PTOLEMUS Consulting Group

International trends in urban mobility pricing

Smarter urban mobility pricing: Brussels SmartMove

Webinar organised by the International Road Federation

28th September 2022

The first strategy consulting & research firm entirely focused on geo-connected mobility & automation

Strategy consulting services

- Strategy definition
- Investment assistance
- Procurement strategy
- Innovation management
- Business development
- Project management

Market research services

- Off-the-shelf reports
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- Custom market research

Fields of expertise

Mobility services	Car pooling Car sharing MAAS	Micro-mobility Ride hailing Shared mobility	Smart parking Tax refund
Vehicle services	bCall eCall Fleet telematics SVT / SVR	Tracking VRM In-car Wi-Fi Parking	Navigation Speed cameras Traffic information
Energy transition	BEV EV charging Fuel cards	Fleet electrification Hydrogen	Low Emission Zones Vehicle-to-grid
Usage-based charging	Car As A Service Congestion charging Electronic Toll Collection	Mobility-as-a-Service Road user charging UBI / PAYD	Vehicle rental Vehicle leasing
Vehicle data & analytics	AI CAN-bus Crowd-sourcing	Data protection Driving behaviour OBD	Predictive analytics Remote diagnostics xFCD
Vehicle automation	ADAS Autonomous cars	Autonomous trucks Robo-taxis	Shuttles
Enabling technologies	Positioning (GNSS / WiFi / cellular) M2M / connectivity	Smartphones Sensors Telematics devices	V2X DSRC / RFID ANPR

A member of the IRF, PTOLEMUS has advised many organisations on tolling and road user charging

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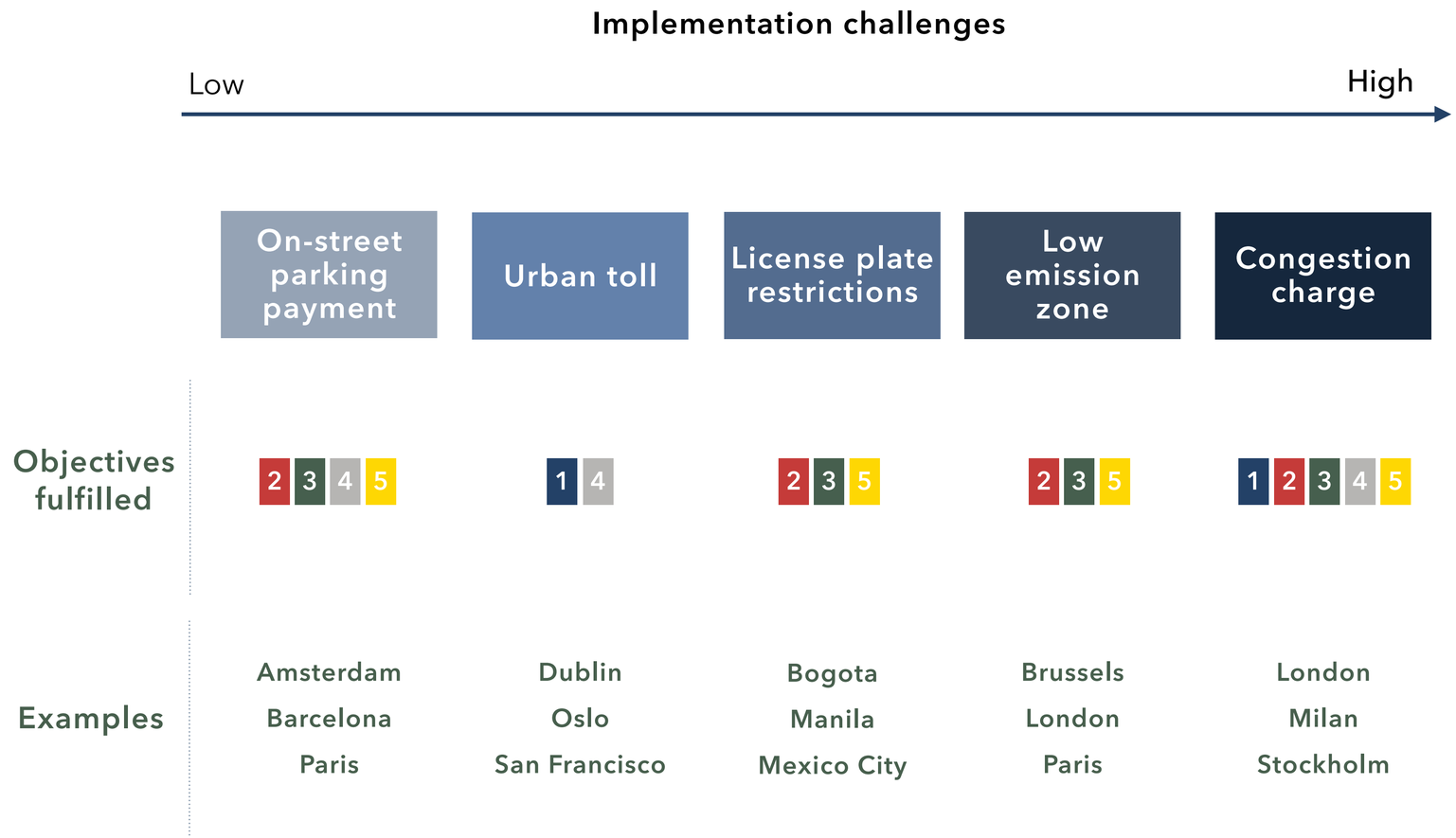
Congestion pricing tackles all objectives, but is more challenging to implement

