



A vision for Sustainable Urban Mobility in 2030:  
Trends, Opportunities and Challenges  
José Luis Irigoyen

February 20, 2019

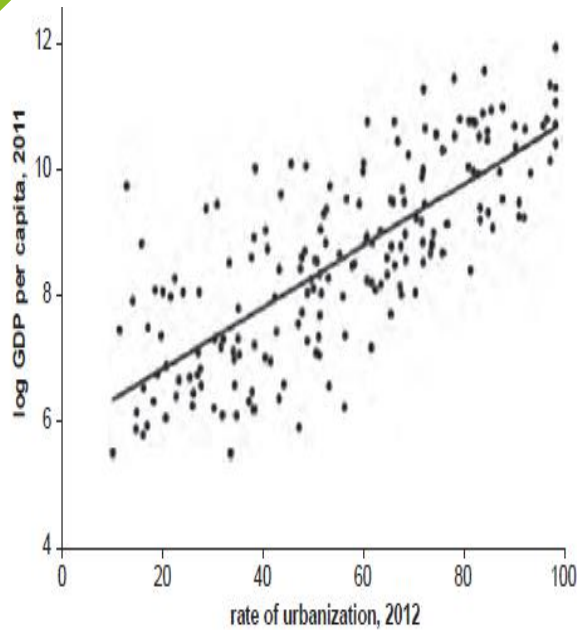
1. Why cities? What are the forces sweeping the urban mobility landscape?
2. Will the “New Mobility” deliver “Sustainable Urban Mobility” for All?
3. The Way Forward. Who will lead the transformation?



# CITIES ARE DRIVERS OF ECONOMIC GROWTH AND GLOBAL CLIMATE CHANGE, ALSO HOME TO THE POOR

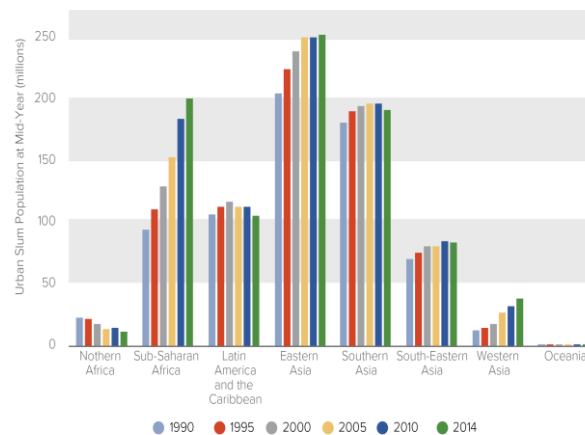
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## Urbanization and GDP per capita

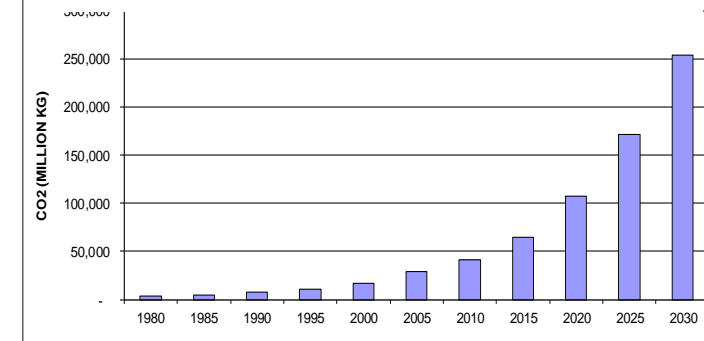


Source: World Bank. 189 countries. The horizontal axis urbanization rate is the percentage share of population living in cities in 2012. The vertical axis represents the natural log of GDP per capita in 2011 U.S. dollar.

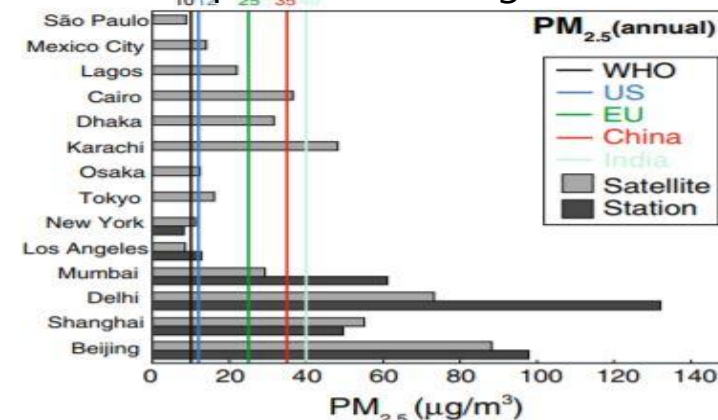
## Urban Slum Population 1990-2014



## CO<sub>2</sub> Emissions from Urban Transport 1990-2030 (WRI-WB, 2007)



## Air pollution in megacities



## Spur Economic Growth

- Cities generate 80% of global output (500 cities account for 60% of global income growth)
- Growing welfare costs of traffic congestion

## Bring Inclusive Development

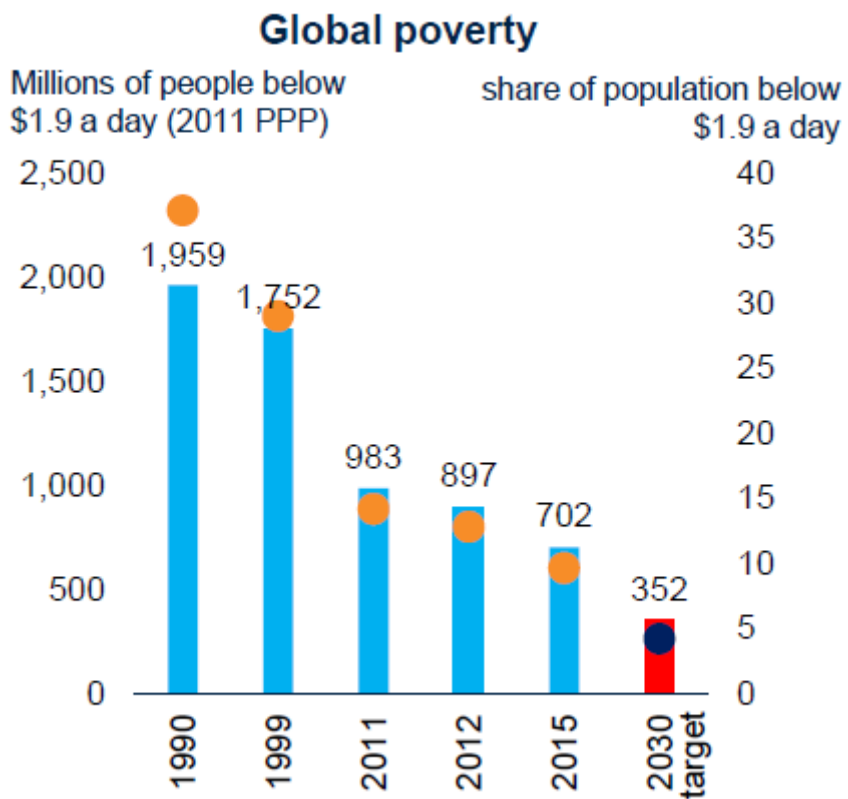
- Jobs, services, social activities
- Growth of slums, urban poverty,
- Bottom quintile spends disproportionate share of income on public transport

## Tackle Local/Global Environment

- Urban outdoor pollution linked to 4 million premature deaths
- Cities contribute 70% of energy-related GHG emissions
- Active mobility for healthy society

