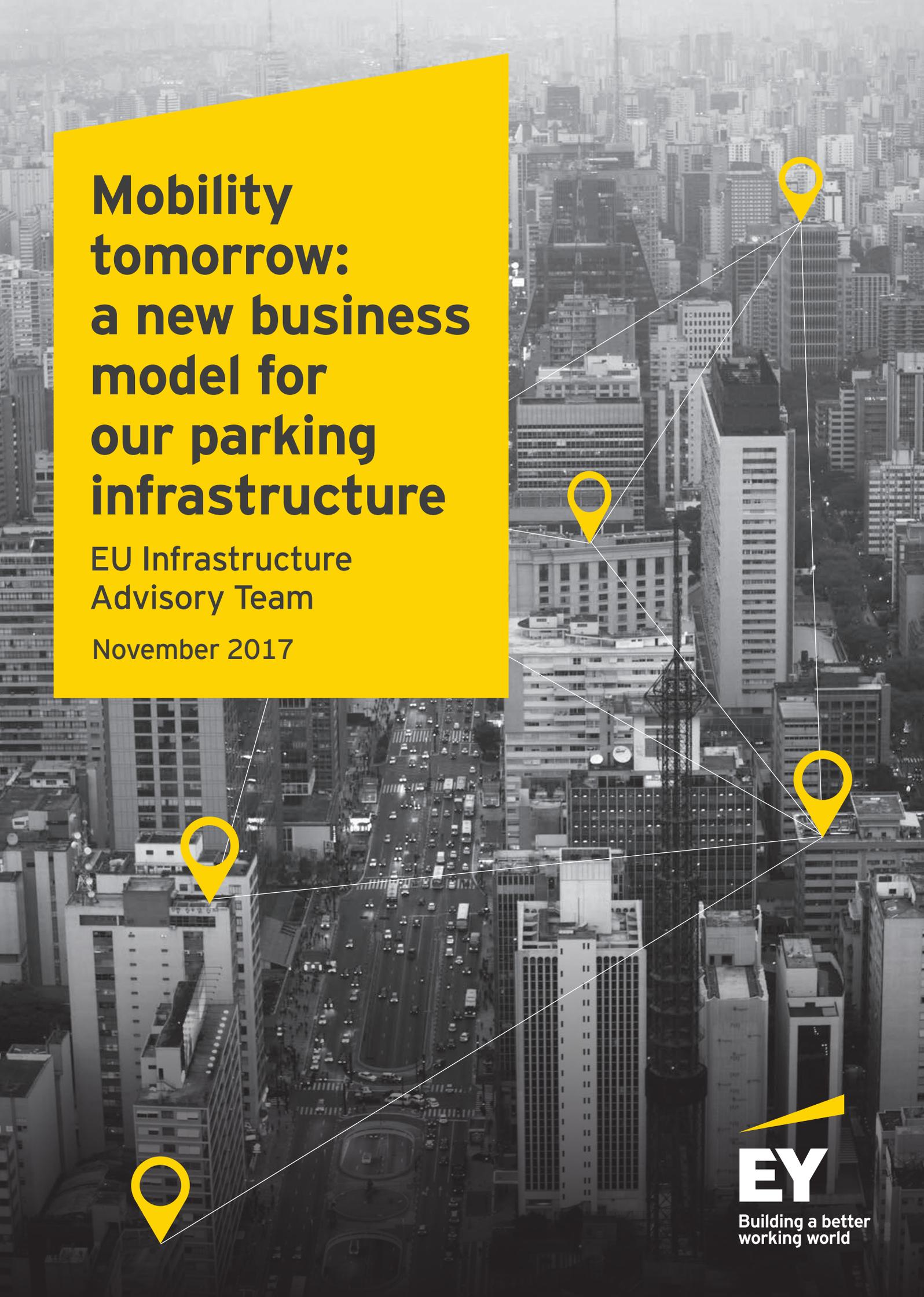


Mobility tomorrow: a new business model for our parking infrastructure

EU Infrastructure
Advisory Team

November 2017



EY

Building a better
working world

Cities today: a congested mobility

Europe has around 800 cities with over 50.000 inhabitants, turning into hubs of growth and innovation as they continuously attract new investment, people and services.

