A Global High Shift Cycling Scenario:
The potential for dramatically increasing bicycle and e-bike use in cities around the world.

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ITS UCDAVIS INSTITUTE OF TRANSPORTATION STUDIES

ITDP Institute for Transportation & Development Policy

A Global High Shift Cycling Scenario:

The Potential for Dramatically Increasing Bicycle and E-bike Use in Cities Around the World, with Estimated Energy, CO_2, and Cost Impacts

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By the Institute for Transportation & Development Policy
and the University of California, Davis

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Research commissioned by the Union Cycliste Internationale (UCI),
the European Cyclists' Federation (ECF), and the Bicycle Product Suppliers Association (BPSA)

https://www.itdp.org/wp-content/uploads/2015/11/A-Global-High-Shift-Cycling-Scenario_-Nov-2015.pdf

UCI UNION CYCLISTE INTERNATIONALE

ECF EUROPEAN CYCLISTS' FEDERATION

bpsa

Platform for Study

Explore how cycling and low powered e-bikes could become a core element of sustainable low-carbon development.

- Affordability
- Health benefits
- Energy use
- CO_2 emissions
- Cost

- Convenience
- Reduced land use demand
- Accessibility
- Mobility

Method Overview

Data Collection

- Global cycling use
- Global e-bike use
- Bike Sharing Schemes (BSS)
- Bike Sales
- Current Infrastructure
- Current Policy
  - Policy impacts

Modeling/Projections/Scenarios

- BAU scenario
- High Shift Cycling(HSC) scenario
  - Sales
  - BSS
  - Infrastructure development
  - Policy
  - Cost impacts
  - Environmental impacts

Data collection:

- Largest known database of urban cycling mode share containing nearly 1,000 cities in 60 countries divided into 21 regions:

- Denmark
- France
- Germany
- Italy
- Netherland
- Nordic
- UK
- Other OECD Europe
- Japan
- Other OECD Pacific
- USA
- Canada
- Mexico
- Brazil
- Other LAC
- Africa
- Non-OECD Europe/Russia
- Middle East
- China
- India
- Other Asia

- Global e-bike and bike sales/stock
- BSS data for over 250 schemes internationally
- Cyclist traffic safety data
- Limited cyclist ridership data
- Bike related costs

E-Bikes

- Reduce Congestion
- Allow point-to-point transit without use of PT at or nearly at the speed of a LDV
- Much more affordable than comparable options
- Low level of physical exertion
- Relatively low footprint
- Open up possibility of intercity-commuting with bicycle superhighways
- Increase catchment radius of PT hubs by 7.7km from traditional bicycles

Alleviated concerns:

Range
Hills
Heat
Operator strength limitations
Transit speed limitations
Load limitations

Benefits including:

Health
Congestion relief
Mobility equity
GHG and PM mitigation
Low cost
Efficient use of public space

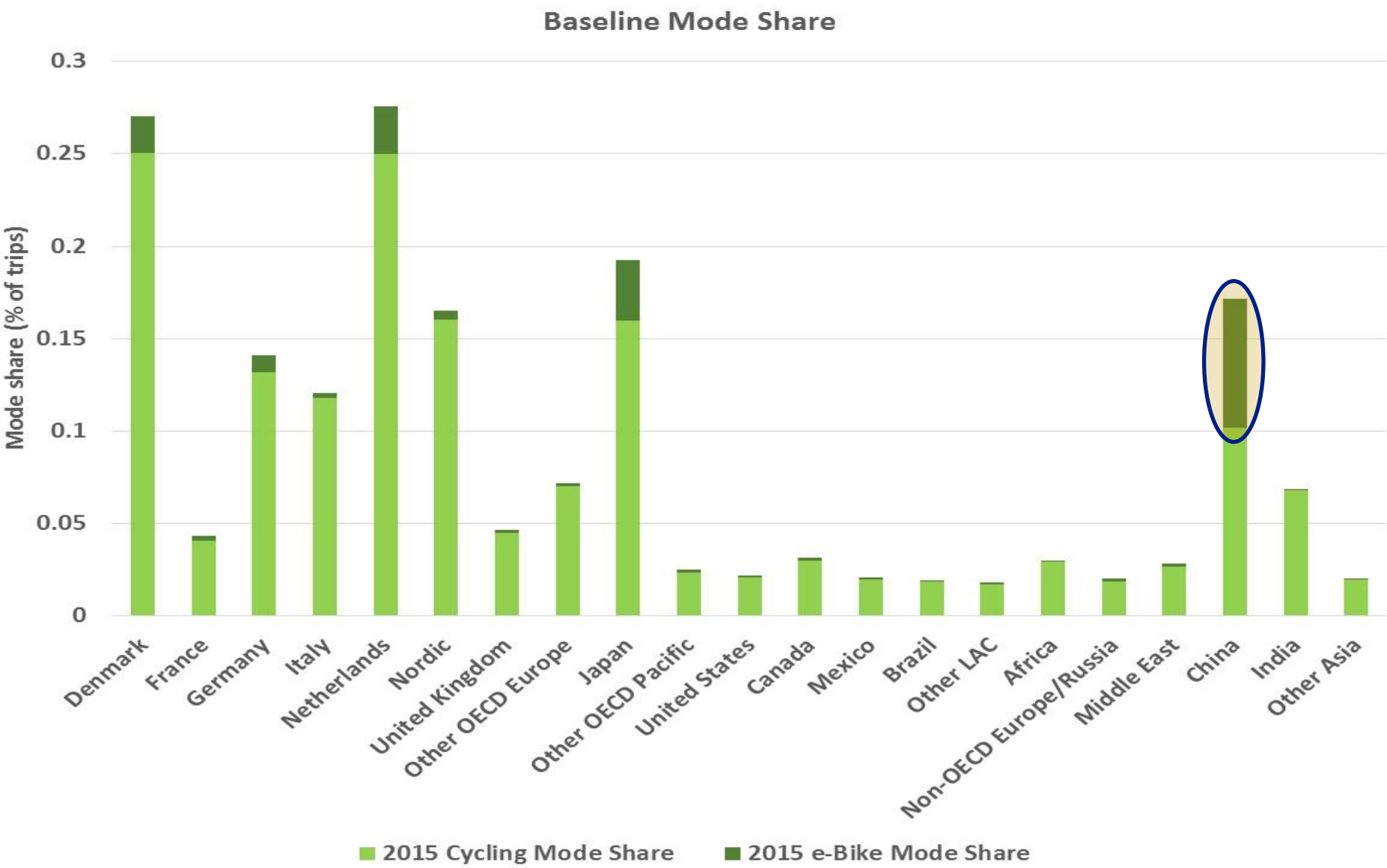
Bike Sharing Schemes (BSS)