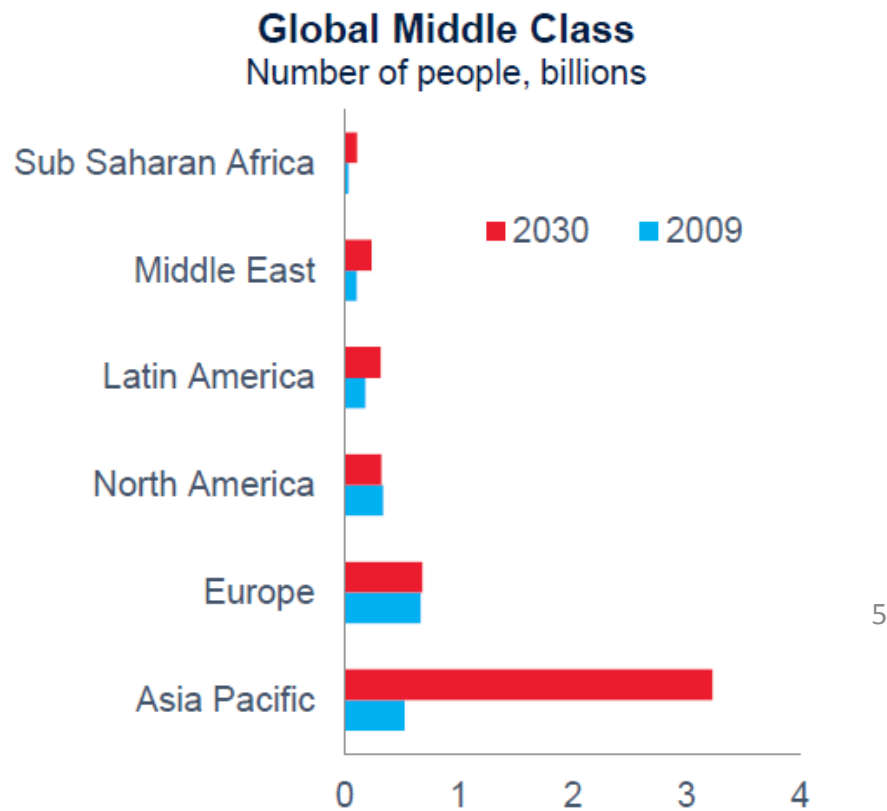
# SOCIO-ECONOMIC SHIFT IN THE MAKEUP OF THE GLOBAL POPULATION

Major achievements in reducing poverty in past 10 years (although 3% target by 2030 far from secured)



Source: World Bank

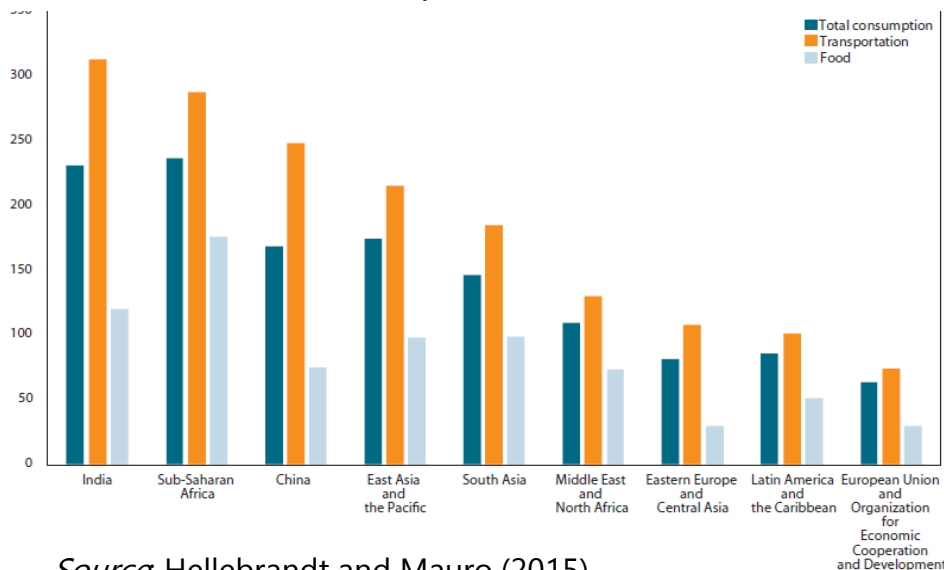
Half of world population will move into middle class by 2030 with new mobility aspirations



# SHIFT BOOSTS NEW DEMANDS FOR TRANSPORT

Household's spending on transportation projected to increase by factor of 3-4 in Asia and Africa between 2013-2035

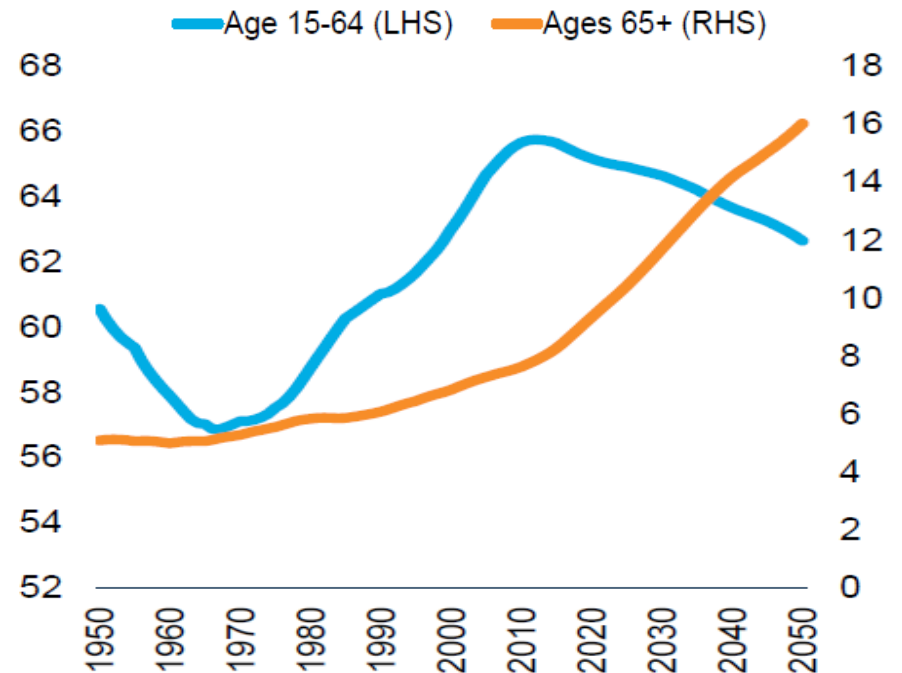
Percent increase of total, transportation, and food consumption, 2013-35



Source: Hellebrandt and Mauro (2015) Petersen Institute

Global population shares by age cohort, %

Source: World Bank



Source: World Bank

- Higher social aspirations: broader social outcomes --jobs, quality of life/of services (e.g., public transport); equity issues –gender, vulnerable groups (aging, disabilities, poor)