If seen from above, our cities are a restless world in motion: cars getting from A to B, trains taking commuters to work, bicycles and motorcycles snipping through traffic, pedestrians hurrying on sidewalks, taxis waiting for their next passenger, trucks carrying away waste or delivering goods ...

Whether it is to reach the office, explore the surroundings or visit a relative, **mobility is the lifeblood** of our cities and essential for the quality of our urban lives.

Our desire and increasing need for mobility brings, however, some consequences, as cities are more and more noisy, congested and polluted.

In 2013 already, nine out of ten Europeans declared they often got stuck in traffic when travelling within cities; 28 European cities were in the Top 2016 world most congested ones¹, with daily congestion rates over 25% (increase in the overall travel time compared to the free flow situation)². Not only congestion increases the impact of GHG emissions, but it leads to waste of fuel and time, with the European Commission estimating that costs at around 1% of the EU's GDP.

The European Commission has been addressing the issue of urban mobility by setting targets for GHG reduction and use of alternative low-emission and renewable fuels. European targets aim to frame future mobility as more sustainable, less polluting and supported by an alternative fuel infrastructure and long-term investment.

Sources:

¹ According to Tom Tom Traffic Index 2016

² According to the Eurobarometer 406 Attitudes of Europeans towards urban mobility, Eurostat



How is the EC framing the future of mobility?

More sustainable

Proposed revision of Directive 2009/28 on Renewable Energy

Currently in negotiations

- ▶ The target for 10% renewable energy in the transportation sector is removed after 2020.
- ▶ Union-wide target of 27% renewable energy share in total gross final consumption of all sectors by 2030.
- ▶ Fuel suppliers to provide a share of low-emission and renewable fuels at least equal to 1.5% in 2021 and 6.8% in 2030.

Less polluting

Directive 2009/33 on Clean Vehicles

Sets technical specifications to include energy and environmental impacts in the purchasing decision

Directive 2009/30 on Fuel Quality

6% GHG reduction per unit of energy supplied into EU fuel mix for fuel suppliers by 2020, overall target of 10% reduction

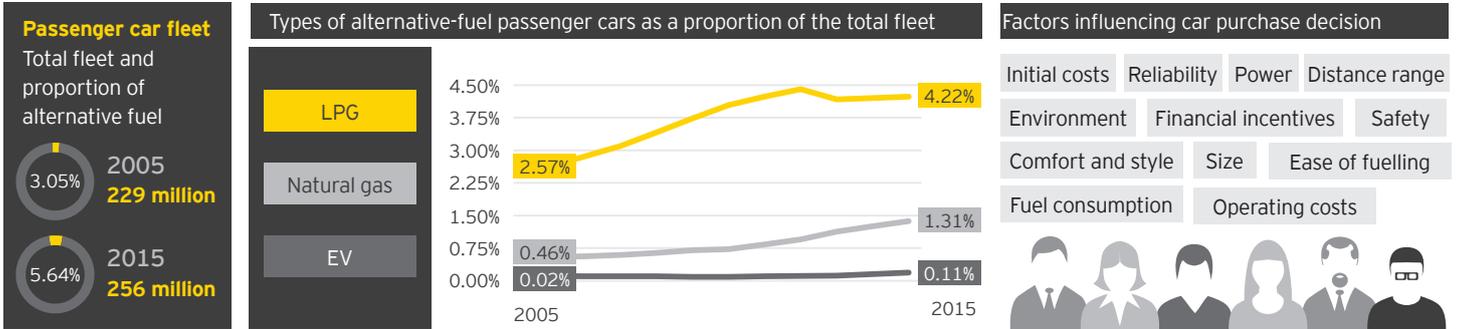
Supported by infrastructure and investment

Directive 2014/94 on the Deployment of Alternative Fuels Infrastructures

Requirement for alternative fuel refuelling infrastructure and sustainable long-term investment and sector specific coverage targets to be achieved.