- Rapid global growth
  - 15,000 bikes (2007) -> over 1 million (2015)
- Eliminates purchase, storage, maintenance, and retrieval of bicycle
- Easy access to travelers
- Encourages first time users
- Innovations:

- **GPS tracking**
- **Automated 'smart-docking'**
- **Tricycles**
- **Greater resilience**
- **Cargo bikes**
- **Availability apps**
- **Maintenance calls**
- **Shared e-bikes**

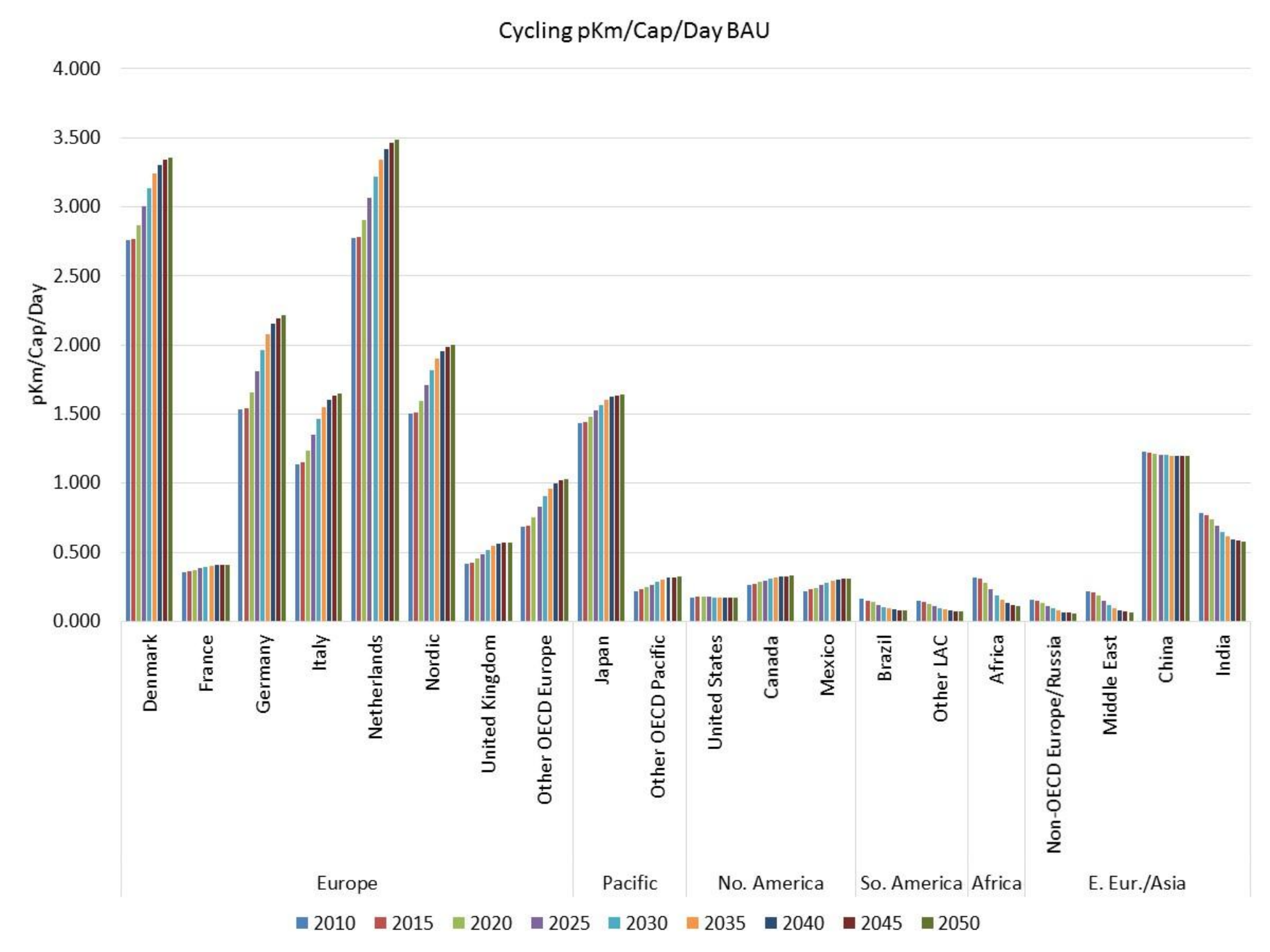
bikes.oobrien.com

Baseline Mode Share



Business as Usual (BAU) Projection

- Likely future given current trajectories for transportation and development
- Assumed recent trends continue
  - Challenge to project cycling mode shares given a lack of time-series data