# RAPID URBANIZATION: SPACES TRANSFORMING FASTER

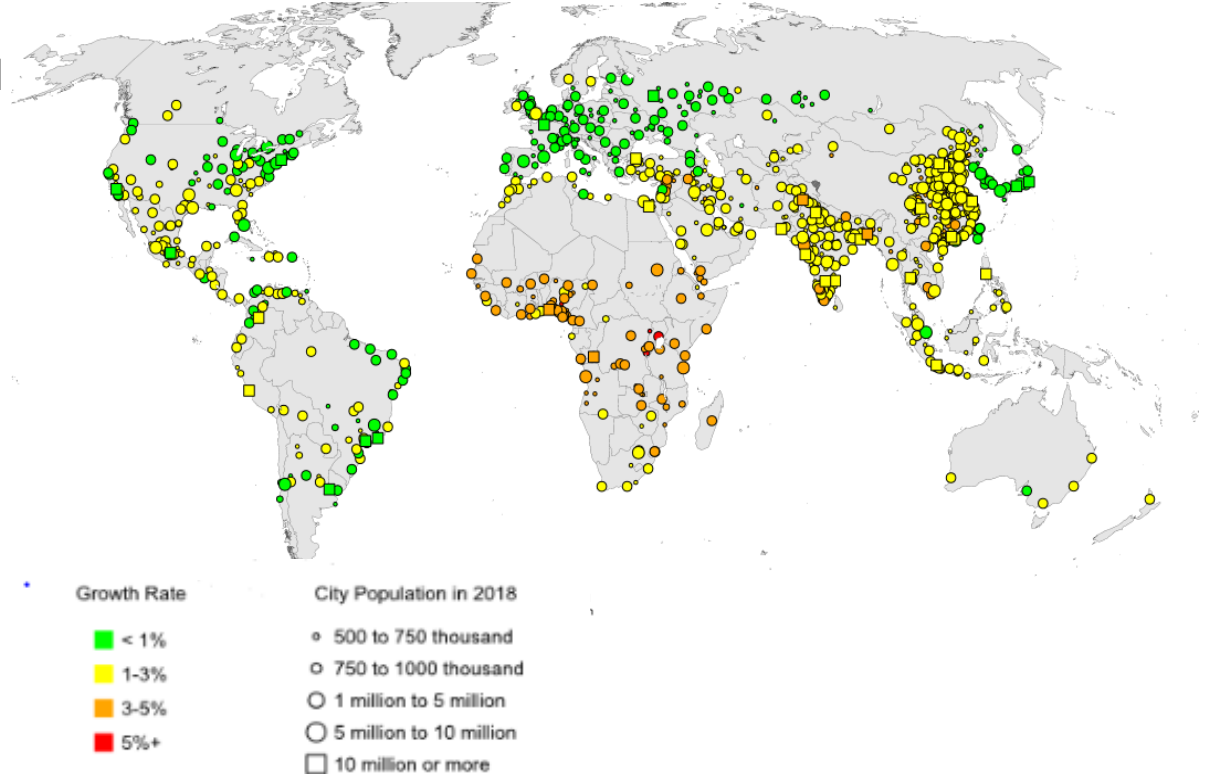
Shenzhen, China  
From fishing village of several thousand



To a city of 9 million



### City growth rate 2018-2030



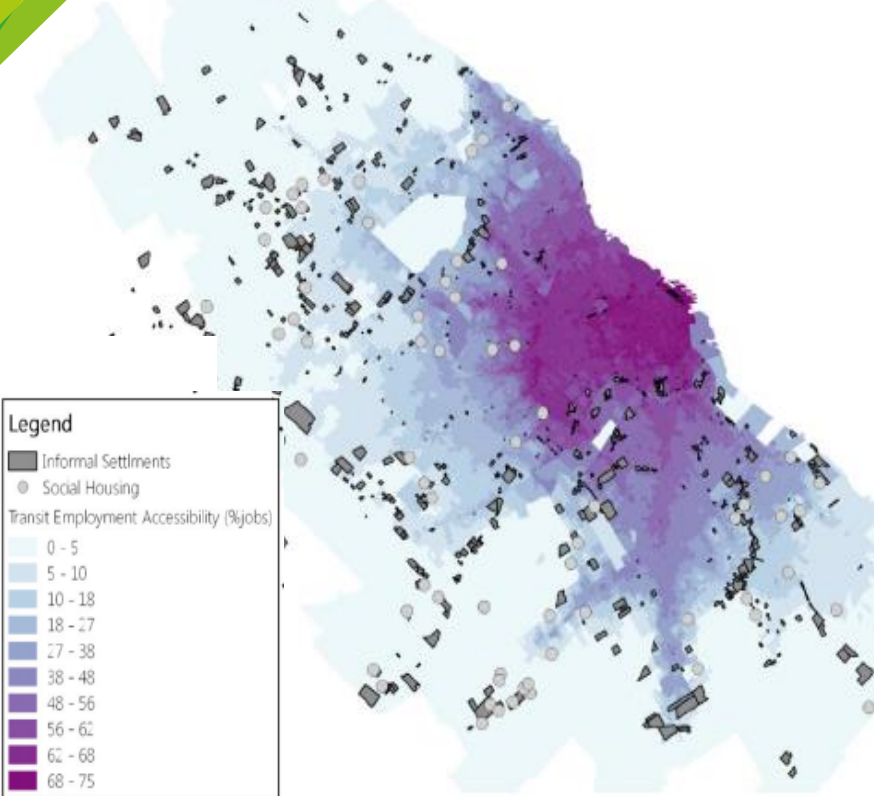
Source: UN World Urbanization Prospects, 2018

By 2030

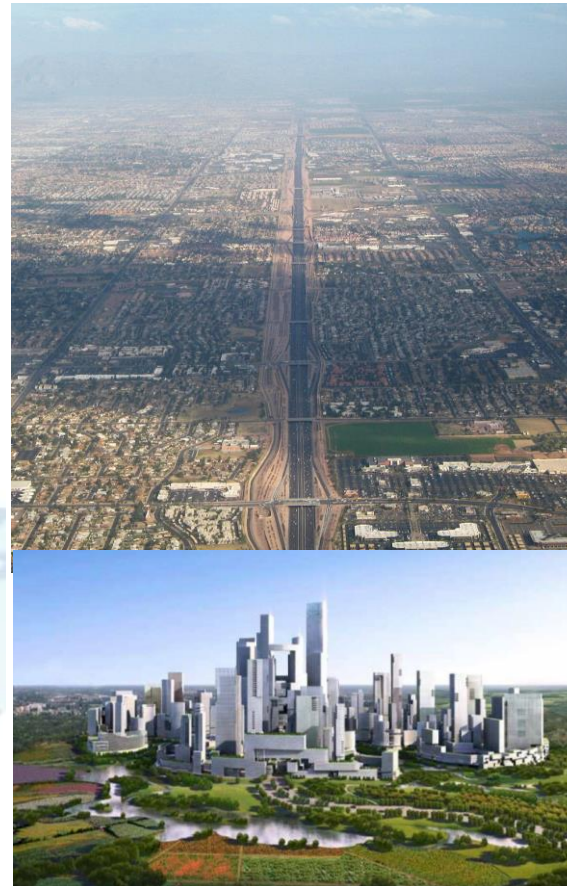
- 60% of population will live in cities, up from 55% today
- Cities in East Asia will triple their built up area; in Africa will double it – urbanization at lower income level
- Rapid pace exacerbates institutional/resource constraints:

# URBANIZATION BRINGS OPPORTUNITIES, ALSO CHALLENGES

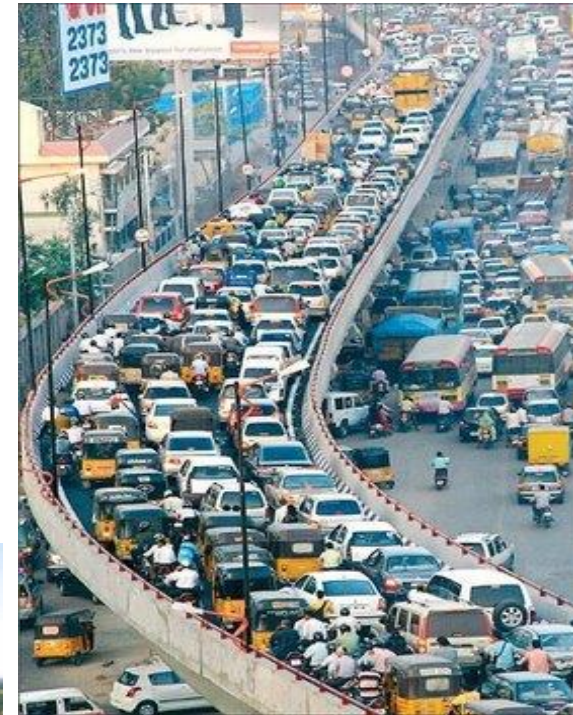
Access to opportunities: jobs accessible within 1 hour by public transit



Urban sprawl and motorization



Megacities congested even at low motorization rates



Cities are learning that it is not possible to build way out of congestion

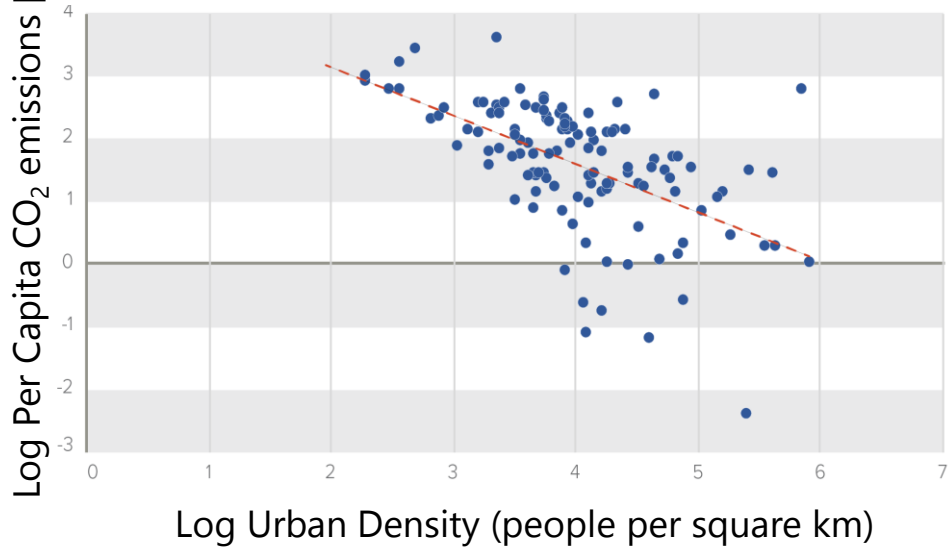
- By 2030, motorized urban mobility set to grow by 40%, fueled by economic growth and urban sprawl. Growing welfare cost of outdoor pollution (4% GDP) and congestion (2-5% of GDP)



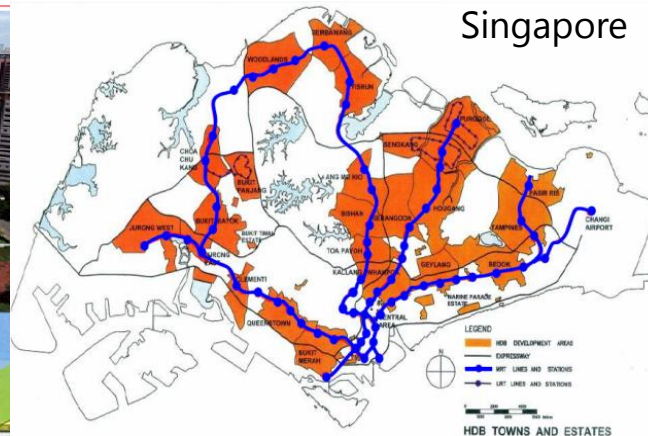
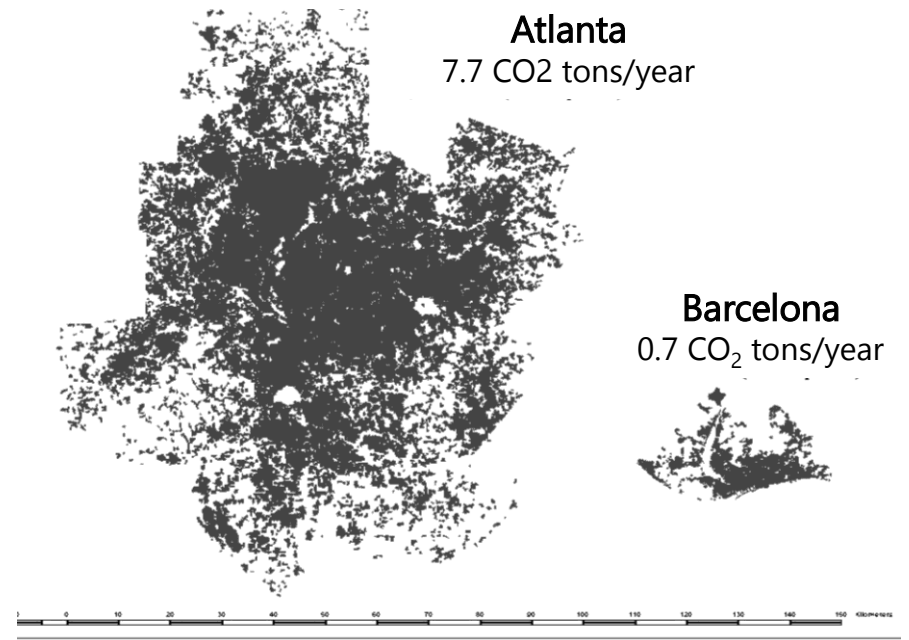
# EARLY CHOICES LOCK-IN LIFESTYLES, ENERGY USE... LAND USE AND TRANSPORT PLANNING

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Relationship between Population Density and Per Capita Carbon Emissions in Urban Areas  
(Source: New Climate Economy, 2018 Report)



