

CAR ELECTRIFICATION AND URBAN MOBILITY: RECENTRING THE DEBATE ON PUBLIC TRANSPORT

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INTRODUCTION

A traffic jam with clean cars remains a traffic jam. Electric vehicles are being touted as one-size-fits-all solution to sustainable mobility, though EVs are not a substitute for public transport. In contrast to public transport, electric vehicles alone cannot effectively facilitate the transition towards a more sustainable, equitable, and economical mobility system. Rather, public transport authorities, operators, and manufacturers, in line with decision-makers and authorities in charge of managing, designing, and policing streets and roads, should facilitate a sustainable mobility transition by decreasing car dependency and increasing multimodal (including intermodal) solutions to support new mobility behaviours.



A BIASED VISION IN FAVOUR OF THE ELECTRIFICATION OF PRIVATE CARS...

Three facts on urban mobility are striking. First, the demand for mobility is continuously increasing; mobility is a pillar of our lifestyles. Second, mobility is dominated by private cars (or two-/three-wheelers) — this leads to high congestion. Third, cars largely rely on fossil fuels, which supply about 95% of their total energy demand. What we observe is that mobility systems that heavily depend on private cars generate many negative externalities – congestion, pollution, carbon dioxide (CO₂) emissions, land use waste, etc.

To deal with these externalities, the narrative has focused on the electrification of private cars, which is framed as the one-size-fits-all solution to mobility challenges. The economics of an electric vehicle (EV) for users can be more advantageous than that of an internal combustion engine (ICE) vehicle. EVs in use do not generate tailpipe emissions and are less noisy than ICE vehicles. For states, EVs can support the development of an industrial strategy towards carbon neutrality.

In accordance with these views, policies have been implemented to promote the adoption of private EVs across the world. In the United States, President Joe Biden has fought for tax breaks for EV buyers, and the state government in California has announced a plan to ban the sales of gas-powered vehicles by 2035. Elsewhere in North America, the provincial government in Ontario has invested Canadian Dollar (CAD) 500 million

in EV production. Furthermore, the European Union (EU) Green Deal aims at banning sales of ICE vehicles by 2035 and incentivising the development of a network of charging points across the EU on the Trans European Network of Transport (TEN-T). Finally, on a global level, the past Conference of the Parties (COP) meetings on climate change mitigation in Glasgow and Sharm-El-Sheikh put a strong emphasis on EV promotion as a sustainable mobility solution.

...VERSUS A SUSTAINABLE MOBILITY TRANSITION: THE NEED TO RECALL KEY PRINCIPLES

However, when looking at a car-heavy mobility system, a one-to-one conversion of ICE vehicles to EVs will not eradicate the many negative externalities. EVs cannot be a substitute for public transport and complementary mobility solutions to solve mobility challenges. Hence, EVs cannot effectively facilitate the transition towards a more sustainable, equitable, and economical mobility system.

For commuters, any traffic jam, whether there are EVs or ICE vehicles on the road, remains an equally unpleasant experience that impairs people from moving around and reflects inefficiencies in our mobility system. Traffic jams caused by cars also affect the quality of bus and tram service and reduces the ability of cyclists, two-wheelers, and pedestrians to move around comfortably and safely.

We need to be mindful about inadvertently fuelling car ownership aspirations as we push for greater EV adoption. A study done by Singapore's Land Transport Authority in 2022 found that EV-friendly policies like lowering EV taxes and the installation of more EV charging stations nationwide could have the unintended consequence of encouraging people who do not own cars in Singapore and have no plans or are ambivalent regarding car ownership to purchase EVs¹. Encouraging the use of public transport, walking, and cycling as more efficient transport modes with lower or even close to zero emissions is of paramount importance to prevent increasing car ownership aspirations, even as efforts to electrify the private vehicle fleet gain momentum.

Furthermore, the population's appetite for cars has decreased, meaning the EV solution is not in line with mobility behaviours. There is evidence that people's relationship to the usage and ownership of private cars – whether ICE or electric – is changing across generations. Once considered as a must-have, cars are seen by more recent generations as a tool, among others, that can be used for a specific mobility purpose.

For the community, a mass EV-based mobility system will not bring about significant improvements. It will not adequately address global warming, inequity, obstacles to accessibility and congestion, road danger, costs for users and society, space inefficiency, degraded urban life, and urban sprawl. Moreover, such a system could generate new challenges resulting from energy and resource consumption. As automobility is a self-reinforcing system that dominates other modes of transport, EVs will not provide enough space for alternatives.

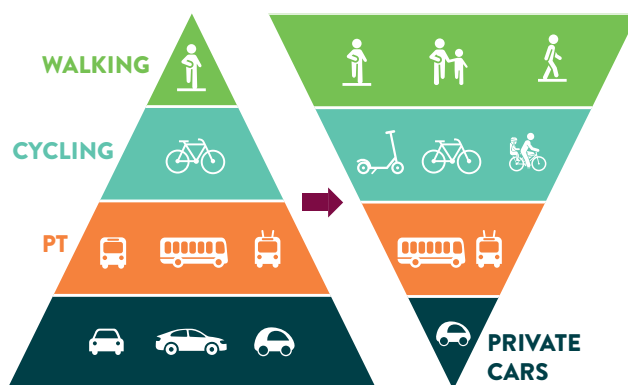
Therefore, public transport authorities, operators, and manufacturers, in line with decision-makers and authorities in charge of managing, designing, and policing streets and roads, should facilitate a sustainable mobility transition by decreasing car dependency and increasing multimodal (including intermodal) solutions to support new mobility behaviours.

