Focused acceleration: a strategic approach to climate action in cities

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The world's human activity is concentrated in cities

Cities are especially vulnerable to climate impacts but are also increasingly taking the lead on climate action

Cities are especially vulnerable to climate impacts…

- **90% of all urban areas are coastal**, exposed to rising sea levels and powerful storms – current path of 3 degrees C of global warming would submerge Shanghai, Rio de Janeiro and Miami

…but are also increasingly taking the lead on climate action

- **400 cities were represented at COP21** that produced the Paris Agreement in 2015
- As many national governments struggle to implement climate commitments, many cities are **innovating replicable, scalable solutions** and demonstrating immediate **benefits** for their citizens

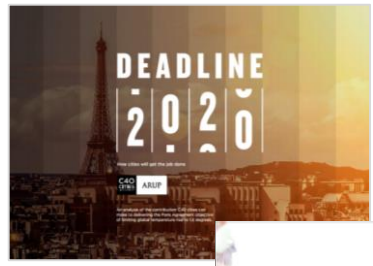
Why have we collaborated with C40 CITIES ?

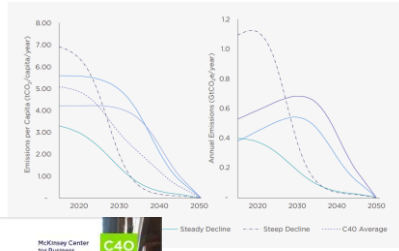
Network of 90+ of the world's largest cities committed to addressing climate change

- Nonprofit organization provides support to cities to collaborate, share knowledge and drive action

C40 produced *Deadline 2020* which assigns target GHG emissions trajectories to cities

- Trajectories represent cities' contribution to the Paris Agreement objective of limiting global temperature rise to 1.5 degrees C
- Different cities have different curves (some are steeper than others), but all go to zero net emissions by 2050

