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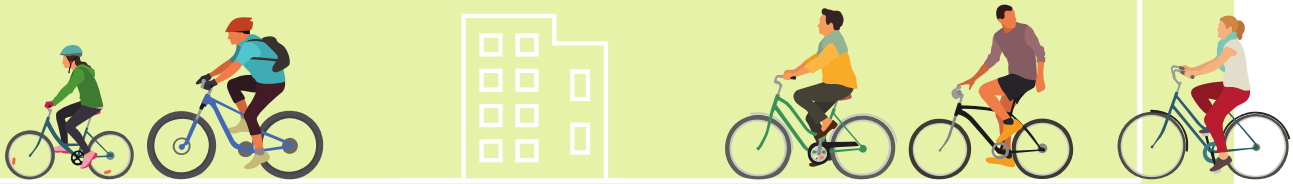

BIKING FOR THE FUTURE

A STUDY OF INTERURBAN CYCLING INFRASTRUCTURE AND HOW TO MOVE FORWARD

A PIARC SPECIAL PROJECT

PIARC

STATEMENTS

The World Road Association (PIARC) is a nonprofit organisation established in 1909 to improve international co-operation and to foster progress in the field of roads and road transport.

This report has been produced by HOE360 Consulting and Bruun Communication under a contract and supervision of PIARC.

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This report is available from the internet site of the World Road Association (PIARC): http://www.piarc.org

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Arche Sud 5° niveau
92055 La Défense cedex, France

International Standard Book Number: 978-2-84060-806-6

Front cover © Rikke Blicher / Graphic Designer

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- **Maria Jimenez**, Madrid City Hall, Spain
- **Martin Binder,** ASFINAG, Austria
- **Anna Fink**, Austria Gov. Community development, Austria
- **Frank Laufenberg**, BMDV, Ministry of Transport, Germany
- **Louis Carpentier,** Ministry of Transportation, Quebec, Canada
- **David Probert,** Welsh Government, Wales

The report is also standing on the shoulders of thought leaders, stakeholders and experts in the bicycle transportation industry and we want to thank all that helped with interviews and case studies;

- **Michael Langdon**, Australia
- **Joseph Ahissou**, Benin
- **Victor Andrade**, Brazil
- **Louis Carpentier,** Canada
- **Gong Fengqi** & **Xing Shi**, China
- **David Louis Uniman**, Columbia
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EXECUTIVE SUMMARY

2023SP02EN

BIKING FOR THE FUTURE

A STUDY OF INTERURBAN CYCLING INFRASTRUCTURE AND HOW TO MOVE FORWARD

Transportation and mobility are key drivers for prosperity and economic sustainability across the globe. But there is also a darker side to the story. In 2021, the global transportation sector produced more than seven billion metric tons of carbon dioxide ($GtCO_2$) and passenger cars are the biggest culprit, accounting for approximately 39 percent of the emissions.

This PIARC Special Project addresses a somewhat overlooked theme; "interurban cycling infrastructure", that may hold the key to mitigate some of these challenges. We believe that bicycling - often in combination with other means of transportation - has great potential to replace a substantial number of short and mid-range car trips as bicycles are by far the most eco-friendly way of transportation, alongside walking.

Investments in active transport modes such as cycling can bring significant benefits to people, communities and ultimately the planet via lower emissions, easier commutes, better health outcomes, improved road safety, better opportunities for social interaction and much more. Some of those elements are examined and unfolded in this special project.

Transforming cities, rural landscapes, roads, and old habits from a car-centric and (combustion) engine focused practice into a bike-friendly transportation culture is, despite the many good reasons for doing so, not easy at all. The case studies and interviews, we have conducted in this Special Project show, that although traffic planners, politicians, NGOs, local and national governments and super-national entities support and fund ambitious projects, such as the EuroVelo bike routes in Europe or the Route Vertes in Canada or the many recreational pathways in China, USA and Australia, the challenges often overcome the solutions - one of the greatest being budget allocation.

The vast majority of attention and funding is allocated to cycling in an urban context, which is possibly also more complex and expensive. Nevertheless any place (city, town or village) is interlinked with another place. Therefore improved insight into "interurban cycling infrastructure" could be a key component in the overall push for cycling, to which many countries around the world are increasingly devoting attention.

Transport has the highest reliance on fossil fuels of any sector and accounted for 37% of CO2 emissions from end-use sectors in 2021. ….. Getting transportation on track with the IEA's Net Zero Scenario requires implementing a broad set of policies, to encourage modal shifts to the least carbon-intensive travel options, and operational and technical energy efficiency measures to reduce the carbon intensity of all transport modes. - International Energy Agency

It's clear that "interurban cycling infrastructure" often is a trail or otherwise recreational route that happens to begin and end in populated areas or go through one. In most countries it's seldomly constructed for commuting or everyday cycling. Dedicated interurban cycling infrastructure is primarily seen in already popular cycling countries, such as Belgium, Denmark and The Netherlands.

EXECUTIVE SUMMARY

But our case studies clearly show that across the globe there is a rising awareness and push for more and better interurban cycling infrastructure; in some places connecting suburban neighbourhoods with downtown jobs, some two-digits kilometres away though a Mega city and in other places repurposing a public trail for daily commuters.

This special project looks at Interurban cycling infrastructure from a global perspective covering both Low and Middle Income Countries (LMICs) and High Income Countries (HICs). We have conducted 10 in-depth case studies, highlighting goals, challenges, solutions and benefits for a given project in a given country.

In combination with a general study of a series of other cases ("light cases"), projects, big data and literature, these 10 cases constitute the platform for our findings and recommendations for all stakeholders to interurban bicycle infrastructure. A special section speaks to the specific needs for LMIC countries.

For each of our Deep Case Studies, we have developed infographics with the main information about the specific country. The Cases can be read in their full length in the Appendix

CONTENTS

1. INTERURBAN CYCLING INFRASTRUCTURE AND WHY IT MATTERS

Cycling is not a new phenomena, it's rather a rediscovered transport mode. Throughout a great part of the 20th century, cycling was a dominant mode of transport. That began to change in the years after the Second World War, where a growing focus on individual car ownership and urbanization gained momentum.

Pre World War 2, cycling was widespread and the lyrics of Katie Melua's song 'Nine Million Bicycles' in Beijing, was a mirror of what cycling once meant to China. Many Chinese cities had a fair and widespread cycling network, which all eventually was removed to make way for car lanes in recent decades. In many places, you can still identify previous bicycle infrastructure, now faded and decommissioned, and this story can be told about a great number of countries around the globe. The good news is, that it may be easier to re-kindle bicycling in cultures, where bicycling was once the natural way of transportation. We actually found this to be true, when interviewing some of the Chinese bicycle experts of today.

Even renowned cycling cities, which after today's perception have very high numbers of cyclists, had more people bike-riding a generation or two back. For example the busiest street for cycling in Copenhagen, Denmark saw more than 60.000 people passing daily on bicycle some 60-70 years ago, hitting a low in the 1970's with less than 10.000 daily cyclists and today that place is passed by around 45.000 daily. This fluctuation is interesting, if you want to bring back the spirit of cycling to your community. Our case studies from Europe, Africa, Asia, Australia and the Americas show that is universal.

With increased numbers of vehicles and urbanization follows congestion, pollution etc, and for some, the quality of life comes under pressure. With growing awareness on sustainability and climate change, cycling has been rediscovered and is now increasingly viewed as one of the important tools in our future mobility. Some might even say they have fallen in love with the bicycle again.

According to the European Cyclists' Federation, the bicycle can help solve more than half of the UN 17 global goals for a sustainable future[1].

When it comes to the maturity and readiness to introduce more (interurban) cycling, countries and road administrations are in different states; with some at a “beginner’s level”, and others “in motion”. And then there are countries that are “well up and running” when it comes to cycling. In our survey amongst PIARC members and through literature reviews, interviews and big data investigations, we have come across a variety of goals, challenges, solutions and benefits, where each country and project is unique, but still with some common denominators.

Bicycling is as complex as other mobility solutions, although a bicycle in itself is a simple contraption. What adds especially to the complexity of interurban bicycling is the need to combine bicycling with other transport modes - cars, trains, metro, boats, buses - in a meaningful way. The more dense an area is (think Mega Cities - China has 18 cities with more than 5 M. inhabitants), the

[1] https://ecf.com/sites/ecf.com/files/The%20Global%20Goals_internet.pdf

more cycling is generally observed, whether a 1% modeshare or 20+%, but cycling that connects places and people is vital, both within a city and between cities.

But if one wants to have more cycling one must have cycling relevant infrastructure. And depending on your history, financial conditions and general starting point, the solutions to your challenges are different, depending on whether you are a Low and Middle Income Country (LMICs) or a High Income Country (HICs).

1.1. DIFFERENT SOLUTIONS TO DIFFERENT NEEDS

As mentioned in the previous section cycling needs relevant infrastructure. Often cities and states look at their urban centers and lay their focus there, which makes sense as the potential uptake in cycling is greater as distances are shorter and likely the density of people is high. But there is a huge potential in more cycling via "interurban cycling infrastructure", yet to be tapped into. And especially as e-bikes are gaining popularity in many countries, distance, topography and weather increasingly becomes less of a factor. And e-bikes have an impact on trip distances, as the average trip length for cycling is around 3 km in most European countries[2], but for e-bike users, the average trip length[3] is 11 km. An important point is that e-bikes also represent a possible economic barrier, as cost can be in the range of EUR1.500 upwards.

Interurban cycling infrastructure is the infrastructure allowing cycling from one urban center to another. This infrastructure can be segregated from the road infrastructure, as an independent bike-oriented platform, it can also be linked to the road infrastructure, as a bicycle lane in the road infrastructure, or it can be the regular road infrastructure where bicycles are also encouraged to use it.

Interurban cycling infrastructure is the fabric that glues places together, by interlinking one place with another place (city, town or village). Therefore improved insight into interurban cycling infrastructure could be a key component in the overall push for cycling, to which many countries around the world are increasingly devoting attention. At the same time it is important to ensure that infrastructure that connects places is integrated in the urban cycling infrastructure network. Otherwise it ends as a puzzle with missing pieces.

The urban centers can be from two different cities, or a city center and a suburban center, but to be considered as interurban, the itinerary needs to include road segments that go through the major cities or even outside the urban environment. **PIARC 2023**

Some countries have a well developed cycling infrastructure, including Interurban cycling. Below is an example from the Belgian city Ghent, where a cycle path leads towards the city.

[2] road-safety.transport.ec.europa.eu/

[3] sciencedirect.com/science/article/pii/S0965856415301865

Example of cycling path along river in Ghent, Belgium. Photo: HOE360 Consulting

1.2. CYCLING'S IMPACT ON TRAFFIC AND ROLE IN SOCIETY

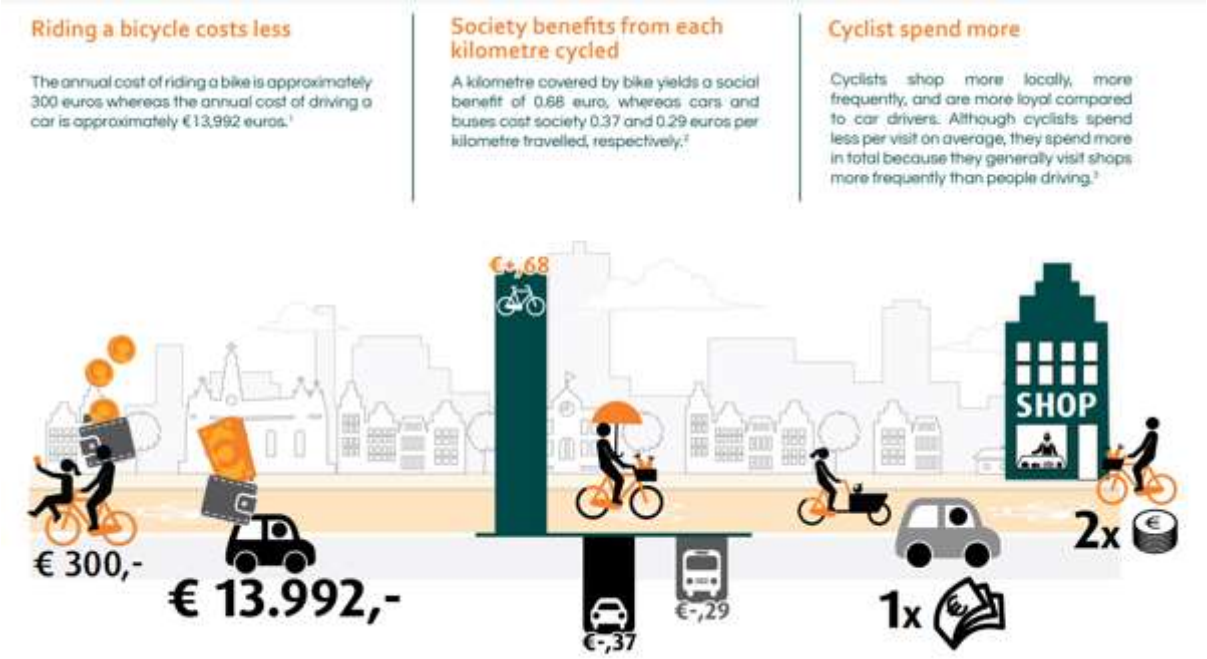
The impact and influence cycling has on traffic and society varies from country to country. Historically cycling has played a bigger role in most countries than currently. For example in the first half of the twentieth century, private vehicles were only for the very few and most wealthy households. The Post Second World War era saw a massive increase in vehicles and road construction.

Cycling is a very efficient people mover and a cycling lane can handle thousands of cyclists per hour at a fraction of the space motor vehicles lanes require. And the construction and maintenance cost is also substantially lower.

It might seem counterintuitive that providing a cycling facility leads to an ease on the general traffic and congestion severity. But cycling helps alleviate traffic congestion, as the higher number of people opting to cycle, the more pressure is relieved from drivelanes, which especially have an impact during peak hours.

Generally lowering of car dependency lifts the Government's investment and maintenance needs and also gives households an opportunity to save money on their transport budget, as operating a private vehicle can seize a major proportion of a household income.

Looking at cycling in a socio economic perspective, the benefits become clear. Below is data from The Netherlands and Denmark:



Source; http://dutchcycling.nl/wp-content/uploads/2023/06/Dutch-Cycling-Vision-2023.pdf

For every kilometre travelled by bicycle, society gains approx. EUR 0,8 in socioeconomic benefits.

Source; https://cyclingsolutions.info/embassy/danish-cycling-statistics/

Both state and society benefit from reduced emissions; Cycling is an almost zero emissions mode, and even electric bicycles have almost zero emissions which not even electric cars can match.

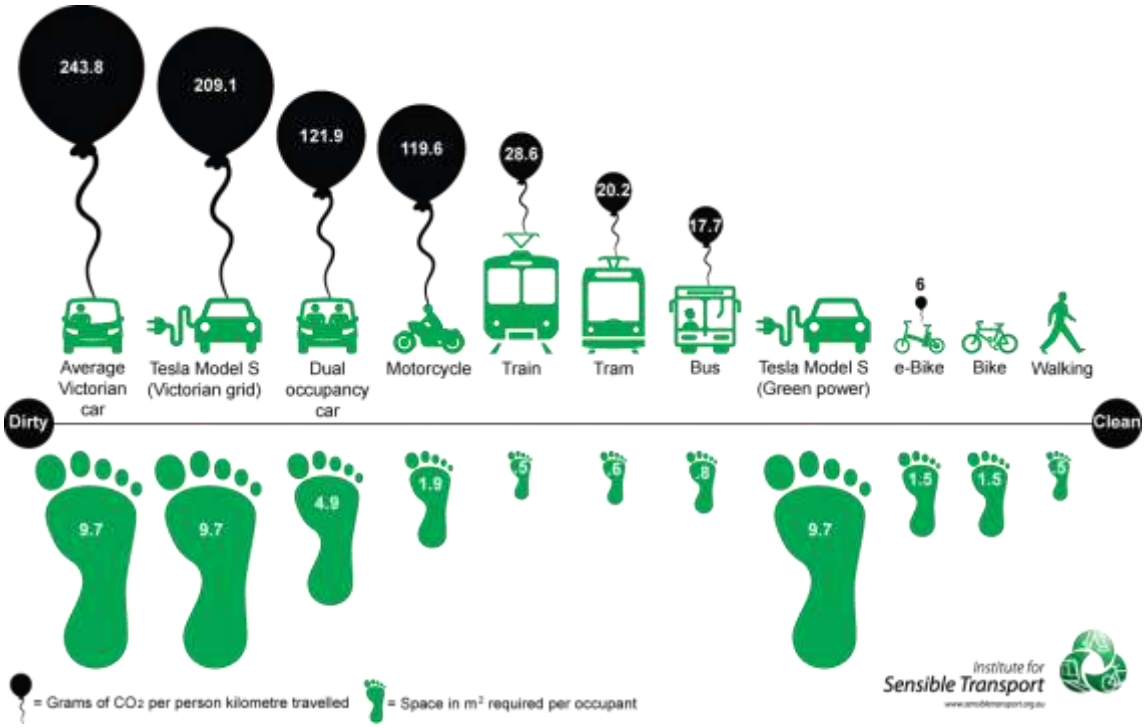


Illustration showing each individual's Co_2 emission per travelled kilometre and the space required for that trip, based on transport mode[4].

Cycling is a winning course for the public health budgets and people's personal wellbeing. Cycling, even at a leisurely pace provides both physical and mental benefits. Cycling is known to reduce the risk of chronic diseases like obesity, heart disease, and diabetes, while improving mental wellbeing.

Health effects of physical activity Reference: Public Health England: Physical activity: applying All Our Health, 2018

According to the World Cycling Alliance and the European Cyclists' Federation[5] cycling delivers on all of the United Nations goals for sustainable development. It does so by:

- Being an affordable and accessible transportation form
- Providing opportunities to transport food and other goods to markets
- Generating healthy lifestyles and improved air quality
- Empowering women and girls by providing transport and access to schools and jobs
- Using human energy to provide a sustainable transportation system
- Providing jobs in the cycling industry at a larger ratio than other industries

[4] sensibletransport

[5] https://ecf.com/system/files/The%20Global%20Goals_internet.pdf

- Offering value for money in infrastructure costs and benefits (ROI)
- Making cities and communities more flexible, sustainable and and resilient
- Ensuring sustainable production and distribution - and tourism
- Decarbonizing transportation and mitigate climate challenges
- Creating global partnerships around the implementation of more cycling

1.3. EXAMPLES OF CYCLING INFRASTRUCTURE

In principle any piece of road is cycling infrastructure, except road types such as motorways, where cycling usually is forbidden. But obviously the comfort and sense of safety vary greatly in relation to the number of motor vehicles and travel speed, as well as the type of possible segregation of transport modes. In simple terms; the higher the motor vehicle speed the less attractive cycling is at that place, which most likely is reflected in the usership. And the greater the need is for segregation between the modes.

The requirements for cycling infrastructure differ between urban centres and interurban areas. Whilst urban centres generally have a more complex environment, with intersections and other pinch points, interurban areas commonly utilize the existing road, its bridges, underpasses and tunnels, or use nature areas with paths or trails.

When it comes to design of infrastructure there are the obvious considerations, such as space allocation and economics, but the user experience should always be an integrated part of planning and design work. First impressions can be ‘make or break’. If a user feels unsafe or uncertain about where to go or what to expect, they might not use the infrastructure provided.

Cycling lanes or tracks can both be designed as one directional and two directional, and in some cases be shared with pedestrians. This is quite common in interurban bicycle infrastructure in Europe, and provides more km of cycling lanes for the same money. Our case studies from Denmark and Benin have examples of this. Each has their pros and cons: The one directional solution requires more space and is more expensive to construct, but provides less conflict points with other road users, as movement is only in one direction. The opposite goes for the two directional solution, but

as Interurban cycling often will be in a lesser built environment, with fewer crossroads and therefore less conflict points, the two directional solution could often be a preferred solution.

When it comes to designing cycling infrastructure, specifically aimed at interurban cycling, we have encountered examples in both high income countries and low and middle income countries of solutions that cater to the specific user needs and also the budgets of the local or regional authorities. In the USA and Canada, greenways and trails are a way to separate bicycling from dangerous traffic, while providing inter-connectivity between urban areas, while China and Denmark, for example, provide fully paved bicycle lanes, in combination with bridges and tunnels, designated for bicycles.

Below, please find some examples of cycling infrastructure, specific to Interurban cycling:

1.3.1. Bicycle Lanes

Dedicated lanes on roadways, with some kind of indication of separation from motor vehicles, the lowest Level of Service being a painted line or simply signage indicating a shared lane (known as "sharrows").

Example of shared bicycle lane. Sharing with pedestrians entails a risk of collision.

1.3.2. Bicycle Tracks

Cycle tracks provide a physical separation from motor vehicle traffic. Especially in rural settings they often run alongside roadways, with a physical barrier to a designated space, where cyclists are separated from motor vehicles by posts, guard rail or curb.

Cycling track separated by grass strip and curb.

1.3.3. Greenways and Trails

Greenways and trails are off-road paths and can be gravel or hard surfaces. Often running along rivers, open land or coastlines, and provide for both everyday cycling (commute) and recreational cycling. Abandoned railways are opportunities for greenways.

A post indicating route and wayfinding

1.3.4. Bicycle Bridges and Tunnels

These are dedicated structures that allow cyclists to cross over or under roads, rivers, railways tracks, or other barriers, safely.

Example of a very safe fully segregated interurban cycling infrastructure, with a tunnel underneath the road.

A well-designed solution should make it easy and intuitive to use and with clear signage and way-finding so that everyone feels confident and safe.

It is important to design a route in a way that allows for an uninterrupted ride, where the cyclist can keep one's flow and rhythm for the duration of the trip, not having to do unnecessary stops or dismount to navigate hindrances, such as stairs, bollards ect. Furthermore the width of the cycling lane or path is highly important, as to feel comfortable as a user.

Danish cycle superhighway, with physical separation and clear route identification and destinations pointers. Photo: Supercykelsti samarbejdet, Hovedstadsregionen.

1.4. RETURN ON INVESTMENT

Road Administrations and decision makers often ask about the return on investment (ROI), before venturing into a project or a significant resource allocation. Models for calculating ROI, either through regular and timely intervention strategies (asset management) or frequent project initiations (new infrastructure) have been around for a long time, but are also often tied to certain assets like bridges and highways that are important to maintain.

A study from the Flemish institute for technological research (VITO) shows a cost-benefit ratio of bicycle highways of at 1:2-14 and their conclusion is unambiguous: bicycle highways pay for themselves twice over in savings on health care and economic costs[6].

Above findings are seen in a number of countries.

It is a great and difficult task to take into account all variables of changing modes of transportation or focus of infrastructure investments, as many factors are contradictory, simply impossible, or very difficult to measure. Happiness and health are two such examples. Other examples are time savings versus stress levels or longevity versus traffic safety. We, the authors, would argue that you become a healthier and happier person with less stress by biking a little more, but it is hard to prove in numbers.

Calculating the ROI for bicycling can be approached from various perspectives, depending on the specific goals and factors being considered.

1.4.1. Transportation Cost Savings

Bicycling can be a cost-effective mode of transportation compared to driving or using public transit. By analysing the costs associated with car ownership, fuel, parking, and public transportation fares, you can estimate potential savings in transportation expenses by incorporating bicycling into your routine. In some cases, we have learned that biking can be a necessity for the local work force and subsequently - and unfortunately - also be perceived as a transport form of low social status. This is true for some places in Brazil, Columbia and Benin and also a temporary issue in China. In Denmark, private vehicles are heavily taxed, which may contribute to many people choosing not to have a (second or third) car in their household.

1.4.2. Environmental Impact

Bicycling is a sustainable mode of transportation that contributes to reducing carbon emissions, air pollution, and traffic congestion. Assessing the ROI in terms of environmental impact may involve considering factors such as emissions, improved air quality, and decreased infrastructure maintenance costs. Many European road authorities in cities and beyond are spending large sums on noise reduction and setting up rules for emission levels. Cycling is an easy and efficient win, when it comes to reducing noise and carbon emissions.

1.4.3. Economic Benefits

Bicycling can have positive economic impacts on communities. This includes increased spending at local businesses, job creation in the cycling industry, and reduced infrastructure costs compared to accommodating motorised vehicles. Assessing the economic ROI of bicycling can involve analysing factors such as local economic growth, tourism revenue, and savings in road construction and maintenance. In our case from the US, local communities have seen property values increase near bike facilities and in Canada and in Europe, many accommodation providers along long bike trails are depending on the income from bicycle tourism. China, USA and Brazil have cases that

[6] https://vito.be/en/

demonstrate how tourism can be a financial driver for more cycling, sustaining local businesses and also introducing locals to ride their bikes on "tourist bike lanes" in Xining, Ohio and Rio.

1.4.4. Social and Community Benefits

Bicycling can foster social connections and community engagement. Analysing the ROI in this context might involve considering factors such as increased community cohesion, improved public health outcomes, and enhanced livability of neighbourhoods. In our Columbia case study, as well as in the US, the local community played a big part in achieving a much needed buy-in to establishing bike lanes in local neighbourhoods.

1.4.5. Revenue Generation

Interurban bicycle infrastructure projects can generate revenue through bike-sharing programs or partnerships with local businesses can contribute to financing the infrastructure and ongoing maintenance. The availability and viability of these financing options can vary depending on the jurisdiction, local policies, and project-specific factors. Often, a combination of funding sources and creative financing mechanisms is required to secure the necessary funds for interurban bicycle infrastructure projects. Collaboration between government entities, private sector stakeholders, and community organisations is crucial to develop sustainable funding strategies and ensure the successful implementation of interurban bicycle infrastructure.

1.5. FUNDING

1.5.1. Investing in cycling infrastructure

As mentioned earlier, investing in dedicated cycling infrastructure, such as bike lanes, separated cycle tracks, and cycling trails, can make cycling safer and more practical for interurban travel. Governments and local authorities can allocate funds to create and maintain such infrastructure. The financing of interurban bicycle infrastructure projects can be achieved through a combination of funding sources and mechanisms.

1.5.2. Government Funding

Public funding sources, such as national, regional, or local governments, play a significant role in financing interurban bicycle infrastructure projects. Governments can allocate funds from general budgets, transportation-specific budgets, or infrastructure development funds to support the planning, design, construction, and maintenance of bicycle infrastructure between urban areas.

France has found an innovative way of unlocking new financial resources for investments in cycling: Through energy-efficiency programmes, essentially paid for by energy providers. That way some 275 million Euros were channelled into cycling programmes from 2018-2022. This approach has its roots in the EU Energy Efficiency Directive, so in theory it could be rolled out across all the EU-27 Member States.

1.5.3. Grants and Subsidies

Governments and non-profit organisations often provide grants and subsidies to support interurban bicycle infrastructure initiatives. These grants can be targeted towards specific objectives, such as promoting sustainable transportation, improving connectivity, enhancing safety, or addressing equity considerations. Organisations dedicated to promoting cycling or sustainable mobility may offer funding opportunities for interurban bicycle infrastructure projects. A number

of States operate with a fifty fifty scheme, where a state backs a project, when Region or Municipality funds half.

1.5.4. Regional or International Development Banks

Regional development banks, such as the Asian Development Bank or the European Investment Bank, provide financing for infrastructure projects, including interurban bicycle infrastructure, in their member countries. These banks offer loans, grants, or technical assistance to support sustainable transport initiatives.

1.5.5. Private-Public Partnerships

PPP allows the private sector to contribute funds for infrastructure development, reducing the burden on public budgets. Private entities can secure financing through various means, including equity investment, loans, and bonds, while sharing financial risks with the public sector. PPP models enable the mobilisation of additional capital for infrastructure projects, ensuring their timely implementation (see more on PPP below). A recent example is how the Nordic Investment Bank is co-financing a PPP in Norway with a 21 year loan of EUR 86 million for the financing, building, maintenance and operation of a road section in northern Norway. The project will also include pedestrian and cycle routes.

1.5.6. Crowdfunding and Community Contributions

Crowdfunding platforms can be used to raise funds for interurban bicycle infrastructure projects. Engaging the local community and cycling enthusiasts by seeking donations or sponsorships can also generate financial support for infrastructure development. An example is the British charity, Sustrans, that creates, maintains and runs a National Cycle Network (See more below).

In Germany the so-called citizen cycle paths initiative was launched by the State Ministry of Transport in 2005. EUR30 million has since then been invested to facilitate cycle paths in circumstances where a conventional route wasn't possible in the short term. Committed local citizens are of particular importance for the project as they can take the initiative and make their private land available. The citizen cycle paths can be built to a slightly reduced standard if necessary, as long as current safety requirements are met. Several hundred kilometres of these citizen cycle paths have already been created across Germany, especially in rural areas[7].

1.6. DESIGN, BUILD, OPERATE

Once the necessary funding is in place, designing, building and operating the (interurban) bicycle infrastructure is the next natural step. The following steps are not mandatory and they are depending on the level of strategic importance, the size and the scope of the projects - and many other factors.

1.6.1. Stakeholder Engagement

Engaging with stakeholders, including cyclists and those who wish to cycle, transportation agencies, local governments, and community groups, to gather feedback on asset performance, identify user needs, and incorporate community perspectives is a good starting point. Incorporating user input and involving stakeholders in decision-making processes can help improve asset management

[7] strassen.nrw.de/de/buergerradwege.html

strategies and ensure the infrastructure meets the needs of the interurban cycling community. Examples of the value of stakeholder engagement include our cases from the USA, Columbia, and Denmark.

1.6.2. Integration with Overall Transportation Planning

Integrate the management of interurban bicycle infrastructure assets with broader transportation planning processes. Coordinate with transportation agencies and urban planners to align the bicycle project or strategy with regional transportation plans, land-use planning, and multimodal transportation networks.

By implementing robust asset management practices, interurban bicycle infrastructure can be maintained in a safe, efficient, and sustainable manner, providing a positive cycling experience for users.

1.6.3. Asset Management of interurban bicycle infrastructure

Asset management of interurban bicycle infrastructure involves the systematic and strategic management of physical assets, such as bike lanes, bike paths, signage, and related facilities, to ensure their optimal performance, longevity, and cost-effectiveness. Depending on the maturity of the national or regional bicycle infrastructure, it may be helpful to develop an inventory of interurban bicycle infrastructure assets and to evaluate the state of each asset, identifying maintenance, repair, or replacement needs. This helps prioritise investment and maintenance decisions, much like traditional asset management systems for roads and bridges. In our Australia case, we have examples of how it makes sense to include bike lanes in the design, build, operation and management of road- and bridge projects.

Regular inspections and timely repairs can help extend asset life and maintain user satisfaction. In some countries, systems and hardware exist to measure the quality of the bicycle path, including potholes, cracks and smoothness of the surface. The Quebec government has financial programs that pay 50% of maintenance fees for the cycling network la Route Vertek.