BACK TO BASICS: WHAT SHOULD BE THE FOCUS OF A MOBILITY POLICY?

To implement a mobility transition, what should a mobility policy aim at? Mobility (defined as the need to move around to access places and people) is a derived demand that is serving our daily programme of activities. Therefore, the overarching goals of a mobility policy outlined by a public transport authority (PTA) should be to meet people's mobility needs and connect people and places by offering – and incentivising the usage of – the most appropriate mobility solutions.

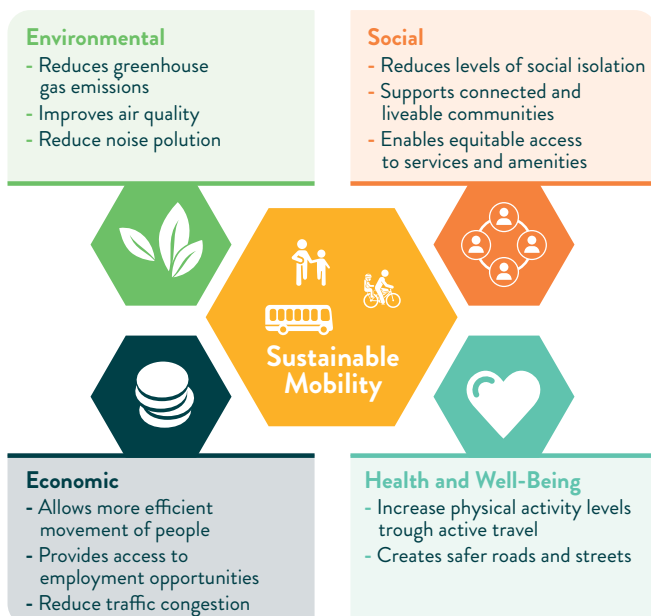
Mobility policies should lead to inverting the transport pyramid and reaching a better mobility mix, i.e. a higher modal share of public transport and active mobility. Where cars are dominating or taking over the mobility system, alternatives should be made available, rather than providing new capacity for cars.

Figure 1. Inverting modal priorities. Source: UITP



¹ 62% and 46% of people aged 18-30 and ≥31 years old, respectively, who did not own cars either strongly agreed or agreed that (i) reduced taxes on EVs, (ii) a nationwide programme for setting up EV charging stations in car parks, and (iii) more mass market EV options would encourage them to become EV owners in the next 10 years.

Figure 2. The 4 dimensions of sustainable mobility



High-capacity public transport should constitute the backbone of (urban) mobility policies. It is crucial to focus on improving and developing public transport services and their attractiveness. This should be complemented by mobility services that are well-integrated with public transport and will support a multimodal lifestyle (that includes intermodal behaviour).

This necessitates supporting safe, comfortable, less polluting, and healthier mobility solutions. These options should be affordable and serve all journeys: to and from home, work, education, care activities, shopping and leisure, etc. Mobility strategies should also focus on *managing demand* in a way that reduces unnecessary trips and the number of people who are not able to move around conveniently.

Based on best practices and practical experiences shared by members of the Organising Authorities Committee (OAC), the benefits of the abovementioned policies are summarised below:

Table 1:

Multicriteria analysis of the benefits provided by different modal priorities, based on a qualitative analysis by the OAC

		PT ALONE	PT + BUNDLE	ICE VEHICLES	EVS
User	Ability to move around	+	+++	+++	+++
	Affordability	+++	++	---	---
	Social inclusion	+++	+++	---	---
	Safety	+++	+++	---	---
Community policy goals (local)	Liveability	+++	+++	---	---
	Local air & noise pollution reduction	+++	+++	---	---
	Economic development	+++	+++	---	---
	Urban sprawl	++	+++	+++	+++
Global commitments	Pollution reduction	+++	+++	---	---

+++ strongly positive; ++ moderately positive; + slightly positive; - slightly negative; -- moderately negative; --- strongly negative

Rather than considering the electrification of private cars as a top priority, a sustainable mobility transition with multimodal solutions based on stronger public transport and well-integrated, complementary shared and on-demand services should be fostered. Mobility will be more efficient (less congestion), and society will benefit from fewer negative externalities in moving around thanks to lower dependence on cars.

To contribute to the discussion on how to implement a mobility transition, this paper focuses on **two specific policy considerations**: 1) taking into account the relevance of different modes in different urban contexts; and 2) thinking about a strategy for vehicles as part of the global energy transition.

CONSIDERATION 1: THE RIGHT MODE AT THE RIGHT PLACE FOR THE RIGHT NEEDS

With regard to a mobility policy, one needs to recognise the high complexity and diversity of expectations regarding travel experience – partially resulting from post COVID lifestyles (*What does 'new normal mobility' look like?*). First, there is a wide range of mobility patterns. Low density and multidirectional trips are increasing, people travel outside the main public transport service hours and in a desynchronised manner, and trip distance can vary significantly, although short distances are often part of the daily commute and for predictable commuters. Second, higher expectations regarding the quality of the public transport travel experience and requests to meet special needs (due to physical needs, gender, commodity transport, etc.) have been strongly expressed in the wake of the pandemic.