- We adopt a BAU future of slow steady trends
  - 2030 cycling per capita is typically within ± 10% baseline levels


Cycling pKm/Cap/Day BAU
pKm/Cap/Day
4.000
3.500
3.000
2.500
2.000
1.500
1.000
0.500
0.000
Denmark
France
Germany
Italy
Netherlands
Nordic
United Kingdom
Other OECD Europe
Japan
Other OECD Pacific
United States
Canada
Mexico
Brazil
Other LAC
Africa
Non-OECD Europe/Russia
Middle East
China
India
Europe
Pacific
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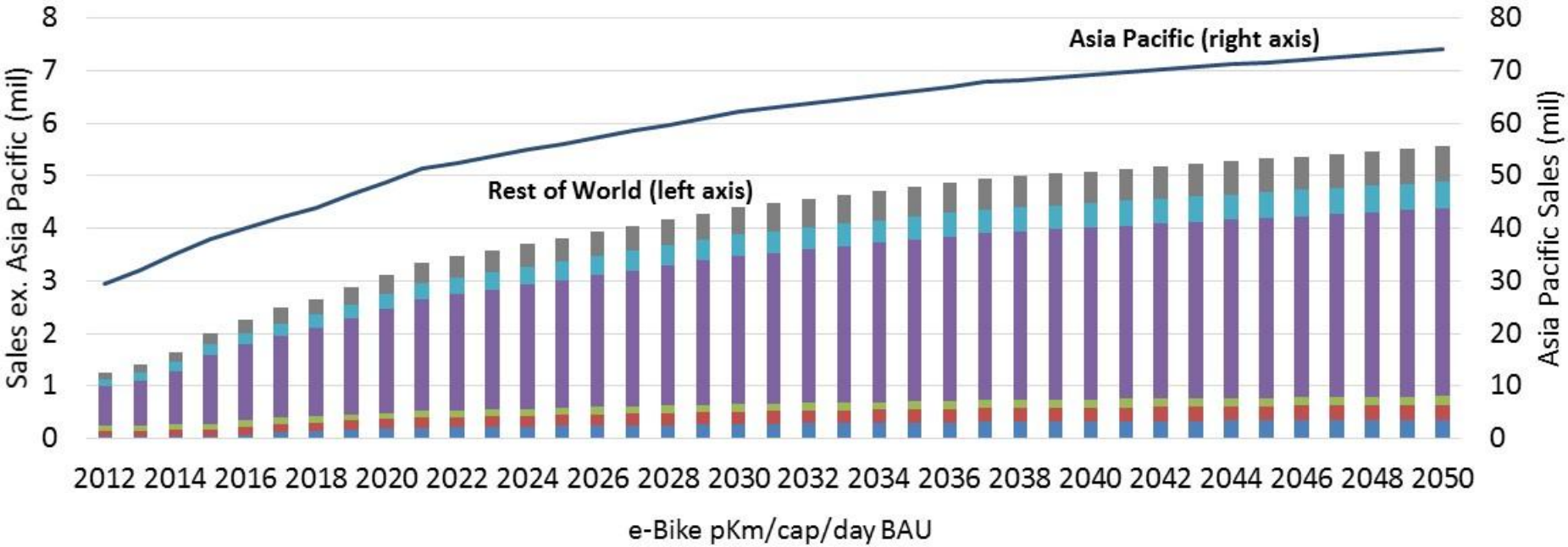
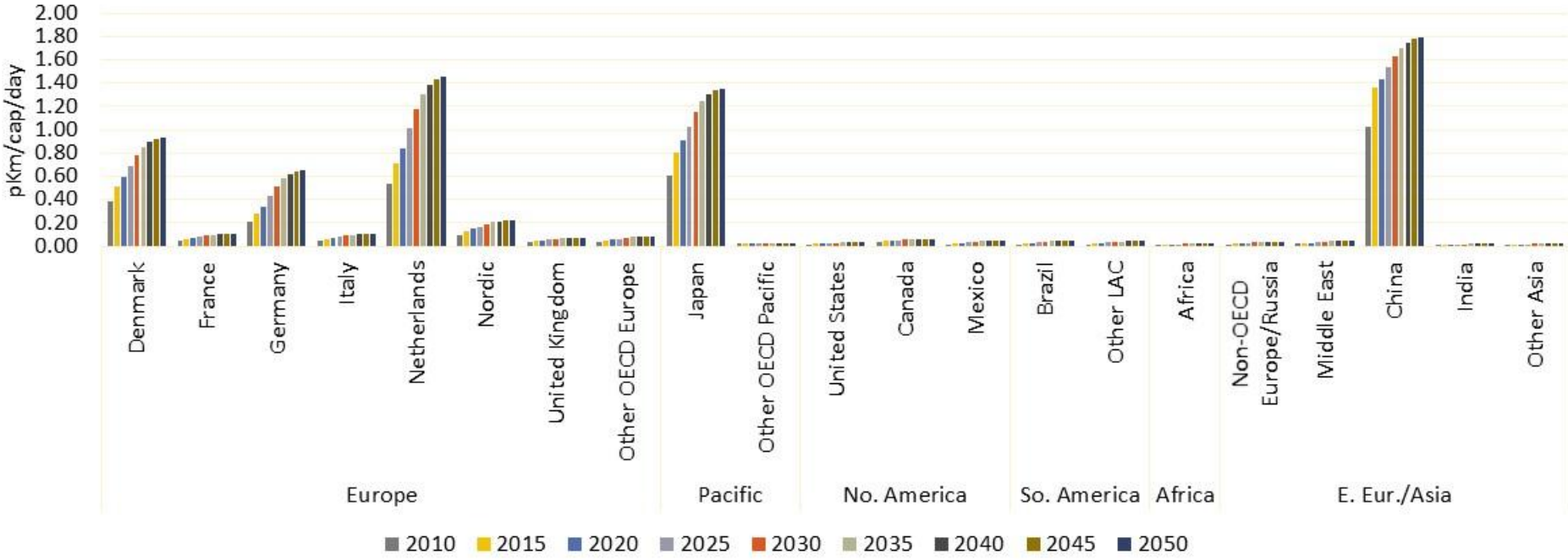
So. America
Africa
E. Eur./Asia
2010
2015
2020
2025
2030
2035
2040
2045
2050