1.7. POLICIES AND ACTIONS

Bicycle policies refer to the measures, regulations, and initiatives implemented by governments, organisations, and communities to promote and support bicycling as a sustainable mode of transportation. These policies can vary significantly across different regions and countries. Overall, shifting from cars to bicycles as a primary mode of transportation between cities requires a concerted effort by governments, businesses, and individuals to create a supportive environment for cycling. By investing in cycling infrastructure, promoting cycling culture, offering incentives, improving intermodal transportation, reducing car dependency, and providing education and training, we can make interurban cycling a more accessible, safe, and desirable option. Below, we have listed and described in short terms, some of the most widely used bicycle action items:

1.7.1. Infrastructure Development

Governments and local authorities may implement policies to develop and improve cycling infrastructure, including dedicated bike lanes, cycle tracks, bike parking facilities, and bike-sharing systems. These policies aim to enhance cyclist safety, connectivity, and convenience.

1.7.2. Complete Streets Policies

Complete Streets policies promote the design and construction of streets that accommodate the needs of all road users, including pedestrians, cyclists, and motorists. Such policies prioritise the integration of bike infrastructure, sidewalks, crosswalks, and traffic calming measures to create safer and more accessible streets for cyclists. In a larger picture, this approach could be re-defined as “Complete Road Policies”, so interurban bicycling would gain a natural place in the policy making.

1.7.3. Bike-Sharing Programs

Governments and municipalities often establish bike-sharing programs as an action to encourage cycling as an alternative mode of transportation. These programs provide access to shared bicycles for short-term use, making cycling more accessible to a broader population. We can see in the cases from Brazil and China that the accessibility to a shared bicycle solves the last mile issue for great many people and have lead to growth in modal share in Brazil and in China, bikeshare is now seen as an enabler towards owning one's own bicycle, initiated by changes in the payment structure, making it increasingly more attractive to purchase a bicycle rather than regularly use a shared bicycle. In our USA case study, the Summit Bike Share is Summit County’s free bicycle share system, where 40 bicycles are available at nine stations for citizens use. It is important to emphasize that for a bike-sharing program to be successful there must be adequate cycling infrastructure.

1.7.4. Bicycle libraries

So-called Bicycle libraries which offer its citizens the possibility to borrow and try a bicycle, often different models and types, from everyday bicycles to utility bicycles or cargo bikes, with or without electric assistance, as a means of introducing and to help people choose the right bicycle for their needs. This can, as with bike-sharing programs, be a way to get people into cycling.

1.7.5. Bicycle Education and Safety Campaigns

Policies may focus on educational initiatives to enhance cycling awareness, safety, skills and responsible behaviour, helping increase the confidence of people who are new to cycling. These campaigns often target both cyclists and motorists, promoting safe use and possible sharing of roads and adherence to traffic laws. Can also be programs on learning to ride a bicycle targeted at different age- or social groups. For instance in Mexico, The Bicitekas advocacy group offers cycle education and awareness courses for caretakers.

1.7.6. Bike-Friendly Regulations

Bicycle policies can include regulations aimed at protecting the rights and safety of cyclists. ensuring appropriate penalties for offences against cyclists, and integrating bicycles into transportation planning and development processes.

Examples include laws requiring motorists to provide a safe passing distance when overtaking cyclists, for instance in Germany road traffic regulations require that motor vehicles keep a distance of 1.5 metres to the side when overtaking a cyclist in a city and at least 2 metres outside of the cities. The regulation applies no matter if the cyclist is riding on the street or on a cycle lane or protective lane. In Austria, motor vehicles must keep a distance of 1,5 metres in towns, when going less than 50km/h and 2.0m when going faster than 50km/h. But obviously it is difficult to enforce, as police do not measure the distance, which means that people are rarely fined and so often do not keep a safe distance.

In a number of countries, there are so-called Bicycle streets where motor vehicles are seen as guests and are required to stay behind bicycles, hence not overtaking.

An example of a Bicycle street from Germany

An example from Poland, that plays on acting with good and friendly behaviour and keeping distance while overtaking

1.7.7. Financial Incentives

Governments and employers can offer incentives to encourage cycling, such as tax breaks or subsidies for purchasing bicycles, often electric bicycles, as well as incentives for businesses to provide cycling facilities such as bike parking, repairs services, showers, and lockers.

In Germany there is the "JobRad"[8] (JobBicycle) scheme, where an employer leases the bicycles and the employees ride them. As a rule, the leasing provider offers the employee to buy the bicycle at the residual value after 36 months or it can be returned. Advantages of the leasing model are tax savings and payment in instalments.

In Switzerland, the initiative Bike4Car is an e-bike trial, where motorists are given the opportunity to curb their vehicle for two weeks and borrow an e-bike. Resultats show "strong evidence that change in habits for just a few weeks influences long-term habitual associations with car usage, and that this change persists even a year after the end of an intervention"[9].

"There are almost 300 tax-incentive and purchase-premium schemes for cycling across Europe offered by national, regional and local authorities to make it attractive to cycle more and drive less".[10]

1.7.8. Integration with Public Transport

Policies may encourage the integration of bicycles with public transportation systems, such as allowing bicycles on buses, trains, and subway systems. This approach aims to facilitate multi-modal transportation options and enhance the accessibility and reach of public transit.

In our case from Brazil there is a special ticket that gives access to the bus and a shared bicycle as the last-mile mode. The Danish cycle superhighways follows in many cases the rail network or major bus lines and have signs that show cyclists the nearest bus stop or train station, in case a cyclist wishes to combine the ride with Public transit. By combining cycling with other modes of transportation such as public transit, interurban cycling becomes more accessible and practical.

1.7.9. Promoting cycling culture

Promoting cycling as a healthy, sustainable, and enjoyable mode of transportation can help shift societal attitudes towards cycling and thereby reduce car dependency and make interurban cycling a more practical and desirable option. Campaigns that raise awareness of the benefits of cycling, such as improved physical health and reduced traffic congestion, can help increase the number of people who choose to cycle between cities.

[8] jobrad.org/

[9] IOPscience

[10] *financial-incentives*

2. A GLOBAL SNAPSHOT OF INTERURBAN BICYCLING

2.1. METHODOLOGY

In this report, we work for the end users and planners of interurban bicycle infrastructure.

Our approach is to provide an up-to-date overview of the goals, challenges, solutions and benefits, connected to designing, building, funding and maintaining interurban bicycle infrastructure, no matter if you are a HIC or LMIC country.

We have gone through relevant big data information channels, made a survey amongst PIARC members and constituents, identified relevant case studies and performed deep interviews with a number of representative project stakeholders across the globe. We also added some "Light Cases" that we believe deserved an "honourable mention" in this special project.

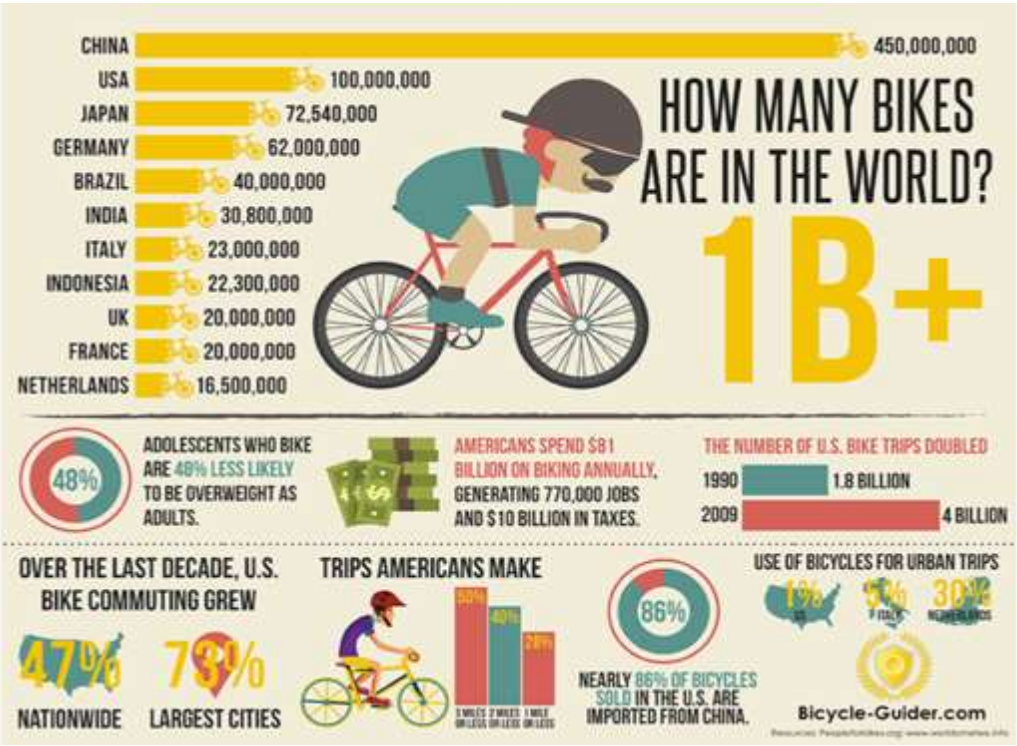
Our focus has been on describing the Goals, Challenges, Solutions & Benefits of the countries/administrations/companies involved in these projects, providing anecdotal evidence of both general and individual circumstances surrounding our subject.

Our findings are not scientifically validated or set in stone. We have tried to describe the best possible approach to common issues, by comparing data sets and other sources with our survey answers and different cases.

2.2. GLOBAL TRENDS AND BIG DATA

Nobody knows exactly how many bikes exist in the world, but it is estimated that there are somewhere around 1 billion. It's a huge number. But, for comparison, there are around 1.5 billion cars in the world.

China, India, EU, Taiwan, and Japan are responsible for 87% of the global production. 364,000 bicycles are produced daily. That's 15,000 per hour, or 253 a minute, or 4 bikes a second.



Source: Bicycle-Guider.com, Peopleforbikes.org and worldometers.info

It is important for us to note that the picture of (interurban) bicycling is constantly changing. In recent years (with Covid and changes in work patterns, along with climate crisis and general urbanization) bicycling seems to be having a renaissance, and even while working on this project, we have come across the following recent projects and programmes:

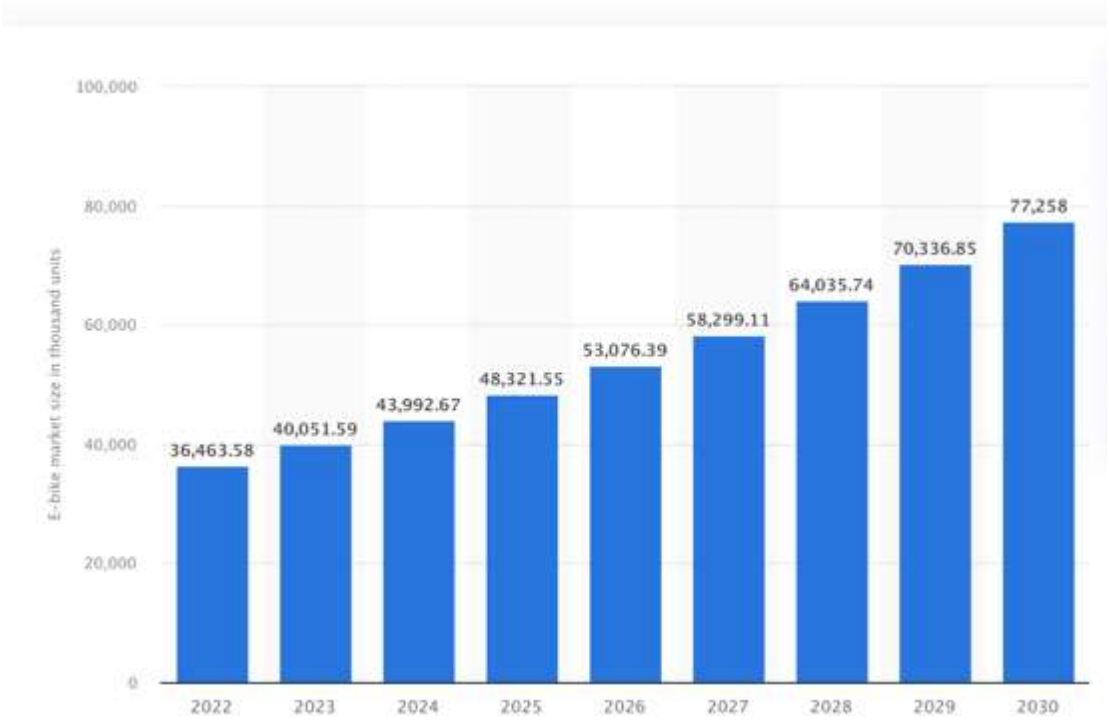
- Italy: The Ministry of Sustainable Infrastructure and Mobility (Mims) has received approval for its first General Plan of Cycling Mobility, which includes a total investment of 1.2 billion EUR. (2022-2024)
- Romania: The contracts for the first seven cycling routes included in the National Recovery and Resilience Plan (PNR) have been signed by the Ministry of Development, Public Works and Administration (MDLPA) and the Ministry of Environment. The funding contracts, worth RON 206.9 mln (EUR 42.2 mln), are for roughly 426 km of cycling routes. (2023)
- France: The French government plans to spend two billion euros through 2027 to improve cycle infrastructure and help people buy bikes in an effort to reduce car use and boost cycling, government ministers said on Friday. The aim will be to double the cycle lane network and the government will spend 250 million euros a year on new bike lanes from 2023 to 2027. The rest of the budget will go towards other measures to boost bicycle use.
- Nairobi, Kenya - Thika Highway Bicycle Lanes: The Thika Highway in Nairobi is being expanded to include dedicated bicycle lanes, improving safety for cyclists and promoting sustainable transportation.
- Cape Town, South Africa - MyCiTi Bus System: The MyCiTi bus system in Cape Town integrated bicycle facilities, including bike racks on buses and designated bike lanes, to provide seamless multimodal transportation.
- Lagos, Nigeria - Lagos Cycling Initiative: The Lagos State government initiated the construction of cycling lanes in selected areas to encourage cycling as a means of transportation and reduce traffic congestion.
- Kigali, Rwanda - Citywide Cycling Network: Kigali has been developing a comprehensive cycling network, including dedicated bike lanes and paths, to make cycling a safer and more viable option for residents.
- Dar es Salaam, Tanzania - Dar Bike Project: The Dar Bike Project aimed to create a network of cycling paths in the city, providing an alternative mode of transport and addressing issues related to traffic congestion.
- Lusaka, Zambia - Lusaka Cycling Project: This initiative focused on building bicycle lanes and paths in Lusaka to promote cycling for both transportation and leisure purposes.
- Kampala, Uganda - Cycling Infrastructure Development: Various cycling initiatives were underway in Kampala to develop cycling infrastructure and promote cycling as a sustainable mode of transport.
- Dakar, Senegal - Dakar Vélo: The Dakar Vélo project aimed to improve cycling conditions in Dakar through the creation of dedicated bike lanes, cycle-friendly streets, and bike-sharing systems.

- Casablanca, Morocco - Casablanca Bike Network: Casablanca was working on a bike network that included dedicated lanes and paths, making cycling a more accessible and safe mode of transportation.

2.2.1. E-Bikes

Electric bikes are on the rise. Their market share is increasing and makes up for a large proportion of bicycles sold, both in LMIC and HIC countries. Several of our case studies show that the introduction of e-bikes to the bicycle communities has provided an opportunity for longer rides, and using the bicycle as an option for transportation, instead of cars. In China, it seems, e-bikes are primarily used for longer rides, while regular bikes are mostly used between transportation hubs (metro-, bus-, train-stations).

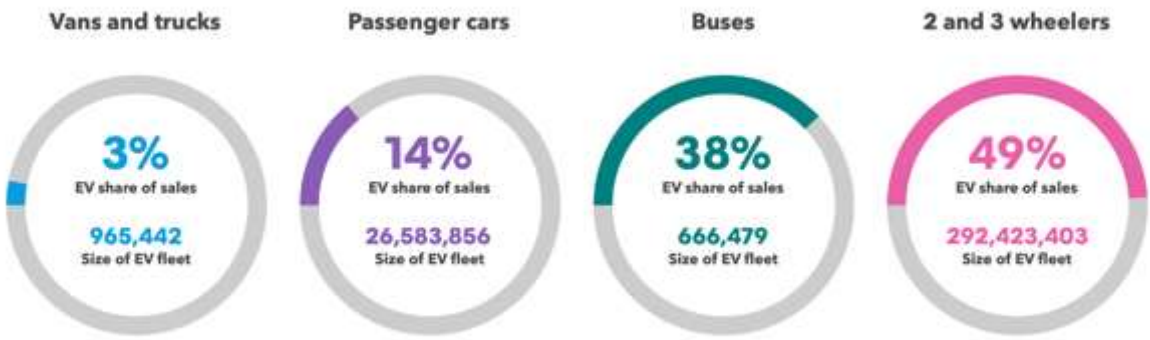
In the Netherlands, e-bikes are becoming so popular that authorities are looking into lowering the speed limits for e-bikers to 20 kms per hour. In other parts of the world, e-bikes could be a game changer for the transportation of goods between local areas. Finally, e-bikes can also help overcome barriers for riding a traditional bike, like hilly terrain, arriving sweaty at your workplace, carrying kids along or just not having the endurance to be riding several kms back and forth every day.



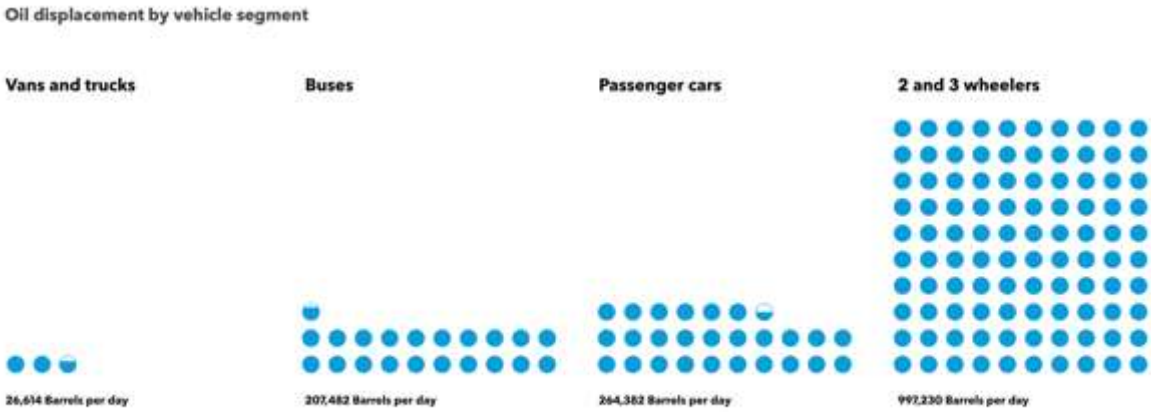
Projections for the global electric bike market volume between 2022 and 2030 (in 1,000s), source global-e-bike-market-volume-forecast

Today E-bikes account for 10% of global bicycle sales, and as the graph above shows numbers are growing. E-bike sales have surpassed sales of regular bicycles in the Netherlands. Between 2017 and 2018, the e-bike market grew by 9%. Several countries see substantial growth in sales numbers. In China, 36 million e-bikes are manufactured a year on average. And according to our Chinese case study E-bikes account for 40-60% of the total number of bicycles.

In England, 65% of electric bikes sold are bought by individuals aged 55 and over. But other countries see a more balanced pattern where sales are fairly spread on age groups and gender. A study in Norway showed that people who obtained an e-bike increased their cycling trips from 28% to 48%.



Electric Vehicles market share - 2-3 wheelers (mainly bicycles) have a 49% market share. Bloomberg, 2023



How different types of electric vehicles displace oil. Bloomberg, 2023

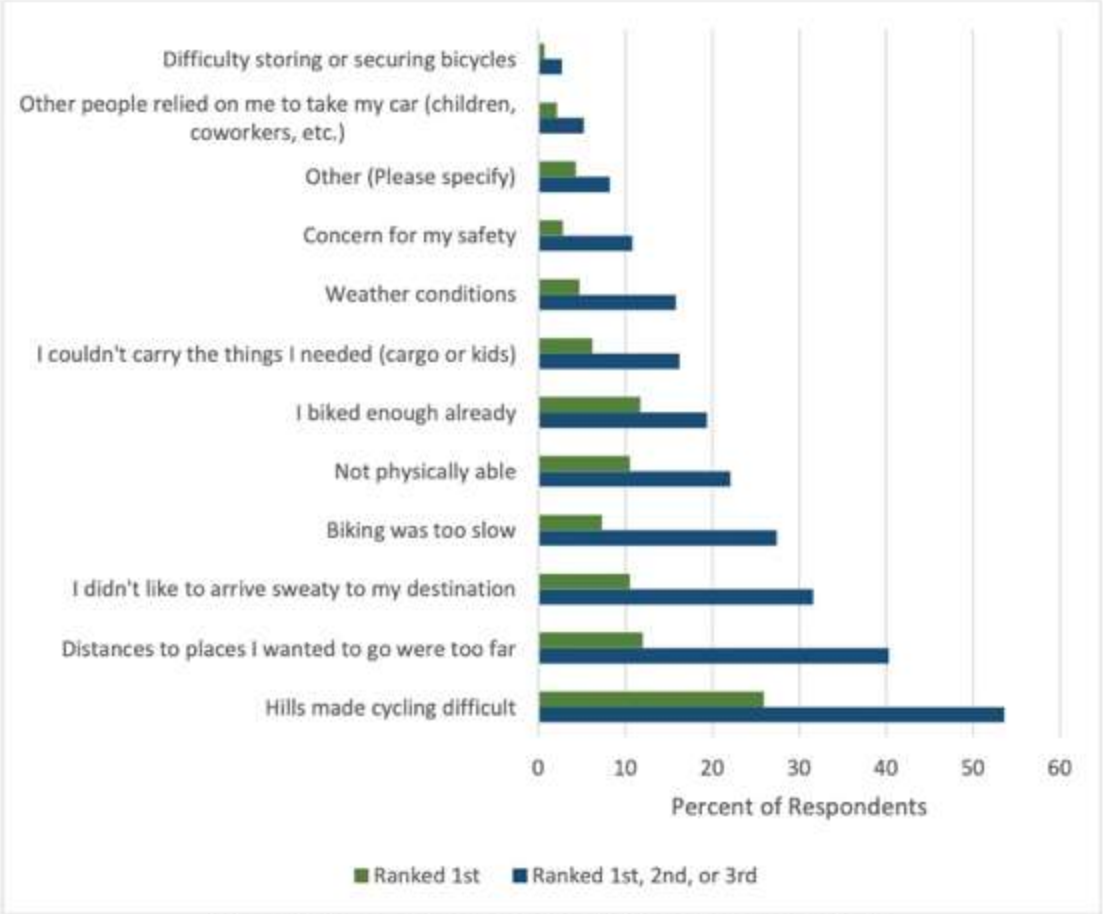
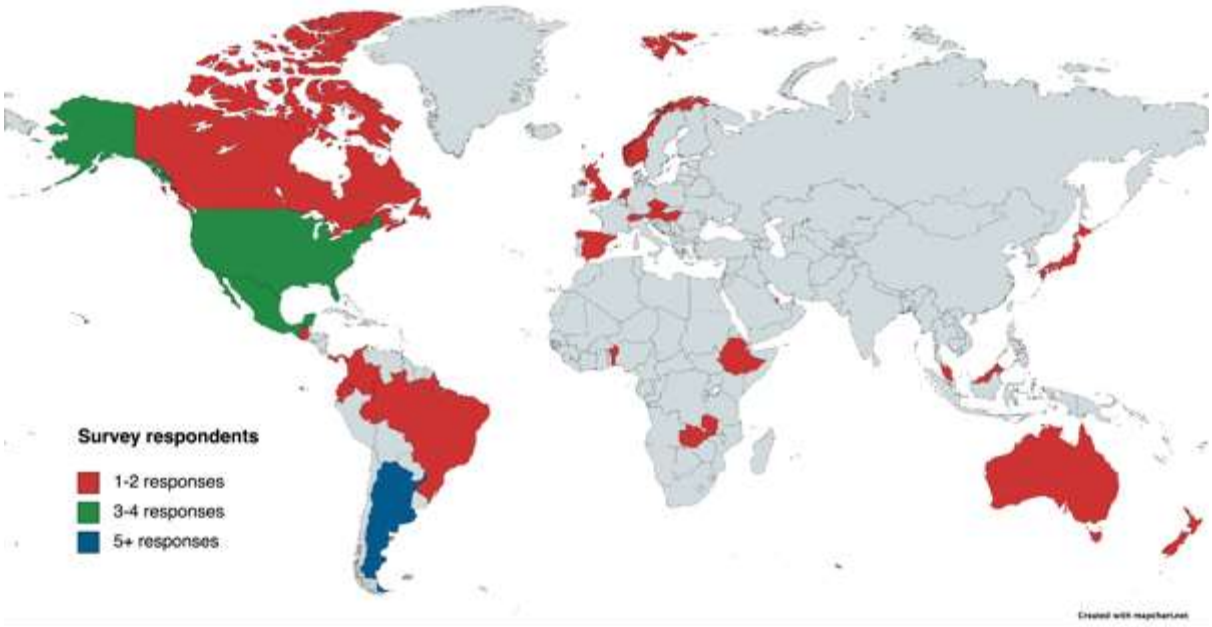


Figure 3.4: Important Barriers to Riding a Standard Bicycle

Barriers to using a (standard) bicycle

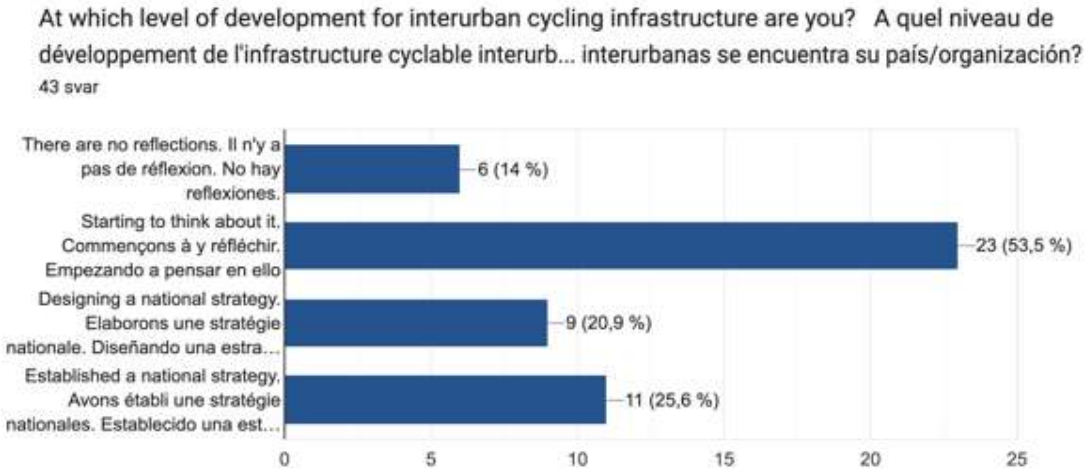
2.3. SURVEY ON INTERURBAN CYCLING INFRASTRUCTURE



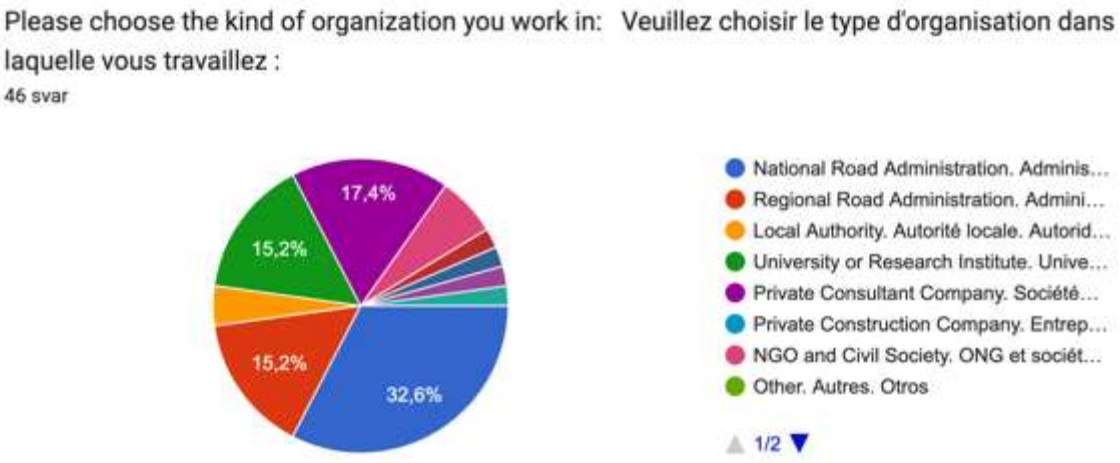
Over the summer of 2023, we conducted a survey on interurban bicycle infrastructure, under the brand of PIARC. We promoted the survey on social media and received responses from all over the world. Our intention with the survey was two-fold: First of all we wanted to get a feeling of the interest and appetite for interurban bicycling with the global bicycle community, including an idea about how mature the different regions and countries are when it comes to (introducing more) bicycling. And secondly, we were looking for bicycle experts to interview for our case studies.

Luckily, we received both enthusiastic and interesting feedback, including from some volunteers for the case study interviews. We refer to the in-depth case studies in their full length for more details.

One of the immediate findings we had, after the survey ended, was that only a relatively small number of our responding countries seem to have a designated bicycle strategy (about 25%). But, also, another 20% are in the process of designing a national strategy, which is a positive sign.



From our survey amongst PIARC members and constituents. Only 25% of responding countries have a national strategy for bicycling



We also had a broad representation in terms of organizational types, which goes to show that bicycling has a broad impact and interest. Most were from national or regional road administrations.