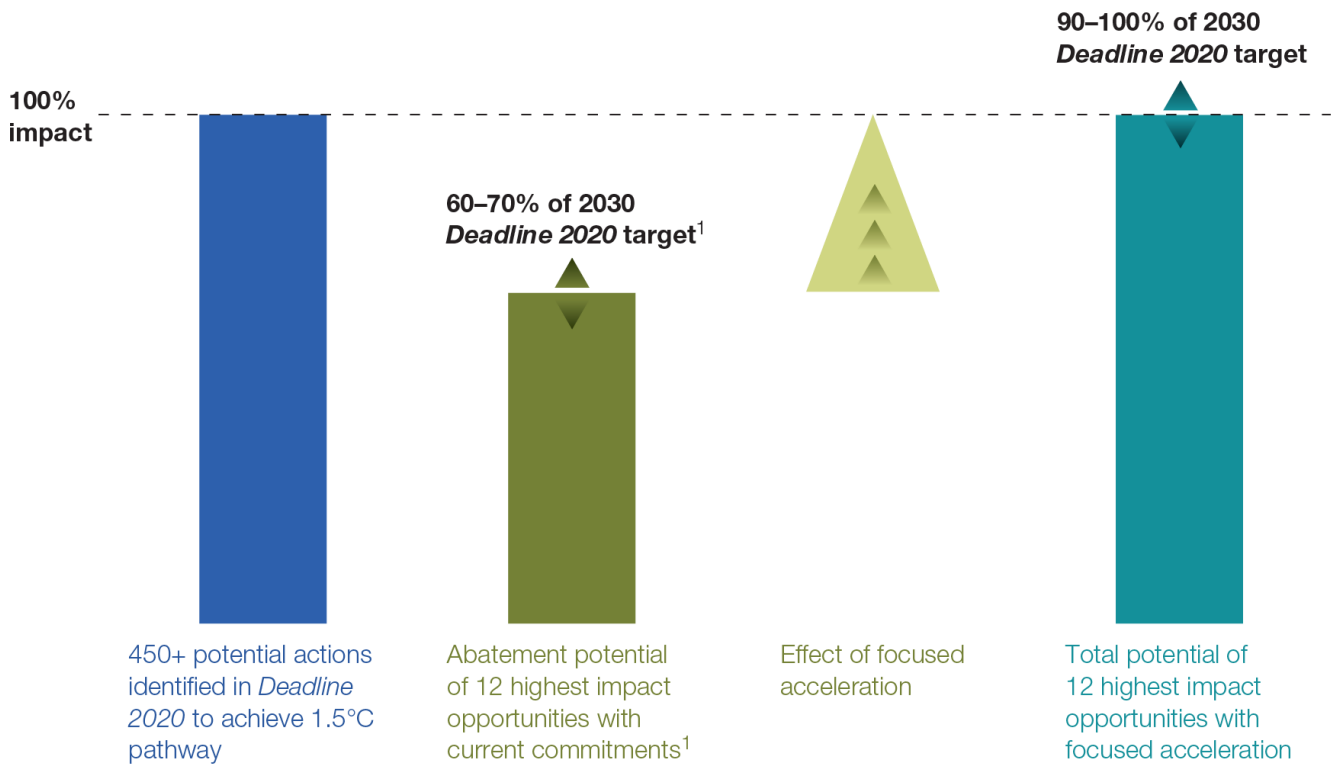




***Focused Acceleration* builds on *Deadline 2020*, detailing the most important emissions reduction opportunities to capture through 2030**

Why “focused acceleration” for climate action in cities?

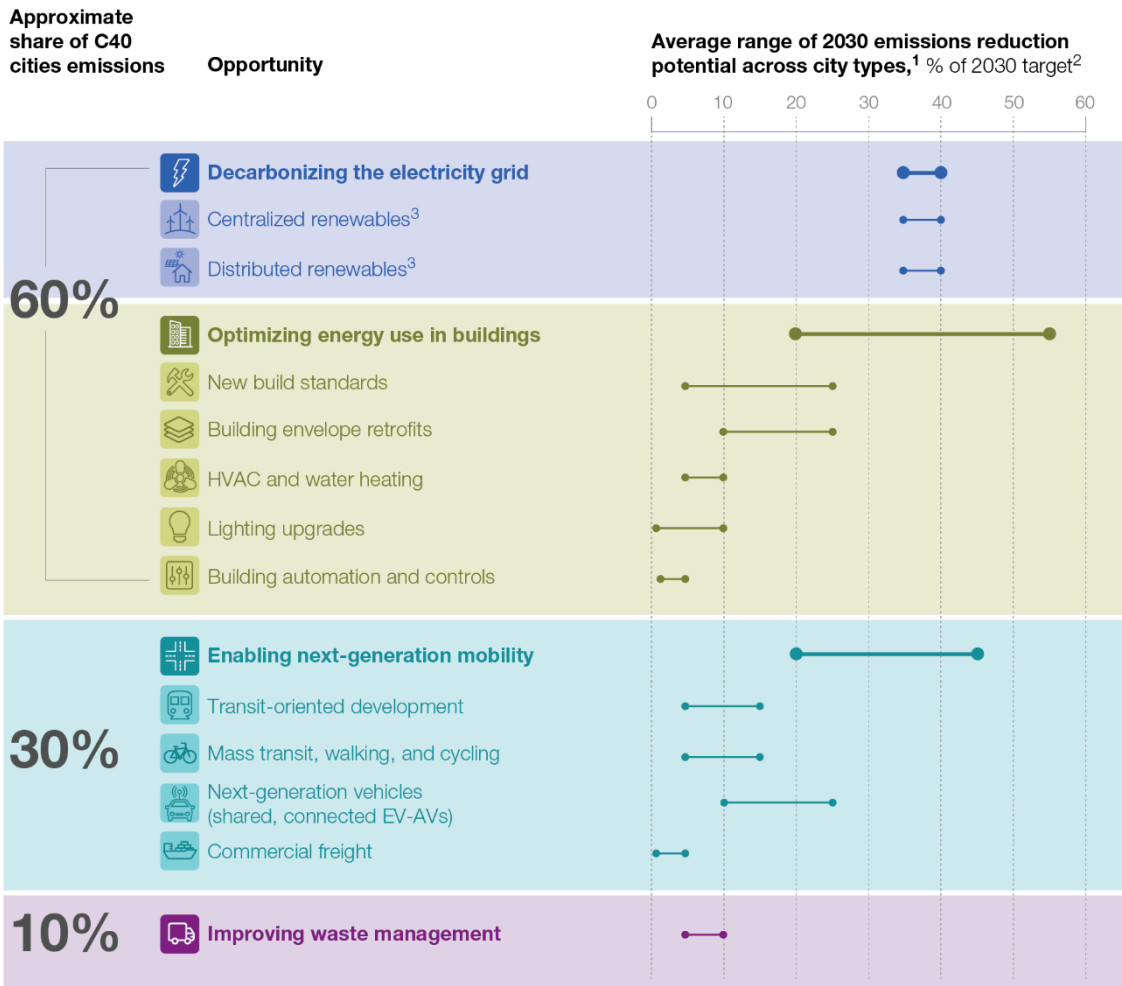
- City leaders juggle many **competing priorities** and **limited capacity** to manage programs
- **Systemic change is hard** – tendency to focus on low-hanging fruit or shiny objects
- Targeted, well-designed commitments **unlock investment** from other players
- Laying the **foundation for deeper emissions reductions** beyond 2030 is critical