Built-up areas of Atlanta & Barcelona at same scale

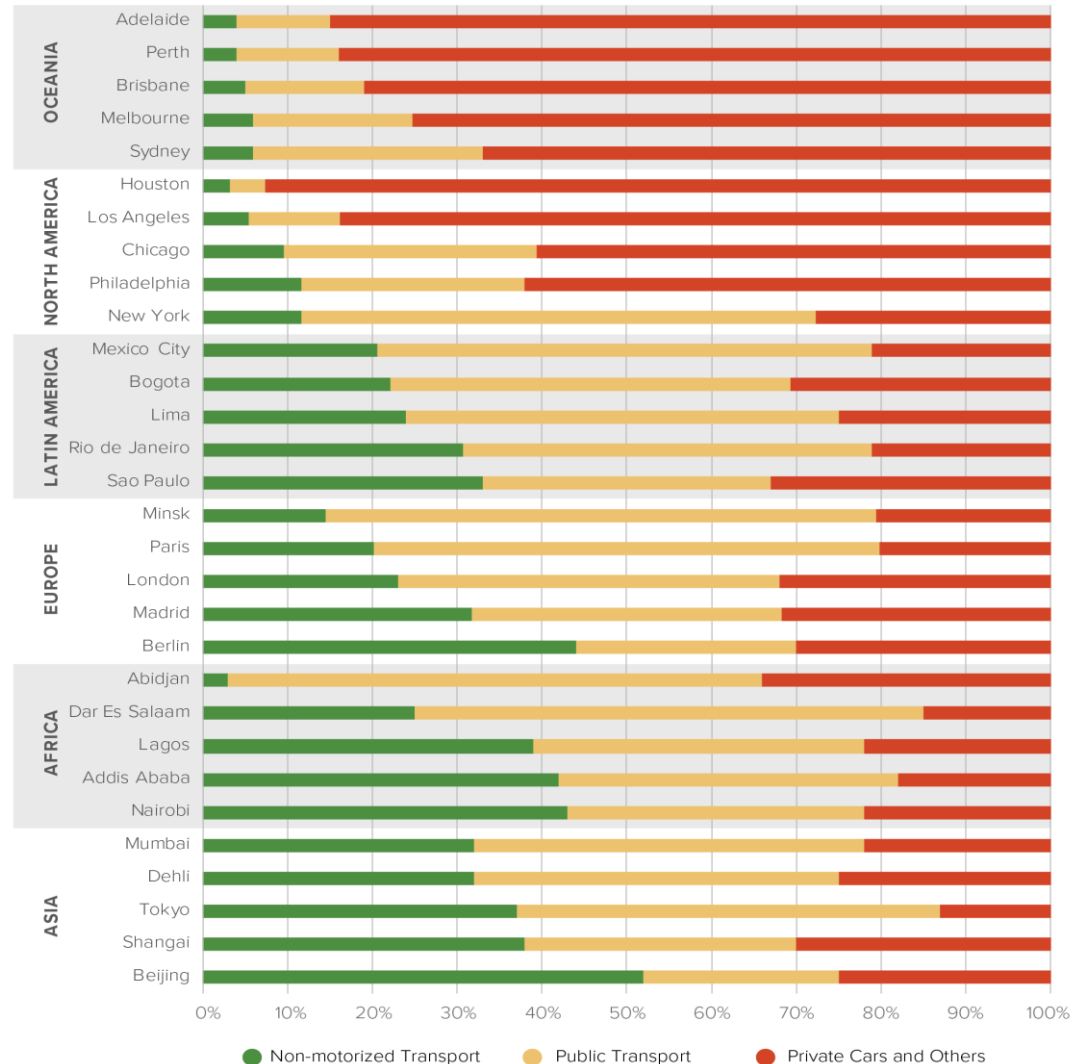


# EARLY CHOICES LOCK-IN LIFESTYLES, ENERGY USE ... MODAL SHARE

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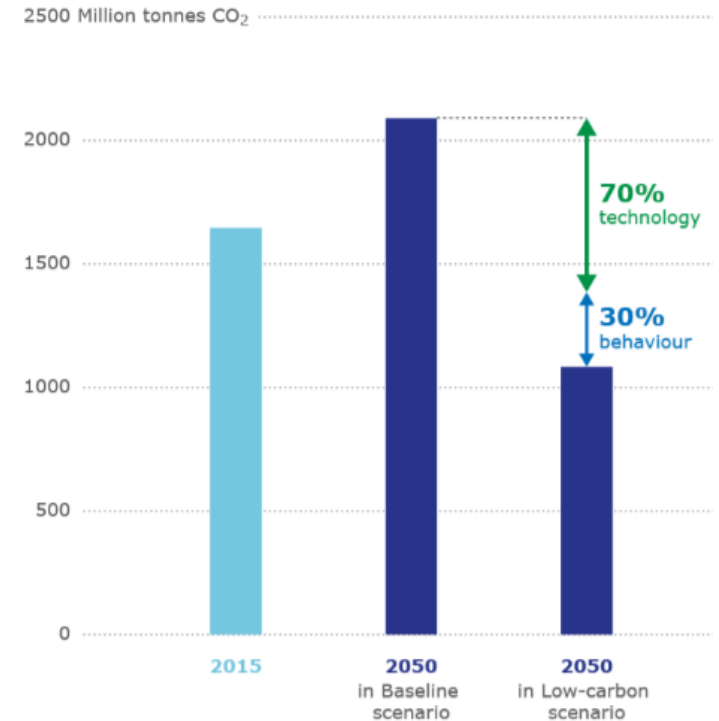
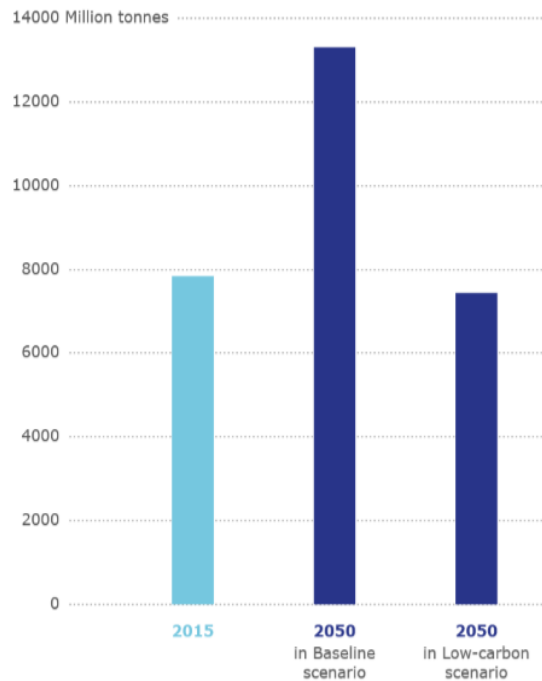
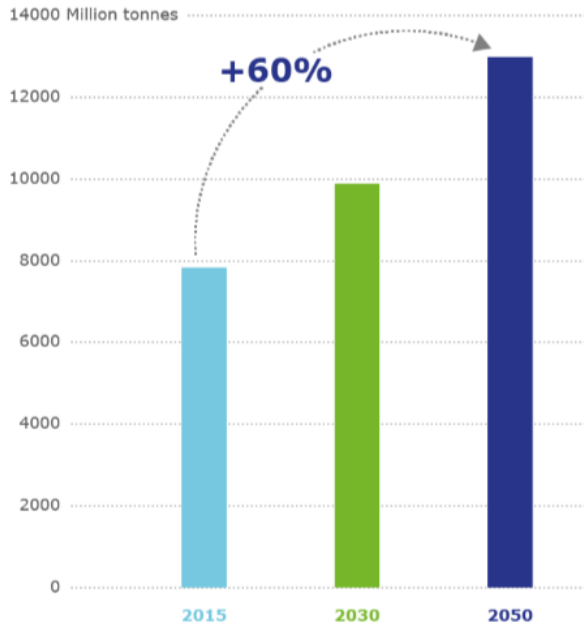


Modal share for 5 of the 10 largest cities in each region (NMT, Public Transport and Private Motorized Options)  
(Source: New Climate Economy, 2018 Report)



# CLIMATE CHANGE, A THREAT TO DEVELOPMENT INCREASING UNCERTAINTY/DRIVING LONG TERM SUSTAINABILITY

ITF, Outlook 2017



- Transport contributes almost 23% of energy-related global emissions and rising...
- BAU could lead to a 60% increase by 2050

Currently foreseeable policies to mitigate transport CO2 emissions are not sufficient to achieve climate ambitions