2.3.1. Comments from the community

Some of the open comments from the survey hold a certain value too:

- "As it is an old cycle path built by sugar cane processing companies, it must be adapted in geometry, signage, running surface, etc. Cycle lane projects must be carried out by experts or following the different manuals that exist on the matter". COLUMBIA
- "Very low interest as most authorities are Car Centric. No significant bicycle infrastructure in small cities like Ipoh. Lanes provided are very narrow and are used by speeding motorcycles. There is zero enforcement to safeguard bicyclists". MALAYSIA
- "A 357 km long bicycle path section has been planned. We are currently waiting for construction
- "Land purchase, authorisation (water, environment) are difficult matters" LUXEMBURG
- "The network is understood as one system by the using public, but is actually managed by more than 15 agencies (mostly park districts). Vision is to build more "lateral" connections to form more of a grid (or loops)" USA
- "Crossing private property and rivers are key barriers" AUSTRALIA
- "After more than 25 years of existence, the Route Verte project requires significant investments to upgrade certain facilities, to review the routes and to continually ensure its improvement." CANADA
- "There's little update on the state of the cycleways. There's no clear mapping of the cycleways" SPAIN

- "We have known for ages that we need a change from motorized modes of transport towards active mobility. There is actually no more research needed. just do it! High speed of motorists impedes in many cases the use of bicycles on a large scale". AUSTRIA
- "Studying the pros and cons of carrying out such an initiative in a city in the interior" ARGENTINA
- "Consideration of two Offshore Bird Habitats" NEW ZEALAND
- "Environment and sustainability: the environment is a taonga that must be managed carefully. We will protect and enhance the natural and built environment by focusing on reducing emissions and waste" NEW ZEALAND
- "As a road authority it is really a challenge to find your role and to get financing for sub-projects which are part of the route but actually have another function as well (like being a water protection mechanism)" NETHERLANDS
- "It would be positive if we had some projects!" NORWAY
- "In Guatemala, the only entity that has some projects is the Municipality of the city but there is no national policy, as such". GUATEMALA
- "Regarding the National Cycle Routes, it is intended to disseminate information to international markets and provide an environment including tour guides, anticipating the recovery of inbound tourism". JAPAN
- "In Austria the national level does not build any cycling infrastructure. Interurban cycling infrastructure is built by the Federal States with co financing of the national level". AUSTRIA
- "The project is an excellent example of reusing a disused railway line for the benefit of the community. It is very well used both by commuters and for leisure", UNITED KINGDOM

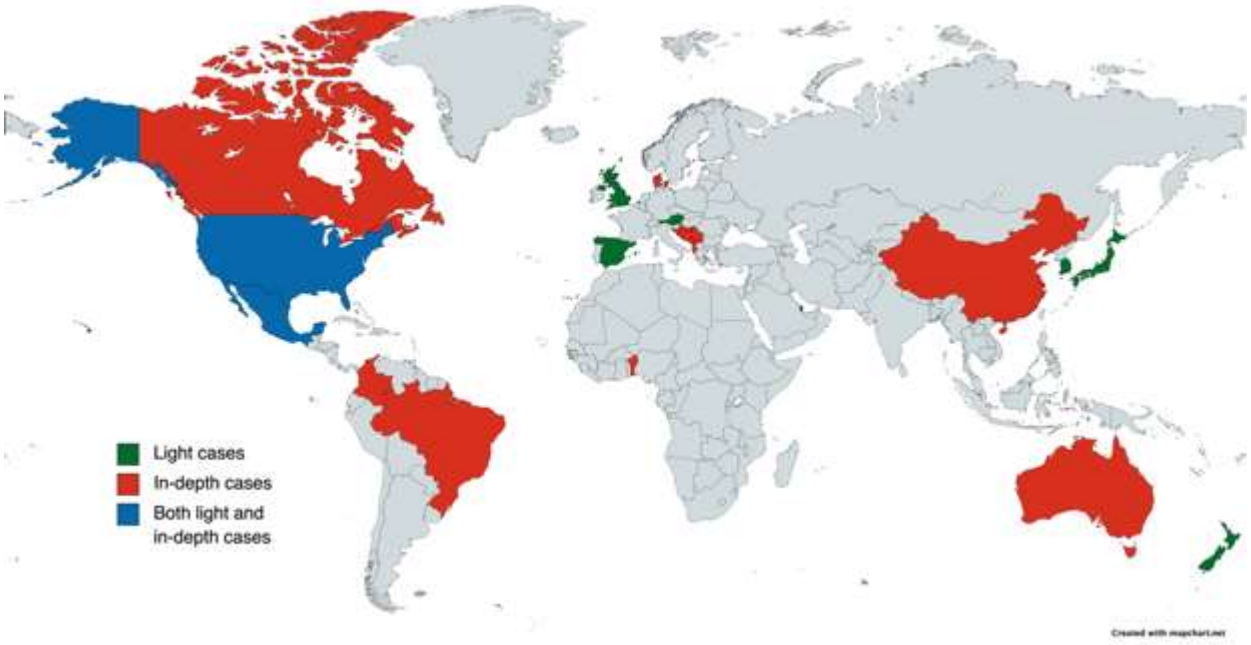
Overall, the survey provided us with valuable information and also most of the bicycle experts from the global community, whom we went on to interview.

2.4. CASE STUDIES

In this Special Project, we have investigated and conducted a number of case studies, identified partly from our survey, partly from big data and literature sourcing and partly from our own outreach to subject matter experts in the global bicycle industry. Below are some key findings for each of our "In-depth" Case Studies, focusing on goals, challenges, solutions and benefits of a specific project, related to interurban bicycle infrastructure.

While some cases and interviews were able to produce a solid understanding of the particularities of interurban bicycling, some of the countries in our case studies are not very close to having a "bike culture" to speak of. Using the bicycle for commuting to and from workplaces, education, markets and for daily transportation is oddly enough either something for the very rich or the very poor. In many LMICs, we find, bicycling is a low status form of transport, and in many HICs, bikes are primarily used for exercise and fun.

We have therefore tried to broaden our scope to include a set of "light cases" too, that demonstrates the diversity of bicycle infrastructure. It is our hope that all of our cases combined can provide inspiration and encouragement for bicycle enthusiasts everywhere.



Distribution of case studies, some of them "light cases", some "In-depth cases".

2.4.1. Light Cases

The following 10 "Light Cases" are examples of different projects that exemplifies the complexity and variety of Interurban Bicycle Infrastructure. Each case is attributed with a #hashtag and a link to the given project.

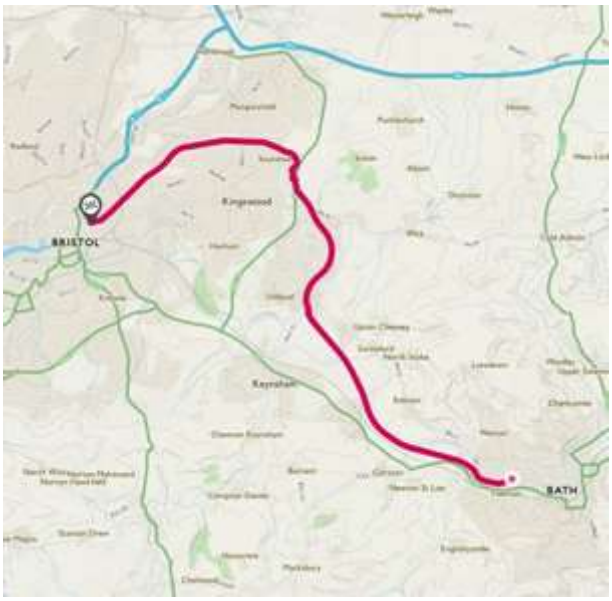
2.4.1.1. Bristol to Bath cycle path

Decommissioned rail line

A former railway line redesigned into a walking and cycling route connecting the two English towns, Bristol and Bath.

With a distance of just over 20 kilometres it's a feasible commute or leisure ride.

The project is an excellent example of reusing a disused railway line for the benefit of the community. It is very well used both by commuters and for leisure.



#repurpose	#redesign	#community

More information; sustrans

2.4.1.2. Regional Cycling Network

Implementation process

Regional Cycling Network of the Federal State Vorarlberg in Austria, planned to stretch 450 km - thereof 200 km Cycling Highways. The implementation is an ongoing process over more than 10 years.

In Austria the national level does not build any cycling infrastructure. Interurban cycling infrastructure is built by the Federal States with co-financing of the national level.

#regional	#cyclesuperhighways	#longterm

More information (in German); klimaaktiv

2.4.1.3. Good Cycle Japan

National level engagement

In 2017 the Bicycle Utilization Promotion (BUP) Master Plan was approved by the Cabinet. The Plan aims to increase the number of municipalities (from 89 to 400 by the end 2025) that have a local BUP.

The 2nd BUP (2021), has specific policy goals, measures and targets. Policy goals such as; "Creating a nice urban environment", "Achieving a vibrant and healthy society", "Promotion of cycle tourism". The plan has been implemented through collaboration among the relevant national government ministries and agencies.

NATIONAL CYCLE ROUTE

#collaboration	#utilization	#policy

More information; Japan national cycle

2.4.1.4. Halfway built

The Ciclovía Colima-Coquimatlán

A 10km two-way bike path project, running parallel to a state highway and connecting the capital of the state of Colima, Mexico with the town of Coquimatlán, where a university campus is located, was planned.

Initially a 6km stage was built and to date there are no indications that its construction will continue.

#statehighway	#two-way	#unfinished

More information; gobiernocolima

2.4.1.5. A cycle path doubling as coastal protection

Connecting two cities

Part of the walking and cycling connection linking New Zealand Capital Wellington and Lower Hutt is currently underway.

The shared path runs along the sea connecting the two cities, and will serve as coastal protection, as the path partly sits on a Seawall.

Initial engagement and investigations started in 2014. Construction on the project began this year, with expected completion in 2026.

#heritage	#multifunction	#walkingandcycling

More information; te-ara-tupua

2.4.1.6. Sports cycling as enabler

Get access to cycling

This 38 km. shared pedestrian and cycling track in Qatar, is giving people an opportunity to practise cycling in a closed and safe system. As the track is designed completely separated from vehicle traffic to ensure complete safety of cyclists.

The perspective of providing access to cycling in a closed circuit can potentially lead to awakening interest in cycling in more common traffic environments.

#uptake	#safety	#enabler

More information; Al-Khor-Road

2.4.1.7. Engaging decision-makers

Gauging Mode-shift potential

Analysis of interurban cycle routes connecting the Spanish city of Barcelona to neighbouring towns, Castelldefels and to Badalona.

Numerous people commute by private vehicles and the objective of this project is to obtain accurate data that can help engage decision-makers in order to make interurban cycling infrastructure more attractive for people commuting. The project runs within the framework of the EU-funded project Molière.

#data	#funding	#mode-shift

More information; observatoriotransporte

2.4.1.8. Collaboration between 15 agencies

Counting

Every four years agencies across the Miami Valley, USA conducts a regional trail user survey, counts, and reports.

The network includes 520 km of connected shared use path and connects 30+ communities across 11 counties. User surveys indicate high support and use of the trails.

The network is understood as one system by the using public, but is actually managed by more than 15 agencies.

#collaboration	#surveying	#trail

More information; trail-user-surveys

2.4.1.9. Multifunctional lane

Solar power

In South Korea the Daejon-Sejong Solar-Powered Bike Path features a roof consisting of Solar panels, which both serves as cover for weather and sun, but obviously also generate electricity.

Despite being a unique infrastructure project, it has an inbuilt challenge and disadvantage, as the 30km two-way bike lane is placed in the median strip of a highway, which makes it difficult to interact with the surroundings.

#exclusion	#safety	#innovative

More information; 20-Mile Solar Bike Highway Generates Electricity

2.4.1.10. Connecting the dots

Obstacles to overcome

Often Interurban cycling will require crossing of waterways or gullies. An iconic example of this is the Golden Gate Bridge connecting San Francisco and Sausalito in the USA.

On the bridge is a shared path (pedestrians and cyclists) separating cyclists and motorists.

Such possible investments can be vital inorder to create a Interurban cycling connection.

#sharedpath	#landmark	#obstacles

More information; San Francisco Municipal Transportation Agency

2.5. IN-DEPTH CASE STUDIES

The following 10 Case Studies were conducted between April and August 2023 with Bicycle experts from all continents. Below is a table that shows the goals, challenges, solutions and benefits of each case at a glance. Each case is different in scope, size, budgets, etc, and we encourage you to read the full cases in the appendix to this Special Project report.

Case	Goals	Challenges	Solutions	Benefits
Australia **HIC**	Enlarge bike networks.	Funds. Deploying cycle paths over long distances.	Combine road and bike projects.	Save money on design, build.
Benin, LMIC	Ease the traffic flow between the two main cities, Porto Novo and Cotonou. Reduce accidents and increase traffic safety. Provide good quality roads for transport of goods.	Doubling of road (10 km) and construction of a new bridge with 2x2 lanes Reduce risk of accidents between motorcycles and cars and bicycles.	2 carriageways of 2 lanes each. 2 cycle paths on either side of the roadway physically separated from the roadways. 1 bridge over the Porto-novo lagoon.	Safer road for vulnerable users. Incentives to bike or walk – change of habits. Easier access to education and work places.

Case	Goals	Challenges	Solutions	Benefits
Brazil **LMIC**	A modal shift towards more active mobility and an empowerment of the workforce. Dedicated lanes and segregation between transport modes.	Political incentives to buy a car. Traffic safety (lack of dedicated lanes). Deficiency of Infrastructure. Changing car lanes to bike lanes.	Regular traffic counting to monitor the development in walking and cycling. Leveraging the trend with Active Mobility. Introducing shared spaces and 30km/h zones. Addition of electric bikes builds good habits.	Diverse use supports multimodal transportation. Bike-share is helping to build new habits. Better bike infrastructure ties large communities together.
Canada **HIC**	Create touristic routes with the possibility to commute. Fund, design, build, maintain the bicycle network.	Weather is an obstacle in winter times. Distances when it comes to everyday commuting. Resources. Perception of bicycles as less important and convenient.	Counting to validate demand. Surveys to pinpoint needs. Research to document use and benefits. Action plans to trigger funding.	Transition effect from sport to commuting. Local support and appreciation of biking through events and openings of new paths. Adaptable processes and methods make room for local needs and traditions.
China **LMIC**	To bring back more bicycles. To create a better, safer and healthier life quality.	Plan and design a multi-facetted use of bicycle infrastructure with many different user groups at the same time.	Combining circular economy, energy savings, CO_2 reduction, healthy lifestyle and tourism. A 5-step approach: urban planning, foreign inspiration, safety, transportation, tourism. Connecting tourist resorts and tourist	Cycling infrastructure in place very quickly. Changing people's lifestyle, towards a more active way of transport. Creating a push towards buying one's own bicycle.

Case	Goals	Challenges	Solutions	Benefits
			attractions with everyday commuting between cities and rural areas.	
Columbia **LMIC**	Implement measures to meet Bogota's Vision Zero Plan, introducing more cycling to Bogota.	Both psychological, political, technical and financial challenges tied to the project.	A corridor that brings users from A to B. Designated bike lanes through inhabited urban spaces. Fundraising with the help of professionals. Sustained communication of the project to the public. Community engagement.	Compared to other transportation infrastructure, bicycle paths are very cheap to build and maintain. An estimated 10-12 % mode shift from private vehicles. Since 2020, the city has implemented 83 kilometres of protected cycleways.
Denmark **HIC**	More regional and long distance cycling. Broader stakeholder involvement.	Funding and budgets, especially for municipalities.	Establishing Cycle Superhighways in and across multiple municipalities. Joint promotion of regional cycling. Joint funding opportunities between the state and the municipalities.	High Return on Investments. Less CO_2 emitted. High increase in users. High user satisfaction. Collaboration and co funding, particularly from the state.
Mexico **LMIC**	More public bike lanes. Better safety.	Poor safety. Cars are preferred. Making room for bikes.	Advanced technology to design and make informed decisions. Better crossing. Intelligent signals.	Raised political awareness. Reduced accidents. Interdisciplinary Involvement.

Case	Goals	Challenges	Solutions	Benefits
			Better land use.	
Serbia **LMIC**	More cycling for commuting. Separated bike lanes Cross-border collaboration. Better funding and budgeting around cycling.	Spatial plans should be updated. Budgets – are very low and other infrastructure is prioritized. Central and south, west of Serbia is very hilly. Safety – when you are biking alongside cars. No guides developed for cycling in urban areas.	New Master plan to replace the 2010 plan. 800 kms designated routes between Serbia and Montenegro. NGOs and the ministry of culture – continue to promote cycling as active tourism. Combination of funding, from municipalities, state, EU and UN.	Public health to reduce heart attacks and stay fit. Less congestion. Active tourism. Cities have constructed designated routes.
USA **HIC**	Enhance use and appreciation of a natural heritage area. Engage the community in the greening of the area. Make bicycling more mainstream. Establish branches to the network.	Resistance from private landowners and neighbourhoods. Political habits and short term planning.	A long term regional plan with heavy involvement of partners. Visualization of new and existing paths to align expectations. Encourage hands-on experience. Policy making, providing evidence of return on investments.	Massive ROI Recreational possibilities to sustain public health. Inclusion of neighbourhoods. Community building. Empowerment of users. Economic development.

Australia

Improving bicycle infrastructure in Australia

Australia
Economic status: HMIC

Area: 7.686.850 km²
Capital: Canberra
Population: 26,036,795

In Queensland in North East Australia, authorities are working on rolling out more cycle infrastructure, by capitalising on the economies of scale that are achievable in major projects. It's an educational process that takes time.

Michael Langdon,
Senior Advisor within the Queensland Department of Transport & Main Roads (TMR)

We need **more separated, dedicated cycling infrastructure** with segregation for the cyclists

Goals

Showing people the benefits of cycling will fill them with confidence and will address their concerns about it

Challenges

- Local (political) obstacles
- Habitual thinking that favors cars and busses
- Frustration between different road users
- Road space for bikes
- Resuming land for new bike projects

Australia

Solution(s)

Smart allocation and asset management.

Collaboration between authorities and public.

Education and capacity building.

Separated lanes from heavy traffic.

Benefits

Value for money and more bike lanes

Community building and business facilitation

Recreational cycling may lead to commuting cycling

People appreciate quality of life – and private space – like cycling

The **Veloway 1**, is a dedicated cycleway running between Lower River Terrace, South Brisbane and Underwood. The 17km cycleway provides a safe and efficient route for bike riders.

Read the Case Study in its full length in the appendix.

Benin

Navigating regional transport and local traffic

Benin
Economic status: LMIC

Area: 112.620 km²
Capital: Porto-Novo
Population: 12,506,347

Joseph Ahissou is Chief of Staff to the Minister of Infrastructure and Transport. Before that he was Director General of the National Centre for Testing and Research of Public Works of the republic of Benin in West Africa and director of rural roads areas, project manager for many road construction projects and also working for the capital, Porto Novo. He has worked with transportation for more than 25 years and he is especially concerned about traffic safety, when it comes to bicycles and other two-wheel transport.

Joseph Ahissou,
Managing director, Chief of Staff to the Minister of Infrastructure and Transport, Benin

"I have a bike and my daughter have a bike, and its useful for sports, but just 50 years ago, everybody, like my parents, used bikes to travel, but now, we don't do that so much.

Goals

Challenges

- Doubling of the Sèmè-Porto-Novo road (10 km) and construction of a new bridge with 2x2 lanes
- Reduce risk of accidents between motor cles and cars and bicycles

In Benin, many people are commuting between cities on motorbikes – often motorbike taxis, but also on bikes, even though these are not so popular currently.

Benin

Solution(s)

2 carriageways of 2 lanes each.

2 cycle paths on either side of the roadway physically separated from the roadways.

1 bridge over the porto-novo lagoon.

Benefits

Safer road for vulnerable users

Incentives to bike or walk – change of habits

Easier access to education and work places

Bicycles used to be more popular in Benin, but now many turn to motorcycle taxis for their transportation purposes, mainly due to the risk of accidents on the roads.

Our road infrastructure is financed by the national state budget, which mainly comes from fiscal taxes.

We also have toll on our roads which is used for maintenance of roads. The transportation of goods from our ports and between cities provide income, but also requires a good transportation infrastructure.

Read the Case Study in its full length in the appendix.

Brazil

Cycling against the current

Brazil has it's share of cycling, but it's also a society, where one's economic ability sets the scene for the choice of transport mode. Many people have walking or cycling at the bottom of their choice-list, so roughly speaking the better the country is doing financially, the fewer people choose walking or cycling.

Brazil
Economic status: LMIC

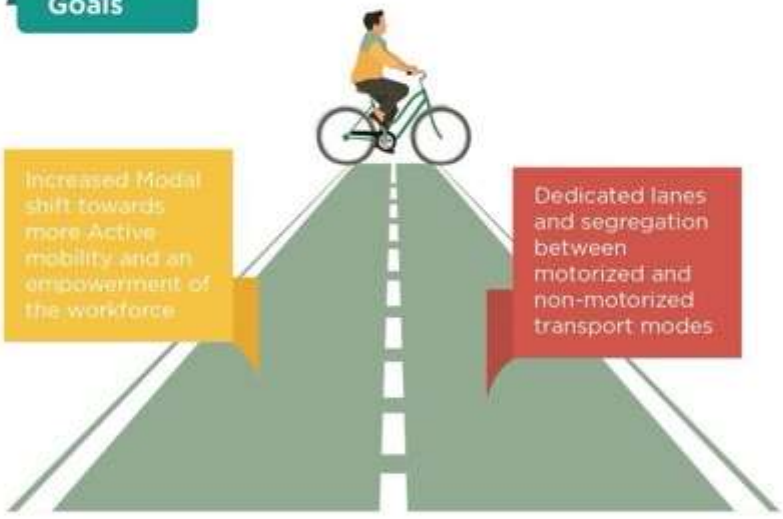
Area: 8.511.965 km²
Capital: Brasília
Population: 215,676,869

Dr. Victor Andrade,
Associate Professor at the Technical University of Denmark

Motivation to cycling more **50%**

Better bike infrastructure

Goals



Challenges

- Political incentives to buy a car
- Traffic safety (lack of dedicated lanes)
- Deficiency of Infrastructure in the economically challenged areas
- Generally it is difficult to change dedicated car lanes to bike lanes

In Brazilian cities, it is not super safe riding a bicycle together with cars. "However, we see many more cyclists sharing the space with cars

Brazil

Solution(s)

Regular traffic counting to monitor the development in walking and cycling.

Leveraging the trend with Active Mobility.

Introducing shared spaces and 30km/h zones.

Addition of electric bikes – build good habits.

Benefits

Diverse use supports multimodal transportation

Bike-share is helping to build new habits

Better bike infrastructure binds large communities together

The Public Bike Share (PBS) system in Rio, combining tourism and commuting, is a very robust solution and one of the most successful PBS´ in the world, with one of the highest usership (trips per bicycle) **per day and a total of 20,480 daily trips -** making it the busiest micro-mobility system in the country.

Read the Case Study in its full length in the appendix.

Canada

The Canadian Connection – La Route verte

Canada
Economic status: HIC

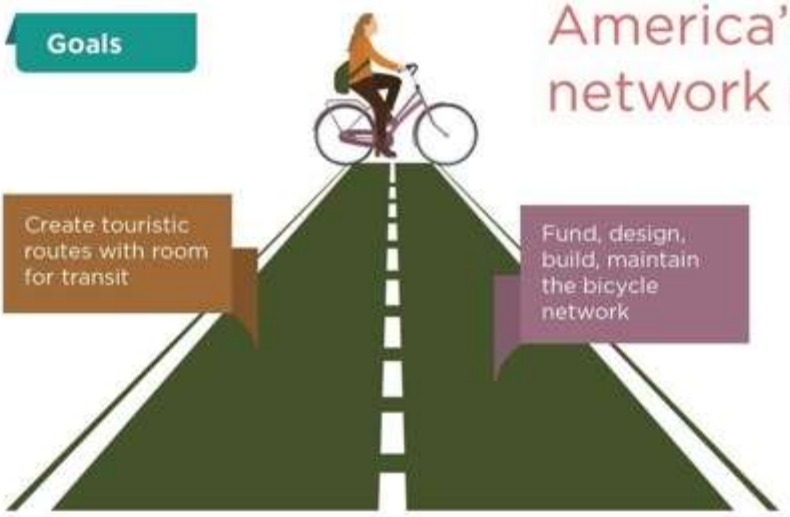
Area: 9.976.140 km²
Capital: Ottawa
Population: 39,088,428

In a big country with vast distances, a rough climate and political differences, cycling has become a driver for collaboration and innovation. La Route verte is a national network of cycle routes, designed for tourism and social life, but now also sustaining local and regional commuting and inter-urban transportation.

Louis Carpentier,
coordinator of active transportation in the Transportation and sustainable Mobility Ministry of Québec

Spanning **more than 5,300 kilometers**, la Route verte is North America's longest network of bicycle trails.

Goals



Challenges

- Weather is an obstacle in winter times
- Distances when it comes to everyday commuting
- Resources often are allocated elsewhere
- Perception of bicycles as less important and convenient

In 1995 the first bike policy from the government in Quebec was produced.

Canada

Solution(s)

Counting to validate demand.

Surveys to pinpoint needs.

Research to document use and benefits.

Action plans to trigger funding.

The provincial government provide financial support to local managers that can go **up to 50% of funding** when the city is going to build a new section of bike paths.

Benefits

Transition effect from sport to commuting

Local support and appreciation of biking through events and openings

Adaptable process and methods make room for local needs and traditions

Collaboration may be repurposed for other related actions, across borders

Read the Case Study in its full length in the appendix.

China

Chinese Fast Track to Change

With policies and strategies in place, the province of Qinghai in central China has been able to take fast action when it comes to rolling out new and improved inter-urban bicycle infrastructure. For the Xining Greenway, local authorities applied a 5-step approach to planning and design.

China
Economic status: LMIC

Area: 9.596.960 km²
Capital: Beijing
Population: 1,411,750,000

Gong Fengqi,
Design director and founder of the company SHIYU, and Project Manager for their part of the Xining Greenway

"My dream is

that cycling can be part of the life of each family and we can build more satellite cities and transport more population outside of the biggest cities and create low density cities that connect living and working and have cycling facilities. This is my vision for the secondary development future here in China".

Goals

Challenges

- Plan and design for a multi-facetted use of bicycle infrastructure with many different user groups at the same time

Electric bikes is about 40%, and even 60% in the cities of the bicycle fleet.

And the traditional bikes are mainly used for short distance commuting, for example from the metro stations to the working space areas.

China

Solution(s)

Combining circular economy, energy savings, co_2 reduction, healthy lifestyle and tourism.

A 5-step approach: urban planning, foreign inspiration, safety, transportation, tourism.

Connecting tourist resorts and tourist attractions with everyday commuting between 3 cities and rural areas.

Benefits

Cycling infrastructure in place very quickly

Changing people's lifestyle, towards a more active way of transport

Creating a push towards buying one's own bicycle

In 2017, Xining City built **urban bicycle lanes** to achieve a seamless connection **between the greenway network and the public transportation network.**

Read the Case Study in its full length in the appendix.

Colombia

Better Biking in Bogota - Ciclo Alameda - a highway for cyclists

How do you tackle the challenges of implementing new cycle paths in a very dense and diverse city as Bogata in Columbia? What about safety, security and the NIMB - not in my backyard - effect?

Colombia
Economic status: LMIC

Area: 1.138.910 km²
Capital: Bogotá
Population: 51,049,498

David Louis Uniman,
International bicycle expert, transportation engineer and City planner, working with green corridors, urban living and bicycling across the world

On a psychological level, more riders should be encouraged **to use their bikes by choice** and not as a last resort.

Goals

Implement measures to meet Bogota's Vision Zero Plan from 2017 by also introducing more cycling to Bogota as a means of commuting and an alternative to overloaded busses and car lanes

The idea of separating bicycling from the pre-dominant infrastructure (roads) have several advantages, *says David:* **"Cyclists hate pollution, as your lungs are your engine"** We hate traffic and intersections - so we prefer the super cycle highways in the secondary roads - small neighborhoods are safer (there are people) and away from cars. Plus you can do your shopping, and collect your kids on your way home".

Challenges

- Both psychological, political, technical and financial challenges tied to the project

Colombia

Solution(s)

A corridor that brings users from A to B.

Designated bike lanes through inhabited urban spaces.

Fundraising with the help of professionals.

Sustained communication of the project to the public.

Benefits

Compared to other transportation infrastructure, such as roads, bridges and railways, bicycle paths are very cheap to build and maintain

An estimated 10-12 % mode shift from private vehicles

Since 2020, the city has implemented 52 miles of protected emergency cycleways

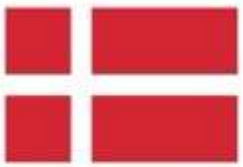
Improved Level of Service increased use by 2-3 times

The Alameda Medio Milenio Cycle is **a green corridor that gives priority to sustainable modes of transport** (pedestrian and bi-cycles), and is considered an inclusive corridor connecting different socioe conomic areas of Bogota.

Read the Case Study in its full length in the appendix.

Denmark

Collaboration, Co-funding and Co-creation



Denmark
Economic status: HIC

Area: 43,098 km²
Capital: Copenhagen
Population: 5.806.000

Back in 2009, the Cycle Superhighway Collaboration in the Capital Region of Denmark was established. Ms. Signe Helledi, Head of Office for Cycle Superhighways, recounts the incremental steps to a successful and inclusive roll-out of a role model of interurban bicycle infrastructure.

Signe Helledi,
Head of Office for Cycle Superhighways

50% of all trips to or from work or education are made on bicycle

Goals

More regional and long distance cycling. Broader stakeholder involvement.

Challenges

- Providing infrastructure for long-distance bicycle commuting
- Funding for construction, especially with municipalities

Funding and budgets, especially for municipalities.

Denmark

Solution(s)

Collaboration across authorities in a "Gentleman Agreement".

Joint promotion of regional cycling.

Joint funding opportunities between the state and the municipalitiess.

Benefits

A high level of benefit-cost gain

Less co_2 emissions

High increase in users

High user satisfaction

92% less co_2 emissions when changing from car to bike

-1,500 ton CO_2 annually

The bike can contribute to achieving **11 of the UN's 17 sustainable development goals**

Read the Case Study in its full length in the appendix.

Mexico

Mexican Bicycling at a Crossroads

Mexico
Economic status: LMIC

Area: 1,972,550 km²
Capital: Mexico City
Population: 128,651,661

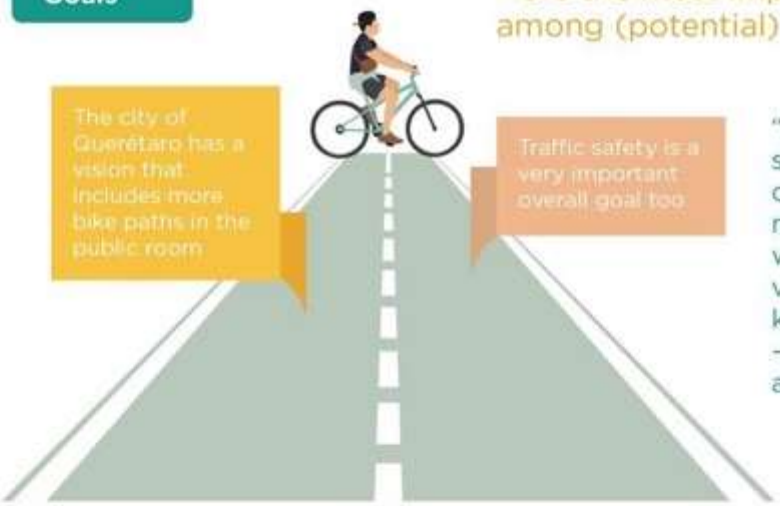
In the Mexican city, Santiago de Querétaro, the young Urban Planner, Abraham Cortés, dreams of a safer, more inclusive and more appealing infrastructure for bicycles. In his work, he uses new technology to create awareness of the need for more space and smarter solutions for the everyday users of the main arteries of the city.

Abraham Cortés,
Urban Planner

Insecurity – or fear of road accidents

– are the most important deterrent for biking among (potential) cyclists in Quetéraro.

Goals



"We have drone pictures of specific parts of the city so we can identify weaknesses in the mobility areas. Specifically I work with traffic models using visualization tools. The key is to know the patterns of movement – from where to where people are going. Says ***Abraham Cortés***

Challenges

- The current traffic culture is a massive deterrent for biking and fatalities are high
- Most transportation happens by car or public transport
- Bikes only take up 4% of the overall transport, while 22% are pedestrians
- Most infrastructure is already build for cars, so taking away a lane is very difficult

Bikes only take up 4% of the road

22% are pedestrians

Mexico

Solution(s)

Use advanced technology to visualize, design and disseminate necessary changes.