1 Assumes current commitments by C40 Cities with climate action plans are met.

12 opportunities across 4 action areas hold the greatest potential for cutting cities' GHG emissions

Prioritization → Modeling of action areas → Tailor strategy by city typology → Output



Decarbonization of the energy grid

Optimizing energy use in buildings

Enabling next-generation mobility

Improving waste management

We developed six illustrative city types to flex the analysis and highlight critical considerations for different individual cities

Prioritization → Modeling of action areas → **Tailor strategy by city typology** → Output

Large, Middle-Income, Semi-Dense City

- **Semi-dense, moderate growth** in **income** and **population**
- **Moderate city powers,** limited history of climate action and data
- **Carbon-intensive grid** with limited decarbonization planned, high solar radiation
- **Rising cooling demand in buildings** as incomes and temperatures rise
- **Partial transit system** (eg, BRT), low car ownership but expected to grow
- **Established waste collection** but no diversion or emissions reduction

Middle-Income Mega City

- **Semi-dense** and **fast-growing population**
- **Significant city powers** tied to national priorities, some climate action and data collection
- **Coal-dependent grid** but rapid decarbonization planned, moderate solar radiation
- **Rapid growth in new builds** with low average efficiency, high adoption of solar water heating
- **New** and **extensive transit system**
- **Established waste collection,** reliance on incineration for disposal

Small, High-Income, Innovator City

- **Low density** and **slow-growing income** and **population**
- **Significant city powers,** extensive history of climate action and data collection
- **Decarbonized grid** with further push planned, low solar radiation
- **Ultra high efficiency standards** in place for building construction/ equipment
- **Extensive transit system** with connections to walking and cycling and shared mobility services
- **Advanced waste management** with high diversion, reliance on incineration

Large, High-Income, Dense City

- **Dense** and **slow-growing income** and **population**
- **Moderate city powers,** history of climate action with good data collection
- **Decarbonizing grid** (regional or national priority), moderate solar radiation
- **Space heating** 50% of building energy demand, mostly fueled by inexpensive oil or gas
- Extensive yet **aging transit system,** growing shared mobility
- **Advanced waste management** with some emissions reduction