To meet existing and future mobility needs in a smart and effective manner, we need to look at different urban typologies and specificities to prioritise the right mobility solutions. There are many contexts in which it is worse to provide cars with more space at the expense of other

transport modes and activities. Effective solutions serving the dual purpose of good mobility and high-quality city life are required.

This should encourage a reflection on the appropriateness of different modes vis-à-vis different urban contexts. In other words, what priority should be given to different transport modes on our roads in order to best meet different mobility needs in different geographic contexts? We have distinguished three typologies of places and have proposed corresponding mobility solutions in the following sections.

CENTRAL AND HIGH-DENSITY AREAS

In high-density areas and city centres, PTAs should not promote the use of cars but, rather, better collective and shared mobility systems. With an attractive environment for work and leisure and a certain level of density and concentration of equipment, city centres are often among the most congested areas; **reducing congestion is key to enhancing freedom of movement and expanding accessibility to the many different urban functions.**

- It is important to prioritise not only public transport over cars, but also walking, cycling, and shared transport modes to ensure the most space-efficient solutions for moving people around.
- We need to consider constraints on private cars where they degrade the operational conditions of buses and public transport or hinder the movement, comfort, and safety of pedestrians, cyclists, or any other essential traffic, including utility and delivery vehicles and emergency vehicles, among others.
- We should consider solutions to promote successful coexistence of different transport modes, specifically pedestrians, two-wheelers, buses, and public transport vehicles, as well as other vehicles with the purpose not of transporting people but rather serving the city and its inhabitants in other ways.

SUBURBAN AND LOWER-DENSITY AREAS

In suburban or periurban areas, where population and urban densities are lower, equipment, shops, and services are more dispersed, and congestion might be less problematic, modal priorities may be approached differently.

- For trips from suburban areas to dense downtown areas or urban centres (where equipment and services are concentrated), high-capacity public transport (rail, light rail, bus rapid transit (BRT), etc.) complemented by alternative services should be prioritised. This covers the development of complementary last-mile

services, including a bundle of transport services such as on-demand, shared, or modal alternatives to private cars to get to the transport hub. Specific on-road infrastructure such as dedicated bus, carpool, and cycling lanes should be considered.

- To meet local mobility needs in these low-density areas, PTAs should consider providing alternatives to private cars, both in terms of services (e.g. transport on demand (TOD) or car-sharing) and infrastructure for pedestrians, two-wheelers, regular public transport services, and shared or pooled four-wheelers, as well as on-demand services. This would enable households and companies, among others, to reduce their need to have more than one vehicle.



RURAL AREAS

In rural areas, density is lower, and settlements and facilities are more scattered. There can be shorter-term wins in encouraging fewer cars per family, although not necessarily none in certain environments, and proposing value-for-public-money services to complement cars. There are specific situations that necessitate motorised transport modes for low, multidirectional, and multitemporal trip volumes, except for short distance trips using alternative solutions (e.g. e-bikes or walking).

Table 2: Key elements when redesigning public transport networks in medium- and low-density areas. Source UITP

GEOGRAPHIC LEVEL	SERVICE PROVISION LEVEL	GOVERNANCE LEVEL
Between urban and rural settlements	Core train and bus network	State, region or province
Between rural settlements	Feeder/branch networks	Region
Within a municipality with dispersed settlements	Local tailor-made services for first/last-mile travel	Municipalities

- Rural areas could benefit from inter-metropolitan rail or road networks. **The last mile and park and ride solutions, combined with these public transport services,** would be one way for public transport to serve these low-density areas where it cannot reach a high density offer. The development of specific infrastructure for two-wheelers should also be considered in rural areas.
- **Alternatives to car ownership,** e.g. infrastructure development for walking, cycling, shared services, or **mobility hubs,** could be promoted.
- Special services for community members with specific travel needs (e.g. no access to a car or no driving ability) and/or for specific trips could be developed.

POLICY TOOLS

To support the implementation of the proposed approach, policy tools have been described in the **UITP Better Mobility Playbook**. These tools may limit space for movement and parking or impose fees for the movement and/or parking of vehicles, along with the application of time limits. Actions could also include reaching out to companies, employers, and traffic generators, with measures favouring the use of public transport and complementary transport modes and supporting environmentally-friendly approaches. However, to ensure societal acceptability of changes that restrict car use, effective communication and strong alternatives need to be ensured, provided they present good value for money. Showcasing the public benefits of this approach may also contribute to the acceptability of these policies.

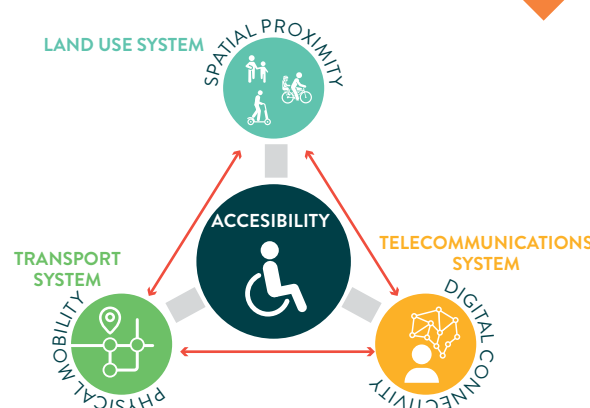
CASE STUDIES

The following case studies present examples of policy actions that are contributing to a sustainable mobility transition.

CAPE TOWN - AN INCREMENTAL APPROACH TO URBAN MOBILITY PLANNING

The Cape Town approach to urban mobility focuses on improving “accessibility”. What does this imply for the city’s approach to urban mobility?