Use existing geometry and infrastructure to ease the crossing of vulnerable users.

Use new solutions, like two-way bike paths and intelligent traffic lights.

Use empty spaces near the road to install bike paths.

Benefits

Raised awareness with politicians and decision makers about possible solutions

Reduce accidents, stress and improve respect for all kinds of transportation

Involvement of both civil engineers and sociologists, and architects

"A lot of people use it for daily transportation in cars, buses, bicycles or on foot, **but the infrastructure is mostly focused on cars,** so that makes any other kind of mobility difficult.

New technology is used for a project about safe crossings for pedestrians, cyclists and other vulnerable users on Avenue 5. de Febrero

- a main artery Road in Querétaro. It crosses the city from north to south and is also part of the Mexican Federal Highway 57.

Read the Case Study in its full length in the appendix.

Serbia

Biking in the Balkans

With the introduction of the EuroVelo Routes to the Balkan countries in Central Europe, the combination of recreational and everyday biking may be a game changer for interurban cycling.

Serbia
Economic status: LMIC

Area: 88.499 km²
Capital: Beograd
Population: 6,690,887

Danijel Vuckovic,
Traffic Engineer and consultant in the field of planning and designing private and public infrastructure.

"I think that more cycling could bring a **lot of positive things** to Serbia"

Goals

More cycling for commuting

Separated bike lanes

Cross-border collaboration

Better funding and budgeting around cyclism

Challenges

- Spatial plans should be updated
- Habits – awareness should be raised
- Cycling for commuting is rare
- Budgets – are very low and other infrastructure is prioritized
- Central and south, west of Serbia is very hilly - up to 2000 meters above sea level
- Safety – when you are biking alongside cars
- No guides developed for cycling in urban areas

the streets are too narrow to live up to these guidelines. So I am really hoping that the next national plans will include bicycle infrastructure, along with roads, rails and other forms of transportation.

Serbia

Solution(s)

New Master plan to replace the 2010 plan.

800 kms designated routes between Serbia and Montenegro.

Promote cycling as active tourism.

Combine funding, from municipalities, state, EU or UN.

Benefits

Public health to reduce heart attacks and stay fit

Less congestion

Active tourism

Cities have constructed designated routes

EuroVelo is a network of 17 long-distance cycling routes criss-crossing Europe, in various stages of completion. When completed, the **EuroVelo network's total length will almost be 90,000 km.** As of November 2022 more than 56,000 km were in place. **EuroVelo is a project of the European Cyclists' Federation.**

Read the Case Study in its full length in the appendix.

USA

United Efforts of Erie

USA
Economic status: HMIC

Area: 9.629.091 km²
Capital: Washington D. C.
Population: 336,833,854

In the US state of Ohio, local communities work hand in hand with federal institutions to design, build, finance and operate sustainable recreation and transportation for all. It is a long game that shows how interurban green infrastructure can play an important part in revitalizing a community, economically and environmentally.

Daniel M. Rice,
CEO of Ohio & Erie Canalway Coalition

Matt Stewart,
Planning Administrator at AMATS

Goals

Challenges

- Resistance from private landowners and from neighborhoods where parking may be affected by the build out of the path
- Political habits and short term planning

Municipalities play an important role in advocating for the Canal and **bring awareness to the fact that infrastructure for walking and biking is equally important** as roads and bridges to society. We need the local decision makers and local leaders and partners to get onboard on this, also when it comes to raising funds from federal transportation resources.

USA

Solution(s)

A long term regional plan with heavy involvement of partners.

Visualisation of new and existing paths to align expectations.

Encourage hands-on experience.

Policy making, providing evidence of return on investments.

Benefits

Massive ROI (see study from 2015)

Recreational possibilities to sustain public health

Inclusion of neighborhoods without large green areas

Community building around activities and local businesses

Empowerment of users

Economic development of business and general area

Our energy companies support what we do. And it makes sense for the health-care professionals. That's obvious, because **people who are more active, equals lower healthcare costs.**

Read the Case Study in its full length in the appendix.

3. HOW DO WE IMPLEMENT BETTER INTERURBAN BICYCLE INFRASTRUCTURE?

Although we have investigated several projects and their ways of tackling different challenges to obtain their goals and achieve the benefits of cycling, we feel that it is not possible to provide "one size fits all" recommendations, as countries are different, in terms of culture, economy, geography, ect. Furthermore, as we have investigated this topic, many experiences and much data derive from Urban planning and design of bicycle infrastructure, and we have not encountered many projects, specifically on interurban bicycle infrastructure. In the following we will present some general recommendations that are worthwhile to have in mind when working on cycling related initiatives.

3.1. GENERAL RECOMMENDATIONS

No matter the maturity regarding cycling a country is at, it is vital to have a strategy pointing forward. Otherwise cycling will stagnate.

3.1.1. National cycle strategy

Every country should on a National level have a strategy and policy for cycling, which filters down on Federal or regional level, and finally into the work Municipalities do.

The national level is necessary to ensure the overall aim, funding and policy is in place. Furthermore, inter urban cycling will often involve state roads and/or several municipalities or regions, hence an overarching national involvement could be beneficial[11].

3.1.2. A Mobility Plan

Having a strategy and policy for cycling enables a discussion on what types of changes and initiatives are wanted, what level of budget will be required and what success looks like. When the overall goals are defined, it is important to establish a kind of baseline or index, meaning where are we today, in terms of usership, infrastructure ect., basically getting data. Because without a baseline one can not say what has changed factually, but only anecdotally. To ensure ongoing backing, both funding wise and general support one must be able to prove success and show "what good looks like".[12] Having a mobility plan in place, makes it easier to develop and connect interurban bicycle infrastructure in a structured fashion.

3.1.3. Engagement and inclusion

It is important to recognize your stakeholders and supporters and opponents, identifying both politically and in civil society who support change and who are skeptical is important. Getting buy-in is vital for a successful path towards cycling implementation. Engaging local communities is a resourceful knowledge base to tap into and will most likely result in a much better process[13]. Involve cycling advocates, urban planners, transportation and mobility experts, and the community in the planning process. Involve the local cycling community and residents in the development process to ensure the infrastructure meets their needs and addresses their concerns. Seek feedback from

[11] See Case Study: Serbia

[12] See Case Study: Denmark

[13] See Case Study: Columbia

cyclists regularly and make adjustments based on user experiences. A bike connection can be a strong driver for community building and prosperity[14].

3.1.4. Assessment and Planning

Conducting a comprehensive assessment of the existing cycling infrastructure, including bike lanes or paths, and connections between urban areas is a first step in planning and designing interurban bicycle infrastructure. Identify high-priority interurban routes where cycling infrastructure is lacking or needs improvement. Remember the synergies between touristic, recreational and everyday transportation cycling[15].

3.1.5. Infrastructure Development

Establishing dedicated and separated bike lanes or cycle tracks is on top of the wish list for many countries, both HICs and LMICs[16]. One option is to widen existing major roads connecting urban areas or build adjacent paths, and a more cost efficient method is road diet where the existing road width is reduced, freeing up space for cycling. Another is to repurpose decommissioned railroad tracks or build off-road cycling paths or greenways along scenic routes or natural corridors between cities.

It is always important to prioritize safety at intersections with protected bike crossings, bike boxes, and bicycle-specific signal phases[17]. The same goes for conflict free under- or overpasses (bridges and tunnels, specific to bicycling).

3.1.6. Intermodal Integration

Cycling can be a solution to the last mile problem - how to get from the train station or bus stop and home. Therefore, it is important to assess connections between cycling infrastructure and public transit stations, allowing seamless transfers for cyclists using buses, trains, or other forms of public transportation. With long interurban bicycle trips, some may choose to cycle only one way and then take a bus or train the other way back or travel part-way and connect with public transport. So flexibility is key, also if you want to bring your bike along with you onboard public transportation. Install bicycle parking facilities at transit hubs, popular destinations, and along cycling routes.

3.1.7. Promotion and Education

Launch public awareness campaigns highlighting the benefits of interurban cycling, such as health, environmental, and economic advantages. Offer cycling education programs and traffic safety training to encourage more people to use bicycles for interurban travel. Fear of cycling, due to (car) traffic is a real deterrent for people to even consider biking[18].

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[14] See Case Study: USA

[15] See Case Studies: China, USA, Canada, Brazil & Serbia

[16] See Case Studies: Benin, Canada, Brazil & Serbia

[17] See Case Study: Mexico

[18] See Case Study: Mexico, Benin, USA, Columbia

3.1.8. Policy and Regulations

Develop and implement supportive policies and regulations that prioritize cycling and protect the safety of cyclists. Encourage cycling-friendly planning that integrates cycling infrastructure into existing environments and new developments.

3.1.9. Operation and Maintenance

Regularly monitoring the usage and condition of interurban cycling infrastructure to identify areas that may require improvements or repairs is key to the reliability, safety and comfort of the infrastructure. A pothole can be dangerous to a cyclist[19] and even the smallest deviations from a decent level of service can deter people from choosing bicycling over other transport modes. Apply a cradle-to-grave or life-cycle-assessment to the infrastructure, as you would do with a costly bridge or highway.

3.1.10. Expand and Connect

Gradually expand the interurban cycling network to cover and connect more cities and regions, gradually increasing the overall coverage and accessibility of the infrastructure.

Create connections and link existing cycling networks to form a comprehensive, continuous, and cohesive interurban cycling system.

3.2. A Road Map for Interurban Bicycle Infrastructure

Below, please find a roadmap with general as well as LMIC-specific recommendations for processes and focus areas to consider, when rolling out (more and better) interurban bicycle infrastructure.

In the section after the roadmap, we will elaborate more on the LMIC context.

[19] See Case Study: Denmark

General recommendations

- Create a Mobility Plan to establish your visions and ambitions. Create a baseline to monitor progress
- Build a bicycle strategy. Zoom in on specific goals and challenges in your situation
- Engage with & include community and stakeholders
- Asses and produce a concrete work program, including project plans and execution
- Design & develop specific bicycle infrastructure
- Integrate with other transport modes and clarify potential pinch points
- Ensure appreciation of bicycles as an integral part of transportation, by promoting societal benefits of interurban cycling
- Educate the public on best behaviour when biking or when you encounter bikes in traffic
- Develop policies and regulations that support and sustain safe bicycling
- Manage your bicycle infrastructure to maintain level of service. Keep expanding your cycling infrastructure

LMIC-specific

- Make bicycles accessible and affordable
- Build a plan with focus on safety
- Explain how bicycles can support societal goals and share knowledge of benefits related to cycling with the public
- Use funding streams available, specifically targeted to LMICs, including international funds
- Identify possible synergies between tourism and daily use
- Consider design and use of materials to identify the best balance between cost and level of service
- Build to best LoS possible
- Include operation and maintenance costs in your budgets to ensure the value of your bicycle infrastructure

3.3. INTERURBAN BICYCLE INFRASTRUCTURE IN A LMIC CONTEXT

All countries are different and just as with any other form of technology, both "hardware" and "software" is needed, when it comes to infrastructure. Without access to a bicycle there won't be much cycling. In many HICs the number of bicycles is high, but many of those may be collecting dust in a garage. In some LMICs, on the other hand, it might be a financial burden to purchase a bicycle, or it's simply not available. The Danish NGO initiative, Baisikeli, collects Danish bicycles that are no longer in use and ships them to Mozambique, where they train the local workforce to become bicycle mechanics, who restore the bicycles and sell them, providing citizens an opportunity to buy a bicycle, which is otherwise difficult to obtain in Mozambique. In a larger perspective, Africa holds a huge potential for cycling, as walking for many people is the primary means of transport:

Walking is already the primary mode of transport for the majority of people. Up to 78% of people walk for travel every day to access healthcare, education, shops, jobs and public transport – often because they have no other choice.[20]

Providing the option of a bicycle as transportation, could enable a large group of people in the LMIC countries to travel faster, save time, or travel further, possibly for better job or education options, as travel distances become longer. But safer facilities are of essence, as Africa is the least safe place to walk and cycle in the world, with 261 pedestrians and 18 cyclists killed every day, according to the UN.

Another way to gain access to a bicycle is Public Bike share systems (PBS), which, as the Rio de Janeiro case illustrates, can be very efficient and successful in generating bicycle trips. Globally there are approximately 3000 systems, both dock based and dockless, of various fleet sizes and varying levels of quality and technical level of advancement .

As mentioned elsewhere the so-called Bicycle libraries provide people an opportunity to try cycling without having to buy a bicycle, thereby serving as an enabler, introducing the individual to cycling.

As Mr. Ahissou told us in the Benin case study: "I have a bike and my daughter has a bike, and it's useful for sports, but just 50 years ago, everybody, like my parents, used bikes to travel, but now, we don't do that so much. We need that back – and we need bike lanes. It is very important to bring these habits back, and help build them. But we need to make our roads safer to do this".

The percentage of house-hold expenditure on transport is much higher in LMICs than in HICs, which means that a more cost effective means of transport will benefit LMIC households to a great extent. The bicycle is just that.

Transport expenditure accounted above 20% of household income for 88% of low-income groups. However, it is below 15% of household income for high income groups, which reveals less financial burden on them.21

[20] Walking and Cycling in Africa – Evidence and Good Practice to Inspire Action, United Nations Environment Programme and United Nations Human Settlements Programme, 2022

[21] Transport vulnerability: Measuring travel time and expenditure budget in Addis Ababa, sciencedirect

However, in some countries, owning a car still represents status or social standing and this can act as a barrier to take-up of cycling. Our interviews with cycle experts in South and Central America supports this.

An interesting point is that LMICs (and possibly any country that is about to start their work on cycling infrastructure) can skip steps and select Best Practices without having to go through a development phase as many well-established cycling countries have done. As an example, would Denmark be starting their journey towards more cycling now, it's likely that they wouldn't make cycle tracks and lanes as they do, with its significant two-curb design, as it's a very expensive design solution. Chances are that they would be looking at Modal Filtering and reduced speed limits as tools for creating a cycling friendly environment.

An example of jumping the evolutionary ladder is how fast countries in Africa expanded Cell phone connections, and thereby skipped the period with investments in telephone poles and wires many other countries around the world had for decades.

3.3.1. Specific advice for LMICs

Most advice on challenges and solutions is universal, but this chapter devotes specific focus on the challenges and solutions in connection with interurban bicycle infrastructure in a LMIC context, these are recommendations that may prove valuable to managers and operators in LMIC countries. They are to be seen as good advice, not a comprehensive list. For more inspiration, we encourage you to read our LMIC case studies in their full length and to look at some of the sources and links also provided in this report.

3.3.2. Safety & Security

Is often a top concern, several LMIC´s have issues with lack of traffic safety and in some cases personal security in the public space. This is an issue that needs strong attention and must be mitigated generally, not only concerning cycling. By providing cycling as a viable mode of transport personal safety can actually be gained, as one travels faster and more separated from other individuals than, say, on a bus.

Well designed and dedicated cycling facilities, efficient speed management, and areas that are well lit and have a minimum of "out of sight" places create more perceived safety.

3.3.3. Cycling pays off

ROI on cycling initiatives are always high, and in situations where funds are limited a lot can be achieved for much lower cost than vehicle related infrastructure, both lower cost on construction, but also on running maintenance. But despite being a very cost efficient transport initiative, cycling infrastructure obviously still comes at a cost, thereby making funding an issue.

Besides the traditional funding through public budgets, fundraising with the help of professionals might be an option. It could be as joint funding opportunities between the state and the municipalities, or exploring possibilities for e.g. funding streams from Developments banks ect.

3.3.4. Community engagement

Securing commitment and support among affected communities can provide valuable insights on non-officiel knowledge.

3.3.5. Synergies

For some countries there might be an opportunity to combine tourism and everyday cycling, so investment in tourism also serves as a transport option for everyday use by local residents. Active tourism is a growing market segment and cycling connections to a site of tourist interest might also serve for one's commute to work or school.

3.3.6. Design and materials

Substantial savings can be obtained through design and material choice. Utilising existing road space is way cheaper than constructing new, and segregation can be realised with posts or other price friendly materials as opposed to granite or other expensive materials. If such a repurposed road also can utilise existing drainage and rainwater infrastructure, a lot of money can be saved.

3.3.7. Data and counting

Although knowing your baseline is important, one can come a long way with open eyes and logic. As data collection can be costfull, observation of people's habits and travel patterns can provide good indication on where a cycling solution would be in demand, there might even be informal “desire lines”, showing where many walk or cycle already.

3.3.8. Life cycle and costs

As with any other infrastructure, there is a limited life span to interurban bicycle infrastructure, also on gravel roads. Therefore it is vital to have a maintenance plan, and to set aside the means to cover repair. So operations and maintenance should be a natural part of the planning and funding process, no matter which infrastructure type we are talking abo

4. CONCLUSIONS

Most people can agree that biking is a positive form of transportation, in terms of the low carbon footprint impact and the exercise and mobility bicycling brings about.

This is certainly true for the people involved in the case studies, we have investigated on all continents, over the summer of 2023. Bicycling delivers on 17 UN Sustainability Goals, makes for a great return on investment, compared to other transportation modes, and is a cheap and easy way to get around, no matter if you are in a HIC or LMIC country.

So why do we struggle to implement more bicycle infrastructure? The answers are quite complex, but one of the major challenges seem to be the hassle, lack of safety and low status of long distance biking, or commuting, as well as general resistance to change. That is why this Special Project is relevant; with a looming climate crisis, increasing urbanisation, obesity, pollution and a growing population, bicycling over greater distances, either in a big city or between inhabited areas should be an easy win.

As we have seen in our 20 light- and deep cases, the transition from urban cycling - which is described in a lot of literature - to inter-urban cycling is a tough one. It is evident that the private car is a strong player in the field, particularly if there is often no infrastructure for bicycles. Our claim is, though, that if you produce the bicycles and build a safe environment for cycling, bicyclists will follow. We have seen numerous examples of this, especially when local or regional communities build out recreational or touristic trails, which subsequently are being used more and more by commuters - and maybe by those, who are not allowed or can afford to drive a car. This is one of the synergies of building and connecting interurban bicycle paths.

In some countries, interurban cycling has become a key to ensure mobility and a natural part of the strategic allocation of resources. It simply pays off to invest in cycling infrastructure. This is why we have looked specifically at LMICs and their challenges, which may be similar to HICs in many ways. Our conclusion is, though, that the benefits of introducing biking as a primary means of transport to a LMIC household is even greater than that of a HIC household. This has to do with how much you spend in percent of your income on transport, but biking can also empower new user groups to be able to go to school or markets.

One interesting fact is that some very wealthy countries do not prioritise bicycles, while others do. Size and distances is part of the explanation, but also, a traffic and transport culture where you can drive from an early age and where road transportation dominates, is hard to change. The e-bikes may help, but the long term success will be dependent on a decent and well-connected infrastructure as well as an open inter-modality - where you can bring your bike on the train, on the bus, in the metro.

Our recommendations to both HIC countries and LMIC countries that wish to improve their bicycling facilities and introduce interurban bicycling are simply to embrace cycling as a natural form of human mobility. Policies, strategies, plans, funding, design, building, maintenance and operations are known steps towards enhancing networks of streets, roads, highways, rails and airports. Once bicycling receives the same attention, it will deliver the missing part of the puzzle, to create a more equal and sustainable transportation for millions of people.

5. SOURCES

5.1. INTERNATIONAL ENTITIES

- PIARC - World Road Association: piarc.org/en
- World Bank: worldbank.org
- United Nations: unstats.un.org/sdgs/dataportal
- WHO: who.int/data
- European Cyclist's Federation: ecf.com/
- International Energy Agency: iea.org/topics/transport
- International Transport Forum (ITF): itf-oecd.org/publications

5.2. MISCELLANEOUS

- Comparison of carbon footprint per transport form: visualcapitalist.com/
- The Danish Cycle Super Highways secretary: supercykelstier.dk/koncept/
- Interreg - cycle highways: vb.nweurope.euchips-general-introduction.pdf
- Bicycle statistics: pioneersportscolorado.com/bike-statistics-and-facts-2019/
- World emissions per sector:statista.com/world-carbon-dioxide-emissions-by-sector/
- Cycle guidelines, Australia: tmr.qld.gov.au/
- News article on cycling in mozambique: washingtonpost.com/
- EuroVelo Homepage: eurovelo.com/
- Labmon publication, Brazil: labmob..br/
- Cycling in numbers: welovecycling.com
- Bicycle statistics: enterpriseappstoday.com/
- Bicycle statistics: groundreport.in/
- EU data on bike sales: ec.europa.eu/eurostat/
- Statistics: ourworldindata.org/
- Road safety: road-safety.transport.ec.europa.eu/
- Paper on E-bikes: sciencedirect.com/
- Dutch Cycling Vision 2023: dutchcycling.nl/
- Danish Cyclesuper Highways, statistics: cyclingsolutions
- Australian Institute for Sensible Transportation: sensibletransport.org.au/
- German Citizen Cycle ways: strassen.nrw.de/de/buergerradwege.html
- E-bike statistics: global-e-bike-market-volume-forecast

5.3. LIGHT CASES LINKS

- Bristol to Bath cycle path, UK sustrans.org.uk
- Regional Cycling Network, Austria, klimaaktiv.at
- Good Cycle Japan: mlit.go.jp/
- Halfway built, Mexico: facebook.com/gobiernocolima/
- A cycle path dobbling as coastal protection, New Zealand: nzta.govt.nz/te-ara-tupua/
- Sports cycling as enabler, Qatar: ashghal.gov.qa/en/
- Engaging decision-makers, Spain: observatoriotransporte.mitma.es/en/
- Collaboration between 15 agencies, USA: mvrpc.org/transportation/bikeways
- Multifunctional lane, South Korea: interestingengineering.com/innovation/
- Connection the dots, USA: sfmta.com/

6. APPENDIX – IN-DEPTH CASE STUDIES

In this appendix, you will find our 10 In-depth Studies in their full length. They are in alphabetical order, beginning with Australia and ending with the USA case.

If you want to know more about the specific case, you can look in our sources, where we have listed relevant links and material for the cases. Or you can reach out to the authors of this report and we will be happy to help.

The following 10 case studies are produced with the kind help of experts from::

- Australia
- Benin
- Brazil
- Canada
- China
- Columbia
- Denmark
- Mexico
- Serbia
- USA

6.1. IMPROVING BICYCLE INFRASTRUCTURE IN AUSTRALIA

In Queensland in North East Australia, authorities are working on rolling out more cycle infrastructure, by capitalising on the economies of scale that are achievable in major projects. It's an incremental process that takes time.

Michael Langdon is a Senior Advisor within the Queensland Department of Transport & Main Roads (TMR). He is managing their Cycling & Walking Technical Research Program, including the running and coordination of technical training courses for staff and stakeholders.

One of many of the actions in the Queensland Cycling Strategy is is to build capacity in both government and industry on asset management and provide guidance on how to include sustainable transportation technology into their operation and management", "A lot of the work we do is focused around technical governance. We run training courses, we develop technical publications on emerging issues or emerging technologies. This is mainly run form the state government in the Brisbane (capital city) office, and we have regional offices. Regional offices manage the assets and the department also works with national guidance and also research on new and emerging issues. The latest issue (2023) which we've been doing a fair bit of work on has been E-scooters. At the work is underway on road retrofitting and separation on road bike lanes. And reducing speed at pedestrian crossings of roads",

Changing habits

When it comes to enabling and improving safety for cycling, the department has good experience with infrastructure as a driver. "Ideally cycling works best at short distances, but if there is good quality infrastructure, it actually makes it easier and safer to travel longer distances. High quality bike lanes, separated from the traffic. You will actually get people travelling further because the infrastructure has been provided. And I mean this is not unique to cycling, we see the same thing with public transport as well. If you have an express service or a direct service that runs at high frequencies, people will come from further away to use it. People are prepared to travel further to use it because they know it's reliable"Once they get on the bike way, they don't have to get off it again or they don't have to put themselves in danger with vehicles in general traffic lanes. So even though distance is often cited as a barrier, it can be also a question of effort and safety",

Complex connectivity

Infrastructure planning, design and operation is always a complex exercise. Also when it comes to allocation and prioritization of funding. Michael explains: “In Australia, there are some things like boarder protection where, because we're an island, it makes sense for the national government to coordinate. But there are a lot more functions that actually happen at the state government level and at the municipal or local level. As a state entity, we do have a strategy for cycling and we do have cycling plans. We also have an annual funding, but we work with local governments to put this into the best possible use. Local governments also have their own funding. We offer matched funding to the local governments, so we put up half of the funding. On the Network Maps, routes are given different priority, so you have to keep in mind that 80% of all roads are owned and operated by local governments and in terms of footpaths close to 95% are local government owned and operated, which means that we need to work with them and they need to put up the projets to get them constructed and build, operated, and maintained. On those maps of priorities, projects are given priority ABCD, and if the local government puts up a project that's on a priority list A, then probably, we will co-fund it”, he says.

“But different authorities will have different perspectives on what the priorities are. And often there can be differences of opinions between a technical assessment and a community assessment. Sometimes you may have a fatal crash at a location that could just be a once off random crash and at a location which otherwise is perfectly safe or reasonably safe, compared to other locations that have sort of compounding crash risk factors. But you may have a local campaign to get a road upgraded or something like that. It may not be a high priority in the overall network. So what we're looking at is where the trip was generated; where do they want to get to, from where to where and what's the most direct route to do that. But also what route will service the majority population that lives in that area. So quite often the network planning is really about how much connectivity does it provide? And does it fill a gap in the network? If it ticks those boxes, then it gets a priority A from us”,

The Veloway 1, is a dedicated cycleway running between Lower River Terrace, South Brisbane and Underwood. The 17km cycleway provides a safe and efficient route for bike riders.

Value for money

Aside from the alignment of strategic projects, some of which involve bicycle infrastructure, the Department is also keen to assess projects on their possible synergies, and there is a clear path

towards more cycling infrastructure in new and retrofitted projects. Often in projects when a road is being re-build, or if there's a project that's going to happen anyway, it's always better value for money if you can get a cycling route included at the time you do the work. Safety standards change all the time and safety requirements change all the time. So quite often if you try to replace like with like, you won't be able to. With any upgrades, you're going to have to bring it up to current standards, so there will be a significant investment involved. But the other thing is when you are doing these major road upgrades, you have to buy materials for them and you have to have labour and you need personnel and you need designers, you need all sorts of people involved. So the marginal additional needs, including a cycle facility, is usually only a few percent of the total project budget", "So if you compare the marginal additional costs to the potential costs of having to retrofit, it makes sense to include the bike lane.

"And quite often with a project that large you will have contingencies. Between the time you start, and the time you finish, the costs of things will change, quantities will change, the cost of materials will change, the cost of labour will change. So they always have to put contingencies on them. So sometimes there will be additional costs and we do have a cycling programme which can assist with that. But a lot of the time they are able to include it in the cost of the project",. "A good example is road resealing. One of the quick wins we had at a project was that we looked at the previous line marking and by making some tweaks, we were able to get 30-40 kms of bike paths with no additional costs to the resealing project. We also wrote a technical guideline about this. Quite often there will be things that the agency will need to do anyway, like resealing roads, where if you can be proactive in the planning stages, you can get facilities for cyclists",

Optimizing funds and efforts

Another example of where you can optimize funding, may be with bridges, "We actually did a technical study on bridge design and bridge construction. And what we were looking at was what were the cost components Lower cost lightweight materials and construction techniques that allow for bicycling might be enough and bridges may be built with less materials and less resources and provide better value for money".

"At the very least when working on a new project we should not make things more dangerous or more difficult for cycling. Depending on the project, it may be that a road gets upgraded to make it better for the buses or better for the heavy vehicles, but it can make it more dangerous or more difficult for bikes and pedestrians

"Each project is an opportunity to improve the situation for cyclists. And that's not just cycling projects, that's every project, you know, the motorway projects, the rail projects. But then the next thing would be in terms of goals, I think people who have the ability and the desire to cycle should have the opportunity and incentives to do so. infrastructure provided that enables that - at a network level. Best practice is to have protected bike lanes. And have a designated operating space for cyclists with some form of separation between larger, faster moving vehicles. If you provide that, then that can be used by people of all ages and abilities",

A map of the principal cycle networks for the central Queensland region. Local governments with a published Principal Cycle Network Plan can apply for funding towards projects that provide high quality bicycle infrastructure on the principal cycle network's highest priority routes.

Cars, cycles & covid.

As in many cases and countries, Australia, although big in size, also has it's difficulties when it comes to allocating sufficient room to bicycles. "One of the biggest challenges we have is trying to get road space reallocated. Due to the perceived traffic impacts decision-makers are often less inclined to give up a traffic lane for a cycling city or remove a parking lane for a cycling facility. There seems to be a level of acceptance about resuming land for motorways or for large infrastructure projects, but often people are reluctant to resume land to build a bikeway",

"There is a lot of recreational biking and long distance recreational biking as well. However, I do find the distinction is a very blurry line. We do get a lot of people who enjoy recreational cycling, but then that often does lead to commuting cycling if there's infrastructure and if you know the origins and destinations. With the pandemic, cities were basically shut down and a lot of people started working from home. And a lot of supermarkets did home deliveries and things like that. There's been a big shift away from the city. Now what we've seen there are some locations, some suburbs that have bike networks and have footpath networks when they get connected to an inter-city link. What we have seen is a huge jump in cycling in those suburbs that already had good infrastructure, compared to other suburbs that don't have bikeways. So I do think that recreation gives people an enjoyment of cycling and these days people do want quality of life. And if there is a more attractive alternative to cars or trains, particularly an enjoyable one, they will use it",

"And a lot of studies have shown that people who drive to the city often do so because they get free parking, either as part of their salary or provided by their employer or something like that. You don't get recreational driving in the same way that you get recreational cycling. And similarly with the scooters. You're not going to take an E scooter on a sort of the Tour de France trip, because the people who are interested in doing that sort of cycling are not interested in scooters. So the scooters are very much utilitarian and a lot of the research is showing that they're not replacing

cycling trips, they're actually replacing car and public transport trips and some walking trips, but it's a different demographic. So people that cycle do so, because they have an inclination",

Raising interest and understanding

When asked about what would get more people cycling, there are both technical and psychological factors. "We need more separated, dedicated cycling infrastructure with segregation for the cyclists. The ideal situation would be a network of cycle tracks with segregation between pedestrians, cyclists, scooters using the same space and then have that provided at a network level, like with the connecting grid. Similar to the road network. That would be the dream. And I do think that it may be achievable through reallocation of road space, particularly kerbside road space which is used a lot for parking. If that parking could be moved to the verge, carports or garages or off street parking facilities and then the road space reallocated for cycling and scooters and other new and emerging E technology, I think that would be the most straightforward, quickest way to roll it out with their existing infrastructure", he says.

"Fortunately, we are seeing a stronger demand for these solutions, and we do see incremental improvement. One of the projects I'm working on at the moment is about retrofitting separators onto existing road bike lanes. I did a similar piece of work six or eight years ago. But at that time, we were still getting a lot of resistance. But since that time we've been able to get up a lot of demonstration projects and we've been able to address a lot of concerns that people had. So that is a step forward towards the sort of infrastructure and sort of network that we're working towards. And actually there is a point that if people aren't familiar with something,and don't know how it operates, can't imagine it, it can be a really hard sell. So showing people the benefits of cycling will fill them with confidence and will address their concerns about it", Michael says. .