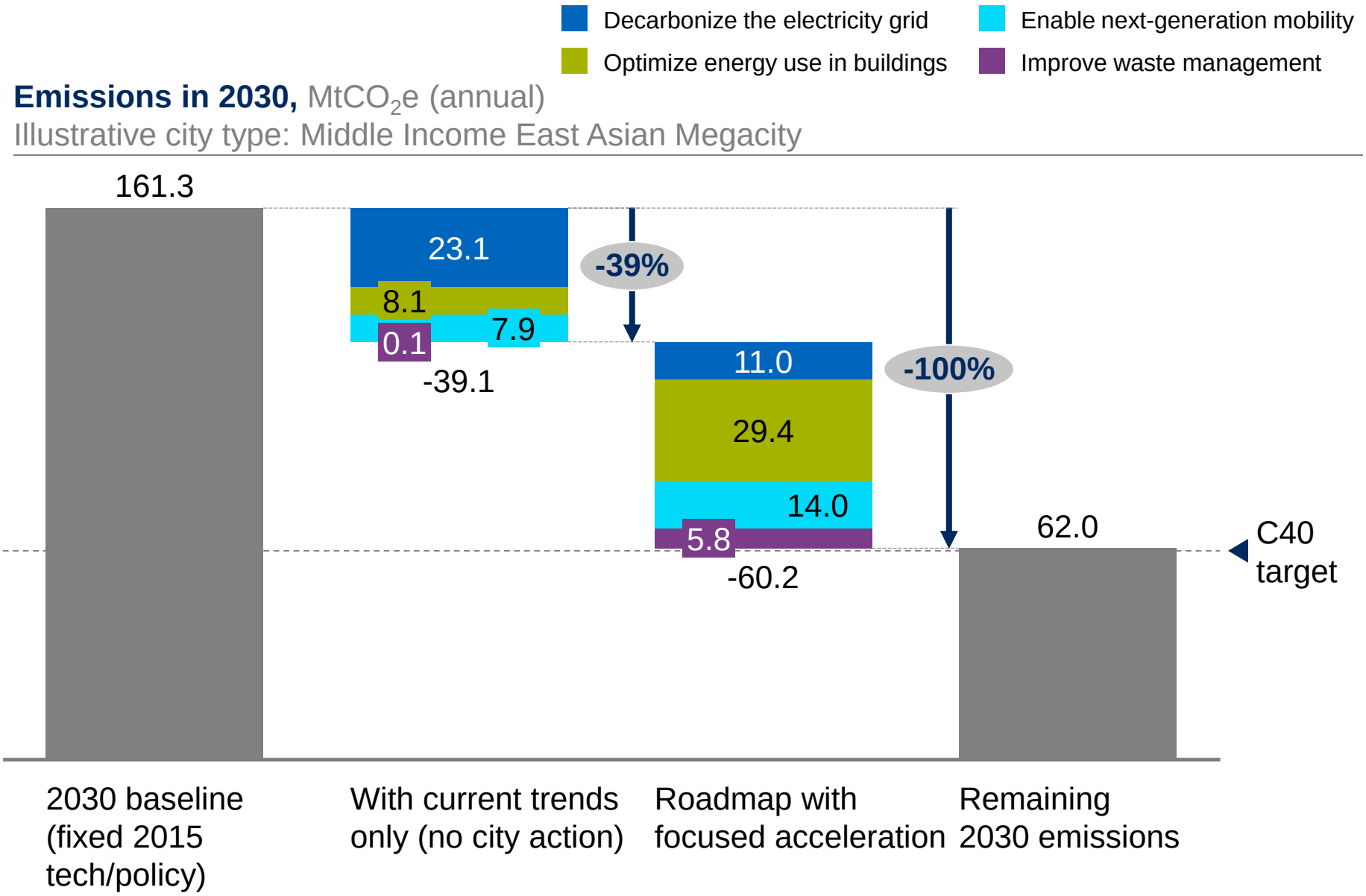
Low-Income Mega City

- **Dense** and **fast-growing income** and **population**
- **Limited city powers,** no prior history of climate action or data collection
- **Carbon-intensive grid** with limited decarbonization planned, high solar radiation
- **Rapid growth in new builds** and cooling demand per m2
- **High share of nonmotorized transport** and walking, new and limited transit system, car use and ownership expected to grow
- **Limited waste collection** and no emissions management