The city is committed to reducing the time residents spend travelling every day through targeted road capacity improvements and interventions that reduce the need to travel at all or during peak times during the day.



Incremental Approach · Improve per aspect

Corridor Approach	Safety	Capacity	Speed	Cost (e.g. change to focus/metrp-wide)	Experience	etc..
Corridor 1 e.g. Full BRT + Feeder implemented						
Corridor 2 e.g. Infrastructure, improvements						
Corridor 3 Improve per corridor e.g. Safety Intervention						
Corridor 4						
Corridor 5 e.g. speed & capacity Improvements e.g. segment of dedicated PT lane						
Corridor 6 e.g. capacity improvement (larger vehicles)						

BARCELONA – THE T-VERDA CARD: A FREE PUBLIC TRANSPORT PASS AGAINST A SCRAPPED CAR

Citizens in the Barcelona province who have de-commissioned and scrapped a vehicle (car or motorcycle) without an environmental label and do not intend to buy another one in the next three years can benefit from the T-verda card scheme.

- The T-verda card provides free and unlimited public transport trips for 3 years (renewed annually if requirements are still valid).
- It can be used on integrated public transport services (Bus Metropolità, TMB, TRAM, Rodalies, and FGC) in fare zones 1-6 of the integrated fare system in Barcelona province.
- The T-verda card is a personal and non-transferable ticket, with a name and ID card that must be validated on each journey.
- It is free for the beneficiary and is delivered to their home address.

The requirements to become a beneficiary of the T-verda scheme are:

1. Be of legal age (eighteen).
2. Be registered as a resident in Barcelona province (Autoritat del Transport Metropolità (ATM) territorial scope).
3. That they have scrapped a vehicle they own, and that they undertake to not acquire another one during the period of validity of the T-verda card. Only vehicles scrapped in the six months prior to the application for this transport ticket and in which the municipality appearing on the vehicle's registration certificate is within the territorial area of the Barcelona province are valid.
4. That they have owned the scrapped vehicle for at least the last six months prior to scrapping.
5. That they have not purchased any new vehicle in the six months prior to the date of scrapping of the vehicle.
6. The vehicle owned by the applicant must belong to one of the following categories:
 - Diesel passenger cars (M1) up to EUR 3 (registered before 2006, without DGT label).

- Gasoline (M1) or gas passenger cars up to EUR 2 (registered before 2000, no DGT label).

- Motorbike type pre-EUR or EUR 1 (mopeds registered before 17/06/2002 and motorbikes registered before 1/07/2004).

The management of this environmental public transport ticket relies on Area metropolitana de Barcelona (AMB) for the 36 metropolitan municipalities and ATM for the rest of cities within the Barcelona province.

Since August 2017, when the T-verda scheme was first launched, 15.301 people in the Barcelona metropolitan area have benefitted from this environmental policy, mainly residents of Barcelona city (63%). 37,5% of the beneficiaries are over 60 years old, 26,3% are 50-59, 21,4% are 40-49, and 14,8% are under 30.

As of October 2023, 13.032 cars (85%) and 2.262 motorcycles and mopeds (15%) have been scrapped. The main fuel type they used was petrol (65%), and more than 55% of them had first been registered over twenty years ago.





LONDON – A TARGETED ELECTRIFICATION STRATEGY

A statutory transport strategy called the 2018 Mayor's Transport Strategy was outlined for London. It covers three principal policy areas - healthy streets and people, good public transport, and new homes and jobs. The different sections are intentionally linked; the way to encourage healthier streets and more active travel is to provide high-quality public transport, which will encourage more people to live and work in a certain place, and so on.

The strategy aims for a 10-15% reduction in total traffic by 2041 against 2016 levels. At the same time, it notes the value of essential service traffic and that tools such as taxis, private car hire, and car clubs can reduce the need for people to own a car.

Part of this strategy focuses on electrification of different types of vehicles:

1. Ensure public transport, which is inherently better for the environment, is high quality.
2. Decarbonise public transport (PT) by converting the rail system to net zero emissions and making all buses zero-emission by 2034 (2030 if funding allows).
3. Ensure zero-emission vehicles are the best choices for those needing a car or van, especially high-usage vehicles such as taxis/private car hire. For example, all new taxis licensed have to be zero-emission capable.

To implement this electrification plan, Transport for London (TfL) is rolling out rapid charging points in locations best suited to these vehicles:

- Locations have been selected to allow more essential and high mileage road users - such as commercial vehicles - to make the switch to zero emissions. The charging infrastructure will be placed in parking bays near key routes used for essential road journeys typically made by high mileage, commercial users, including taxis and freight.
- The charging bays will be rolled out across the south of the capital by autumn 2024, with more than 60 charging points across other parts of London to follow, including 51 points for use by taxis.
- These public charging bays are the latest addition to London's growing EV charging network of nearly 13,000 charging points.

The authorities will unlock land owned by TfL and other members of the Greater London Authority, including the London Fire Brigade, London Ambulance Service, and Metropolitan Police, as well partners in the National Health Service (NHS), to increase the density of the rapid charging network across the city.



BUDAPEST - A MULTIMODAL APP WITH LAST MILE SERVICE TO COVER LOW DENSITY AREAS DEVELOPED BY BKK

As part of its mobility strategy, Budapest Közlekedési Központ (BKK) aims to increase the share of public transport by 3% within a few years. This can be achieved through a combination of fleet renewal, purchase of more attractive vehicles, push measures—somewhat limited by governmental laws and policies—, and further expansion of the existing public transport network.