Objectives of urban mobility pricing

1. Road infrastructure funding
2. Congestion reduction
3. Pollution and noise reduction
4. Public transportation funding
5. Modal shift

Urban mobility taxation options



Source: PTOLEMUS

Urban mobility pricing started in Singapore and has since been implemented in several European cities

A brief history of congestion charging schemes - Launch date by city

1975 — Singapore

7.3 km² (City Centre) and key expressways

Manually operated until 1998

Pay for entrance | **US$0 to US$4**, depending on the entry point **(main area or expressways)**

2003 — London

21 km² (1.3% of Greater London)

Pay for entrance, exit, and intra-area trips

Daily fee **(£15)**

2007 — Stockholm

30 km² (16% of the city surface)

7-month trial in 2006

Pay for entrance and exit | Single passage fee

€0 to €4, with **maximum daily amount of €9 to €13**

2012 — Milan

8 km² (4.5% of the city surface)

Ecopass (2008 - 2012) | Area C (2012 onwards)

Pay for entrance in the area | Single passage fee (**€5**)

2013 — Gothenburg

10 km² and key expressways

Largely inspired by Stockholm model

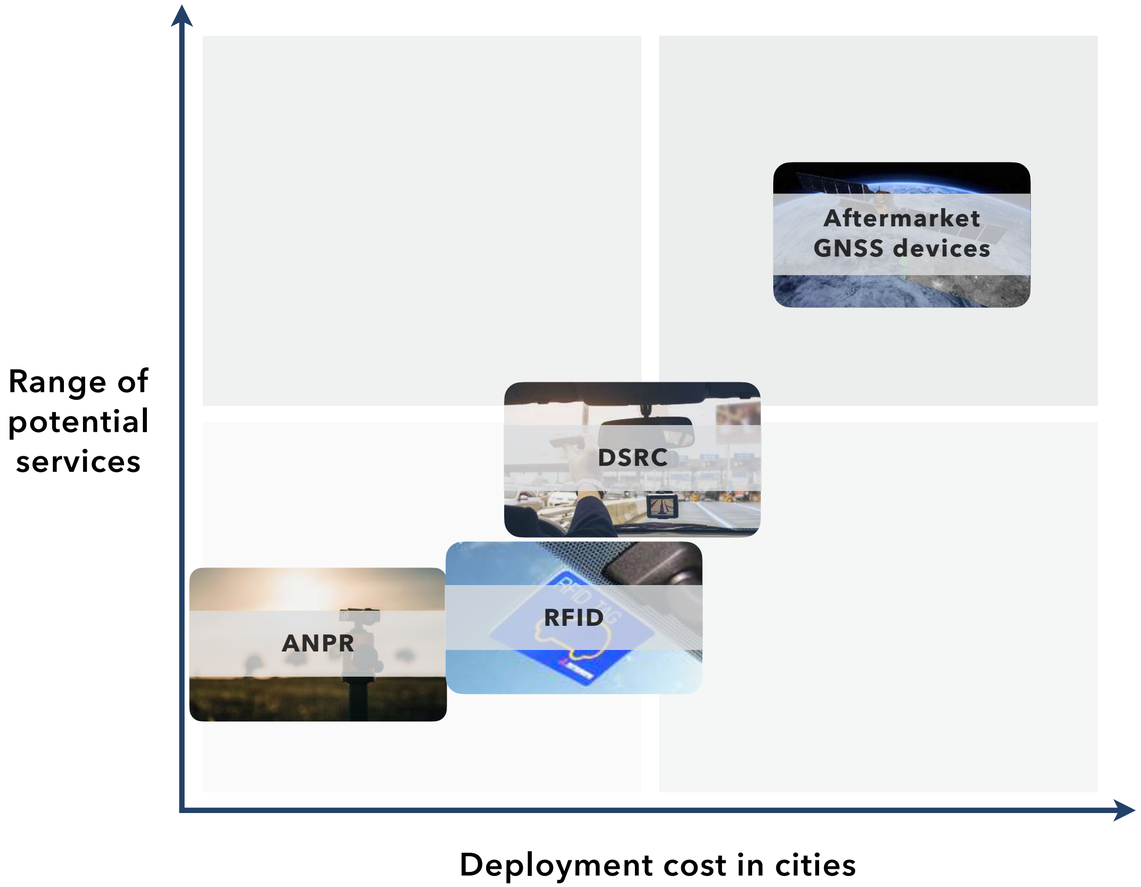
Pay for entrance and exit | Single passage fee