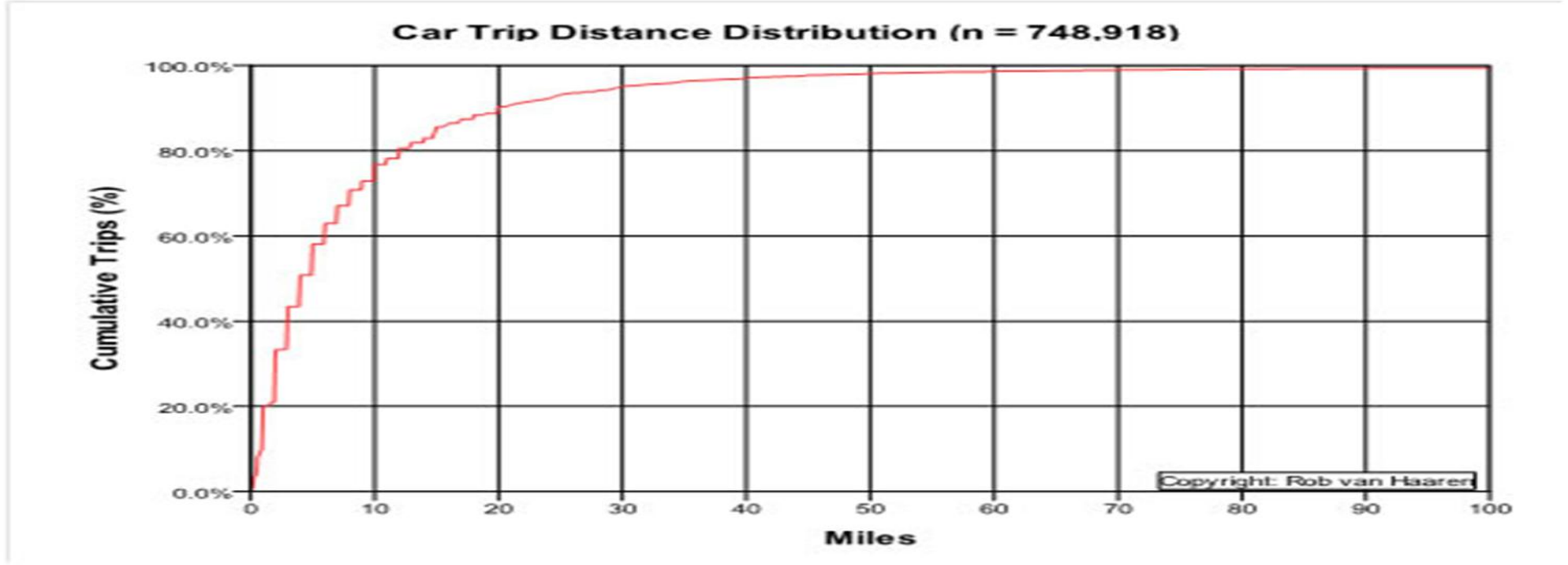


e-Bike pKm/cap/day BAU



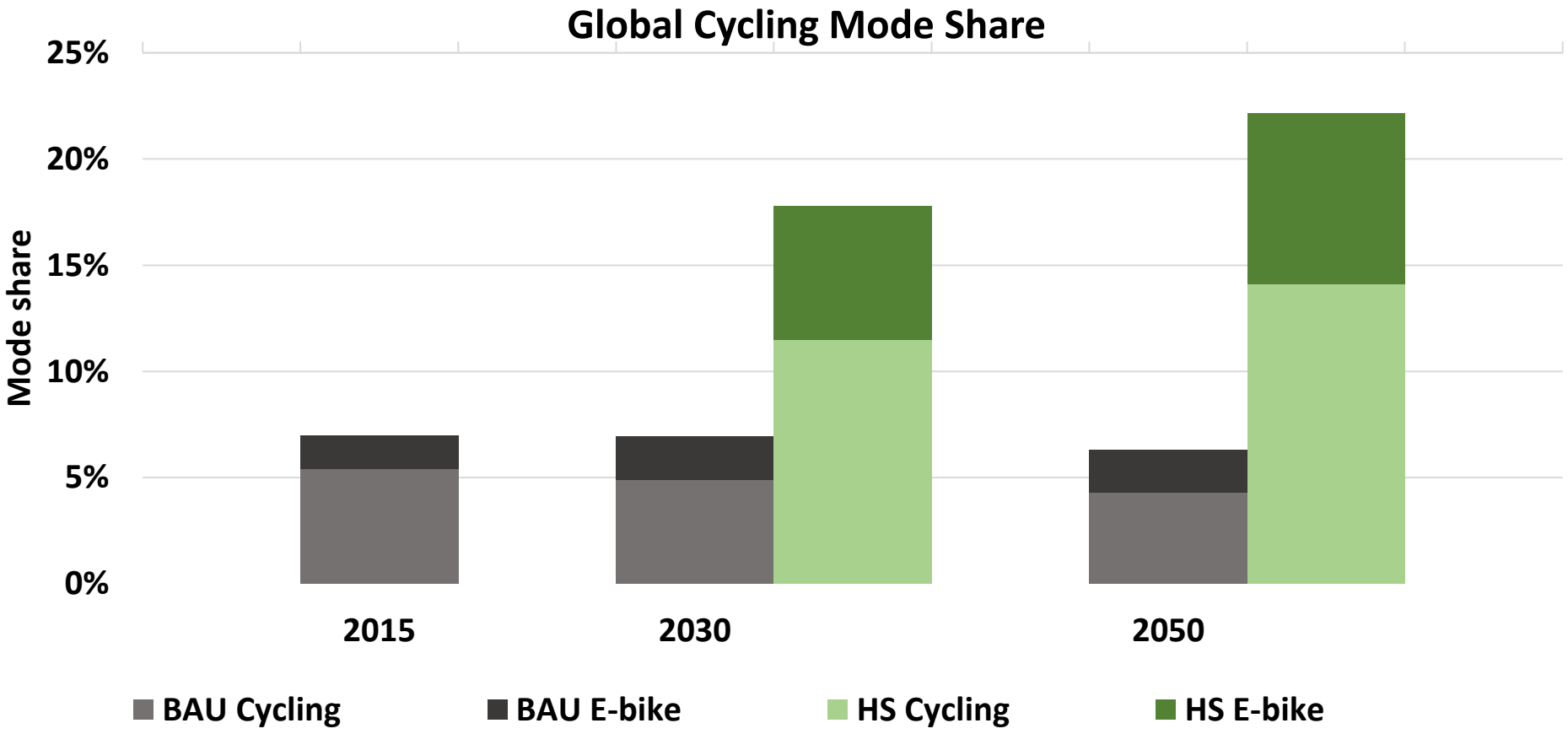
High Shift Cycling (HSC) Scenario

- Examine the upper-limits of feasible cycling
- 2030 and 2050 targets based on :
  1. The average future city can approach the current cycling levels of ‘top performers’
  2. Certain percentage of trips are ‘cyclable’ based on trip distance
  3. Increases are constrained by a plausible maximum rate of change
- HSC requires:
  - Massive behavioral shift, Infrastructure development, Policy incentives