BKK has begun modelling an extensive range of network development possibilities to see how much they could contribute towards this goal. The goal is to offer a combined mobility package that provides attractive mobility services for all mobility needs, closely matching the travel time, availability, reliability, accessibility, and affordability of private cars. When these conditions are met, it is probably not necessary to use a private car, which should be reflected in the relevant policy measures.

The reliability of the mobility package can be increased through physical accessibility-related measures. This would even cover public transport, in addition to other mobility package elements (such as shared mobility options) that might be relevant in terms of affordability.

BKK aims to become a mobility-as-a-service provider. They have launched an application called Budapest Go that integrates journey planning and mobile ticketing and provides information about traffic changes, but there are still some other features under development, such as integrating more mobility providers into the app.

As of 2023, BKK has installed almost 700 micro-mobility points with 150-metre density in the city centre, where shared scooters and bikes can be parked, and they plan to install more in the coming years. In integrating shared mobility into the city mobility service offerings, BKK aims to establish the necessary physical infrastructure and adapt the regulatory framework to reflect the shared mobility boom that occurred after the existing regulations were put into effect.

BUURTBUS - AN ON-DEMAND SERVICE FOR LOW-DENSITY AREAS IN THE NETHERLANDS

Buurtbus is a form of public transport that was launched in 1977 in the Netherlands in sparsely populated areas near large cities, as a feeder service to major public transport routes. These services were introduced to replace traditional public transport services. Associations were set up to provide a mobility service, and the public authorities subsidised them. The Northern Province of the Netherlands, for example, has 10 Buurtbus associations, with hundreds of volunteers providing a service on 11 bus routes with 19 minibuses, from early morning until late night Monday to Saturday. There is no need for users to make a reservation. The routes have planned stops, but buses can also stop on request. The fare is the same as that of conventional public transport, and the season ticket works on the Buurtbus, except for on-board sales, which are not possible. Timetables are regularly adapted in conjunction with regular line operators to ensure connections. Buurtbus services are integrated into the public transport operator's passenger information system, and information and ticketing are provided via the mobile application and conventional ticketing systems for regular public transport lines. To keep reasonable costs, the service is operated by volunteer drivers in 8-seater minibuses, so no special driving licence is required. The purchase and maintenance of the vehicles is managed by the organising authority, which contracts with an operator who supports the volunteers (training, coordination with the timetables of the strong and regular lines, etc.). Each volunteer drives 1-2 times a week, with 3-4 hours of driving on each round. Sometimes, they drive every 15 days, which explains why so many volunteers are needed. Recruitment campaigns are organised by the associations with the support of the transport authorities. The service is much appreciated, not only for everyday journeys such as home-to-work or home-to-study, but also by those who cannot cover too great a distance by bike or on rainy days. It plays a clear role in social cohesion, with the involvement of retired volunteers, and provides regular public transport services for local communities. In 2018, there were 250 BuurtBus routes in the Netherlands. 90 bus routes, operated by 1,800 volunteers, transported 800,000 people.

SINGAPORE'S FRIENDLY STREET SCHEME

As part of its Land Transport Masterplan 2040 (LTMP2040), the Land Transport Authority (LTA) is studying how Singapore's road infrastructure can better support walking and cycling in neighbourhood centres to create a more liveable and inclusive environment for all.

LTA is exploring possible locations where part of the road can be pedestrianised or converted to create wider footpaths or cycling paths. A pedestrianised street is similar to a very wide footpath, whereby the road is closed off to vehicles and reserved for pedestrians, bicycles, and other personal mobility vehicles. In some instances, where it is safe and feasible to do so, the repurposed roads may also be used for community activities. Features may also be added to prioritise public transport or improve its accessibility and connectivity.

LTA has identified over 60 projects for implementation across Singapore. Each project requires extensive engagement with the local community and stakeholders to generate placemaking ideas to further enliven streets and create a sense of ownership. As of October 2023, there are four completed projects. One of the completed projects, Eng Hoon Street at Tiong Bahru, is shown in the photos.

Before the intervention, Eng Hoon Street, which serves residential homes and shops in the Tiong Bahru neighbourhood, was a two-way road. Following consultations with the community, Eng Hoon Street was permanently pedestrianised in August 2023. Plants and benches were also installed as part of the pedestrianisation works, giving everyone a safer and more pleasant walking experience.



Before: Eng Hoon Street as a two-way road



After: Pedestrianised Eng Hoon Street

To build a more sustainable and inclusive land transport system, LTA will continue to partner with local communities to create more comfortable and secure public spaces by enhancing their walking and cycling experiences. LTA will be introducing a "Friendly Streets" initiative to create more inclusive and people-friendly commutes within neighbourhoods.

Friendly Streets will build on Singapore's existing efforts such as Silver Zones², School Zones³, and road repurposing to make its neighbourhoods more inclusive and conducive for "Walk Cycle Ride" journeys, creating better communities. Each Friendly Streets project may include one or more of these elements. The initiative will target streets near key amenities and transport nodes with high pedestrian flows and have features such as wider and more accessible footpaths, raised pedestrian crossings, and signalised crossings with pedestrian priority⁴.