€0 to €2, with **maximum daily amount of €5.50**

Source: PTOLEMUS

ANPR is the most widely used solution today while smartphones and in-vehicle systems are emerging

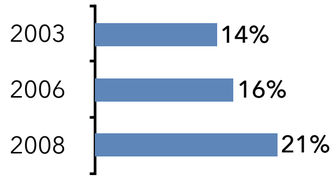
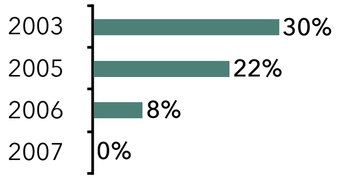
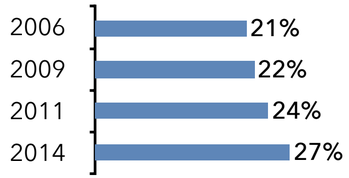
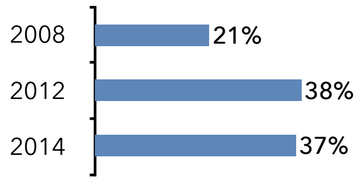
Traditional technologies



Emerging technologies

ANPR = Automatic Number-Plate Recognition; **RFID** = Radio Frequency Identification; **DSRC** = Dedicated Short Range Communication; **GNSS** = Global Navigation Satellite System
Source: PTOLEMUS

London, Stockholm and Milan congestion pricing schemes have had impressive results

	Traffic reduction	Congestion reduction	Pollution	Modal shift	System costs*
London			-13% NOx -15% PM10 -16% CO2 emissions	Ca. **44% decrease of number of people entering** London by cars (2015 vs 2002)	**39% of revenues in 2008** (65% in 2004)
Stockholm		**Congestion reduction has been in line with traffic reduction**	-13% PM10 -13% CO2 emissions	**99% of commuters** renouncing to use car **switched to public transport**	**11% of revenues in 2015** (31% in 2008)
Milan		**28% reduction** in average traffic congestion until 2014	-18% NOx -18% PM10 -35% CO2 emissions	About **12.5% increase of passengers exiting subway stations** inside the area	**65% of revenues in 2014** (46% in 2009)

Note: NOx = Nitrogen Oxydes; PM10 = Particulate matter of diameter 10 micrometers or smaller * Costs for operating the system

Source: Urban road pricing: a comparative study on the experiences of London, Stockholm and Milan, Edoardo Croci; Long-Term Effects of the Swedish Congestion Charges, OECD