Goals

- Include new and improved cycle infrastructure into all new projects and upgrades.
- Everybody with the inclination and ability to cycle should be given the chance
- Funds and efforts should be coordinated and allocated in the best possible manner

Challenges

- Conflicting commitments
- Lack of funding
- Habitual thinking that favors parking cars and busses.
- Competing interests between different road users
- Road space allocation for bikes
- Locating space/land for new bike projects

Solution(s)

- Smart allocation and asset management
- Collaboration between authorities and public
- Education and capacity building
- Separated lanes from heavy traffic.

Benefits

- Value for money and more bike lanes
- Community building and business facilitation
- Recreational cycling may lead to commuting cycling
- People appreciate quality of life – and private space – like cycling.

6.2. NAVIGATING REGIONAL TRANSPORT AND LOCAL TRAFFIC.

Joseph Ahissou is Chief of Staff to the Minister of Infrastructure and Transport. Before that he was Director General of the National Centre for Testing and Research of Public Works of the republic of Benin in West Africa and director of rural roads areas, project manager for many road construction projects and also working for the capital, Porto Novo. He has worked with transportation for more than 25 years and he is especially concerned about traffic safety, when it comes to bicycles and other two-wheel transport.

Mr. Joseph Ahissou, Managing director, Chief of Staff to the Minister of Infrastructure and Transport, Benin.

Benin is bordering to Niger to the north, Burkina Faso to the northwest, Togo to the west, the Atlantic ocean to the south and Nigeria to the east. The port of Cotonou is a key portal for goods to the inland of these countries, and the roads from Cotonou are very busy with trucks and with traffic building up, also with commuters from the suburbs of Cotonou and Porto Novo. So the need for new and better, and more inclusive, transportation infrastructure is great.

The state roads of Benin are about 6,000 kms and about 3,000 kms are paved road. A new recent government strategic program entails several infrastructure projects, including an upgrade of a strategic stretch of road from Porto Novo, towards Cotonou.

Joseph is highly involved in these projects and he is happy to report, that Benin recently moved from a low to middle income country, which helps with the overall funding for road infrastructure.

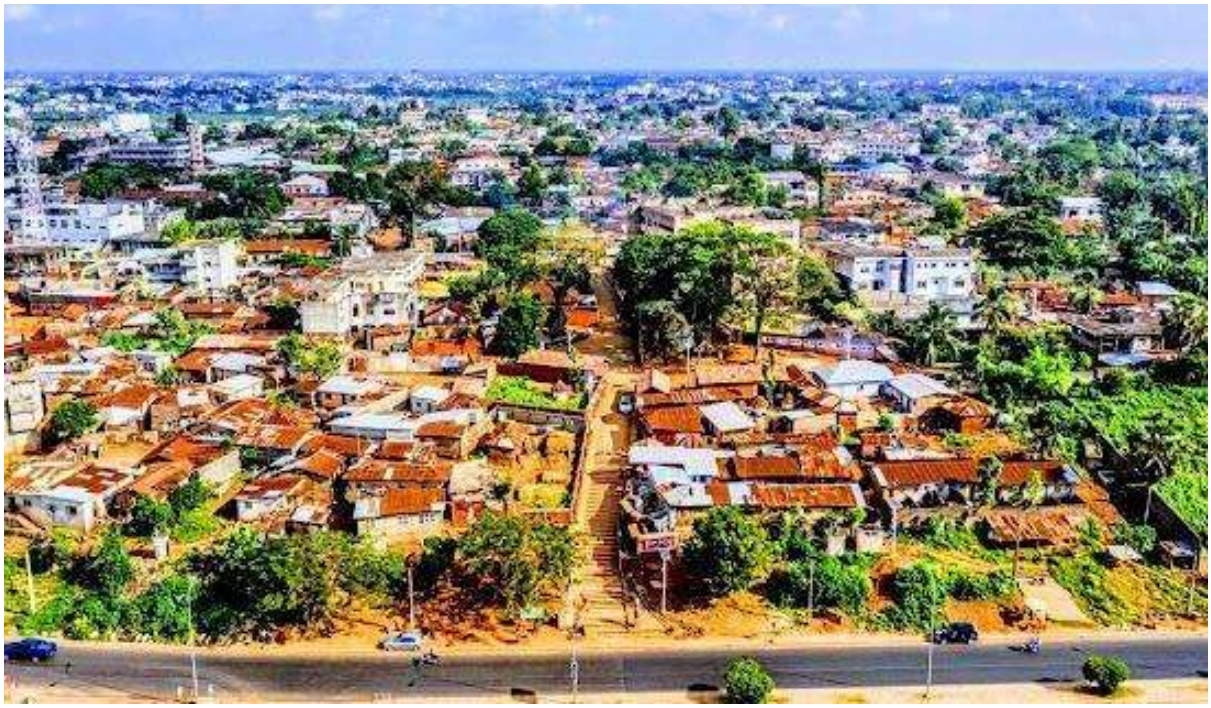
Bicycles used to be more popular in Benin, but now many turn to motorcycle taxis for their transportation purposes, mainly due to the risk of accidents on the roads.

Safety First

When asked about challenges for the Benin infrastructure, Joseph immediately points to road safety, and in that connection specifically the separation of heavy traffic from the light traffic. In Benin, many people are commuting between cities on motorbikes – often motorbike taxis, but also on bikes, even though these are not so popular currently.

“We are trying to separate bikes and pedestrians from the other traffic, but we have challenges with locals crossing the road and many people are still afraid to bike, as we don’t have designated bike lanes in all places. They also share the space with the motorbikes, which is not a big problem. That is why we now start building out the road between Porto Novo and Cotonou. One part of the road goes to Lagos in Nigeria. The main challenge is to reduce accidents between cars and motorbikes and bicycles. That is why we separate the bike lane and the main road. I think this is the main goal and challenge”, says Joseph.

“Also, for commuting between Porto Novo and Cotonou, people are using moto-taxis, which are really two-seat motorbikes with a driver. This is true for all the cities and municipalities around Cotonou. So I think it is good to have separate lanes for this. And regarding bicycles, it is the same pattern, and especially for students that commute between cities, we have to consider how to address their safety issues”, he adds.



Porto Novo, the Capital of Benin, with about 300,000 inhabitants. The city is close to the large port city of Cotonou, with about 700,000 citizens. The roads around the area serves about 2 mio locals and is a transport hub to several other countries in the region.

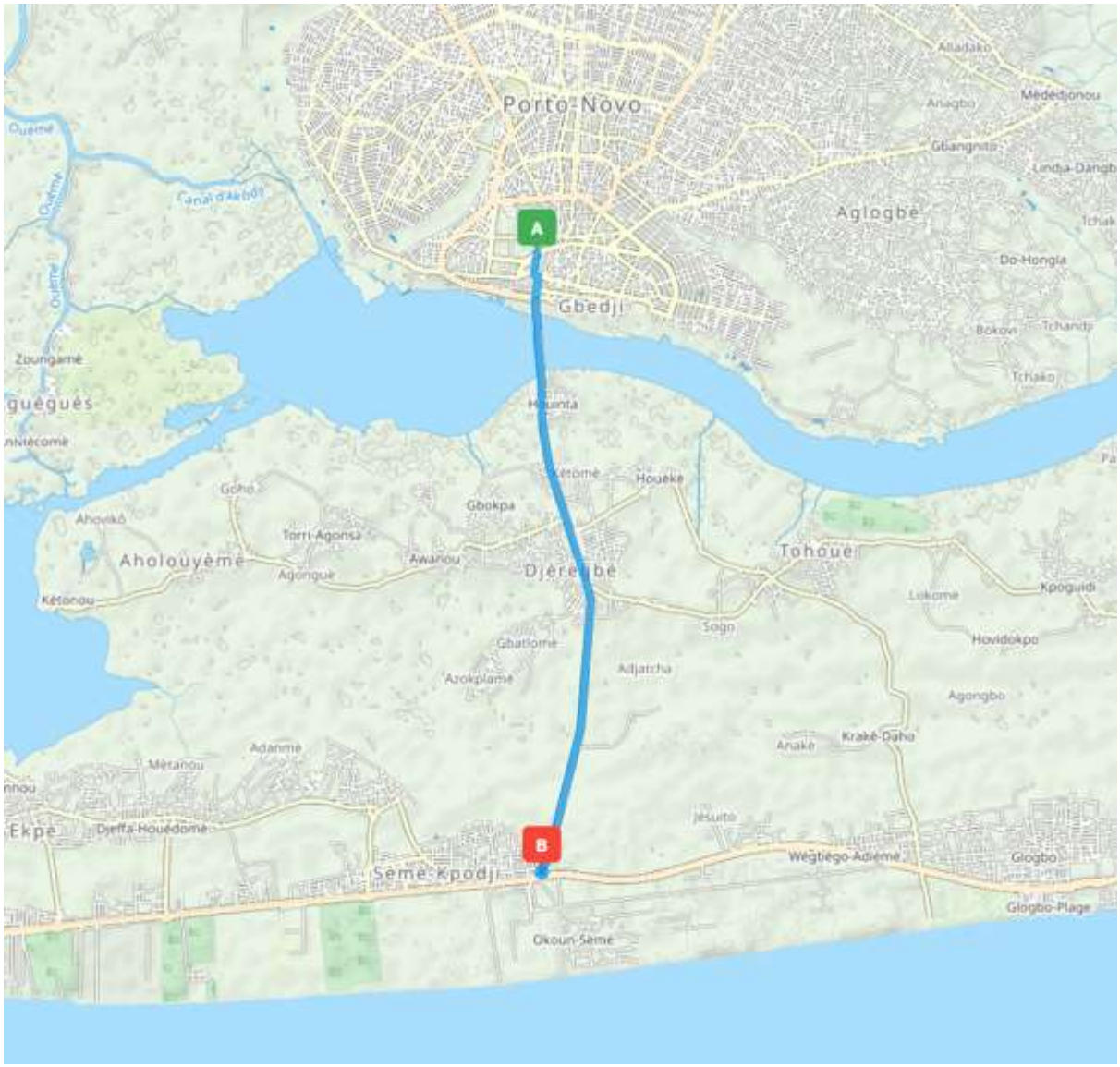
Economic life cycle

"Our road infrastructure is financed by the national state budget, which mainly comes from fiscal taxes. We also have toll on our roads which is used for maintenance of roads. The transportation of goods from our ports and between cities provide income, but also requires a good transportation infrastructure. And we also need to reduce the risk of accidents. But installing separate lines and introducing multi-modal transport between roads, rivers, the sea and different transport modes is also a challenge. And as 90% is by road, we have to invest in road construction and at the same time reduce accidents", says Joseph.

Bringing back bikes?

"I have a bike and my daughter have a bike, and its useful for sports, but just 50 years ago, everybody, like my parents, used bikes to travel, but now, we don't do that so much. We need that back – and we need bike lanes. It is very important to bring these habits back, and help building them. But we need to make our roads safer to do this", Joseph underlines.

With an increasing GDP and a role as key hub for several countries, the transportation system of Benin is an important part of the regional development, but it also poses some challenges to local commuting and local traffic safety. The projects around Porto Novo and Cotonou are designed to ease traffic and improve road safety while promoting local trade and to improve living conditions of the people of the area. Hopefully bicycling can become a part of this, with more designated bike paths.



The doubling of the road from Porto Novo on a 10 km stretch, includes rebuilding a bridge across the Porto Novo lagoon. It also provides new options for two-wheel traffic.

Goals

- Ease the traffic flow between the two main cities, Porto Novo and Cotonou.
- Reduce accidents and increase traffic safety.
- Provide good quality roads for transport of goods between Benin and other countries.

Challenges

- Doubling of the Sèmè-Porto-Novo road (10 km) and construction of a new bridge with 2x2 lanes
- Reduce risk of accidents between motorcycles and cars and bicycles.

Solution(s)

- 2 carriageways of 2 lanes each
- 2 cycle paths on either side of the roadway physically separated from the roadways
- 1 bridge over the porto-novo lagoon

Benefits

- Safer road for vulnerable users
- Incentives to bike or walk – change of habits
- Easier access to education and work places

6.3. CYCLING AGAINST THE CURRENT

Brazil has it's share of cycling, but it's also a society, where one's economic ability sets the scene for the choice of transport mode. Many people have walking or cycling at the bottom of their choice-list, so roughly speaking the better the country is doing financially, the fewer people choose walking or cycling.

Dr. Victor Andrade is Associate Professor at the Technical University of Denmark

Victor has a PHd from 2004, and is a former associate professor at the University of Aalborg. He is the Founder and Former CEO of LABMOB (Laboratório de Mobilidade Sustentável), in Brazil. He currently works at the Technical University in Denmark.

Having lived and worked both in Brazil and in two periods in Denmark, Victor has a broad insight to cycling in Brazil, with an added insight from his International perspective on Mobility.

A country as large as a Continent

Brazil is almost as large as Europe, and is diverse and different, also when it comes to cycling. There is no real interurban cycling infrastructure, but major cities, such as Rio de Janeiro and São Paulo have cycling infrastructure connecting areas and neighborhoods over significant distances.

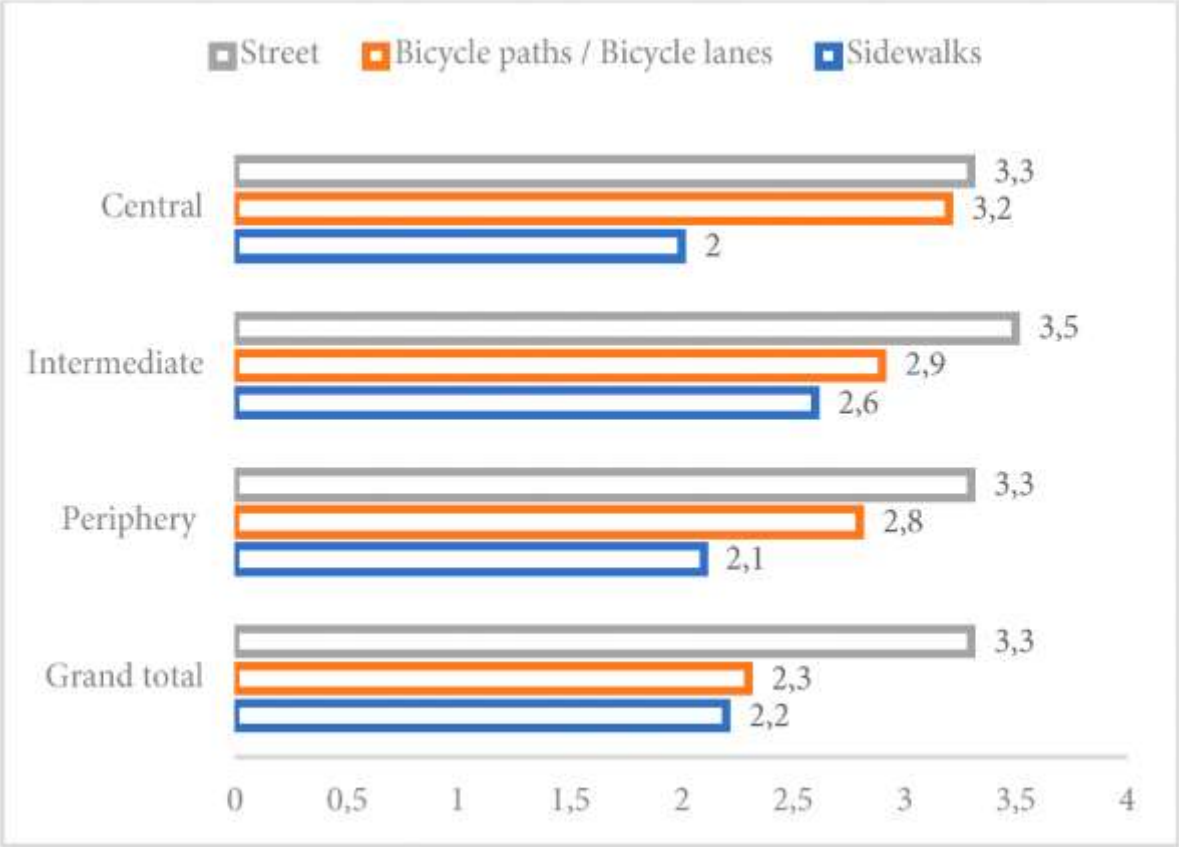
Development of any kind of cycling infrastructure is mainly done through public investments, which is what drives the build-out of infrastructure. Administratively, Brazil has three main levels; the federal, the state and the municipalities, so coordination of bicycle infrastructure can be difficult, especially between municipalities. But generally speaking initiatives to build cycling infrastructure comes from Municipalities, Victor recounts.

In order to secure federal funding for infrastructure initiatives, it is mandatory by the national government that cities or municipalities have a Sustainable Mobility Plan[22]. But having a plan does

[22] The 2012 National Urban Mobility Policy states that cities with a population of over 20 thousand people must develop urban mobility plans. Source, The Bicycle Brazil Program, by Ana Carboni

not secure co-funding per-se from the federal government and funding don't usually cover the entire budget required and is granted based on municipality size.

Major cities such as Rio de Janeiro and São Paulo, have mobility plans, and many smaller cities too, but they can struggle with implementation, which leaves a big gap between intentions and practices.



Frequency of bike use compared to type of bicycle infrastructure (Bicycle Mobility, LABMOB, 2018).

Placed in the Global South comes with challenges

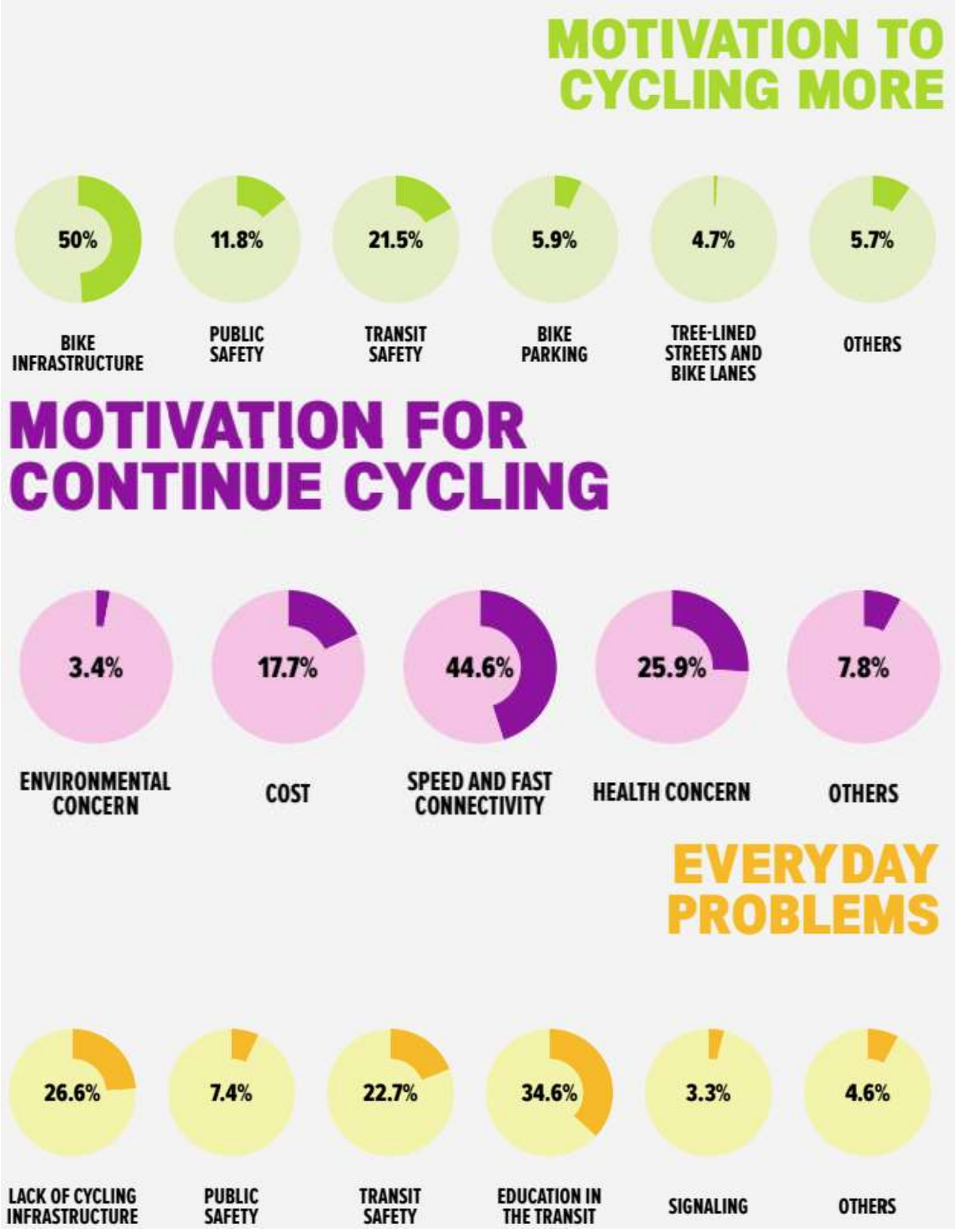
Being placed in the Global South means that Brazil has many other important issues to address as a society and therefore infrastructure for active modes isn't always on the top of the list, when public sector priorities are made. This is also the case when it comes to people's personal choices concerning their transport. Commonly, cycling as transport mode is based on a lack of alternatives. If people do not have a car or motorcycle as an option, they can take a bus, and as the last option they're going to walk or bicycle and that's not only in Brazil as it's very common in the global south, according to Victor.

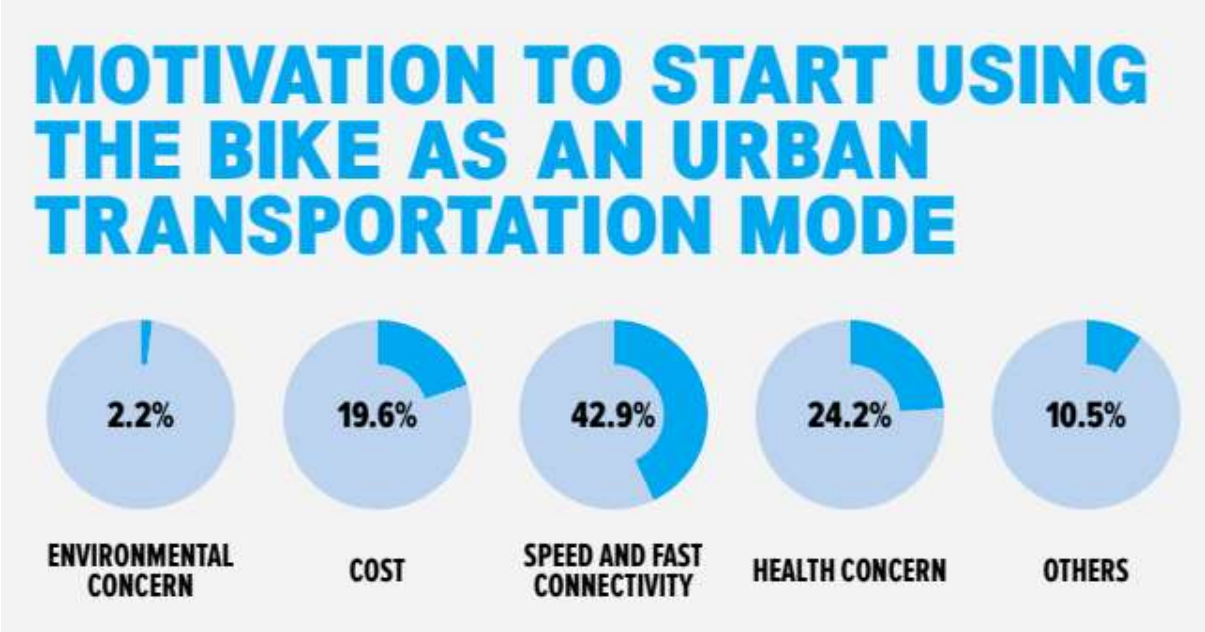
"Taking buses to go to work is not what people wanna do, but it might be the only option that they have. We have a lot of people walking or riding their bicycles because that's the only option they have. If we look at where bicycle infrastructure is distributed geographically and historically, it has been implemented in the wealthy neighborhoods, where you have the smallest share of the population, and it has led to a modeshift from cars to bicycles. But that's a very small share that is not representative", says Victor.

To some extent Brazil's economic situation influences the cycling level. For instance Brazil had a very good economic period from 2006 until 2013, where a real decrease in the number of people riding bicycles could be observed, as more people could afford other transport modes. When it comes to reasons for cycling, the two big ones are convenience and economy, says Victor.

"Also", Victor adds, "We need to remember we're talking about a very large country, so we're not only talking about active mobility, but about providing fast trains ect. and politically, the current national government is offering incentives for purchase of private cars, and the president said in a speech that people should have the right to buy their own cars, tells Victor. Which pulls modeshare in the opposite direction".

In Brazilian cities, it is not super safe riding a bicycle together with cars. "However, we see many more cyclists sharing the space with cars, but it is very unsafe. So I think we also need to be careful to not romanticize the possibility of sharing the road in such a dangerous environment for cyclists", says Victor.


MOTIVATION TO CYCLING MORE
50%
BIKE INFRASTRUCTURE
11.8%
PUBLIC SAFETY
21.5%
TRANSIT SAFETY
5.9%
BIKE PARKING
4.7%
TREE-LINED STREETS AND BIKE LANES
5.7%
OTHERS
MOTIVATION FOR CONTINUE CYCLING
3.4%
ENVIRONMENTAL CONCERN
17.7%
COST
44.6%
SPEED AND FAST CONNECTIVITY
25.9%
HEALTH CONCERN
7.8%
OTHERS
EVERYDAY PROBLEMS
26.6%
LACK OF CYCLING INFRASTRUCTURE
7.4%
PUBLIC SAFETY
22.7%
TRANSIT SAFETY
34.6%
EDUCATION IN THE TRANSIT
3.3%
SIGNALING
4.6%
OTHERS

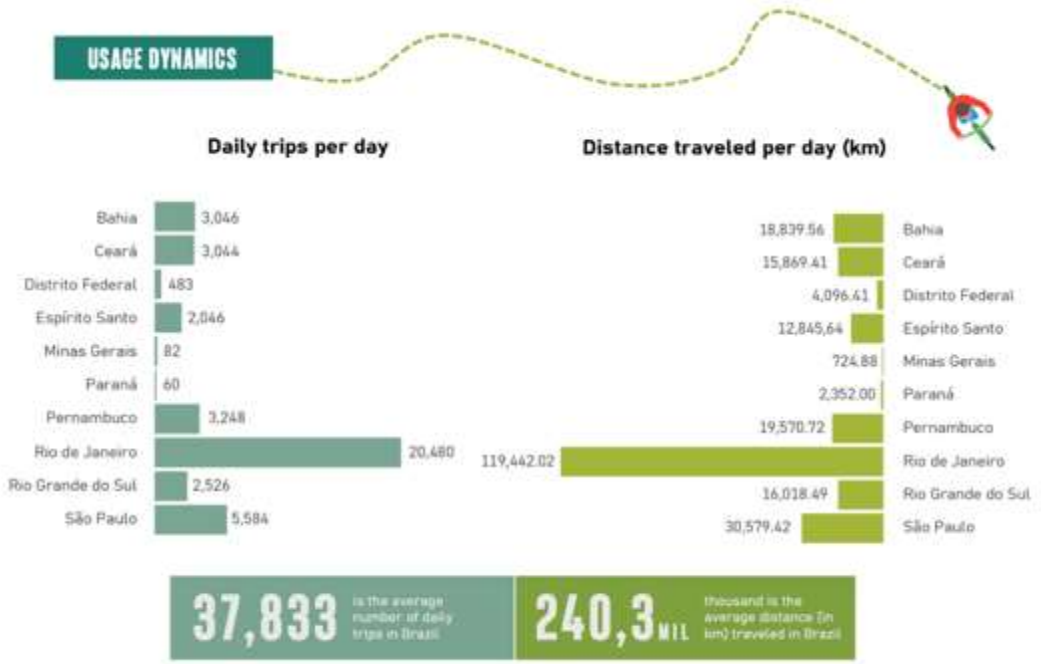


National Survey; 5012 cyclists were interviewed in ten Brazilian cities among different regions: Aracaju, Belo Horizonte, Brasilia, Porto Alegre, Manaus, Niterói, Recife, Rio de Janeiro, Salvador and São Paulo. The numbers show their combined answers.

Bike share as a lever

Rio de Janeiro has constructed cycling infrastructure, also in the periphery of the city and it is clear that active mobility has a place in the city. One thing is infrastructure, another is access to a bicycle as a supplement. The Public Bike Share (PBS) system in Rio, combining tourism and commuting, is a very robust solution and one of the most successful PBS´ in the world, with one of the highest usership (trips per bicycle) per day and a total of 20,480 daily trips - making it the busiest micro-mobility system in the country. Furthermore combining Public Transit and PBS is used by many, especially combining buses and then PBS as a Last Mile transport form is popular, and there is even a special Multimodal ticket.

Bikeshare Station in Rio de Janiero. Photo by Marcio Chagas



As of 2021 there were 34 share systems operating around Brazil, contributing greatly to the cycled kilometers (source LABMOB MICROMOBILITY BRAZIL, 2022).

Goals

- Increased Modal shift towards more Active mobility and an empowerment of the workforce.
- Dedicated lanes and segregation between motorized and non-motorized transport modes.

Challenges

- Political incentives to buy a car
- Traffic safety (lack of dedicated lanes)
- Deficiency of Infrastructure in the economically challenged areas
- Generally it is difficult to change dedicated car lanes to bike lanes.