The Friendly Streets initiative will be piloted in five neighbourhoods across Singapore – Ang Mo Kio, Bukit Batok West, Tampines, Toa Payoh, and West Coast. LTA will work closely with the community in each of the five pilot neighbourhoods and plans to implement this by 2025.

² Silver Zones are areas with enhanced road safety measures that make it safer and more convenient for senior pedestrians to cross the roads. These features include distinctive signs, road features, and markings that help lower vehicle speeds and guide pedestrians to designated crossing points.

³ School Zones are specially demarcated areas fronting a school, with the intent to help create a safer road environment for schoolchildren.

⁴ The Green Man at these crossings will be activated more quickly and give pedestrians more time to cross the road.

In the designs shown, signs, 3D road markings, and coloured road surfaces are used to signal entry into Friendly Streets. There are wider and barrier-free paths and crossings to create a more pleasant environment.

Note: Artist impression details are subject to discussions with the local community.



BENEFITS

The proposed multimodal mobility approach would bring several benefits. First, **PT and associated mobility services are the most efficient solutions in terms of public realm space used to transport as many passengers as possible and are effective solutions to traffic congestion.**

- With regard to **moving people around**, public transport by bus is twice as space-efficient and by rail, four times more space-efficient, than cars. With the optimistic assumption of a 1.3 person occupancy rate in cars, a full standard bus can take more than 40 cars off the road, a full metro, 600 cars, and a highspeed metro (like RER in Paris), 1,500 cars.
- In terms of **space needed to park vehicles**, public transport is also more efficient in terms of the space required for stabling public transport vehicles. Private cars, whether ICE or electric, are parked for 95% of their lifetime and waste that valuable urban resource. Deciding how to prioritise the use of public space is key.

- Today, authorities acknowledge the significance of street life as the motor of society. It benefits the economy and places citizens at the heart of city planning. A car-free public realm will support a vibrant local economy and community.

Second, **PT and associated mobility services contribute to optimised management of land, another precious common good asset** that is fundamental to the success of our metropolises, cities, and villages. Land is one of the most precious resources available for humans. When urban areas grow in area and population, they tend to consume vast amounts of space composed of valuable unbuilt land. This is aggravated in the case of car-based urban development; transport infrastructure dedicated to cars requires a large amount of land at the expense of other activities and/or natural spaces. The development of public transport and complementary services (using existing infrastructure) and, where needed, infrastructure will enable governments to control urban sprawl and reinforce rationale land use.

CONSIDERATION 2: OUTLINING A GLOBAL CLEAN ENERGY TRANSITION STRATEGY

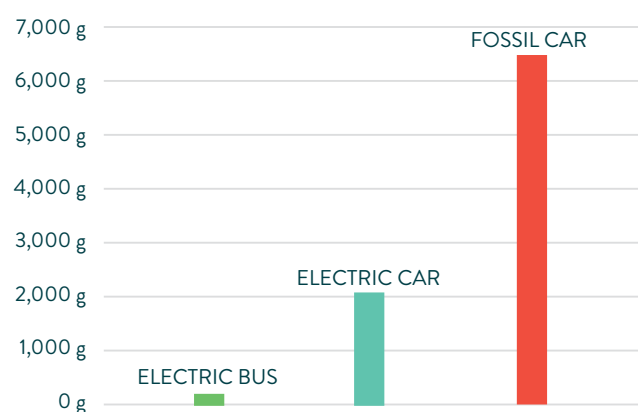
The focus of the second consideration relates to **energy and climate**. Implementing a mobility policy on the one hand and an energy transition and decarbonisation policy on the other are two separate topics.

Once the right mode of transport is being provided at the right place, the energy issue needs to be considered. As illustrated by the chart in Figure 3, Västtrafik, the PTA in Gothenburg, Sweden, calculated that if 50 people travel by electric bus, the associated emissions would be 11 times less than if they travel by electric vehicle and 36 times less than if they travel by fossil fuel vehicle.

The shared nature of public transport and bundling of services, when combined with the characteristics of active modes, give this multimodal alternative to private cars an inherent advantage in terms of energy efficiency and emission intensity.

This contributes to the objective of reducing the energy consumption and carbon emissions of our mobility. Consequently, a mobility policy leading to a modal shift from private cars to public transport and a bundle of services, in a context where funding is limited or technical issues may need to be overcome, significantly contributes to the dual goal of increased energy efficiency and climate change mitigation.

Figure 3 – Relative CO₂ emissions per kilometre for electric buses, EVs, and fossil fuel vehicles. Source: Västtrafik communication campaign



Note: Calculation based on vehicle life cycle (manufacturing and operation) if 50 people travel by electric bus (181g CO₂/km) electric car (50/1.4 x 58g CO₂/km when charging with Swedish electric mix) or fossil car (50/1.4 x 182g CO₂/km). Number of people per car is 1.4 (average from 2021)

each other. Together, they shift trips away from private vehicles to collective modes, resulting in an overall 4% decrease in emissions.

- Investing in infrastructure to prioritise collective and active modes increases the use of these modes. Combining infrastructure investment with improvements to public transport and incentives for shared modes results in an 8% reduction in emissions.
- Improving the efficiency of informal vehicles in emerging economies where they are most used can result in an additional 4% reduction in global CO₂ emissions.