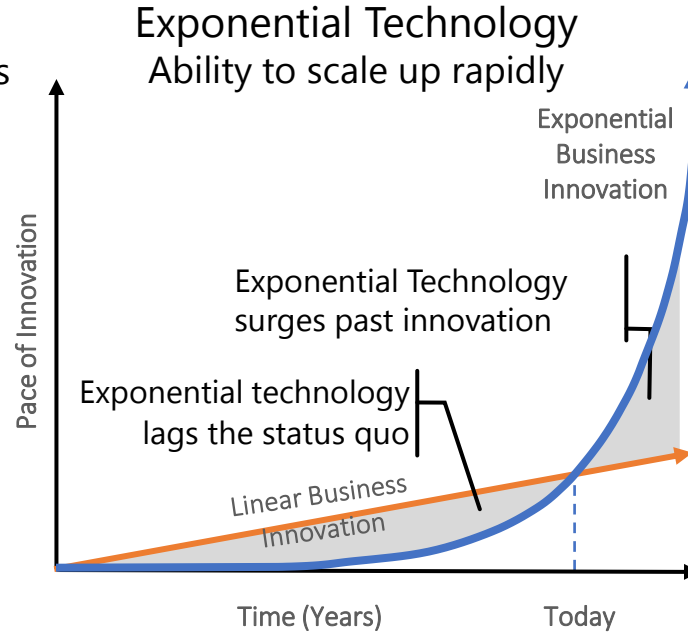
The right policies can significantly cut CO<sub>2</sub> emissions in cities

Source: International Transport Forum. Outlook 2017 (Presentation)

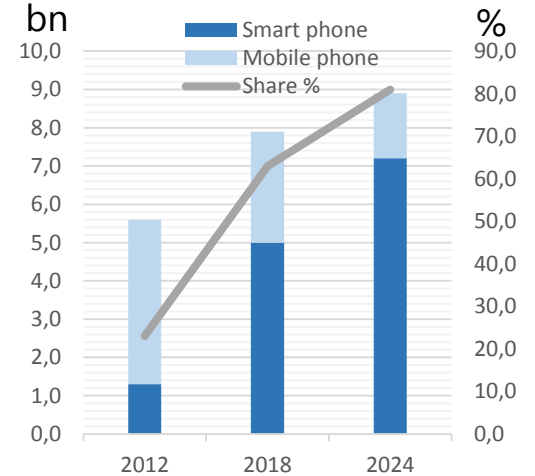
# DIGITAL INNOVATION/DISRUPTIVE TECHNOLOGIES CHANGING THE WAY WE THINK, ACT AND RESPOND...

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ICT/Digital innovation  
Connectivity enables non-friction flows



### Mobile phone subscriptions



## Disruptive Technologies

- General purpose technology, so ubiquitous in terms of price and/or performance relative to substitute or alternative approach, that drive accelerated change and have broad reach
- Disruptive trends in mobility change incumbent transportation modes, services and behaviors. Digitization enables access while changing costs and funding models

# ... SPURRING RADICAL CHANGES IN HOW PEOPLE CHOOSE TO TRAVEL AND THE AMOUNT OF TRAVEL THEY DO

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Cards integrate across modes, allow smart subsidies

Bogota SITP card

3. Multi-purpose use



Aadhaar card, India

4. Subsidy linked to social security infra



2. Subsidy if multiple transfers needed -RJ



1. Card allows integration across modes.



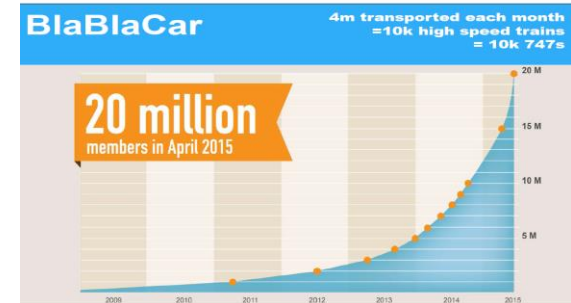
Smart Card



Platforms: Mapping Apps crowd source traffic data



The future of mobility is shared



- New ways of communicating (smart phones, digital platforms, IoT, cloud computing) allow to match supply and demand and to nudge users towards shared transportation options
- New forms of mobility (bike-sharing, driverless vehicles, mobility as a service, e-commerce, drones) that better cater to personal needs, blurring the lines between private and public transport.
- The predictive capacity of "Big Data" analytics and the application of Artificial Intelligence can improve planning and the performance of transport systems



# URBAN MOBILITY GOES DIGITAL TO BOOST EFFICIENCY: THE PROMISES OF THE "NEW MOBILITY" ARE BIG

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## Automated driving (AV)

From assisted driving to driverless cars within a decade w/pilots by 2020. Potential reach: 5-20% of all driving by 2030.

- System efficiency/road safety improved
- Number/length of trips by car increased, modal shift away from public transit as disincentives for driving removed.
- Social acceptability. Affordability

## Connected systems and networks

M2M connectivity and on-line platforms. Ability to collect data in real time from growing number of sources enables integration and matching of supply and demand

- Share of multimodal trips and system performance increased
- Data privacy/protection concerns. Potential



## Business Models

Drive costs, revenues and ability to sustain change  
Proliferate faster than regulations. Creative PPPs

- Overhaul of traditional financing models

## Shared Use

Proliferation of mobility as service from micro to car to transit, without ownership

- Pooling reduces veh/km, congestion, fuel use
- On-demand ride services bridge gap in first/last mile coverage.

## Electric Vehicles (EV)

From none a decade ago to 1.25 million in 2017, yet 0.1% of all vehicles. Uneven distribution: 5 countries account for 80%

- Reduction in emissions, air pollution
- EVs could be net contributors to climate change: energy mix matters!

# FOR CITIES, THE NEW MOBILITY ENTAILS PROFOUND CHANGES

A transformation in the way governments, service providers, businesses and citizens interact:

- New urban governance, with sensitive issues such as data sharing, protection and privacy. With an open data policy, cities can go further encouraging communities to participate in improving processes and co-creating solutions
- New (sometimes disruptive) means of service delivery, which require understanding the policies and business models that will make them viable and the consequences for existing public transport services.



Source: Transforming Transportation 2019: “Will New Mobility Deliver Sustainable Transport for All?” Conference hosted by the World Bank–World Resources Institute