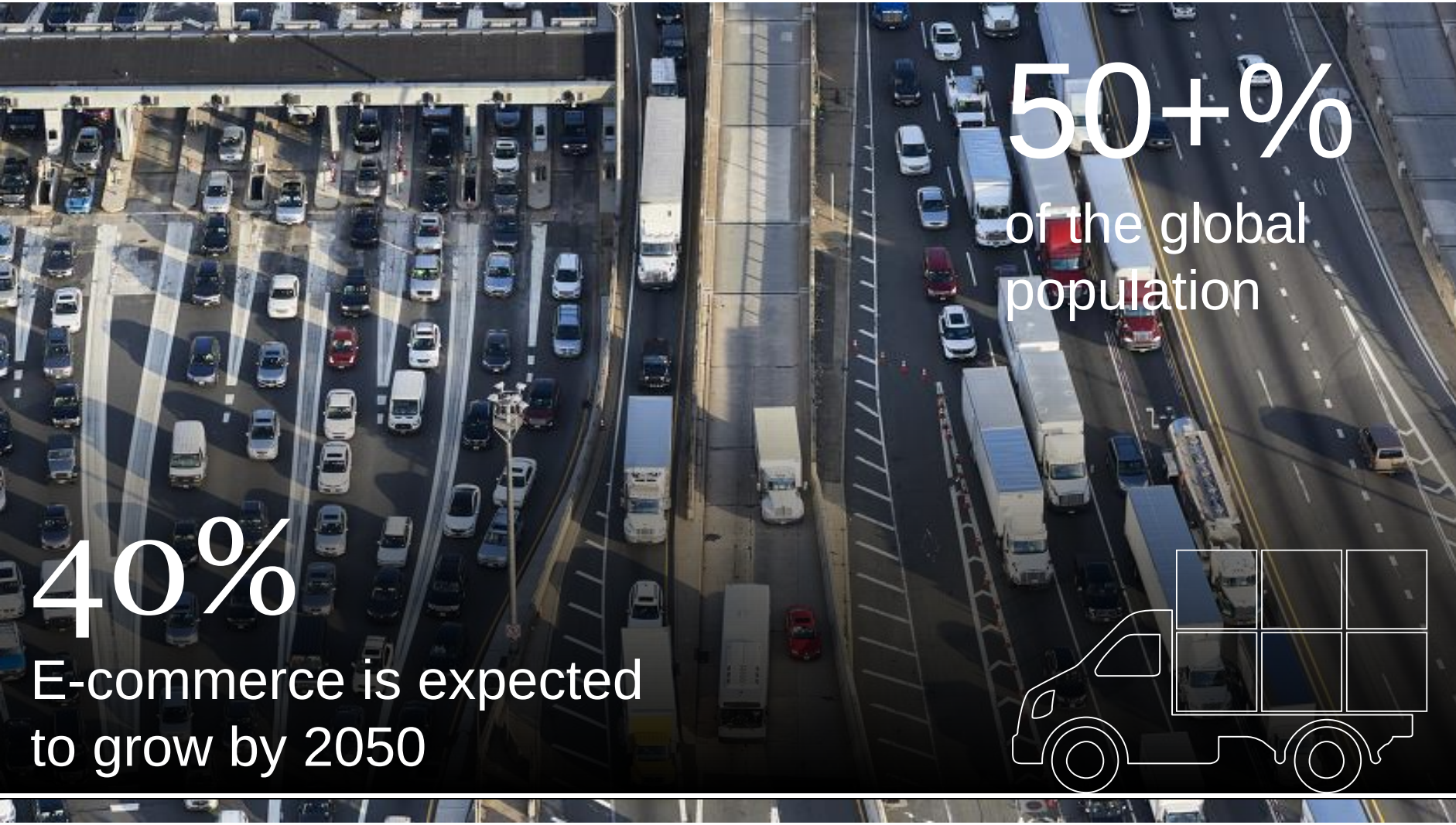
Large, Low-Income, Leapfrog City

- **Semi-dense** and **very fast-growing income** and **population** (double size by 2030)
- **Limited city powers,** no prior history of climate action and data collection
- **Coal-dependent grid** with limited decarbonization planned, high solar radiation
- **Rapid growth in new builds** and energy intensity of buildings as incomes rise
- **High share of nonmotorized transport** and walking, very limited transit system, car use and ownership expected to grow rapidly
- **Limited waste collection** and no emissions management