A new wave of congestion pricing schemes is coming

	New York City	Los Angeles	Brussels
Envisaged model	**Fixed toll rate** charged to drivers entering the 10 km² area south of 60th St. in Manhattan CBD Seven scenarios proposed **($5 - $23/entry)** Exemption for residents living in Manhattan CBD **earning less than $60,000** Light vehicles toll capped at once per day Trucks toll capped at twice per day	**Fixed toll rate ($4)** charged to drivers entering a 11 km² area of West Los Angeles and Santa Monica 90% discounts for residents 50% discount for low-income drivers	**Per kilometre toll rate** charged to drivers within the whole Brussels metropolitan region Toll rate is a sum of a flat rate of **€1-2** and a variable rate of **8 - 20 cents/km** Heavy vehicles would be exempted, but still subject to Viapass
Political context	The project, proposed by the City and the State has the **support of the Biden's administration** and several city organisations Opposition comes from representatives of the state of New Jersey and is expected from some non-exempted drivers in NYC	There are **supporters and detractors** of the scheme among the city council members	**Strong opposition from parliaments** of the Flanders and Wallonia neighbouring regions
Recent and future developments	The **environmental assessment (EA) has been published in August**, and recommends the application of toll fees of **$6.5 to $13** Next is validation of public comments, and the **Federal Highway Administration decision in January 2023**	A feasibility study was conducted in 2019 and **a pilot programme is expected to be launched by 2025**	**A SmartMove pilot was launched in August**, and a second and bigger phase of the pilot should start soon

Source: PTOLEMUS

Several measures should ideally be combined and communicated to foster public acceptance

	Impact on public acceptance
1. Prioritise congestion reduction over revenue generation Indicators that raising funds for the city is the scheme's primary objective **trigger more opposition in the mind of the public**	Medium
2. Engage an informed public discussion Alleviate public concerns such as **privacy fears**, **tax fatigue**, etc. and communicate about the **health benefits**, **reduction of number of accidents**, **increased funds for public transportation**, etc	High
3. Conduct a trial **Easily implemented when infrastructure is already in place**, such as in the case of a congestion pricing zone overlapping a LEZ	Medium
4. Develop alternative modes Offer more and better alternatives to car trips, such as **car sharing, new public transport lines, parking facilities outside the zone, etc.**	High
5. Handle edge cases proactively **Specific social categories** and **specific trips** can be offered a preferred treatment including **discounts** or **HOV lanes**	High

Source: PTOLEMUS

Various alternatives are available to cities to alleviate potential user privacy concerns

Solutions for users privacy management

Best practices from Singapore

Emerging solution

Prepaid cashcard

Insertion of a prepaid cashcard into the in-vehicle unit to avoid retention of vehicle identification data

Temporary data storage

Retention of number plate identification of offending vehicles no further than the offence is dealt with

Aggregated data collection & use

Commitment to use traffic location data only in an aggregated format

Cryptography

Encryption of user's identity to allow anonymous and unlinkable interaction between the car and the toll system

Source: PTOLEMUS

Mobility pricing schemes are much smarter than vehicle bans but also require significant evangelisation

Mobility pricing

- ★ Offers options to drivers
- ★ Raises funds for cities
- ★ Encourages modal shift
- ★ Can be made distance-based
- ★ Application area can vary overnight with a GNSS system
- ✳ Detrimental effect on rural populations
- ✳ Could be seen as “unfair” by poor citizens

vs

Vehicle interdiction

- ★ Best for the environment
- ★ Encourages modal shift
- ✳ Detrimental effect on rural populations
- ✳ Detrimental to city finances
- ✳ Car use completely impossible including for taxis and restricted mobility persons (sick, old and handicapped inhabitants)
- ✳ Generates driver’s frustration

Ways to reduce the weaknesses of mobility pricing

Emphasise expected benefits and **measure them** during the trial period

Effectively handle edge cases e.g. using targeted exemptions (commercial vehicles, ambulance & firemen, poor inhabitants, etc.)

Improve **public transportation and overall mobility offer** (e.g. with MaaS)