Solution(s)

- Regular traffic counting to monitor the development in walking and cycling.
- Leveraging the trend with Active Mobility
- Introducing shared spaces and 30km/h zones
- Addition of electric bikes – build good habits

Benefits

- Diverse use supports multimodal transportation.
- Bike-share is helping to build new habits.
- Better bike infrastructure binds large communities together

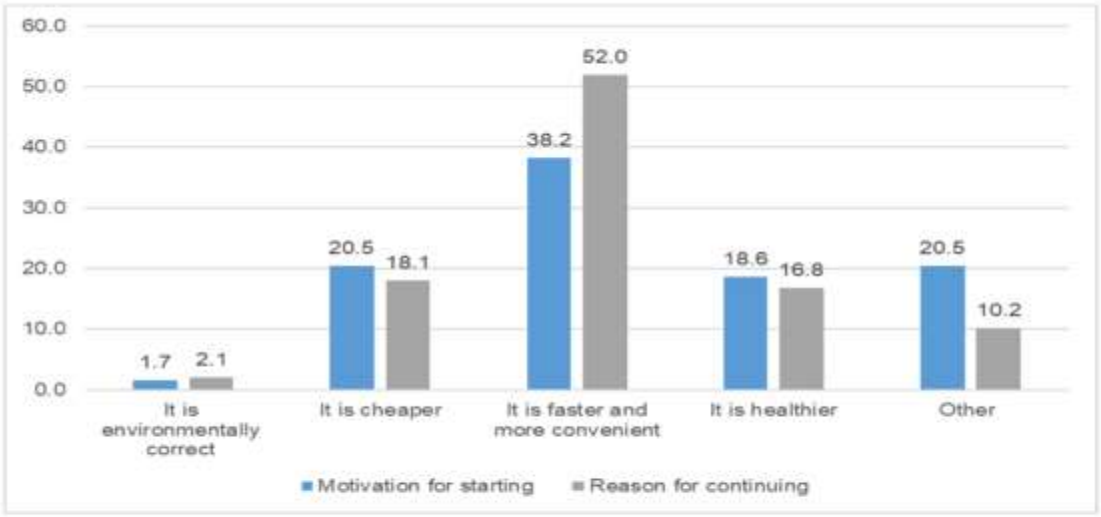
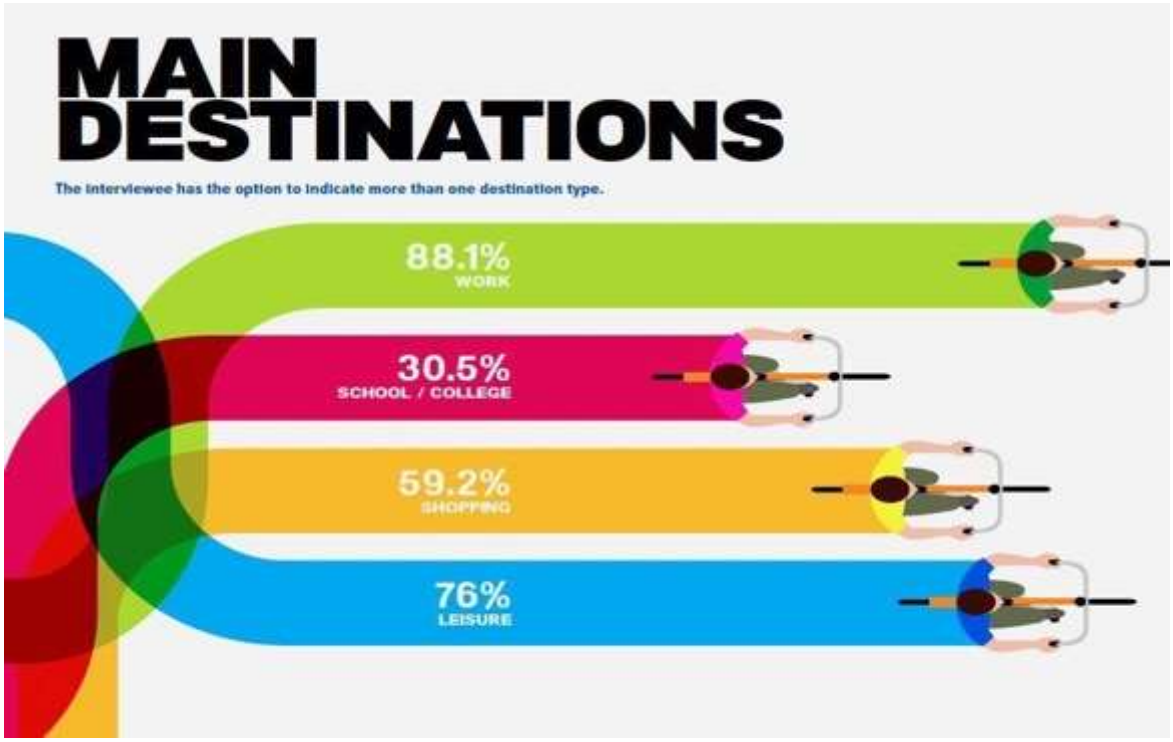


Chart 7.6. Rio de Janeiro: motivations for starting using the bike and for continuing using it as a means of transportation (2015). Source: The authors' elaboration with data from the national survey on the Brazilian Cyclist Profile (TRANSPORTE ATIVO, 2015).

As the above chart shows, cyclists find faster travel time and convenience the primary reasons for cycling, but safety concerns need to be addressed.



Main destinations when cycling, (LABMOB 2021).

6.4. THE CANADIAN CONNECTION – LA ROUTE VERTE

In a big country with vast distances, a rough climate and political differences, cycling has become a driver for collaboration and innovation. La Route verte is a national network of cycle routes, designed for tourism and social life, but now also sustaining local and regional commuting and inter-urban transportation.

Louis Carpentier is the coordinator of active transportation in the Transportation and sustainable Mobility Ministry of Québec and he is an outspoken advocate for cycling and cycling infrastructure. For 13 years, he was the director of development of la Route verte for the cycling association named Velo Québec, overviewing the development, maintenance, and enhancement of the national cycle network with his team, local partners, the Transportation ministry and the end users.

"I have been a cyclist from the age of 3 or 4, and I have used a bicycle on a daily base since then. Meeting my wife many years ago on a bike event, we since then have traveled on bike with our three kids on various occasion", says Louis. "Professionally, I work on the national level helping provide sufficient attention to programs adapted to local needs. I am involved in policy making in favor of active transportation. My role also involve producing bylaws and providing provincial standards", says Louis.

Linking nations and regions

La Route verte - the green road - is an original idea of Vélo Québec, created with the Ministère des Transports et de la Mobilité durable du Québec, the Québec government and regional partners. Spanning more than 5,300 kilometers, la Route verte is North America's longest network of bicycle trails. It connects multiple cities and locations inside the Quebec province, and it has links to Ontario, Ontario, New Brunswick and the U.S. About 40% of La Route verte is located on dedicated bike ways, such as rails-to-trails that go from city to city. Nearly 50% of la Route verte is located on provincial roads.

The history behind la Route verte shows, that shifting attention to bicycling as a viable transportation mode is not easy, but often is a question of collaboration and consistency.

"We have this organisation called Velo Quebec that was founded about 50 years ago, and it used to be an organisation for cycle tourism and also a social charity. There used to be these priests that would help young men out of trouble, and go cycling around the province. It was amazing. And then in 1992 Quebec hosted two bicycle events; the Velo City and the Velo Mondiale. That really kickstarted the whole thing, by bringing users, professionals and politicians together to talk about cycling mobility", Louis recounts.

Three years later the provincial government proposed the La Route verte project. It was a pivotal moment for Quebec in terms of cycling, but also, there was a sense of change in the air, with Quebec moving towards a more confident place as a nation within a united Canada.

About this time, a large part of the abandoned railways in Quebec were expropriated by the government. And many of these were transformed into trails and greenways.

"So this was an opportunity to create a province-wide project that would bring together people after some political divergences. And in 1995 the first bike policy from the government in Quebec was produced. You might say that there was a conversion about people, opinions and politics. So it started in 1995, and the route is now 5300km long and 900 new km are in the planning", says Louis.

La Route verte is a network of bicycling and multiuse trails and designated roads, lanes, and surfaces, spanning 5,300 kilometers and connecting more than 400 towns in Quebec, Canada.

Challenges and opportunities

When asked about some of the specific circumstances for implementing inter-urban and inter-regional bicycle infrastructure, Louis mentions three factors:

"I want to point to perception, resources and seasons as the main obstacles for us. Cycling is still not perceived as a real alternative to automobile. So creating new cycling infrastructure by using existing car space is not very popular or widely accepted. It is easy to build new bike ways as long as they don't take parking places or car lanes. Furthermore, cycling in Québec is still perceived in many cities as a leisure and tourist activity, not transit oriented enough", says Louis."When it comes to the resources, the demand for governmental aid is still big, even with 2 distinct provincial financial programs in place. Having bigger budgets would help local and regional authorities to build new bike infrastructures faster. This help could go further than bike infrastructure and narrow down on "bike fiscality" – the return on investment, and the operations and maintenance that helps sustain that", he says.

Finally, Louis is mindful of the challenges that come with being a country in the high north:

"We have 4 distinct seasons that can discourage many cyclists to keep riding after November with the cold, the snow and winter conditions. Only a few cities have winter maintenance plans for bike ways, especially within dense urban areas. I am not aware of any inter-city winter maintenance plans in the province. Much of the inter-city bike infrastructure are used for snowmobile or cross-country skiing during the winter" says Louis.

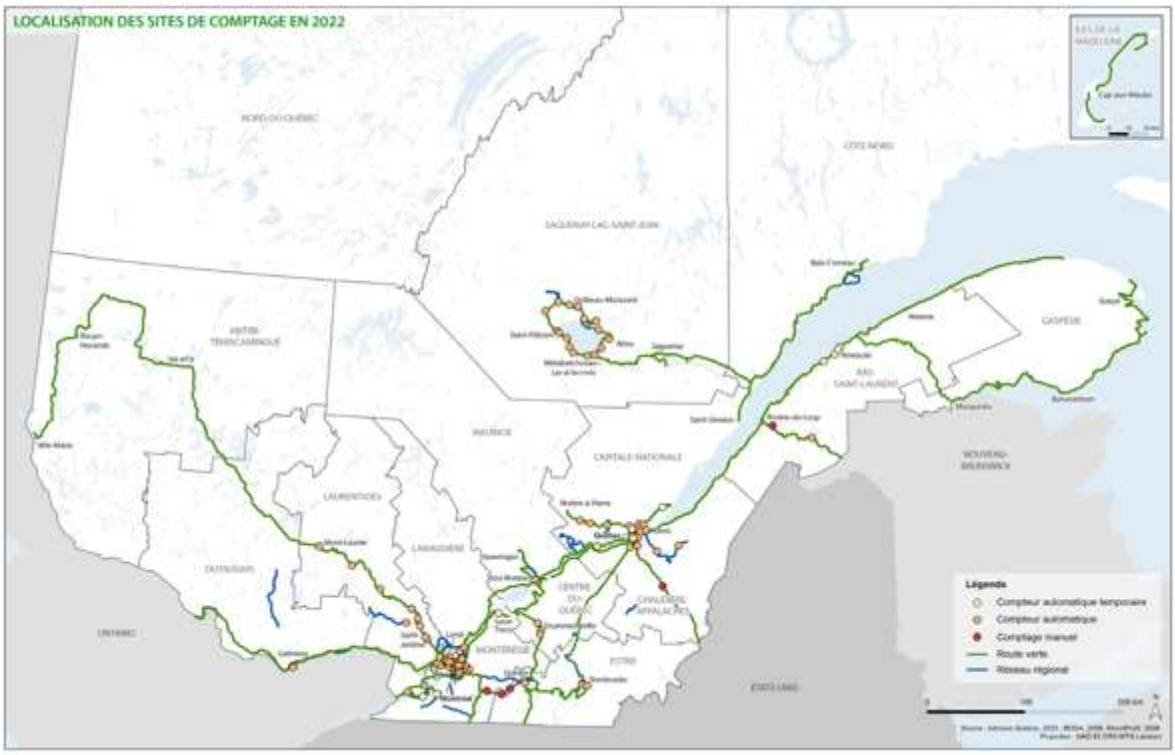
"In Montreal, you can have -20 one day and the next day could go up to 0 degrees. So, without a bike infrastructure winter maintenance plan, it can be hard for cyclist to plan around. Some cities do have a winter maintenance plan in place, but for the most part, winter biking is still perceived as risky", Louis says.

La Route verte generates more than 500 mio. EURU via tourism each year.

But despite these challenges, there are also positive developments and opportunities for growing the bicycle infrastructure and -culture in Canada.

"Canada is a very large country with varied culture and weather, from the west to the east coast and even in the middle, we have very rural areas with almost no biking. But we are seeing

developments, for instance in the small provinces east of Quebec, where they are trying to develop better conditions for bicycles", says Louis. "One anecdote was that we opened a stretch of la Route verte in a smaller city and the mayor was making a speech and her angle was, that they now are connected to the rest of the province and that people can come visit her town. So that is another key point and potential game changer; that we can begin a transition from tourist roads to commuting. It's a little like the movie where the character, played by Kevin Costner, build a baseball field in the middle of nowhere, based on a dream and a vision – and eventually people start coming. What we have seen is that people who have been biking for sports over the weekend start biking to work on Monday. So the original goal of la Route verte was mainly tourism and exercise. But nowadays a lot of local managers have set up some from of system, so they can count people on bicycles. And we see now that there's a lot of people commuting to work there, perhaps because the seasonal use also has developed. Usually cycling would start around the middle of June and finished middle of September. But now things are kicking off in April and finishing up much later. I think It's a matter of changing people's mindset; if you can get them out there rolling they can actually see that it's working, also if they are local decision makers", says Louis



A comprehensive registration of the usage of la Route verte from 2022 showed 8,900,000 passages across 77 sites that were observed. (Fréquentation des réseaux cyclables du Québec, 2022, Velo Quebec).

Funding and collaboration

A critical part of building and maintaining inter-urban bicycle infrastructure is funding, and being in charge of the annual funding mechanism from the Transportation Ministry, Louis has a great insight into how to make the best out of your resources.

"The most important for the Route verte is a global action plan which is Velo Québec's responsibility. The provincial government provide financial support to local managers that can go up to 50% of funding when the city is going to build a new section of bike paths. And once it's constructed and it's also signed, the Transportation ministry can provide a funding programme for maintenance for the Route verte's sections, which is quite unique. So there's some standards that have to be met and Velo Québec works directly with the regions, local cities and every regions on

this, so it works as a joint effort so to speak. At the end of the day, we are there to supervise and to provide technical support.. Velo Québec was inspired by the Swiss action plans in this area, where focus is to keep certain standards, including safety and comfort standards., says Louis.

“In a broader perspective, there are still a lot of influence needed for the transportation system to cater more to cycles. In Europe, you can bring your bike on a ferry, on a train, anywhere. And here it is still not integrated like that. You still have to put your bicycle in a box and it needs a more preparation which can be dissuasive for users. So again; perception and resources are important.. The perception is “You need to do it”. But that might still not be the case with a bike lane everywhere in Québec. And in fact when you have a bike way, a lot of people are going to be using it for free; Walkers, hikers, cyclists, people with disabilities. And the investments should be equally accepted as those of a baseball diamond or a soccer or hockey sports facility”, says Louis. “Perhaps we should plan more around the user’s needs, in combination with an eye to local culture and traditions – but also with a clear determination to increase the number of users of sustainable transportation. Constantly researching and documenting the positive impacts of active transport is very important to help leaders taking advised decisions; economics, health, etc. in order to create the changes, we need”, says Louis.

Photo by Venrick Azcueta

Goals

- Create touristic routes with room for transit

- Fund, design, build, maintain the bicycle network

Challenges

- Weather as an obstacle in winter times
- Distances when it comes to everyday commuting
- Resources, particularly as trade-off often goes to traditional facilities
- Perception of bicycles as less important and convenient

Solution(s)

- Counting to validate demand
- Surveys to pinpoint needs
- Research to document use and benefits
- Action plans to trigger funding

Benefits

- Transition effect from sport to commuting
- Local support and appreciation of biking through events and openings
- Adaptable process and methods make room for local needs and traditions
- Collaboration may be repurposed for other related actions, across borders

6.5. CHINESE FAST TRACK TO CHANGE

With policies and strategies in place, the province of Qinghai in central China has been able to take fast action when it comes to rolling out new and improved inter-urban bicycle infrastructure. For the Xining Greenway, local authorities applied a 5-step approach to planning and design.

Mr. Gong Fengqi, the Design director and founder of the company SHIYU, and Project Manager for their part of the Xining Greenway explains:

“Our main business is to design way-finding and street furniture for cycling roads. With the Xining Greenway, we extended our services to include visual identity, logo and public information. We also participated in the master planning and coordination of implementation. To build the best possible cycling infrastructure, we defined 5 focus areas or concepts”:

- Vision of “Highland Greenway, Happy Xining.”
- Exchange of advanced technology and experience from aboard
- Cycling safety issues
- Improving urban cycling transportation
- Building comprehensive tourism opportunities

Mr. Gong Fengqi, Design director and founder of the company SHIYU

For each of the focus areas, SHIYU produced original plans and recommendations for the build-out of the 400 kilometers Greenway network, which included construction of 17 pedestrian- and cycling bridges and integration with a new Metro system.

To guide cyclists best possible, they introduced a visual image recognition guiding system of Xining's urban greenway in terms of greenway branding and signage system. The entire greenway network follows a unified style, unified visual effect, and unified quality, achieving consistency between functionality and visual aesthetics.

To benchmark with advanced technology and knowledge from abroad, they brought in senior planners in urban transportation and urban space, as well as bicycle projects from Copenhagen, Denmark.

To tackle cycling safety issues, they provide signs, guidelines and recommended barriers to ensure safety precautions being undertaken by users.

To improve urban cycling transportation, they helped optimize existing cycling conditions by designating bicycle lanes on existing roads through signage, road markings, and colored surfacing. Additionally, new lanes are being built with dedicated lanes for non-motorized vehicles, thereby enhancing the cycling environment.

Finally, to tie the link between tourism and commuting, they helped connect over thirty tourist attractions and other destinations throughout the city and its surroundings to the routes of the Greenway, integrating resources beyond the cycle lanes to the experience.

Bringing back bicycles

In the opinion of Mr. Gong and his colleague, Mr. Xing, China is now seeing a re-introduction of bicycles, after a dry spell where the primary growth has been in car traffic and car infrastructure.

"If we consider the development of Chinese cycling and go back about 20 years, China had a lot of bicycles and people used bicycles a lot in their daily commuting. But later we experienced rapid development in the number of cars and the use of bicycles was neglected. And in many many cities where construction was taking place, roads were built for cars and they didn't leave any space for bicycles at all but", says Mr. Gong, "When we started our first project some 10 years ago, in the Beijing city area, they didn't have bicycle lanes. We have to squeeze the car lanes and change them

into bicycle lanes and that route design did not create a very bike-friendly environment. But recently, over the past few years we have seen a fast development of electric bicycles and also of designated bicycle lanes, being reintroduced. Another reason for this change is that a lot of cities are building cycle routes for tourism purposes, near tourism resorts or near the big lakes or parks.

With a positive change in the overall policy, the cycle routes have been paid more and more attention from all the cities and they are increasingly getting permission for cycling route development. And not only that: cities are now competing on the quality of their bike lanes. For example in one area in Beijing where they built a cycling highway where only very high speed bicycles are allowed to ride".

"Now the overall percentage of electric bikes is about 40%, and even 60% in the cities. And the traditional bikes are mainly used for short distance commuting, for example from the metro stations to the working space areas. Also, small size motor bikes are forbidden in big cities. So there is no change from scooters to electric bikes in this case. Overall, we can see that every year more and more people will choose cycling and this helps release the traffic pressure in congestions for cars especially", Mr. Gong points out.

Change in mindset

When asked what the reasons for the positive changes are, Mr. Gong refers to a change in the mindset of city planners and decision makers: "You know, there is a will to change from the earlier mass housing development to a quality focused development. This means that the promotion of cycling routes is not only to mitigate traffic jams but also for energy saving and circular economy development and also to bring about a healthy lifestyle. And promote tourism - a lot of factors. So instead of sitting in the cars in the traffic jam, you now have the choice to do some cycling, at least for a few kilometers, if you want. And also the cycling routes are a resource for tourism".

"The faster process in China, it's mainly because we have a special political system. So that is something difficult for other countries to copy and paste. But on the other hand, from my point of view, now we link this cycle route development closely with tourism development. And this multiplies the cycle use and sales - also of accessories - many many times. So I think it could be that we have learned to change people's lifestyles so they see now that cycling is part of their activity and sparetime, which was not the case before. I think this is a good point we want to share with you", Mr. Gong concludes.

Finally, when asked about his visions for the future of interurban bicycle infrastructure, Mr. Gong highlights the social aspects, as much as the transportation: "My dream is that cycling can be part of the life of each family and we can build more satellite cities and transport more population to outside of the biggest cities and create low density cities that connect living and working and have cycling facilities. This is my vision for the secondary development future here in China".

One of the first cycle lanes along the river. Xining 2015, photo, Niels Hoe

Future Greenway connecting into the City of Xining, 2015. Photo Niels Hoe

Greenway connecting the city with new development area (Photo SHIYU, Xining 2023)

Xining timeline

- In 2015, Xining City used the Huanhe River waterfron, the Nanchuan River waterfront, and Beishan surburban line as the framework to build a greenway network system with a total length of 150 kilometers. This laid the foundation for the formation of the Xining Greenway.
- In 2016, utilizing urban, rural roads and protection green corridors on both sides of rivers and highways, the greenway system in the central urban area was connected to suburban parks and tourist attractions.

- In 2017, Xining City build urban bicycle lanes to achieve a seamless connection between the greenway network and the public transportation network. By utilizing urban and rural roads and waterways extending from the city to Huangyuan, a unique plateau greenway system has been formed, currently spanning approximately 420 kilometers.

Goals

- To help bring back more bicycles after 20 years of neglecting bicycle infrastructure.
- To create a better, safer and healthier environment for inhabitants and visitors to the Xining area.

Challenges

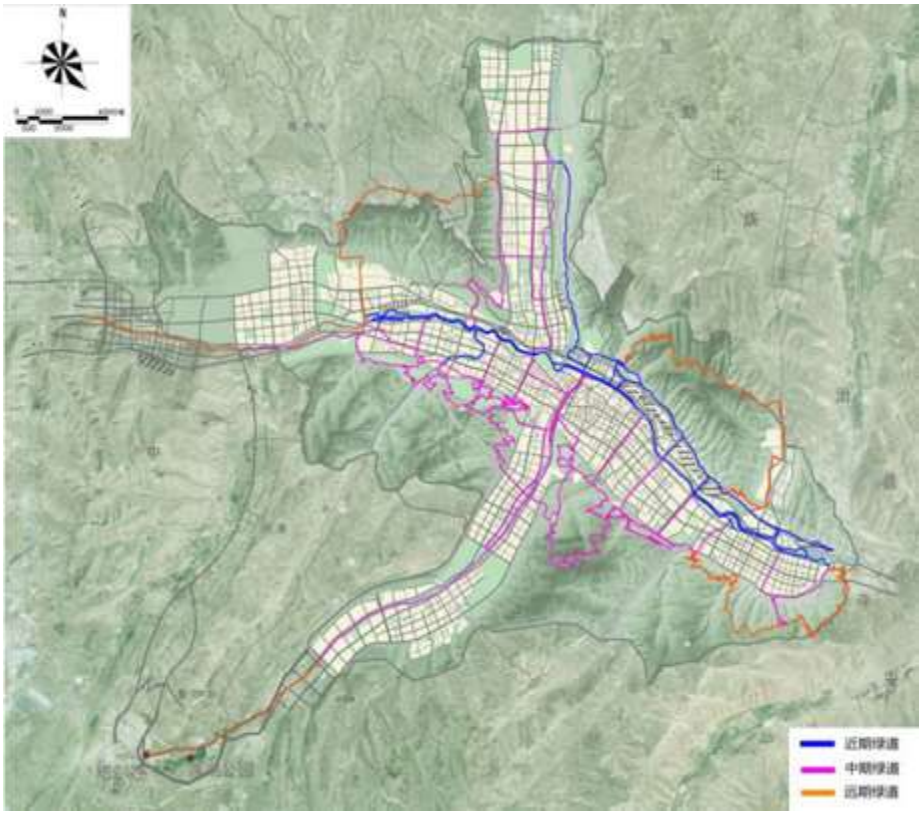
- Plan and design for a multi-facetted use of bicycle infrastructure with many different user groups at the same time.

Solution(s)

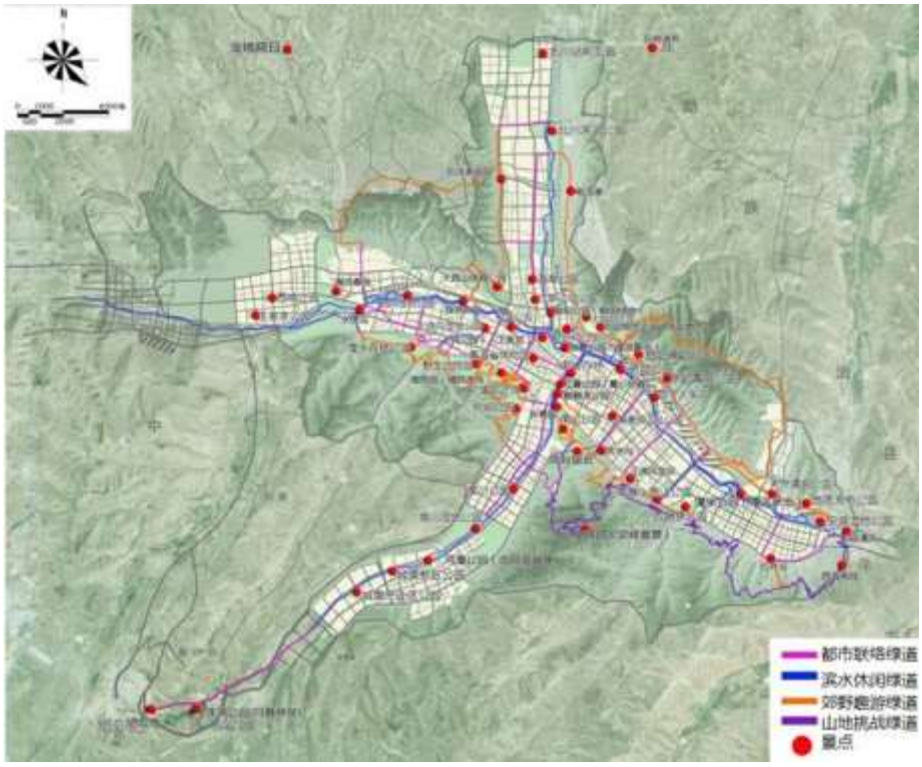
- Adapting and implementing a more holistic way of building out infrastructure, encompassing a circular economy, energy savings, co2 reduction, healthy lifestyle and tourism promotion .
- Working with a 5-step approach: urban planning, foreign inspiration, safety, transportation, tourism.
- Connecting tourist resorts and tourist attractions with everyday commuting between 3 cities and rural areas.

Benefits

- Learnings - how to get cycling infrastructure in place very quickly;
- The fast projects rely on a certain political system that might be difficult for other countries to copy, but we have succeeded in changing people’s lifestyle, towards a more active way of transport.
- Bike-share - Is still very popular. But prices for use have gone up, so for regular users it begins to be more cost efficient to own one's own bicycle, thereby creating a push towards buying one's own bicycle.



Network plan for the building of the Greenway. Blue indicates the initial construction, followed by the pink and finally the network is complete with the construction of the orange part.



The Network plan and how the routes integrate with attractions or destinations, the red dots.

6.6. BETTER BIKING IN BOGOTA - CICLO ALAMEDA

How do you tackle the challenges of implementing new cycle paths in a very dense and diverse city as Bogata in Columbia? What about safety, security and the NIMB – not in my backyard – effect?

David Louis Uniman is an international bicycle expert, transportation engineer and city planner, working with green corridors, urban living and bicycling across the world. For four years, he worked for the District Secretariat of Mobility in Bogota, supporting their mission to *"promote the happiness and quality of life of its inhabitants and visitors in terms of mobility, that powers the development and competitiveness of the city, protecting life and rights in an inclusive manner, with ethical and transparent management."* He currently works on a bike project in Lima, Peru and also worked in Mexico.

David was Project Manager on the Ciclo Alameda, which is a signature project for the municipality of Bogata, establishing new bicycle infrastructure across the city. Although a tough project to push through, David remains hopeful and enthusiastic about getting more people to embrace biking in the city.

"Bogota is big and incredibly dense; 8-9 million people live there and the distances are very large. The average cycling distance is 7-8 kms. Bogota is a radial city, with a center where everybody works, and outer neighborhoods where people are living. And the further from the center, the lower the household income is. Interestingly, 80% of all cycling trips are made by the 3 poorest income levels (there are 6 levels). They travel very long distances on bicycles - which is a cheap way of commuting. There are also choice-riders among the income level group 3-6 ", says David.

"Because people have to travel very far to work, the city has high-speed Bus Rapid transit lines (BRT). The logic is: *Let's make long trips faster.* But the buses are full and also, bikes may not compeed on speed, but there are many other advantages to biking, such as bringing people all the way from door to door. So we felt we needed to break the concept that main roads and main infrastructure have to go together. BRT generally follows the transport corridors, whereas the Ciclo Alameda uses residential streets where there are people and shops, adding life and safety."

The idea of separating bicycling from the pre-dominant infrastructure (roads) have several advantages, says David: “Cyclists hate pollution, as your lungs are your engine” We hate traffic and intersections - so we prefer the super cycle highways in the secondary roads - small neighborhoods are safer (there are people) and away from cars. Plus you can do your shopping, and collect your kids on your way home”.

These values and benefits, along with the city’s mission, laid the foundation for the Ciclo Almeda, which is projected to become a designated 25 km long bike path that connects the poorer part and rich part of the city.

“The Ciclo Almeda actually starts in a big park to the South and ends in a country club in the North, passing through the city center along the way. So we expected more bikes between the poorer areas and the companies downtown, but we also discovered that more wealthy people in the North started riding the path, particularly we saw an increase in women”, says David. “Another aspect is that when we communicate the convenience and speed of traveling on the bike path, more riders join in. But although bikes are a part of the city - and people support this way of transportation, there is still a bit of NIMBY - particularly when you bring a bike lane past wealthy neighborhoods. So there is class politics involved too here”.

David mentions 4 major challenges the project needed to overcome: “On a psychological level, more riders should be encouraged to use their bikes by choice and not as a last resort. Cycling needs to become more popular and that entails safer routes and better security. Politically, there has to be support from local politicians, no matter if the bicycle lanes take up space for parking or come too close to privileged neighborhoods. Technically, connecting bike paths to each other may trigger a need for new bridges or other expensive infrastructure. And financially, funding is hard to obtain, if you are competing with more immediate and serious alternative investments, such as hunger, safety or health”, he says.

The learnings from the project include a wide variety of take-aways on how to design, build, finance and operate interurban cycling infrastructure. David especially highlights the human aspect of introducing designated bike lanes to a community - or rather two communities; “As the project took form and we planned for the lay-out of the bike lanes, we went street by street and talked to the people that were going to be affected by the new infrastructure. We brought along experts and held workshops to address any concerns or reservations the public might have. The neighborhood groups were presented with 3 alignment alternatives and they gave inputs to what would be the best and safest solution”, David recounts.

As the Ciclo Alameda moves towards finalization, David dreams of more projects like this for regions and cities with similar challenges and opportunities for change. “The Ciclo Alameda, although not a perfect project, is still a Proof of Concept for interurban bicycling from one community to the other in a very traffic dense city with limited resources for infrastructure. To me, installing the infrastructure is the first step in changing the mindset of people living and working in the cities. Then it’s very much up to the dialogue and communication between the project entities and the public to ensure sustainable success”.

Goals

- Implement measures to meet Bogota's Vision Zero Plan from 2017 by also introducing more cycling to Bogota as a means of commuting and an alternative to overloaded busses and car lanes.