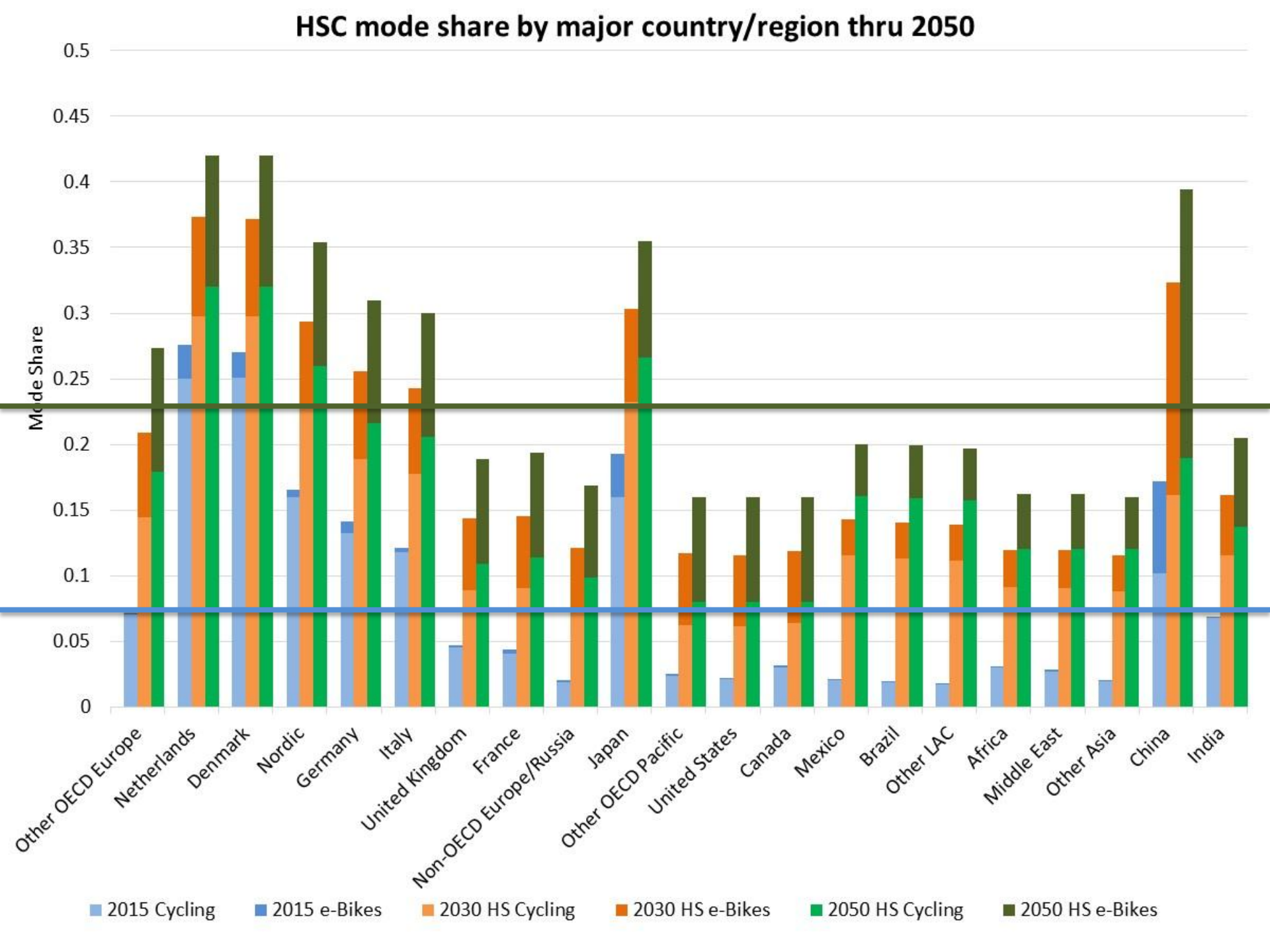


The results: rapid mode share increases in the HSC

- In the High Shift Scenario, there are similar mode share increases in OECD and non-OECD cycling



UCDAVIS
SUSTAINABLE TRANSPORTATION ENERGY PATHWAYS


HSC mode share by major country/region thru 2050
Mode Share
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Other OECD Europe
Netherlands
Denmark
Nordic
Germany
Italy
United Kingdom
France
Non-OECD Europe/Russia
Japan
Other OECD Pacific
United States
Canada
Mexico
Brazil
Other LAC
Africa
Middle East
Other Asia
China
India
2015 Cycling
2015 e-Bikes
2030 HS Cycling
2030 HS e-Bikes
2050 HS Cycling
2050 HS e-Bikes

TODAY

~7% of urban trips,

globally, are taken by bicycle and e-bike.