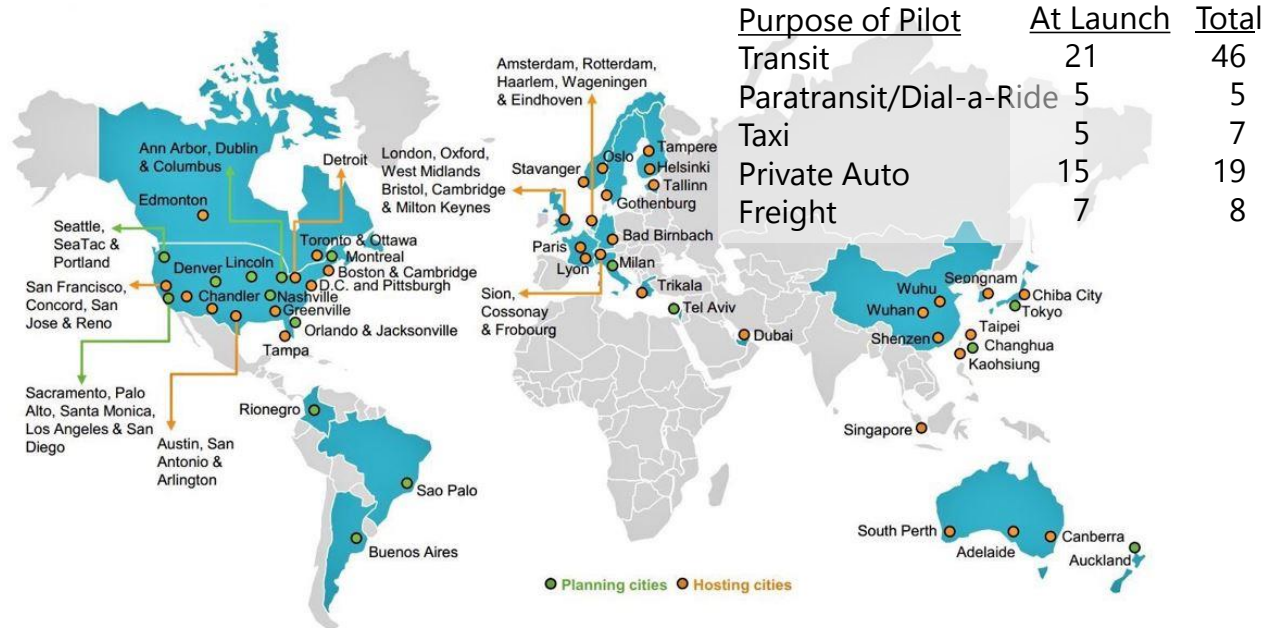


# ABOUT 100 CITIES PLANNING AND TESTING AVs, MANY FOR MORE PROMISING TRANSIT USES

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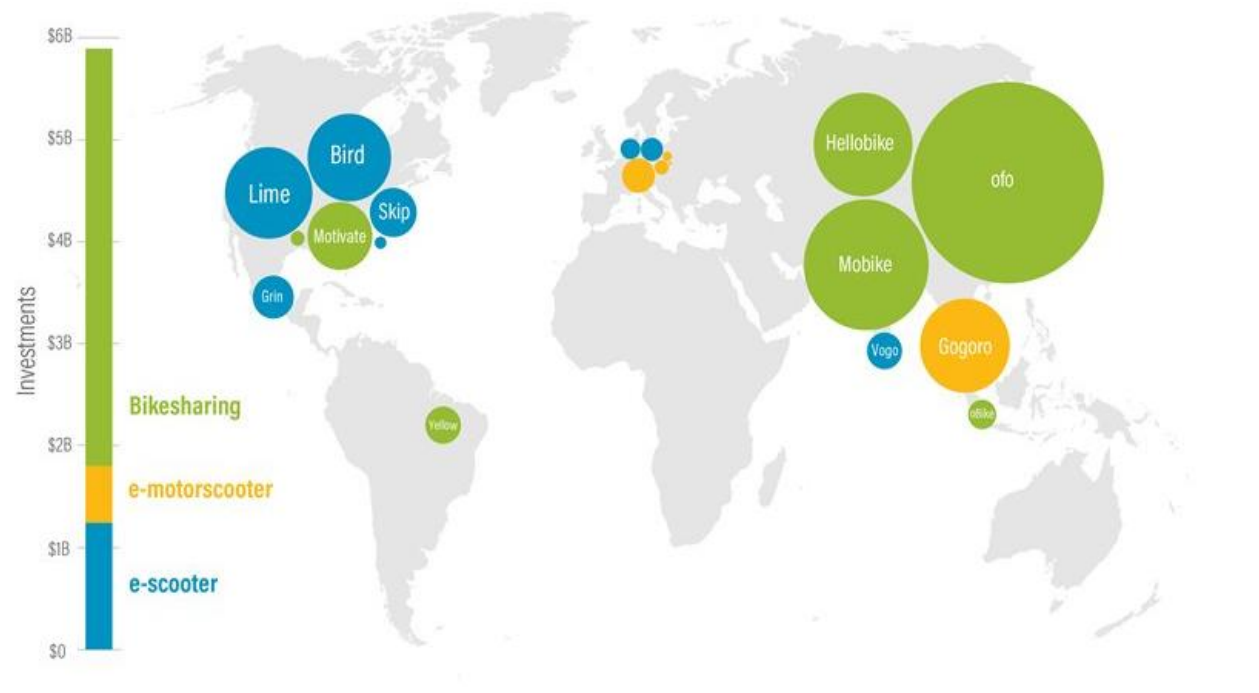
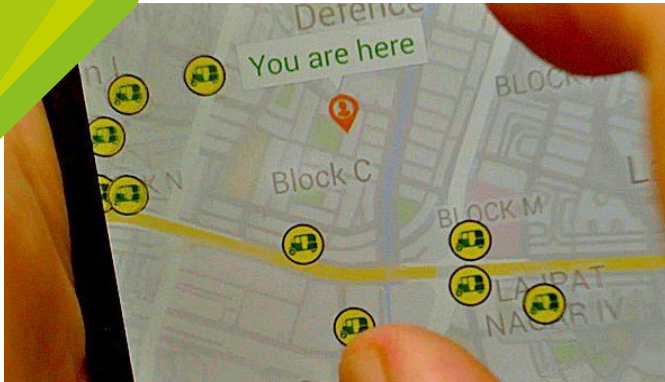
## Cities planning and testing AVs



Source: Bloomberg Philanthropies, Aspen Institute, Bloomberg New Energy Finance. Note: See Bloomberg Philanthropies' interactive "Global Atlas of Autonomous Vehicles (AVs) in Cities" ([web](#)). 'AV' stands for 'autonomous vehicle'. This map only covers AV pilots and policymaking efforts where city, municipal, or metropolitan governments are playing a substantial role.

# MICRO-MOBILITY TAKING OFF AROUND THE WORLD, PROVIDING MORE OPTIONS FOR FIRST AND LAST MILE ACCESS

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Source: World Resources Institute

WORLD RESOURCES INSTITUTE

BIRD's record growth: 120 cities, \$2 bn in just 14 months



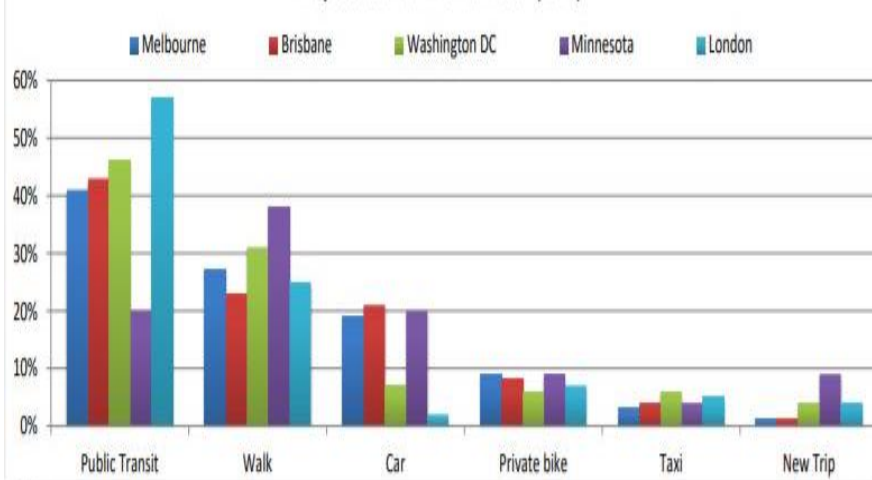
- E-Scooters in Paris: 7 operators, \$3/trip, available in city center.
- Bike sharing: 850 cities in 2015 up from 68 in 2007. Now 300 bike-sharing companies worldwide
- China: 1 million dockless bikes in Shanghai after regulation in 2018.
- Didi: 30 million trips/day.