Challenges

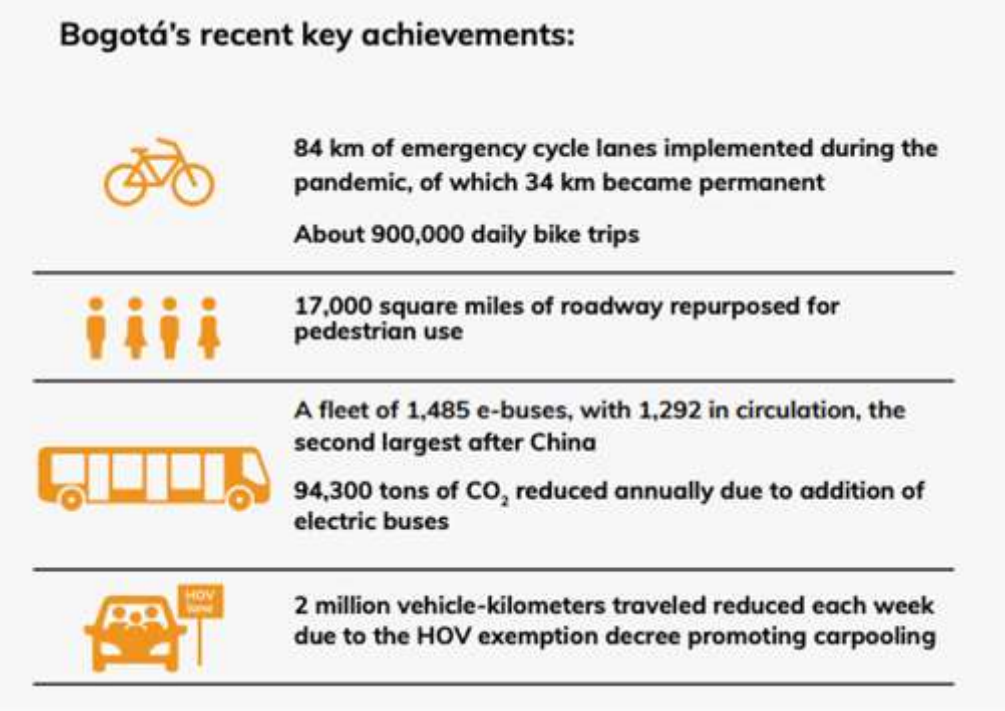
- Both psychological, political, technical and financial challenges tied to the project.

Solution(s)

- A corridor that brings users from A to B, without being too close to traffic, while also considering safety and security issues.
- Designated bike lanes through inhabited urban spaces are key to reducing insecurity and also can help users complete their daily tasks, such as shopping.
- Fundraising with the help of professional legal and financial consultants- using green card credits.
- Funding came from a patchwork of donors, including International Development Bank, C40 Finance Facility, GIZ (German Organization for International Collaboration), Green Carbon Foundation and a local Colombian Oil company fund.
- The psychological barriers to cycling were mitigated by sustained communication of the project to the public, which also helped politicians understand and support the project more.

Benefits

- Compared to other transportation infrastructure, such as roads, bridges and railways, bicycle paths are very cheap to build and maintain.
- An estimated 10-12 % mode shift from private vehicles.
- Since 2020, the city has implemented 52 miles of protected emergency cycleways
- Improved Level of Service increased use by 2-3 times.



The Alameda Medio Milenio Cycle is a green corridor that gives priority to sustainable modes of transport (pedestrian and bicycles), and is considered an inclusive corridor connecting different socioeconomic areas of Bogota.

6.7. COLLABORATION, CO-FUNDING AND CO-CREATION

Back in 2009, the Cycle Superhighway Collaboration in the Capital Region of Denmark was established. Ms. Signe Helledi, Head of Office for Cycle Superhighways, recounts the incremental steps to a successful and inclusive roll-out of a role model of interurban bicycle infrastructure.

Ms. Signe Helledi, Head of office - Cycle Superhighways of the Capital Region of Denmark

"We actually have our 15 year anniversary next year. It started with the City of Copenhagen's objective of having 50% of all trips to or from work or education done by bicycle, but when we looked at the Copenhageners themselves inside the municipality boundaries, we found that they actually almost already lived up to this. The challenge was to get those who enter the municipality from the surrounding municipalities to cycle more. Therefore, we reached out to the surrounding municipalities and asked if they would become involved in doing something to improve the regional bicycle infrastructure, which would make it easier for people to cycle over longer distances", says Signe.

Collaboration across the nation

That was how the collaboration started; with 15 municipalities and the Capital Region. The collaboration has now grown to 29 municipalities, covering the entire Capital Region. To ensure efficient coordination across all parties, a joint office was established under the helm of the Capital Region of Denmark. The office has 5 full time employees and is financed by the Capital Region (65%) and the municipalities (35%), where each one pays a set fee per inhabitant.

The office coordinates and ensures a common approach, in construction, design, but also concerning communication and documenting effects. The actual construction of infrastructure is covered by the relevant municipalities through which a specific route runs. "Our office helps create the preparatory material, so it is easier for the municipalities to apply for funds for example via the national bicycle fund for infrastructure, or in their own budget", says Signe. "When you create a Cycle Superhighway, you look at the existing infrastructure. What does it take to get from point a to b? What needs to be upgraded, what should we do, what is the missing link? How can we make it extra orange[23] as we call it?".

[23] Orange is the color used to brand all things related to the Cycle Superhighways and to ensure a common identity across municipalities possible special interest and wishes

In cooperation, the municipalities have agreed on a set of standards or recommendations for what the infrastructure should be like. The Cycle Superhighway collaboration in the Capital Region has common design and maintenance recommendations on the design of a cycle path, types of asphalt, operation, or how to work with prioritizing cyclists in signals and signal technology. And their website has references to the Road Act and articles of knowledge, for example, about lighting, signage etc.

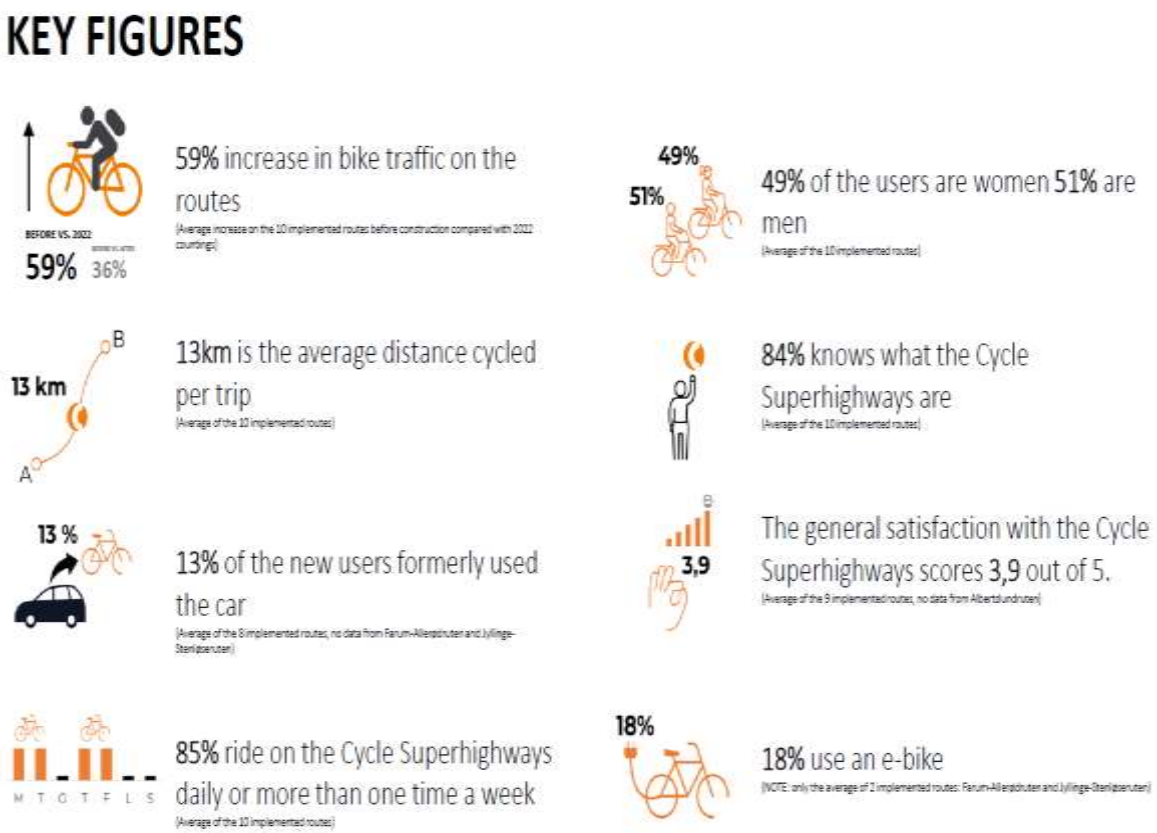
“In the Collaboration we have common design standards and recommendations for cycle superhighways which all the municipalities have agreed upon. For example, on lane width, crossings, lighting, signs and so on. It is only recommendation. In the end the municipalities decide the design because they have road authority. A route does not have to be perfect from the beginning”. There is no such thing as “one size fits all”, says Signe.

Inspired by highways

One main goal with Cycle Superhighways is that cyclists have the same users experience throughout the route and through every municipality. This entails coherence, accessibility, as well as safety and security and comfort across the routes. “When building this regional Cycle Superhighway network we are inspired by highways, not because it's the same, but because of the recognizability and coherency. It has something to do with readable infrastructure; no matter where you are along a route, you don’t get lost along the way. But it also has something to do with you feeling of being prioritized as a cyclist, and that can be done in many different ways.”

The Municipality of Copenhagen, where there is an amazing number of cyclists, is very different from rural areas where there are not so many commuters on bicycles. “In the Collaboration we are trying to balance between standards that both the Municipality of Frederikssund and the city of Copenhagen can identify with[24]. It is always difficult when there is something that is differentiated in relation to the number of cyclists, economic and geography”

[24] The two municipalities have respectively 46.000 and 644.000 inhabitants



Societal results and effects of the Danish Cycle Superhighways25

Documenting success

"To measure the user satisfaction in regards to the cycle superhighways we perform regular evaluations based on a pre-measurement before construction and a after-measurement after the construct and launch of the cycle superhighway. A Cycle Superhighway evaluation focuses on different parameters: bicycle traffic counts, comfort, travel time, black spots and more. On the basis of that, we can demonstrate an effect, to inform and inspire those considering building a new cycle superhighway".

To document the impact cycle superhighways further, Signe says that every year in the first week of September the bicycle traffic on all cycle superhighways is counted "so we have documentation of how bicycle traffic is increasing. We also make annual bicycle path inspections, where we have trained our student assistants to become cycle path inspectors. They ride through a Cycle Superhighway from start to end, i.e. across all municipalities and register everything to do with operation and maintenance; a pothole here, a missing sign there or that street lighting is broken. It also means we have documented over the years that this stretch has now been worn down or has had worn asphalt for 4 years. Perhaps it is then about time for the politicians to set aside money for maintenance. The documentation is delivered digitally with coordinates, so every single registration can be identified and located".

[25] www.supercykelstier.dk

Facts about the Cycle Superhighway Collaboration in the Capital Region of Denmark

No of Municipalities 29

Member of staff 5

Target;

850+ Kilometers of routes

60+ routes

Funding;

USD 440.000 yearly from the Capital Region of Denmark

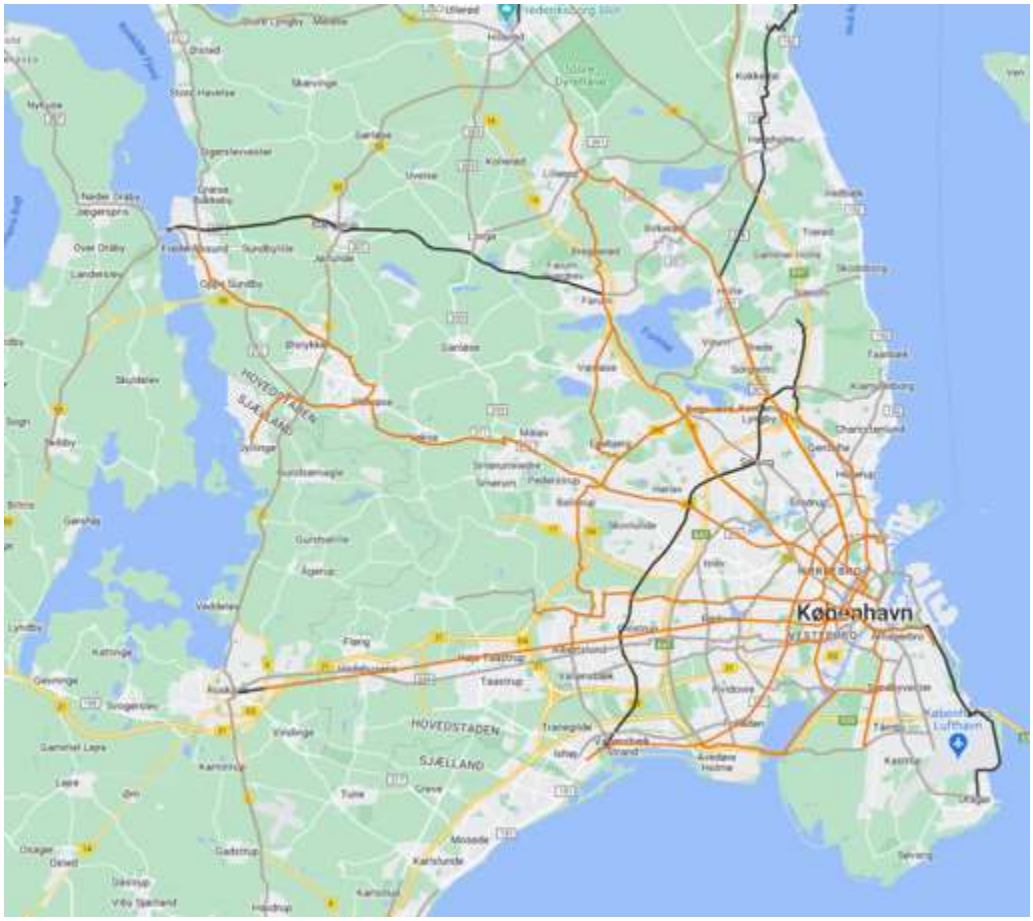
USD 0,12 per inhabitant, paid by the respective municipality

When asked how and where to begin, if you are a new to Cycle Superhighways, Signe suggests this:

- "I would start by describing the current situation to get a baseline and have it all described in a report. Then you can get a picture of where you have build and upgrade the cycle infrastructure.
- According to a study[26], the complete network of cycle superhighways in the capital region of Denmark involves an estimated investment of more than EUR300 M.), with an internal interest rate of 23% and a cost-benefit gain of EUR800 M. Cycle Superhighways rank among the top five most profitable projects in a survey of all economic analysis of Danish infrastructure projects.
- The 29 municipalities with different political standpoints, have come together in what is called a gentleman's collaboration. No one has committed to anything, no one is saying they have to. They do it because they can see an adv*antage in promoting regional cycling.*
- The thinking behind getting municipalities to collaborate has led to the Central Jutland Region now also having a Cycle Superhighway collaboration between the Region and 10 municipalities around Aarhus, the second largest city in Denmark. And in the Southern Denmark region another 12 municipalities have joined forces to promote cycling, not necessarily Cycle Superhighways, both more broadly on Cycling issues. "But they understand well that they have to work together", says Signe.
- "It's also very exciting that we can see all the cycle superhighways that have been built so far, they keep getting upgraded, so they're may not be super from the start, but we have a bit of a mantra in the office that a Cycle Superhighway is never finished, and you can always upgrade it", says Signe.

[26] https://cyclingsolutions.info/cost-benefit-of-cycling-infrastructure/

Cycle Superhighway in interurban surroundings.



Overview of existing and future network, Danish Cycle Superhighways

Goals

- 50% of all trips to or from work or education done by bicycle
- Introduce regional bicycle infrastructure
- More shared responsibility for bicycling across sectors

Challenges

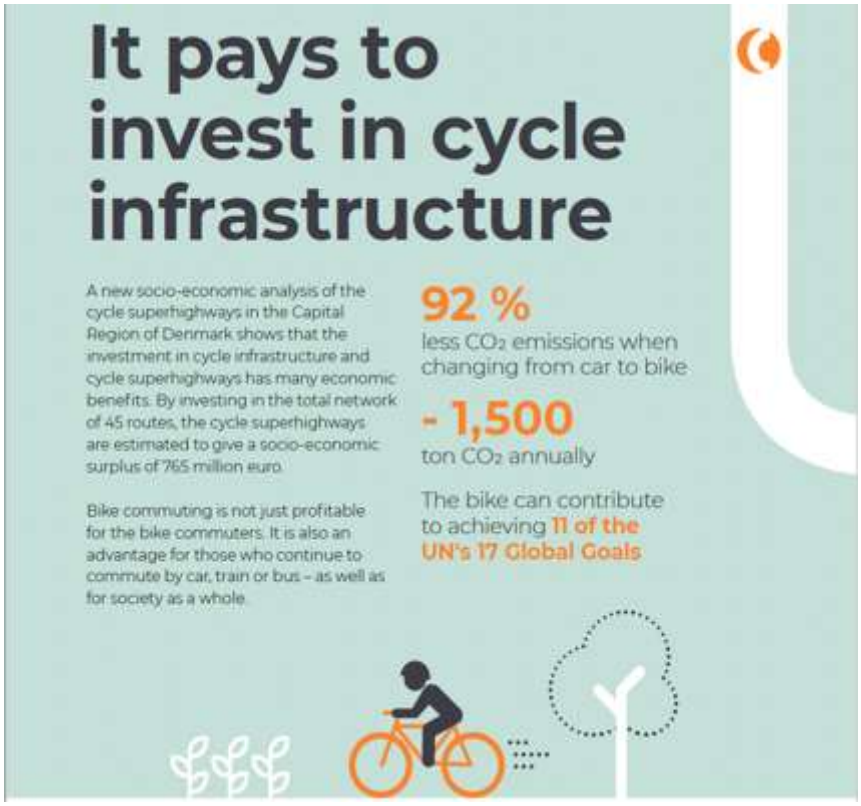
- Providing infrastructure for long-distance bicycle commuting
- Funding for construction, especially with municipalities

Solutions

- Collaboration across authorities in a “Gentleman Agreement”
- Joint promotion of regional cycling.
- Joint funding opportunities between the state and the municipalities

Benefits

- A high level of benefit-cost gain
- Less co2 emissions
- High increase in users
- High user satisfaction



Societal return on Investment estimates, The Danish Cycle Superhighways, 2019.[27]

[27] www.supercykelstier.dk

6.8. MEXICAN BICYCLING AT A CROSSROADS

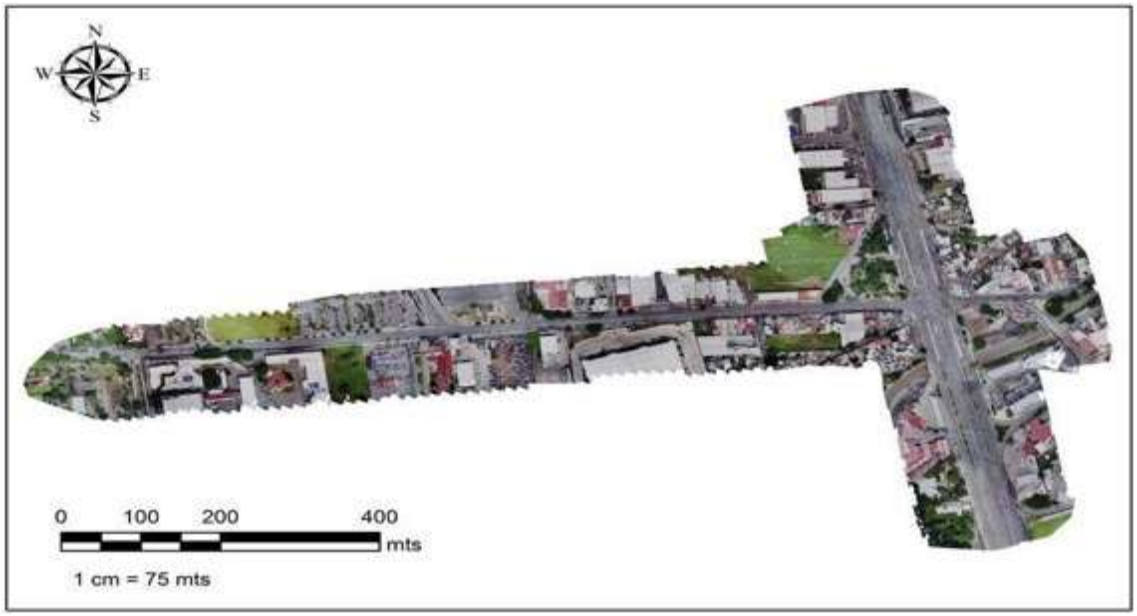
In the Mexican city, Santiago de Querétaro, the young Urban Planner, Abraham Cortés, dreams of a safer, more inclusive and more appealing infrastructure for bicycles. In his work, he uses new technology to create awareness of the need for more space and smarter solutions for the everyday users of the main arteries of the city.

Abraham Cortés Ronquillo has been working with urban mobility projects, mostly on pedestrian and cycling issues and with both public and private entities. He is now working for the Instituto Mexicano del Transporte, IMT, that carries out research, technological innovation, formulation of technical standards, as well as post-professional training and updating to contribute to improving transport safety, sustainability and competitiveness.

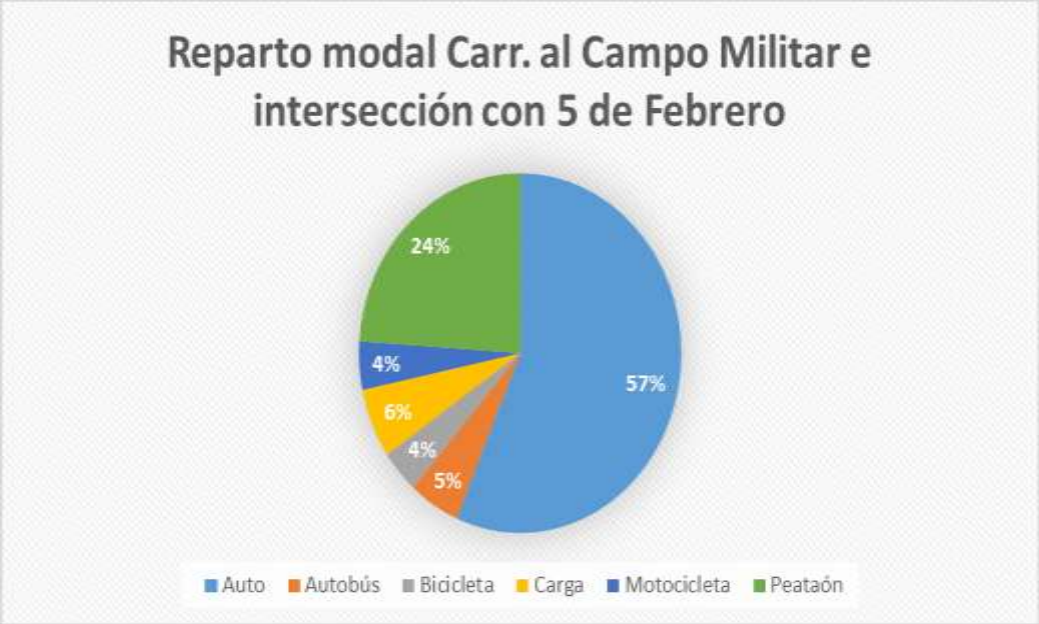
Abraham's role entails all aspects of design, planning, building and maintaining infrastructure, including traffic models and field research.

Currently, Abraham is engaged in a project about safe crossings for pedestrians, cyclists and other vulnerable users in Querétaro - a city of 2 million inhabitants in central Mexico, about 200 kms North of Mexico City. The Avenue 5. de Febrero is a main artery Road in Querétaro. It crosses the city from north to south and is also part of the Mexican Federal Highway 57.

"A lot of people use it for daily transportation in cars, buses, bicycles or on foot, but the infrastructure is mostly focused on cars, so that makes any other kind of mobility difficult. The avenue got demolished last year and has now been rebuilt. The main focus of the new infrastructure will also be the car, although there will be some cycle lanes and new bus stops", says Abraham. "When I started on the project, I was not aware that the avenue was going to be demolished. So it's an interesting case because it offers a new way to solve the challenge of road safety".



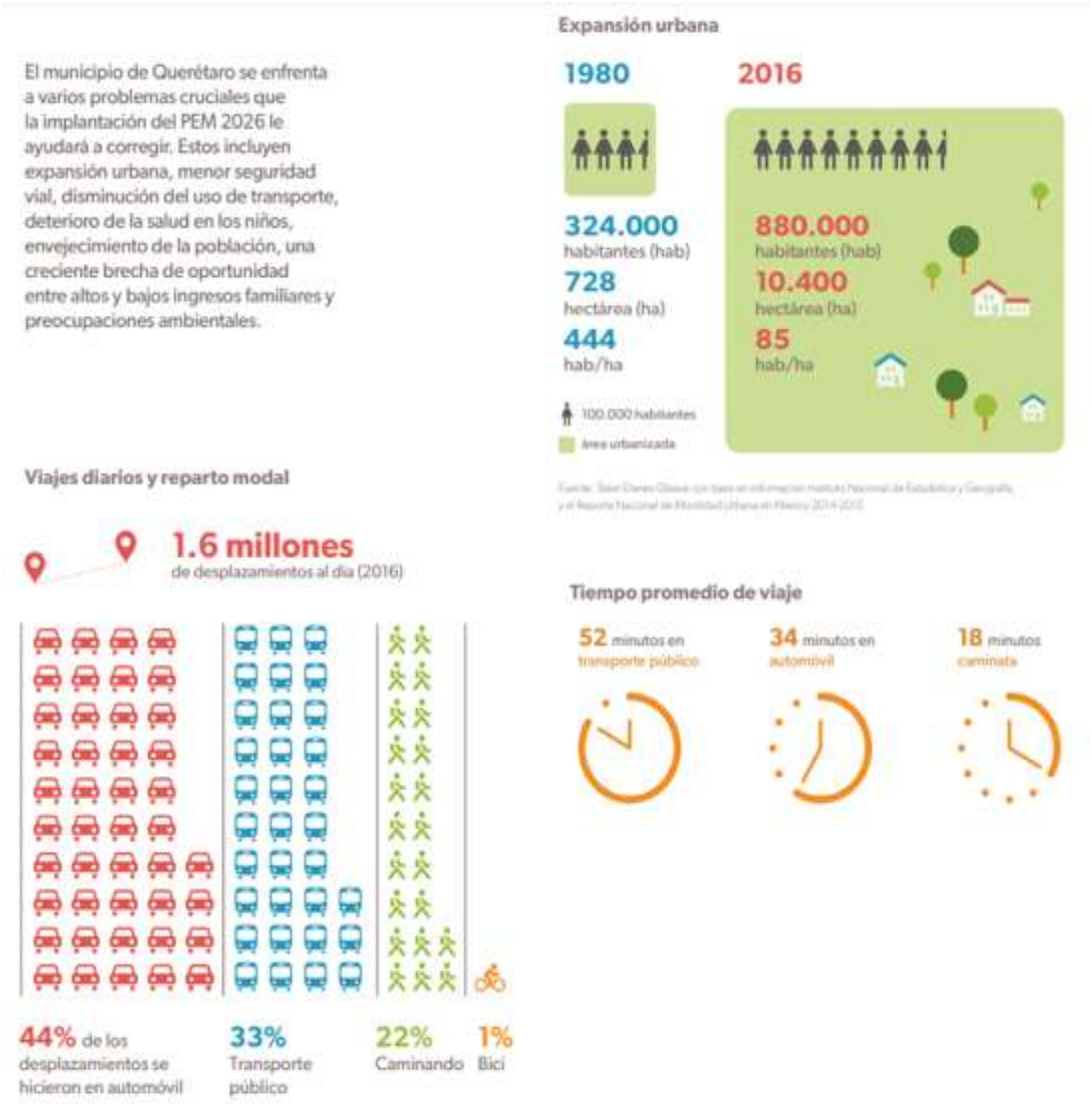
Orthophotography is the photographic presentation of an area of the earth's surface, in which all the elements are on the same scale, free of errors and distortions, with the same validity as a cartographic map.



Modes of transportation in the intersection. Cars are predominant, followed by pedestrians. Bicycles only account for 4%, but there was an increase, following a large road repair project.

One door closes, another one opens

With the demolition and reconstruction project, a lot of car traffic was moved to other places, but it also opened up for new modes of transportation; “Many people looked to other ways to move about than driving. So nowadays it's more common to see scooters and bicycles and that didn't happen before, before it was more of a low income option. So maybe it has changed a little. But I would still say that most of the infrastructure for bicycles is in touristic places or high income neighborhoods. So I think the government could encourage more options for transport to the people, but on the other hand, many road users are hesitant to use cycling or walking, due to road safety risks”, says Abraham. “it's not that they are not dying inside the cars because we also have a really high mortality there, but they feel safer because they have all these metal structures around. So it's very complex, actually”.



A fast growing and popular city, Querétaro relies heavily on cars and public transportation.

Technology as foundation for change

In order to build an overview of challenges and possibilities for inter-urban mobility, Abraham works with different kinds of technology and methods. This includes drone technology, modeling, field research and 3D models.

“We have drone pictures of specific parts of the city so we can identify weaknesses in the mobility areas. Specifically I work with traffic models using visualization tools. The key is to know the patterns of movement – from where to where people are going. And if you can't make a specific study for every neighborhood then you have to look for the working centers or where people need to go in order to make a living”.

“With the drone we try to get all the actual images of an intersection and then use AutoCAD to create a 3D model, which again shows that this is a complex and crowded space and that there are needs to be solved. After that we input the data into a Vissim microsimulation. With the combination of images and simulations, we are then able to change the crossings and install safety measures. In a way, we are rethinking the intersection. Some examples of safety measures are full stop signs and the introduction of a two-way bicycle path, so the cyclist does not always have to cross the road”, Abraham explains.“ In this way, we also show pedestrians and cyclists where it is safe to cross and we eliminate certain black spots”.

Vulnerable users share space, as most space is taken by vehicles.

Slow change coming

When asked about the status and numbers of bicycle riders in Querétaro, Abraham admits that bicycles are not at all the preferred way of transportation. But he also feels that given the right incentives and infrastructure, this may change.

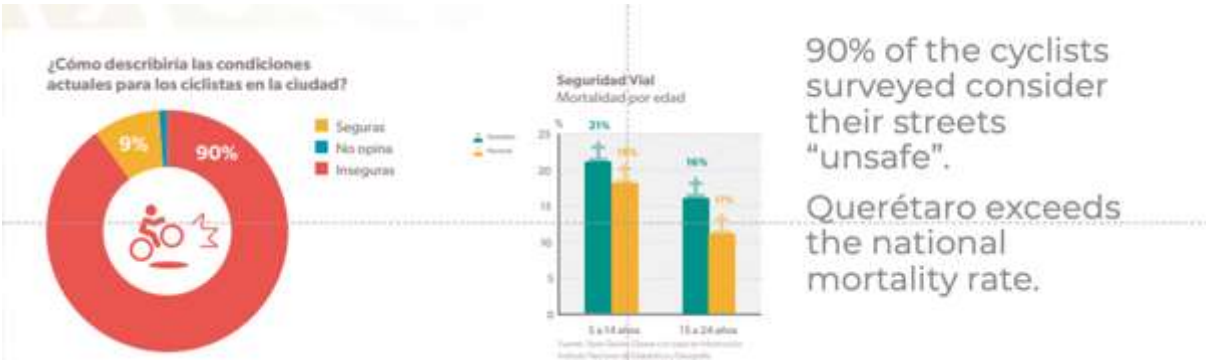
“Well, I try to bike every day. I use it for my everyday transportation but when you look at the statistics, for instance on this one intersection, we can see that more than half of the traffic happens by car and 24% it's pedestrian and bikes would be 4%. But if you are just considering the cars, you would be ignoring almost half of the people that use this section of roads. Especially in the mornings, we see a lot of pedestrians and cyclists. And basically, most people are just trying to get out of the way of the cars and they don't care where they cross over, which is very dangerous”, says Abraham.