Example impact: Middle Income Mega City

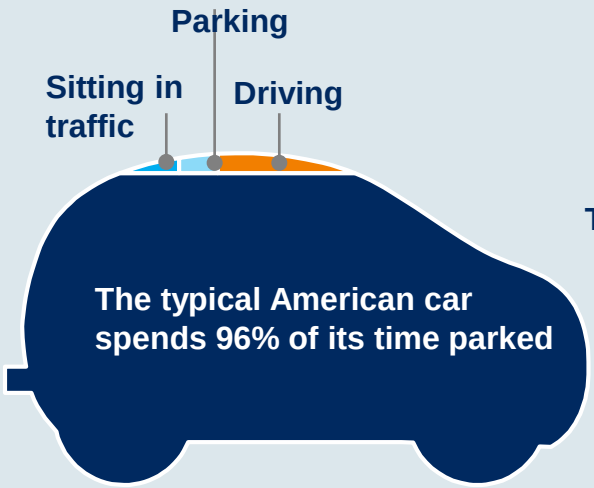


Deep Dive: Enable Next-Generation Mobility

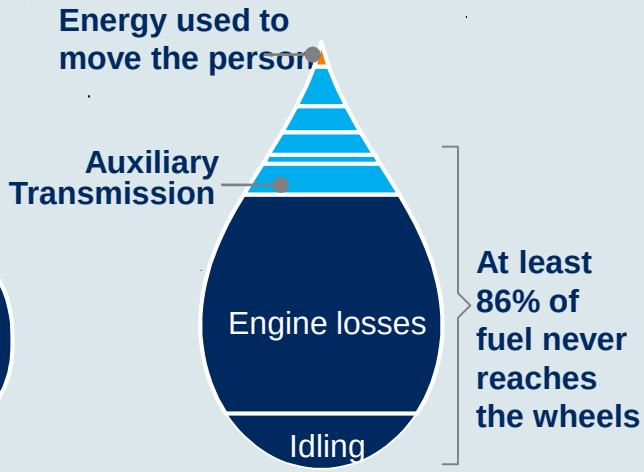


Waste in the current transport system

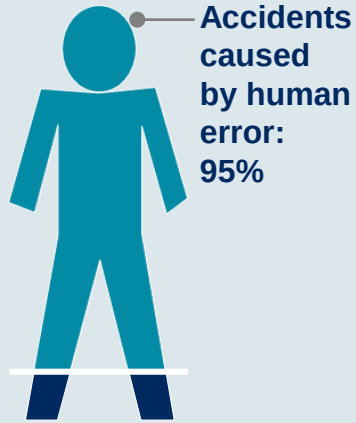
Car utilization rate



Tank to wheel energy flow - gasoline



Deaths and injuries on the road

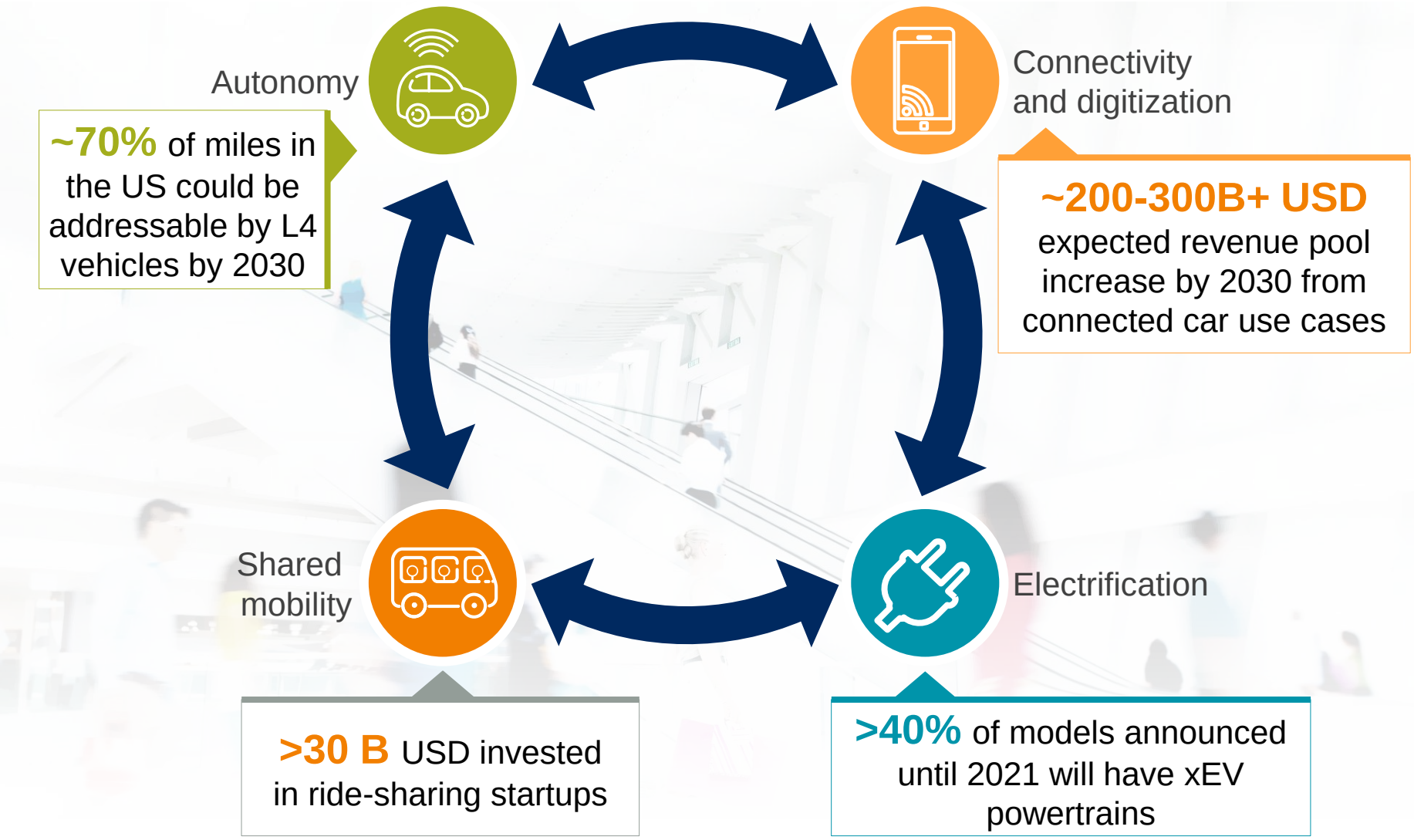


Land utilization rate

A road reaches peak throughput only 5% of the time

50% of most cities' land area is dedicated to streets and roads, parking lots, service stations, driveways, signals and traffic signs

Global megatrends that will significantly change mobility