# WILL "NEW MOBILITY" DELIVER SUSTAINABLE TRANSPORT FOR ALL? TRANSITIONS AND UNKOWNS, PERILS ARE REAL

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## Modal substitution from bike sharing in 5 cities

Reproduced from Fishman et al. (2014)



Washington Post, Nov. 2018

### Scooters are fun! Let's regulate them.

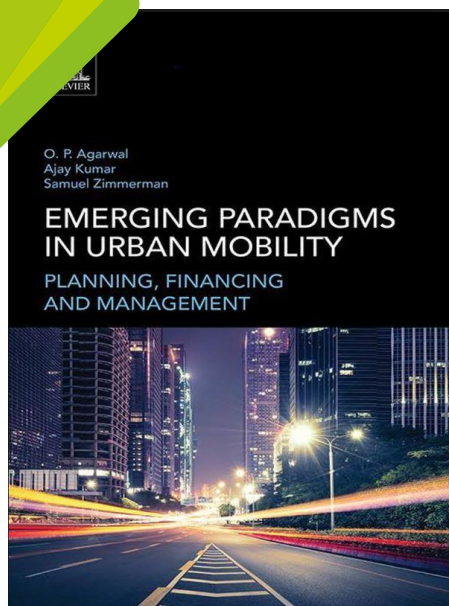
SANTA MONICA, CALIF. Electric scooters are a little like Q-Tips. In both cases, the products are fun to use, but can be dangerous. One person woke up in the emergency room with a fractured skull and possible permanent brain damage. "They're very handy. The real danger is when they're not used properly."

Bike-sharing leading to chaos?



- Increasing risk of stranded assets due to technological obsolescence or disruption of public transport's long term sustainability
- Convergence between innovation and regulation is challenging: city authorities reluctant to come to terms with new business models;
- Social acceptance/equity: benefits of new technologies may not be evenly distributed due to affordability issues or availability of services in marginal areas; job suppression in developing countries; safety concerns





The major disruptions sweeping the urban landscape are redefining the mobility paradigms for a sustainable future. Several key shifts needed within a Shift-Avoid-Improve-Enable framework:

- From managing traffic flows/congestion to managing for broader set of goals:
    - accessibility for all
    - efficiency through system integration, planning land used and mobility of people and goods together, smart technologies
    - road and people's safety (e.g., gender)
    - green objectives (air quality, GHG emissions, resilience) addressing safety
  - From enhancing supply and public transport by compulsion (for those who can't afford a car) to managing demand and public transport by choice:
    - more choices (e.g., investments in active non-motorized/micro-mobility, on-demand technologies for small buses/vans, micro-transit, BRTs/ARTs)
    - pooling, (e.g., priority of shared mobility in terms of space allocation and pricing based on space/vehicle occupation, better "whole" trip experience)
  - From IC engines to electric vehicles
    - cross sectoral policies to increase share of renewable/clean energy in mix
    - charging infra, incentive programs, regulations, leasing models for batteries
  - From independent vehicles to connected (shared) vehicles
    - pricing to discourage riding alone; converting on-street parking into pick-up/drop-off zones; dedicated lanes for shared autonomous vehicles
  - From user pays for public transport to "beneficiary" pays
    - e.g., congestion pricing, land-value capture, transport tax
  - From "top down" planning to inclusive/participatory planning focused on people
    - consultations, bottom-up solutions
- ... the emerging paradigm should obviate the need to own a car
- e.g, Helsinki 2025, Mobility as a service (MaaS)

# ALSO GREATER COHERENCE AND INTEGRATION OF POLICIES AND NEW INSTITUTIONAL CAPACITIES

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Convergence of policies across sectors:

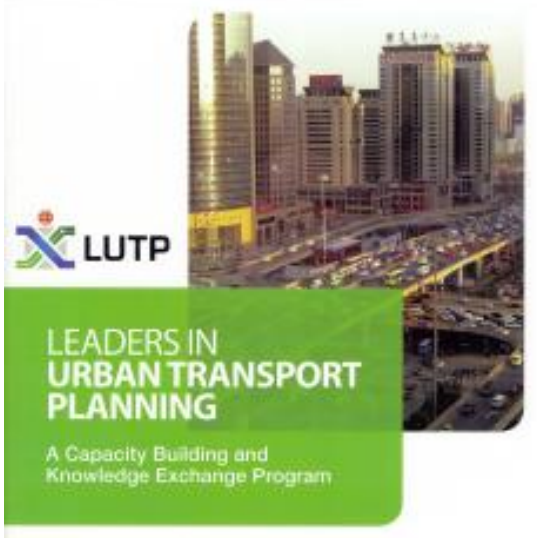
- Managing for climate change entails minimizing overall emissions from transport, land use (housing, urban sprawl), energy mix, and increasingly ICT
- Realizing the benefits of electric mobility needs cleaning the energy matrix, also charging vehicles when renewables are in use. Current energy mix of key countries investing in EVs limits the benefits of electric mobility

Breaking silos: cooperative institutions to integrate across modes, jurisdiction boundaries and government levels

- Basis for successful coordination of policies on land use, road provision, traffic management, public transport, parking policies (e.g., TfL; Tokyo more than 57 transport operators need to be coordinated)
- National policy frameworks help guide cities

Capacity of cities and transit operators to manage rapid innovation and adjust to evolving conditions

- Ability to engage citizens and private sector stakeholders to enable innovative business models and people-oriented solutions, induce behavior change, and mobilize support for SUM strategies.
- Multiplication of actors as cities become more interconnected with technology, More ways to engage 'intelligently' with users. Cities embracing open data policies will go further: open standards, cross domain platforms for data linking, sharing and analytics across public and private sectors
- Policy makers should be aware of transitions and unknowns. Over the longer term, these behavioral changes could lead to entirely new usage patterns, with significant impacts on public transit, transportation infrastructure, land use, and urban form



# ARE CITIES PREPARED FOR THE CHANGES? STRONG LOCAL LEADERSHIP/INSTITUTIONS WILL SHOW THE WAY

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While cities can learn from each other, their path to transformation, pace and options for managing mobility for sustainability will differ depending on:

- Initial conditions such as how prosperous, densely populated, compact, connected they are...
- How developed their public transportation system is...
- The capacity of political leadership and institutions to change behaviors and stay on course

## Global Megacities (35)

>10 million inhabitants

High to low income countries

About 15% urban population

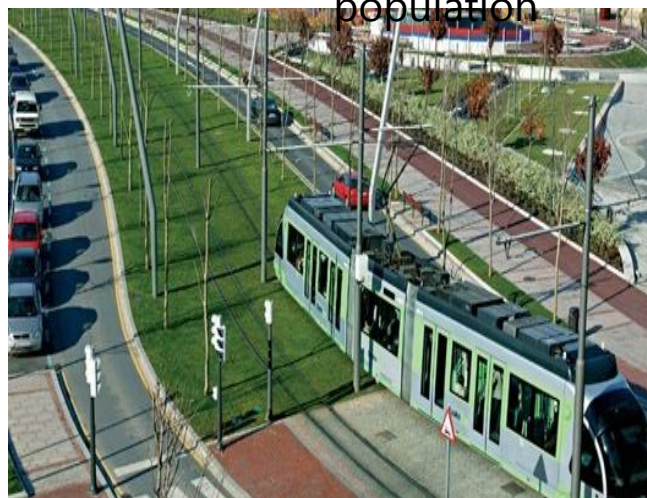


## Mature cities (144)

1-10 million inhabitants

>\$20,000 per capita income

About 30% of the urban population



## Emerging Cities (291)

1-10 million inhabitants

\$2 to \$20,000 per capita income





Thank you! Muchas  
gracias! Eskerrik asko!

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