Source: International Transport Forum (ITF/OECD), How Improving Public Transport and Shared Mobility Can Reduce Urban Passenger Carbon Emissions Scenario Results and Policy Findings, 7 March 2023

HOW IMPROVING PUBLIC TRANSPORT AND SHARED MOBILITY CAN REDUCE URBAN PASSENGER CARBON EMISSIONS: SCENARIO RESULTS AND POLICY FINDINGS

A 2023 International Transport Forum (ITF) study looked at projections for urban passenger emissions if governments maintained current policies. It presented two sets of urban passenger transport policy measures – one set for public transport, the other for shared transport modes – and the effects of each. It then looked at the effects of combining the two sets of measures in the Sustainable Urban Transport Supply (SUTS) scenario. Finally, the study presented the Integrated Sustainable Urban Mobility (ISUM) scenario, wherein the SUTS scenario was supplemented with improvement in infrastructure for collective and active modes.

The key conclusions were the following:

- Improving public transport services and operations alone results in a marginal increase in the share of public transport trips.
- Investing in shared modes can shift trips away from private vehicles, but shared modes carry fewer passengers per trip than public transport, making them less productive. Shared-active modes are not attractive for longer trips.
- Policy measures to improve public transport and incentives for shared modes complement

A HOLISTIC APPROACH TO THE ENERGY TRANSITION

In order to be aligned with the United Nations Sustainable Development Goals (SDGs) and global carbon emissions reduction objectives to keep the temperature rise under a certain threshold, PTAs, public transport operators (PTOs), and industry have a responsibility to limit the negative externalities of collective and shared mobility systems.

In effect, these stakeholders should actively commit to and accelerate the energy transition of public transport and complementary modes, which applies to fleets (including buses, boats, shared cars, and trains) and clean energy supply (electricity, hydrogen, or biofuels). By doing so, the sector will improve public transport and complementary services even more.

An energy transition strategy requires a two-tier approach.

- First, the energy transition should consider two main objectives: 1) energy efficiency upgrades and 2) energy conservation & a shift towards the provision and consumption of decarbonised energy sources.
- Second, a full lifecycle assessment of the transport sector from a carbon perspective should be conducted. The sector must consider various aspects related to the energy transition, ranging from vehicle manufacturing and construction of infrastructure to operations. The following chart presents a holistic vision of the key aspects that should be considered.

Figure 5 – Key aspects in lifecycle assessment of public transport. Source: UITP:
The Road to Sustainability: Transition to Renewable Energy in Public Transport



An energy transition strategy should also be aligned with and supported by other strategies and policy tools, including:

- Wider territory transition and adaptation plans, funding, and budgets
- Sustainable Urban Mobility Plans (SUMPs)
- Investment schemes
- Operational contracts and tendering procedures between PTAs and PTOs, with the aim of using them a tool to fund the energy transition.

THE RIGHT TRANSITION FOR THE RIGHT VEHICLES

Energy transition strategies should ensure they apply to the right vehicles and the right mobility purposes. Consequently, the sector should play a leadership role in developing a holistic ground transport energy transition strategy, which should also consider the types of vehicles that should benefit from an energy transition.

In this regard, the following two major priorities have been identified:

- We should consider the most **efficient people-mover vehicles** as a priority. This would cover public transport (rail and road public transport fleets), as well as modes that complement public transport – bicycles, two-wheelers, shared vehicles, scooters, etc.

Different vehicle fleet owners usually look at their own fleets and outline their own individual strategies. Such an approach will probably not lead to a coherent, efficient, cost-effective, or structured energy transition, if one does not consolidate all the needs for energy or all the sources of energy.

- Therefore, we should support the energy transition of **high mileage and usage vehicles** in the sphere of urban freight or public service vehicles (medical, rubbish collection, police, fire and security services, public service utility vehicles, etc.) and should consider including fleets owned by companies or public bodies.

CAPACITY BUILDING, PREPARATION, AND MANAGEMENT OF A COMPLEX PROCESS

Driving a holistic energy transition that includes different types of vehicles would entail engaging in a complex process that requires careful preparation and management. Authorities, operators, and industrial actors in charge of and involved in the transition should be equipped with the right technical skills and consider the potential challenges and risks to ensure a successful energy transition.

Based on discussions among OAC members, four main **points of attention** have been identified for the energy transition. They apply to collective and shared modes, as well as private cars.



Table 3. Points of attention for a public transport energy transition strategy.
Source: Based on a qualitative analysis by OAC.