Autonomous vehicle use cases are driven by what is being transported, where it is being transported, ownership, and technological evolution

What is being transported?

Passengers

Goods

Where can the vehicle operate?

Cities

Suburbs

Rural areas

Highways

Closed confined areas

Drivers for autonomous vehicles use cases

Who owns the vehicle?

Private ownership

Privately operated fleet

Public operated fleet

What technology is being used?

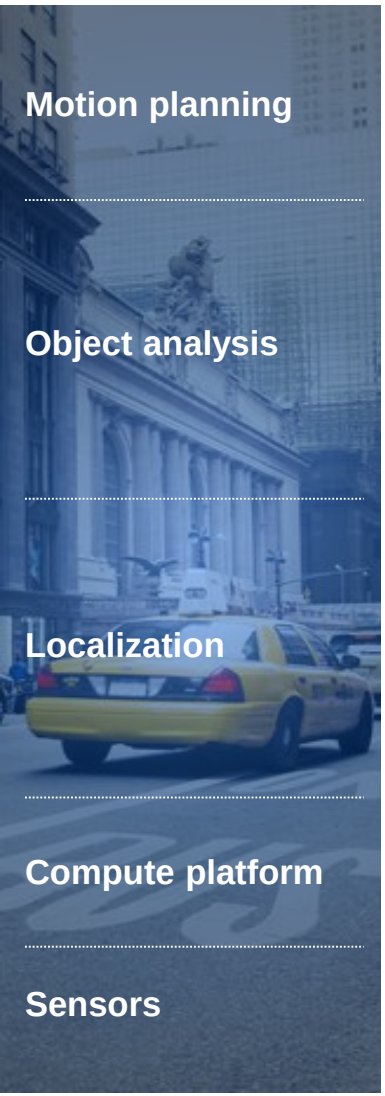
Driving assistance

Partial autonomy

Full autonomy

SOURCE: McKinsey Center for Future Mobility

… but constraining the operating environment enables L4 autonomy to hit the road in the next 2-4 years