- Electricity**
By end 2020: appropriate number of publically accessible points in urban/suburban and other densely populated areas
By end 2025: Ports of the TEN-T core network and other ports at shore-side
- CNG**
By end 2020: appropriate number of publically accessible points in urban/suburban and other densely populated areas
By end 2025: Appropriate number of points along the TEN-T core network
- LNG**
By end 2025: at maritime ports of the TEN-T core network and appropriate number of points for HDV along the TEN-T core network.
By end 2030: at inland ports of the TEN-T core network
- Hydrogen**
By end 2025: appropriate number of points in the Member States who choose to develop it

Current trends influencing urban mobility



Source: European Environment Agency

This ambition from the EU has led to the development of **alternative-fuel vehicles** (LPG, NG, EV) and the emergence of **new consumption trends** in the passenger car market.

The number of LPG passenger cars almost doubled between 2005 and 2015, reaching 10 million vehicles in 2015, 4.22% of the total passenger car fleet. The number of natural gas (NG) passenger cars almost tripled between 2005 and 2015. Electric cars are slowly penetrating the EU market and include battery electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV) and electric vehicles with a range extender (REEV). Rapid developments in battery technology are expected to remove current barriers such as high cost, efficiency and range anxiety, thus driving EV adoption.

However, if more sustainable fleet solutions can help reduce pollution, they don't solve the problem of congestion.

Green congestion is still congestion

The way people move around cities must therefore be rethought, and future mobility is likely to be very different from what most European cities experience today. Numerous trends such as digital innovation, the Internet of Things and energy decentralization are already influencing urban mobility and disrupting the paradigm of car ownership, thus creating new incentives and a new model for the sharing economy.

Think of how rapidly ride-hailing services through smartphone application have grown over the past few years to be able to compete not only with traditional car-sharing and car-pooling services, but also with private vehicle ownership.

The next generation of car sharing models will be enabled by **blockchain technology**, facilitating peer-to-peer interactions between owners and making car 'ownership' a tradeable commodity.



In parallel, the purchase and maintenance costs of new vehicles will increase due to improved in-vehicle technology, making it more expensive to own a personal one. This will support a shift of the ownership paradigm by paving the way to **'fractional ownership'** and enabling more people to access vehicles they may not have had the opportunity to before.

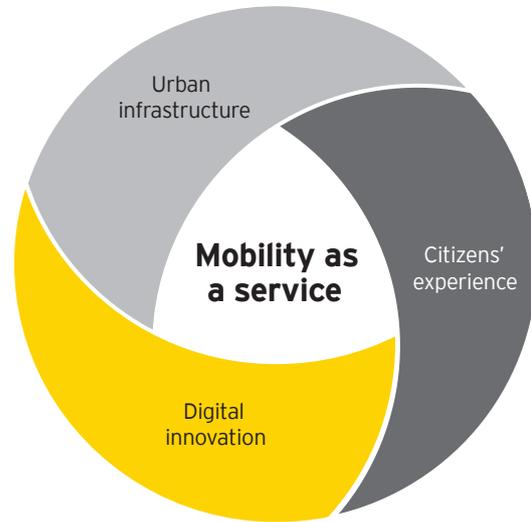
EY has recently filed a patent application for a blockchain enabled fractional car ownership platform, currently being tested in Singapore and Hong Kong.

The need for a shared mobility service platform

Mobility has thus to be thought no longer as an individual citizen concern, but rather as part of a common city framework, where its growing demand is supported by **shared platforms** providing people with the most suitable options in terms of time and itineraries, while being at the same time safe and sustainable.

Mobility will become a service offered to citizens, who will be at the heart of this revolution and will be adopting new technologies and services. They will have access to a digital platform enabling them to choose the transport mode better responding to their day-to-day experience, with the possibility to use a car every time they need without bearing the operation and maintenance burden.

Digital innovation will be a crucial enabler, as the Internet of Things will change our relationship with cars and mobility: greater connectivity will foster the interaction between mobility demand and supply, while big data and analytics will offer deeper insights on the customer experience, making it easier to understand evolving mobility patterns.



Mobility as a service that anyone can choose on a digital platform

There already exist some smart initiatives aimed to anticipate, design and deploy sustainable solutions and accelerate the transition to clean vehicles and new forms of mobility. These can be applications that offers their customers shared mobility options and facilitate urban travellers in finding a free parking space. Some use digital technology and multi-modal information services (MIS) to allow for electronic payment, contactless ticketing and real-time information systems.