Installment of a two-way bike lane can help prevent dangerous crossings.

In another study of the same avenue, we were looking at how many cars were going with one person and how many cars were going with more than one person. And most of the cars have only one single user and that takes up a lot of space".

Part of the change, then, has to come from a change in transportation habits, and the city of Querétaro actually has decided on two very specific plans of action, following a vision of what the city is going to look like in 50 years, Abraham explains. "But even though the planning mentions both more public parks and more bike lanes, we are still prioritizing cars and infrastructure for cars too much in my opinion", says Abraham.

The project combines different disciplines and various methodologies such as Road Safety Audits, drone photogrammetry and infrastructure modeling from point clouds, incorporating everything in a microsimulation model.



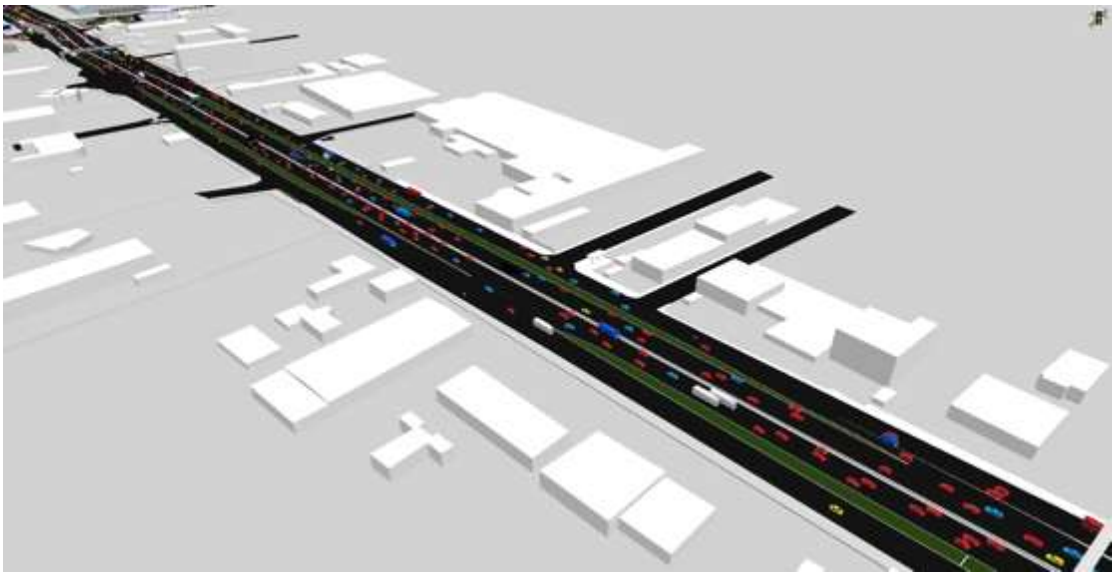
Insecurity – or fear of road accidents – are the most important deterrent for biking among (potential) bikers in Quetéraro.

Don't tell it, show it

Abraham and his colleagues are constantly trying to optimize the road safety on their local streets, for pedestrians and bikes, as much as for cars. The maps, models and studies, they make, might help with budget allocations for this. But, as Abrahams puts it: "Until we get more attention to bikes and pedestrians, we have to work with the geometry and what safety measures we can install. What we can do, is to pinpoint the black spots, where there are many road accidents and that is mainly crossroads. And then we try to make our government aware of these matters, by showing them what they will get for their money. And this is where our models come into play. I think that they help more people to see that those traffic studies are happening and to ask their governments for the right information.

In the end, the goal is to reduce the mortality of our streets. That would be the main focus of all of this work. And I think infrastructure, it's what would make it happen. If you can make people respect other ways of transportation, and if you make specific spaces for every one of them and they don't have to share - they can just go", Abraham underlines.

Showing and sharing the relevant information to the relevant stakeholders is critical to Abraham. "The main reason to be involved in the matter for me is to reduce or stop the mortality at the streets of my community and to reach the people that can make the difference; the governments, the private sector and nonprofit organizations. They have to be fully working together, because most of the time the analysis and design work is already made, they just don't know and get it all done again".



In red, vehicles with a single occupant. More than 50% of the cars have only one single user.

Goals

- The city of Querétaro has a vision that includes more bike paths in the public room.
- Traffic safety is a very important overall goal too.

Challenges

- The current traffic culture is a massive deterrent for biking and fatalities are high.
- Most transportation happens by car or public transport.
- Bikes only take up 4% of the overall transport, while 22% are pedestrians.
- Most infrastructure is already built for cars, so taking away a lane is very difficult.

Solution(s)

- Use advanced technology to visualize, design and disseminate necessary changes.
- Use existing geometry and infrastructure to ease the crossing of vulnerable users
- Use new solutions, like two-way bike paths and intelligent traffic lights.
- Use empty spaces near the road to install bike paths.

Benefits

- Raised awareness with politicians and decision makers about possible solutions,
- Reduce accidents, stress and improve respect for all kinds of transportation.
- Involvement of both civil engineers and sociologists, and architects

6.9. BIKING IN THE BALKANS

With the introduction of the EuroVelo Routes to the Balkan countries in Central Europe, the combination of recreational and everyday biking may be a game changer for interurban cycling.

Danijel Vuckovic is a Traffic Engineer and consultant with international experience in the field of planning and designing infrastructure for both private and public clients. He now lives and works out of Belgrade, the capital of Serbia. Danijel has great insight in current transport strategy and the mechanisms that make the wheels spin in the Balkan Region.

“I have worked on various cycling projects in the region, defining the alignment for several EuroVelo routes and for other cycling projects, but also a lot with the cycling infrastructure in cities. My cycling experience in the Balkan region comes from Bosnia and Herzegovina, Montenegro, as a combination of the planning and design needs by local-self-governments, national institutions and International Financial ”, Danijel says.

“I think that more cycling could bring a lot of positive things to Serbia: We are one of the countries in Europe with the highest level of heart attacks as a share of deaths, so I guess more exercise would be helpful there. But there are good things happening in Serbia, I would say. The region of Vojvodina is a good example, but there are also cities that have constructed a lot of cycling paths and marked cycling routes. Sharrows and separated lanes for cyclists in cities are still not in place, but there is movement in the right direction. In general, the situation is promising”, he says.

Danijel is cautiously optimistic about the future of interurban cycling for Serbia and the rest of the Balkan region, but he is also realistic and outspoken about what it will take to move forward, in terms of political and economic action.

Design debate

One example, Danijel mentions, is the need to update and specify the bicycle infrastructure design guides for interconnecting bike routes.

“We need spatial plans to properly assess, and then define new routes through existing infrastructure, including in the big cities. So even though we do have design guidelines for cycling

infrastructure in Serbia and elsewhere, there is still no tailored well for the design though urban areas where there are many obstacles due to the existing state and heritage in general. And if you ask me, you can't use national guidelines for roads in narrow streets, where you can't just fit in a standard bike lane or path. Hence, we need to find a solution to this, though well-defined strategies, spatial plans and relevant design guidelines, which will allow proper inclusion of cycling corridors and green routes within urban areas", says Danijel.

"Right now, for instance, I'm doing the design for 15 kilometers of bike paths in Sarajevo and we have issues because construction permits are dependent on guidelines all the way back from 2005. But the streets are too narrow to live up to these guidelines. I am really hoping that the next/updated national design guidelines will consider bicycle infrastructure in this regard, along with roads, rails and other transport modes.", he says.

Cross-border cycling

An example of a cross-border collaboration, not only in the Balkans, but throughout Europe, is the EuroVelo Routes - a network of 17 long-distance cycling routes criss-crossing Europe. When completed, the EuroVelo network's total length will be almost 90,000 km.

Danijel worked specifically with those parts of the routes that go through the Balkans.

"Euro-Velo routes 6, 8, 11, 13 are mostly done in terms of defining the alignment and including feasibility studies. Especially in the northern part of Serbia, which is a self-governed area, called Vojvodina, they have quite developed corridors, including an 80 km connection to Romania. "There is more focus on cycling plans in Vojvodina, than the rest of the country", says Danijel, and continues "People do use bicycles into Vojvodina from nearby villages. And they want to construct new routes in Vojvodina to separate bikes from cars. It is a completely flat area of the country, and they use bikes a lot".

The Euro-Velo routes are crossing borders inside and outside of the Balkans, and even through there are not many cycle route projects on the municipal level, throughout the region, Daniel is hopeful on behalf of the development of inter-urban cycling: "There are many projects in the making, including conversions of decommissioned railway lines, urban cycle plans and EU-funded projects, all of which plays into the overarching system of the Euro-Velo Routes. Bosnia and Herzegovina, Montenegro and Serbia are active players in this process and I personally hope that we will see the different cycling corridors become included in the national transportation plans in more detail and that this will form the foundation for further development", Danijel says.

Fundraising and fun racing

When it comes to the future of biking in the Balkans, Danijel sees an opportunity in combining the demand for ecotourism with the need for commuting. "One example is a 800 km route in the mountain areas in Montenegro and Serbia (called Cult Bike Route), which is becoming very popular. Hopefully we can promote this for touristic purposes, and there are similar attempts to introduce better conditions or bike-tourism throughout Serbia and Montenegro and the rest of the region", he says. "But there is still room for improvement, especially for commuting, and budgets are a problem, especially for the municipalities, which must prioritize other infrastructure, like sewage and water. I hope that we can combine the different aspects of biking in a fundraising effort between the local and regional governments, perhaps with co-funding from the EU or other IFIs", he says. "Also, budget wise, we should as a state allocate more money to cycling infrastructure, for

instance from the revenue from public transport and traffic related fines. My dream is that we start thinking more about how we can connect the dots, including the suburbs with the cities – maybe not the city centers, but the terminus of public transport", says Danijel.

Goals

- More cycling for commuting
- Separated bike lanes and paths
- Cross-border collaboration
- Better funding and budgeting around cyclism.

Challenges

- Spatial plans should be updated
- Habits – awareness should be raised
- Cycling for commuting is rare
- Budgets – are very low and other infrastructure is prioritized
- Central and south, west of Serbia is very hilly – up to 2000 meters above sea level.
- Safety – when you are biking alongside cars.
- No guides developed for cycling in urban areas

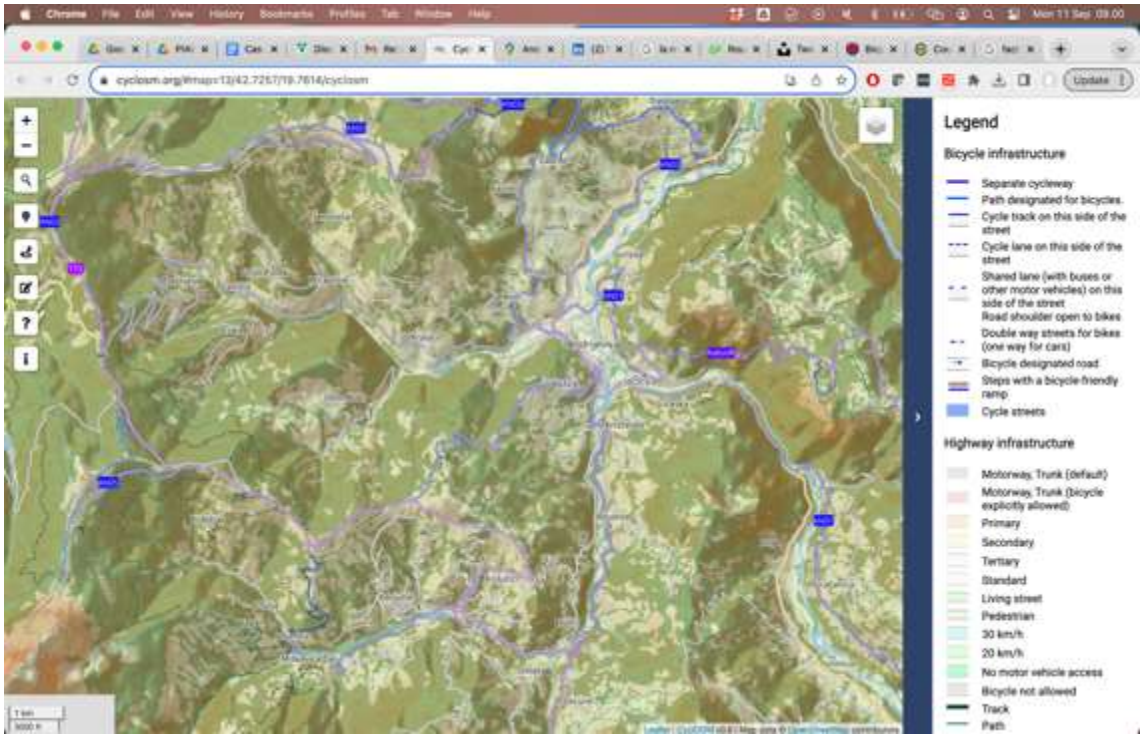
Solution(s)

- New Transport Master Plan in Serbia to replace 2010 plan that was not addressing cycling
- 800 kms designated routes between Serbia and Montenegro
- NGOs + ministries – continue to promote cycling as active tourism
- Combination of funding, from municipalities to state, to EU to IFIs.

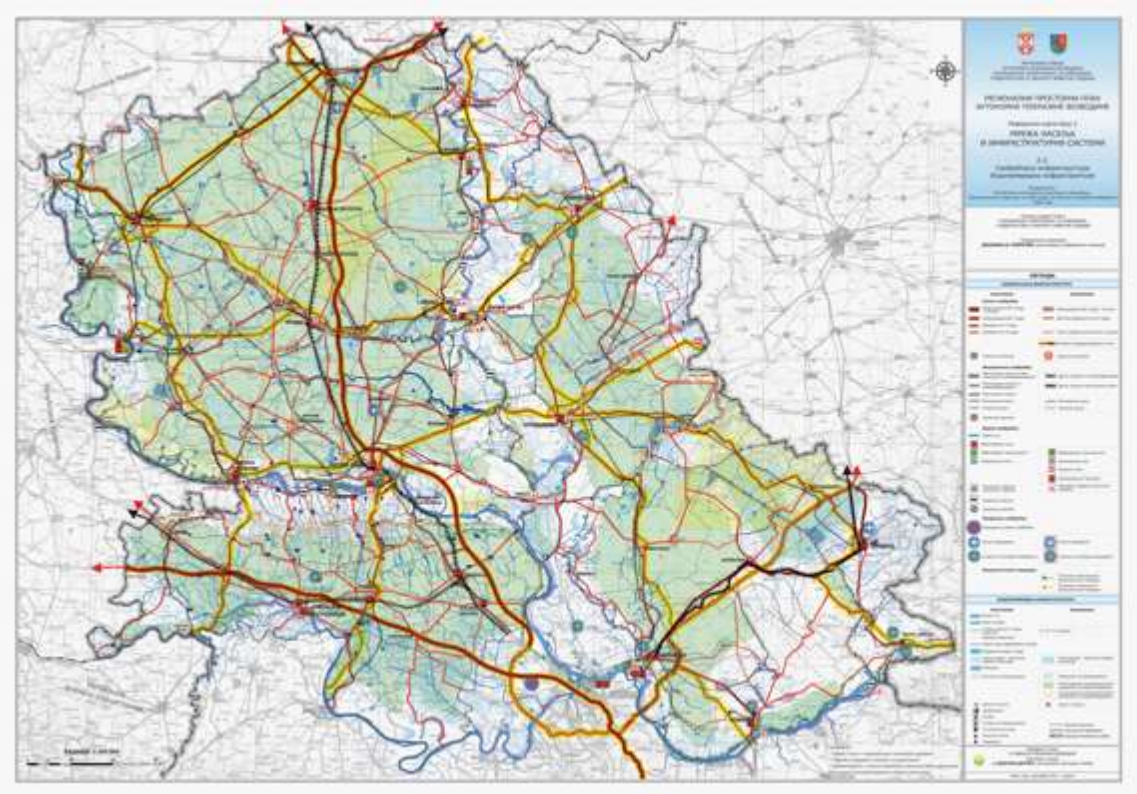
Benefits

- Public health to reduce heart attacks and stay fit
- Less congestion
- Active tourism
- Cities have constructed designated routes

The Cult Bike Route – a cross-border collaboration between Montenegro and Serbia.



Designated bike routes in Montenegro - primarily used for bicycle tourism.



Regional spatial plan of Vojvodinas transport infrastructure with planned international (green color) and national (orange) cycling routes/paths. Many or most of them are implemented.

Some ongoing Initiatives:

Transforming abandoned railway corridors that are planned to be dismantled, to green cycling corridors:

- the first 5 km implemented in Uzice (west part of Serbia)
- 17 km Beocin-Petrovaradin (unde design), with potential extension for 16.5km to Sremski Karlovci.
- 18 km Ruma -Vrdnik in Vojvodina
- cycling path Belgrade-Obrenovac-Lajkovac-Cacak-Uzice-Mokra Gora
- -ycling path in Priboj Municiaplity

Someof the projects co-funded by EU:

- approximately 140 km of cycling paths in South Banat (Vojvodina), linking Belgrade and EV13
- approximately 800 km of CultBikeRoute developed through 14 municipalities, 7 in Serbia and 7 in Montenegro.
- approximately 70 km constructed cycling path between Zrenjanin (Serbian) and Temisoara (Romania)

EuroVelo is a network of 17 long-distance cycling routes criss-crossing Europe, in various stages of completion. When completed, the EuroVelo network's total length will almost be 90,000 km. As of November 2022 more than 56,000 km were in place. EuroVelo is a project of the European Cyclists' Federation

6.10. OHIO & ERIE CANALWAY AND TOWPATH TRAIL

In the US state of Ohio, local communities work hand in hand with federal institutions to design, build, finance and operate sustainable recreation and transportation for all. It is a long game that shows how interurban green infrastructure can play an important part in revitalizing a community, economically and environmentally.

Daniel M. Rice is President and Chief Executive Officer of the Ohio and Erie Canalway Coalition. Together with Matt Stewart, Transportation Planning Administrator, AMATS - Akron Metropolitan Area Transportation Study he is conveying the lessons learnt from 30 years work with the Ohio & Erie Canal Towpath Trail. Dan has been coordinating the project throughout all this time, while Matt is fairly new to the collaboration. They have however already found common grounds on the importance of the trail for community building, public health, equity and growth of the entire Ohio & Erie Canalway National Heritage Area.

Dan Rice, CEO of Ohio & Erie Canalway Coalition (left) and Matt Stewart, Planning Administrator at AMATS.

Inter-urban and multi-usable

Originally used for mules pulling canal boats, the Ohio & Erie Canal Towpath Trail is now the key walking, running, and biking route through the Ohio & Erie Canalway National Heritage Area. Currently spanning 90 miles long across four counties, the Towpath Trail is estimated to be 101 miles when complete. The trail follows closely, though not entirely, along the original route of the Ohio & Erie Canal and provides natural, cultural, historical, and recreational opportunities throughout.

The towpath is a multiuse set of trails and parks with the majority of users being recreational uses and with about 30% of the users being long or short distance commuters.

Matt, who moved to the area about 1 year ago has a first hand experience as a house buyer in the area:

Sustainability in many forms

“We need sustainable and local opportunities for recreation and exercise. We have seen that house prices go up near the Canal, which means that having a walkable and bikeable neighborhood is essential to the quality of life for many house buyers. I would estimate that it affects as much as 10% of the house price, if you have easy access to nature and parks”, says Matt. “Municipalities play an important role in advocating for the Canal and bring awareness to the fact that infrastructure for walking and biking is equally important as roads and bridges to society. We need

the local decision makers and local leaders and partners to get onboard on this, also when it comes to raising funds from federal transportation resources".

Summit Bike Share is Summit County's free bicycle share system, with 40 bikes available at nine stations across Summit County. Dan agrees: "We see that developers have begun to recognize the value of installing walking and biking paths to their areas. During COVID, we experienced a huge demand for out-doors activities and space, and it is clear to me, that the Trail is an essential service to society and that it sustains human interaction and well-being. The Return on Investment is high, not only in terms of house prices and better public health, but also in a more reliable work force for the companies and in the support of local business from the users of the infrastructure, including tourists. We usually say, that everybody has a stake in this, and we estimate the ROI to be about factor 4, so that you get 3 dollars back for each dollar invested", he says.

When it comes to the maturity of bicycle infrastructure itself, the Towpath has certainly helped getting more people on their bicycles. "But we still have some way to go", Dan says. "We need a system that is independent from cars and we need all the necessary investments in place. It is a long game - and can not move in electoral life cycles of 4 or maybe 6 years. We have to prove that this is not a vanity project, but a legitimate project", says Dan.

Matt : "I think the more infrastructure you have, whether it's primarily a recreational trail like the Towpath or just something as simple as like a bike lane or even signage – and the more safe places you have to bike, the more bikers we will see. And I just feel fortunate that we are living in one the most progressive areas in our country in terms of bike infrastructure by any stretch, and I think we're well ahead of average in the community buy-in. Not everybody is onboard, but a lot of people recognize the importance of biking here."

An outtake from the map of Ohio & Erie Canal Towpath Trail clearly shows the inter-connectivity of the trail with roads, bike paths and hiking paths, like branches on a tree.

The snowball effect

With 30 years of experience on the job, Dan has witnessed the slow, but sure development in the general appreciation of the Towpath: “You know it's really starting to snowball, I think. We start to see developers recognize the value in the connection. 10 to 15 years ago, developers were building housing developments without sidewalks. Now they see the need to build sidewalks and maybe even a walking trail. And then where you're going to build that housing development, how can that connect to the local restaurant, the local school, the local coffee shop?. Even in downtown Pittsburgh, they have been very active about building bicycle lanes. So there are other communities working with this, and that's why it's frustrating when those communities that want to be liveable, sustainable and active in attracting and retaining talent don’t hear the call. Because walkable and bikeable is what young people are looking for. They don't want to drive everywhere. They want to be able to walk and bicycle. Those communities that do not embrace that walkable, bikeable community I'm afraid are going to get left behind”, says Dan.

Dan also has another point to make, referring to the recent pandemic. “We learnt it the hard way out of the pandemic when the world shut down; where did everybody go? They went to parks, trails and public space and for the longest times in my opinion, parks, trails and public spaces have been considered non essential services. If anything, hopefully the pandemic taught us that parks, trails and public spaces are essential services. From a mental health, emotional health, physical health. It's all part of how we exist as human

beings", he says. "There's so many studies that are done the importance of parks in disinvested urban communities where people don't have access to parks. They have higher stresses ~~and~~ health issues. My plan is that we become much more cognizant of the importance of parks, trails and open spaces in our lives", he adds.

Building communities along the way

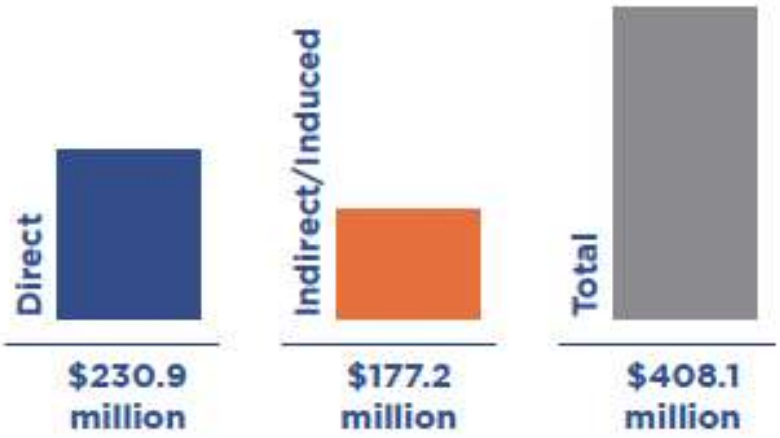
"Our approach to working with the public is that everybody has a stake in what we do, whether it's the local Chamber of Commerce, the local business, the local bed and breakfast, the bicycle shop, the restaurant, the government agencies, foundations. I kind of jokingly say that if you've got a pulse, we'll talk to you. And the reason for that is? You could probably think that we are only appealing to bicycles and walkers. But that's very narrow. The health institutions of our healthcare companies and hospitals are major supporters of what we do. Our energy companies, like Dominion, they support what we do. And it makes sense for the healthcare professionals. That's obvious, because people who are more active, lower healthcare costs. And corporations like the Goodyear Tire and Rubber Company, want to get their employees out there and more active to lower their healthcare costs. And Dominion likes what we do because it's good for the environment and it's good for their company and communities they serve.So we appeal to a broad based audience and that's by design and partially from a funding perspective. Because in 1996, the US Congress designated the Ohio & Erie Canalway National Heritage Area. The charge they gave us was; build trails, preserve historic buildings and conserve natural areas. Those three things. There were two catches. One: we're not going to give you all the money. In other words, we're going to give you a little bit of money. And two: you don't have any authority. So good luck to us", says Dan. "So think about that model: The only way we can get things done is by having everybody invested in the project, because the federal government isn't going to give us all the money and we cannot tell anybody to do anything. We have a whole lot of carrots but we have no sticks at all", Dan says. "It would probably be so much easier if just one agency did everything and owned everything and maintained everything. Does it take much longer time doing it our way? Yes, it absolutely does. But the other advantage I think that we have is I think our way is more sustainable because now it's not one agency that owns it all. We all own it. Everyone has skin in the game and It's it's built in that this is locally invested, locally owned. So it is a great way of building a community".

Return on investment

" A number of years ago we estimated how much had been invested in the development of the open trail and at that point of time it was $100 million that had been invested in the development of the Towpath Trail. The breakdown was probably; 10% Private, 20% State, 30% Federal, and 40% Local

"We did an economic impact study in 2015 and what we learned is, is that on an annual basis, the Ohio & Erie Canalway National Heritage Area generates $408 million in economic impact. It generates $34 million in tax revenue. It actually supports 4200 jobs. For the longest time, people tend to think of what we did was like a tree hugging project. We were just a natural resource

project. Well, I'm not saying those things are bad, I mean certainly conserving and taking care of the environment are good things. But when you go and talk to an executive at the Goodyear Tire and Rubber Company, they want to hear about jobs. And public and private work places now use our trail maps, our brochures, our materials to recruit engineers, doctors and lawyers to come live and work in Northeast Ohio. So now we're not just seen as a nice trail project; we are seen as part of the economic development package and as a part of the plan to retain and attract talent to our area", says Dan.



The economic impact of the Ohio & Erie Canalway National Heritage Area is $408.1 million annually. This economic impact consists of four main components: tourism ($387.2 million), operations ($1.8 million), grantmaking ($142,000), and capital expenditures (close to $19 million). Source: THE ECONOMIC IMPACT OF NATIONAL HERITAGE AREAS: A CASE STUDY ANALYSIS OF THE OHIO & ERIE CANALWAY NATIONAL HERITAGE AREA, 2015.

"We populate members of our board of directors as a nonprofit with representatives from those companies. Because think about it this way; Now, when I go to Washington, DC, or the federal government, or when I go to our state government, and I show them our materials and I show them those logos of those corporations, it actually gives me recognition. It's like, oh, these organizations support you, so therefore it must be a good project", Dan smiles.

Matt adds: "Most of our committee members are municipal leaders. You know, mayors or municipal engineers or other people that are on staff or elected officials from those communities. And where I see all of this going, whether we're talking about the Towpath or just general bicycle pedestrian infrastructure, it has to become equally important or just part of the mainstream - something that you do naturally. AMATS funding policies really have shifted in the last dozen years or so to reflect that. It's not just, oh, you want to build a park trail and that's not very important. I see our role at AMATS as a supporter of those kinds of projects and also our funding policies reflecting that. And I will say a lot of the hard work has already been done. It feels like our funding policies right now kind of have already made this mainstream, and assistance from the federal government helps, of course", Matt says.

"You know, we have federal transportation bills that are passed roughly every five years and there are certain directives within that which allocate certain funding toward different

types of projects and projects that we used to think of as kind of like it would be nice to have this, you know, and that that usually ends up being these alternative modes of transportation is is much more mainstream now".

"It is often a tough sell with local leaders, but if you can't make that economic argument or can't get like those partners on board it can be a problem. They don't care about the recreational or quality of life benefits maybe. But I feel that Northeast Ohio is way ahead of the curve with incorporating trails and just bicycle infrastructure in general into normalcy", says Matt.

Mainstreaming and including

Dan: "I would agree that we definitely made progress, but we still have a ways to go and especially as our climate continues to change, we need to become less and less dependent upon the car. And the best way to do that is to utilize our existing bicycles and bicycle infrastructure. Yes, we have supported the local level, we get support at the state level, but it could absolutely be better. We could be investing even more. And we could do so much", says Dan. You know, the pandemic I think taught us a lot of these lessons including how important parks, trails and public spaces are? I At least in two signature projects that we're working on; these major park projects along the Towpath Trail. I'd like to see not just two, but dozens of them, particularly in our of black and brown communities, because unfortunately we still have a pattern in our country of disinvesting in poorer areas. In urban and black and brown communities. I think that's important to be aware of, and I will say on the federal level with the current administration, equity has been a huge component of their strategic programs, like the federal transportation bill and you'll never know what it is going to be like next time. So that's always, that's always a worry, Dan says. "But actually I don't think it is about politics, but more the structure. Our elected officials in the United States are functioning on a two, four and six year time frame. That's their worldview. But we think of things in 5/10/15 and 20 year time frames. So how do we help people to think of the long game? And that just investing in something for four years isn't good enough? Our economic impact studies are part of that exercise, effectively legitimizing investments and showing the return to the community. So there is nothing about what we're doing that is vanity. It is about an essential service to people and that goes back to the equity issue, that's something we still have a long ways to go. And it's unacceptable. Everybody deserves a great park, trail, public space, regardless of your age, your gender, income, race or experience. It doesn't matter, Dan underlines. .

Goals

- Enhance use and appreciation of natural heritage area
- Engage community in greening of the area
- Make bicycling more mainstream as an alternative to other transportation modes.
- To establish branches to the network, so nobody is ever more than 10 mins away from a branch.

Challenges

- Resistance from private landowners and from neighborhoods where parking may be affected by the build out of the path.
- Political habits and short term planning

Solution(s)

- A long term regional plan with heavy involvement of partners.
- Visualisation of new and existing paths to align expectations.
- Encourage hands-on experience.
- Policy making, providing evidence of return on investments

Benefits

- Massive ROI (see study from 2015)
- Recreational possibilities to sustain public health
- Inclusion of neighborhoods without large green areas
- Community building around activities and local businesses
- Empowerment of users
- Economic development of business and general area

World Road Association (PIARC)

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