Timeline for L5 | Timeline for constrained L4

L4/L5 tech timeline	Constraints to accelerate timeline
8-10+ → 2-4	▪ No highways, urban environments or operating during peak times
5-8 → 2-4	▪ No operation during night or bad weather to improve accuracy of object detection
8-10+ → 2-4	▪ Provide map based and/or V2X updates to route around edge cases
3-5 / 3-5	▪ Operate only on main roads that have been mapped
8-10+ → 3-5	▪ Limit operation without maps to local roads with clear lanes/curbs
2-4 / 2-4	▪ No constraints necessary
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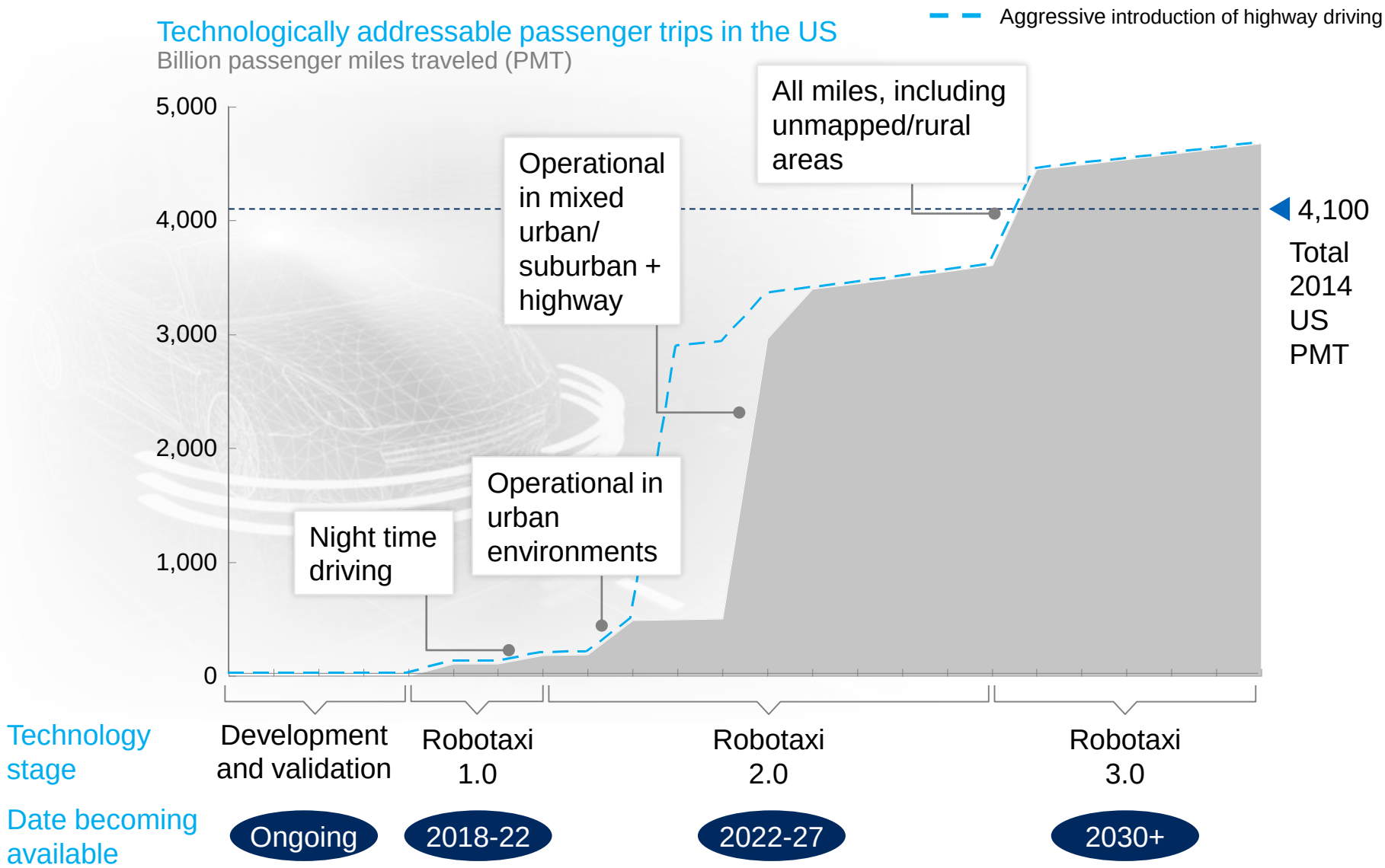
1 HAD: Highly automated driving

The majority of the US market could be addressable by highly autonomous vehicles by the mid-2020s



SOURCE: Expert interviews, DOT, McKinsey Center for Future Mobility

An Integrated Perspective on the Future of Mobility

Cities of the future will be….