Parking operators

Vinci upgraded several supermarket parking facilities with EV charging points.



Q-park app-controlled e-bike service "E-Bike-To-Go" available in their infrastructure to offer mobility alternatives.



Interparking offers access to DriveNow shared fleet of electric vehicles in several cities.



ICT system developers



Google Maps new feature helps finding free parking spaces.



Siemens Integrated Smart Parking Solution collects parking data and assess in real-time space usage to offer new traffic management options.



Park Indigo is a smartphone application to locate and access over 4000 parking spaces.

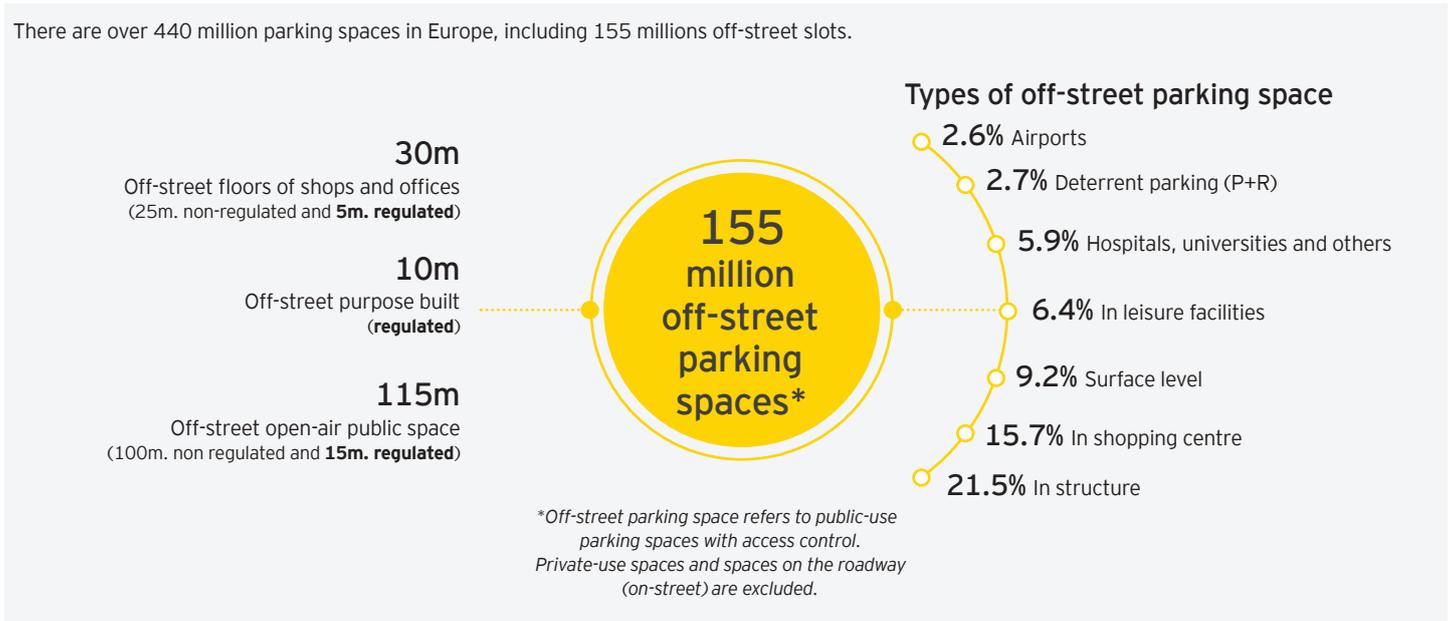
If we imagine our future mobility as a service to be chosen on a digital platform, **what kind of urban infrastructure could support such shift?** How can the existing infrastructure be adapted and/or transformed to best serve the future mobility?

At EY we have been considering whether new infrastructure would be required to address the growing demand for mobility and its adaptation to new digital and technological needs. We believe the key to future mobility is already in the hands of our cities and may lay in their parking infrastructure.

Building on our existing parking infrastructure ...