If we shift to a modest

23% of trips taken by bicycle

or e-bikes by 2050 as part of a comprehensive shift toward sustainable transport (mass transit, walking, and biking), and away from cars, then...

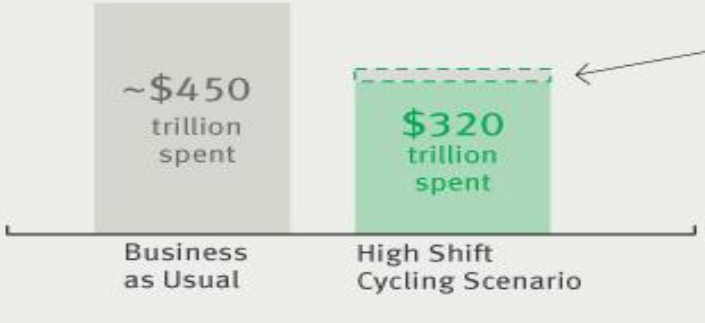
2050 EMISSIONS FROM URBAN TRANSPORT

We could avoid

~300 megatonnes of global C02 emissions,

a 7% reduction in urban transport emissions over BAU due to cycling, as part of a 47% total reduction in the comprehensive HSC scenario

2015-2050 CUMULATIVE COSTS OF TRANSPORT



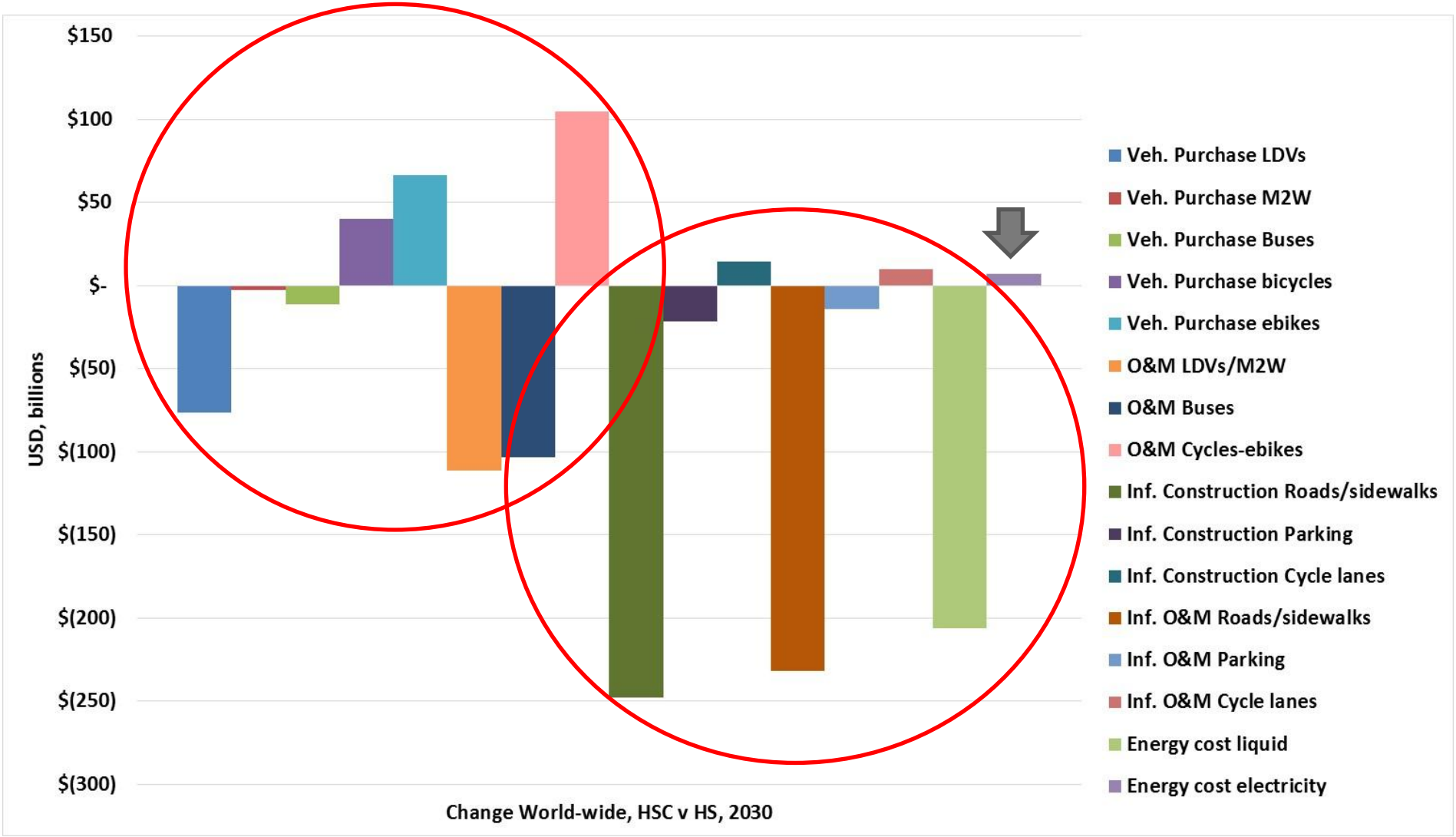
And save cities

$25 trillion USD

