable transport objectives. Cities in China and India need proven methods to address these and thus meet their mobility challenges. SOLUTIONS has worked towards addressing these challenges by assessing solutions from elsewhere – primarily Europe, Asia and Latin America – for use in regional settings.

The recommendations listed in this paper emphasise the role of public transport and other sustainable solutions in initially mitigating the detrimental effects of motorised transport and, improving the liveability of a city. The readily available solutions proven in other parts of the world make them ideal for a seamless transfer and to positively impact cities facing mobility challenges. In assessing transferability and enabling necessary change, SOLUTIONS is working towards a vision where the futures of Indian and Chinese cities are secured by sustainable mobility.

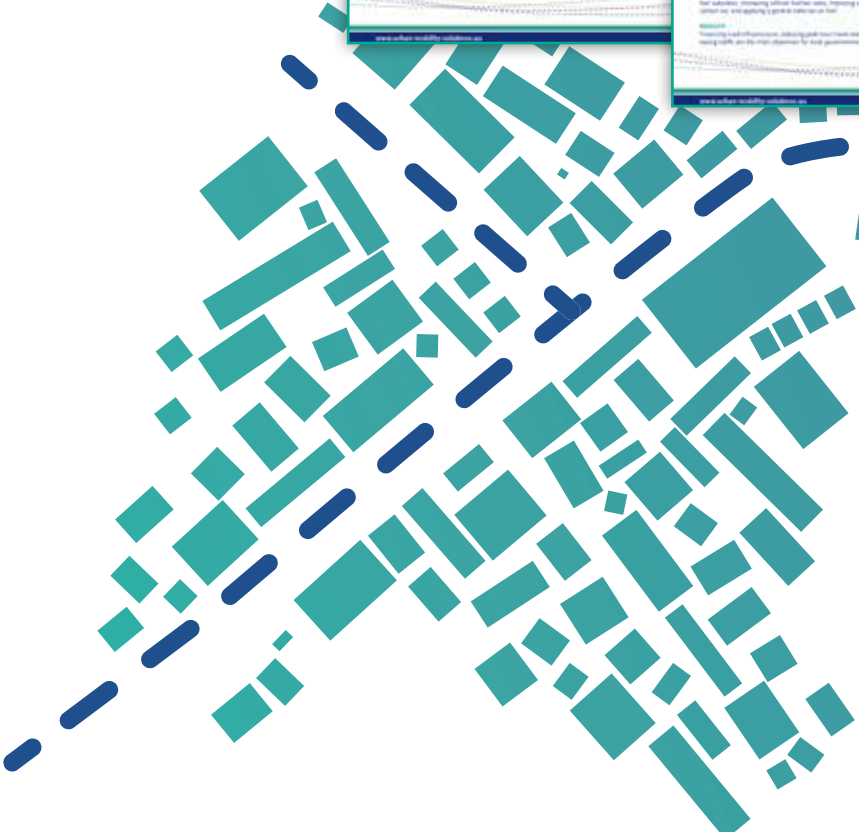




### SOLUTIONS Factsheets

The SOLUTIONS Factsheets examine a number of sustainable urban mobility measures and include a case study on cities that have successfully implemented them.

To see the database of factsheets, go to [www.urban-mobility-solutions.eu/resources/factsheets](http://www.urban-mobility-solutions.eu/resources/factsheets)



### SOLUTIONS Network

The SOLUTIONS Network keeps alive the valuable collaborations on sustainable urban mobility created during the SOLUTIONS project and helps deliver on the UN's Sustainable Development Goals, the Paris Agreement and the New Urban Agenda.

It will broaden the original project's partnerships by inviting additional organisations that are working on implementing sustainable urban mobility actions across the world, link their activities to boost their impact, and also create new partnerships to develop targeted concepts and pilot projects for sustainable urban mobility solutions.

To join or to find out more about this exciting new initiative, please contact the SOLUTIONS project coordinator, Oliver Lah: [oliver.lah@wupperinst.org](mailto:oliver.lah@wupperinst.org)

# SOLUTIONS: Sharing Opportunities for Low carbon Urban transportatION

Website: [www.urban-mobility-solutions.eu](http://www.urban-mobility-solutions.eu)



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## PARTNERS

The SOLUTIONS project consortium, consisting of partners from all over the world, brings together a wealth of experience and know-how from organisations, consultants, cities, research and technical experts involved in transport issues and solutions.



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