Sources: *EU car parking market*, Q-Park, 2014 and *Parking facilities in Europe - a market with space for investors*, Catella, 2016



The current trends are towards a reduced number of private-owned cars, with cities increasingly banning cars to solve congestion, pollution and noise issues. Oslo plans to permanently ban all cars from its city centre by 2019, for instance.

In light of this evolving urban mobility landscape, the existing parking infrastructure will need to be adapted and its use rethought.

... What if we leveraged on the existing parking infrastructure, adapting to future mobility needs and transforming it into a multi-service platform, that everyone can access through his or her mobile phone?

... to create a shared mobility platform

Imagine if ...

Our future cities will be served by an appropriate number of parking infrastructure, smartly located across the city, so as to enable the most access to mobility solutions for local residents, businesses, commuters, and tourists.

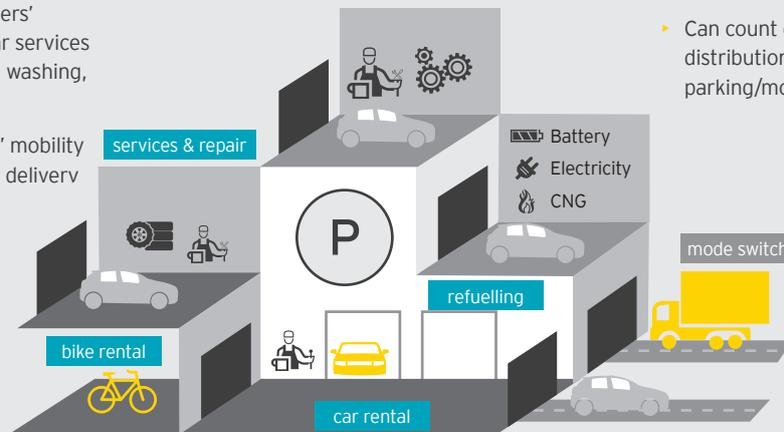
And all of that accessible by a simple touch on your mobile phone?



Integrating the existing parking infrastructure with new mobility services offers the opportunity to develop a wide Mobility 3.0 shared platform.

Parking infrastructure

- ▶ Are used as base stations for public and private car fleets
- ▶ Provide mobility solutions at users' convenience as well as other car services including recharging, repairing, washing, etc. while stationing
- ▶ Are strategically covering cities' mobility demand while offering last mile delivery solutions for freights



Heavy-duty vehicles

- ▶ Are mainly gas-powered
- ▶ Produce less air pollution and noise
- ▶ Can count on a widespread gas distribution network at well-located parking/modal-switch stations

Users

Get access to mobility services' networks through their smartphones to select, book, pay, operate and share the best available solution to their mobility needs.



Several mobility options available

E-bikes, Motorcycles, EV, access to public transport with intermodal eTicketing, etc.

Cars

- ▶ Mainly E-powered, are mobile batteries that once plugged-in can help balance local grid by means of micro-charges/discharges
- ▶ Communicate and interact with users, maintenance services and signalling systems for a full autonomy
- ▶ Are available to and affordable for everyone thanks to smart leasing solutions

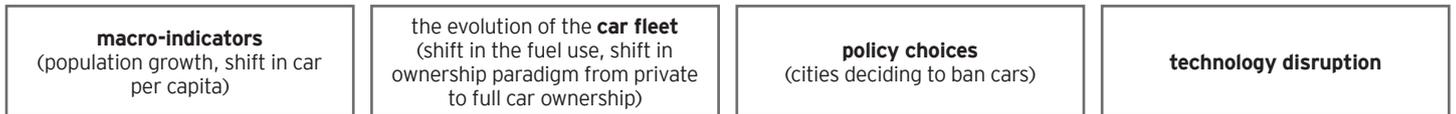
Are there more business models to explore for the future of parking infrastructure?

What would be the actual effect on congestion?