<p>1 CHOICE OF TECHNOLOGY</p>	<ul style="list-style-type: none"> ➤ Technology selection: Identify how to align energy transition objectives with technologies and solutions and assess the potential of different technological options for your specific objectives and operational requirements. ➤ Industrial production capabilities: Analyse the manufacturing production capabilities for clean vehicles, charging infrastructure, and energy provision, looking at the transport, energy, and construction industries. ➤ Operation and maintenance: Analyse the availability of manufacturers' and operators' operation and maintenance capabilities, ensuring the users and the community benefit from the technologies used in the energy transition. ➤ Energy provision: <ul style="list-style-type: none"> - Assess the origin of the energy and its production. - Assess the energy requirements for each technology. - Assess the reliability of the grid and infrastructure, as well as energy market prices.
<p>2 ENERGY TRANSITION COST AND FUNDING</p>	<ul style="list-style-type: none"> ➤ A “full cost” analysis: <ul style="list-style-type: none"> - Conduct a global cost benefit analysis (CBA), covering capital expenditure (CAPEX) and operational expenditure (OPEX), as well as total cost of ownership (TCO), for different energy transition technologies. - Complete the analysis with a life cycle assessment (LCA) and development of a holistic carbon emission reduction approach. ➤ Funding availability: Ensure enough funding is made available to sustain the energy transition, in terms of both CAPEX and OPEX. Ensure that aggregate carbon is reduced effectively. If funding has to be deviated from covering the cost of running these services, the result will lead to fewer public transport trips and more car trips, which, even if they are EVs, will result in more carbon emissions and more congestion.
<p>3 LAND USE PLANNING AND REGULATION</p>	<ul style="list-style-type: none"> ➤ Strategic land use planning and land availability: Develop a strategic approach that looks at land availability for the specific equipment needed to support the energy transition. This would entail looking at areas to be serviced by public transport and conditions to integrate specific equipment in the development of a compact land-use environment. ➤ Legislative requirements: <ul style="list-style-type: none"> - Consider technical and design requirements to successfully develop equipment, such as depots for clean energy vehicles. - Identify the legislative and administrative processes required to obtain all the planning, environmental, and legal authorisations for equipment that will support the energy transition.
<p>4 PUBLIC REALM SCARCITY AND COMPLEXITY</p>	<ul style="list-style-type: none"> ➤ Space and volume required for equipment: <ul style="list-style-type: none"> - Consider space for overhead or sub-surface service capacity, such as additional power cables or media cables. A careful and selective strategy should be defined, involving private stakeholders, vehicle owners, and owners of residential and non-residential buildings. ➤ Overground on-street space availability (private cars): <ul style="list-style-type: none"> - Assess the impacts of private EV charging infrastructure on the public realm – for example, taking up space that could be used for public transport, active travel modes, and other accessibility requirements (e.g. wheelchairs, baby carriages, etc.), - Assess the impacts of EV weight on roads and streets, which would potentially necessitate infrastructural or safety upgrades.

CONCLUSION

Congestion and the many negative externalities (environmental, social, economic, urban, etc.) that result from a car-dominant mobility system will not disappear by electrifying all private cars; an electric car traffic jam remains a traffic jam!

Rather, we need to transform our mobility systems in a more efficient, just, inclusive, environmentally friendly, cost-effective manner. **We need to facilitate a sustainable mobility transition through mobility strategies and policy actions that promote a multimodal and intermodal lifestyle. This will improve people's accessibility to places and activities.**

By promoting a modal shift away from private cars and towards public transport and associated mobility services, we can make our mobility system more energy-efficient and contribute to climate change mitigation. Strong action by the mobility sector to accelerate its energy transition will significantly contribute to global climate change efforts and represents an opportunity to improve the sector. One key condition of success is that investment be prioritised to move towards healthier and more sustainable mobility.

In order to bring public transport and complementary mobility options to the forefront of sustainable mobility thinking and strategies, we have the following four recommendations:



RECOMMENDATION 1: PROMOTE A HIGH-QUALITY MULTIMODAL AND INTERMODAL MOBILITY SYSTEM

A primary goal for a mobility strategy/policy should be to promote multimodality and enhance intermodality, which covers a well-functioning and widespread public transport system, as well as active modes and shared mobility solutions. It is important to develop and implement measures to further prioritise public transport and all other modes that provide an alternative to private cars.

RECOMMENDATION 2: PRIORITISE THE RIGHT TRANSPORT MODE IN THE RIGHT PLACE AT THE RIGHT TIME

- When implementing mobility strategies, prioritising the right transport mode in the right place and/or at the right time is paramount. We support an approach that grants priority to certain modes and transport options in specific places and times of the day, month, and year: more collective and active mobility in and around dense and central areas, and more shared, on-demand or PT complementary car-free mobility in lower-density areas.
- Such mobility strategies will contribute to sound public realm and land management, by preventing the sector being overtaken by private cars and allowing it to meet useful mobility and other collective and urban life purposes.

RECOMMENDATION 3: IMPLEMENT A PHASED MOBILITY ENERGY TRANSITION BY PRIORITISING AMONG MODES AND CONTEXTS

- Accelerating the effort that the sector is making to implement an energy transition will bring additional benefits. Still, it is key to define priorities in terms of the energy transition, looking at all the different types of vehicles in use.

- An energy transition should adopt a holistic approach and consider what modes should first benefit from an energy transition. Considering people-mover efficiency and the intensity of vehicle usage, the private car goes down to the bottom of the priority list in terms of transport modes that should benefit from an energy transition.

RECOMMENDATION 4: ADOPT A STRONG GOVERNANCE FRAMEWORK

A strong governance framework is needed to support these strategies, with the following required:

- Establish a multilevel governance framework that supports stronger cooperation between local authorities, operators, industry, and national states.
- Enable authorities, with the support of operators and industry, to pioneer, test, and develop policies and tools to better regulate car use (based on criteria such as emissions, size/weight/speed, and parking/public space occupancy).
- Launch a sustainable funding and financing effort to cover the operating costs of a sustainable mobility transition, while simultaneously reducing financial support for privately used and owned cars.



This is an official Policy Brief of UITP, the International Association of Public Transport. UITP represents the interests of key players in the public transport sector. Its membership includes transport authorities, operators, both private and public, in all modes of collective passenger transport, and the industry. UITP addresses the economic, technical, organisation and management aspects of passenger transport, as well as the development of policy for mobility and public transport worldwide.

This Policy Brief was prepared by the Organising Authorities Committee.



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