Source: PTOLEMUS - Note: MaaS: Mobility-as-a-Service - Credits: Lorie Shaull

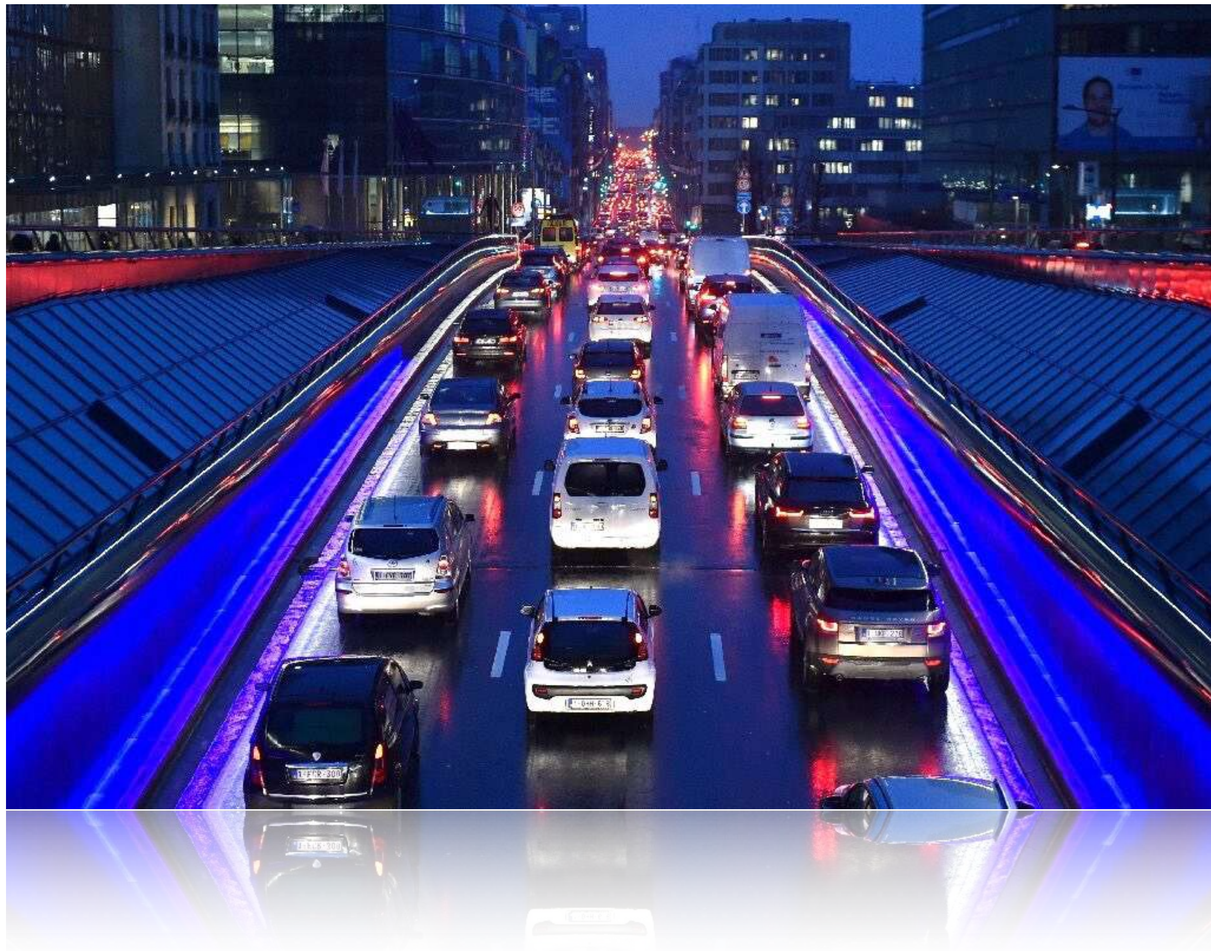
In a high inflation era, new mobility pricing schemes can reduce the acceptance challenge

New mobility pricing schemes can be much smarter

- Flat tariffs can be replaced with **distance-based rates**, using GNSS
- **Charging can vary,** based on time and area, combining mobility pricing with advanced traffic management
- **ANPR cameras can then be restricted to enforcement**, reducing costs
- **Apps** can bring **easy account reload** and **MaaS integration**, which improve citizen's mobility experience

Applicability and tariffs can be flexed depending on local priorities:

- **Target area** can be extended over time
- Certain **vehicle categories** can be exempted (taxis, buses, ambulance, firemen, etc.)
- Preferential tariffs can be applied to **Zero Emission Vehicles**
- Certain **population categories** can be exempted



Source: PTOLEMUS - Note: MaaS: Mobility-as-a-Service

The success of the new mobility pricing wave will be built on a step-by-step approach and a strong support policy

Public acceptance is the biggest challenge thus objectives should be made clear and actions aligned with them

- Traffic reduction or
- Pollution reduction or
- Fund raising

Implementation should be made step-by-step

- **Starting with a trial with measured KPIs**
- **Broadening the applicability** gradually (area, population, time, etc.)
- **Exempting** certain categories of the vehicles and the population

A strong support policy should be implemented

- **An easier mobility experience must be offered** including with a MaaS application, P+R parkings, improved public transport, etc.
- **A communication policy detailing the target benefits to be achieved**
- **A solid enforcement policy** based on a strong legal environment

Source: PTOLEMUS - Note: MaaS: Mobility-as-a-Service, P+R: Park & Ride

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