... and new/transformed business models

Our methodology

EY has built a tool for policy makers and parking operators to assess and guide their parking management decisions. More specifically, the EY parking impact model allows to showcase the impact on the parking business model based on different indicators:

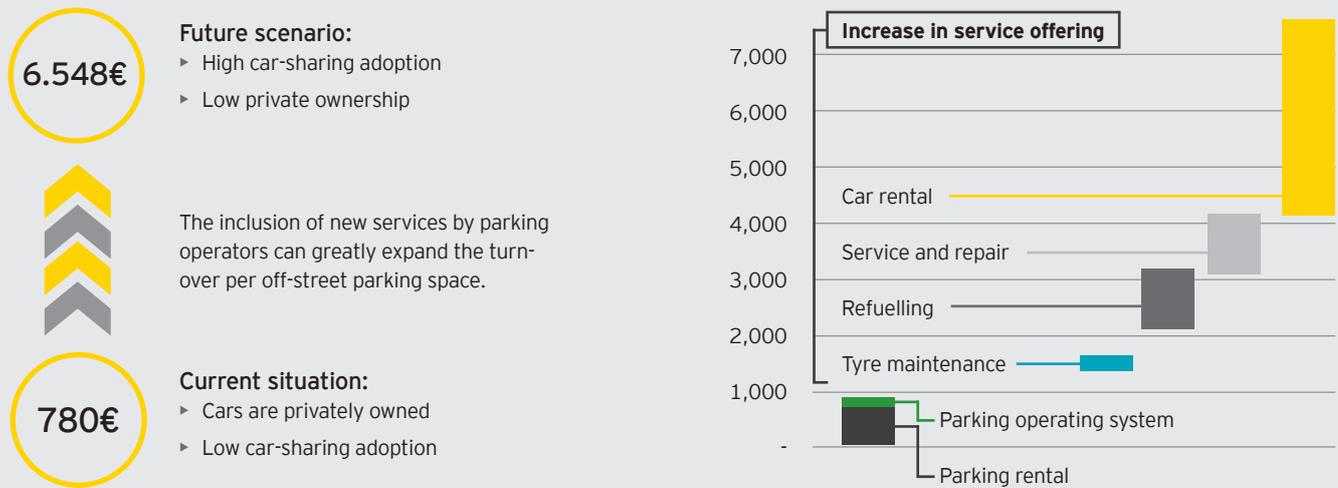


EY has modelled the parking ecosystem and demonstrate how the whole picture could evolve up to 2040. The EY parking impact model can be used as a starting point in different studies: e.g. city master plans, parking feasibility studies, and parking operational models.

Our insights

One specific feature of the EY parking impact model is that it clearly depicts how the parking (revenue) model can alter from shifting from the traditional way of car owning towards a parking built around a model of car sharing.

EY's insight on the impact on the parking revenue model



EY's insight on the impact on the demand and supply side of the parking eco-system



Our contact details



Tristan Dhondt

Partner

tristan.dhondt@be.ey.com



Antonio de Rose

Director, Infrastructure Advisory

antonio.de.rose@be.ey.com



Albert Coigné

Director, Real Estate

albert.coigne@be.ey.com



Marina Buna

Manager, Energy Sector

marina.buna@be.ey.com



Steven de Schepper

Manager, Valuation and Modelling

steven.de.schepper@be.ey.com



Giacomo Potenza

Senior, Transport Sector

giacomo.potenza@be.ey.com



Filippos Anagnostopoulos

Senior, Energy Sector

filippos.anagnostopoulos@be.ey.com



Yoann Clouet

Consultant

yoann.clouet@be.ey.com

EY | Assurance | Tax | Transactions | Advisory

About EY

EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. We develop outstanding leaders who team to deliver on our promises to all of our stakeholders. In so doing, we play a critical role in building a better working world for our people, for our clients and for our communities.

EY refers to the global organization and/or one or more of the member firms of Ernst & Young Global Limited, each of which is a separate legal entity. Ernst & Young Global Limited, a UK company limited by guarantee, does not provide services to clients. For more information about our organization, please visit ey.com.

© 2017 EYGM Limited.

All Rights Reserved.

ED None



In line with EY's commitment to minimize its impact on the environment, this document has been printed on paper with a high recycled content.

This material has been prepared for general informational purposes only and is not intended to be relied upon as accounting, tax, or other professional advice. Please refer to your advisors for specific advice.

ey.com/be