over the next 35 years due to cycling

Marginal costs and benefits of greater cycling

Cost: High Shift Cycling v. High Shift without additional cycling -- 2030



HSC Policy

Six Ways to Make the Change

Build
network of cycling and e-bike infrastructure

Implement
large-scale bike-share programs

Invest
in sidewalks, footpaths, and public transport

Plan
urban growth to prioritize cycling, walking, and public transport

Remove
motor vehicle incentives, such as parking requirements and fuel subsidies

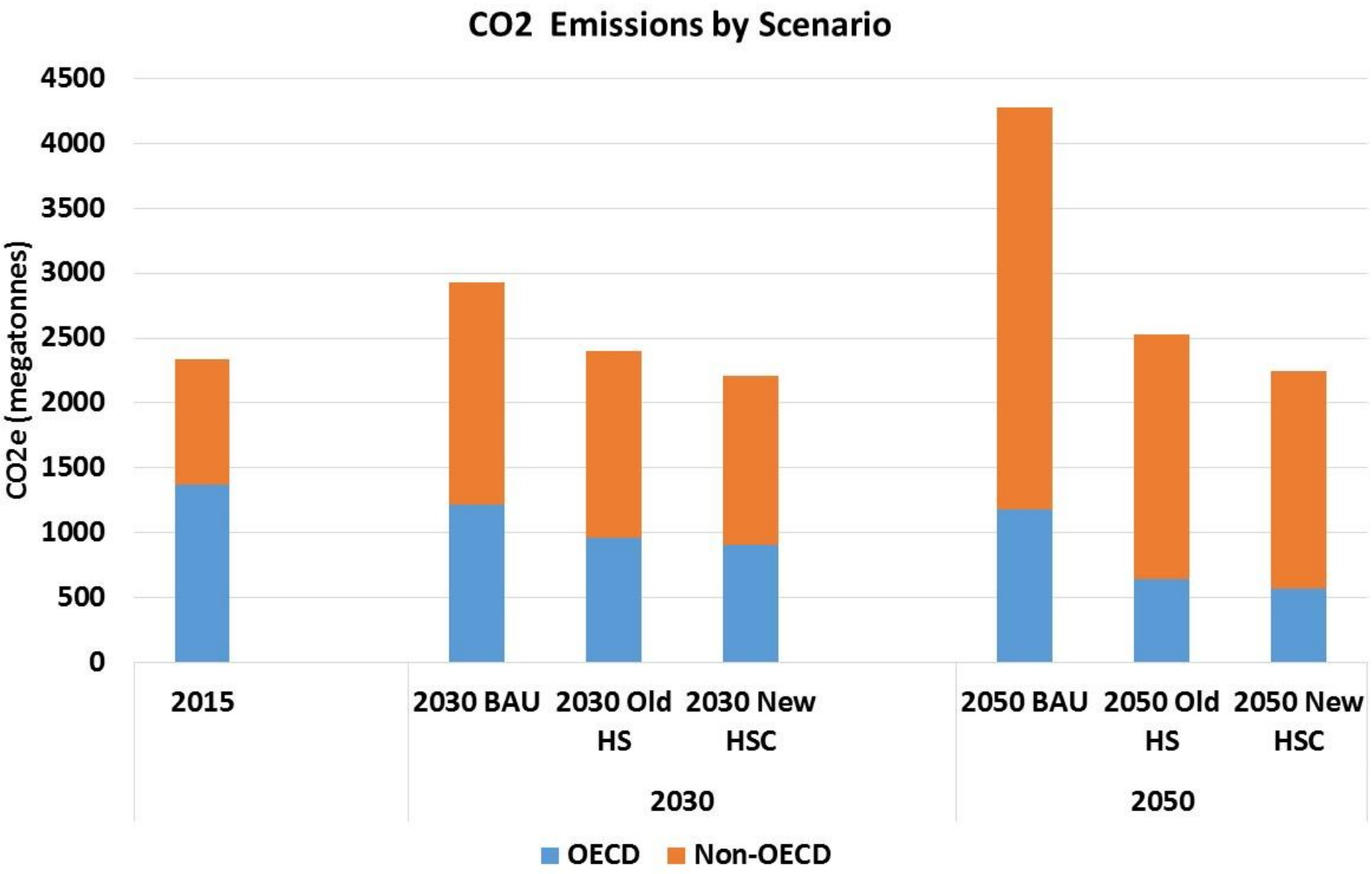
Adopt
management policies such as congestion pricing

Research needs going forward

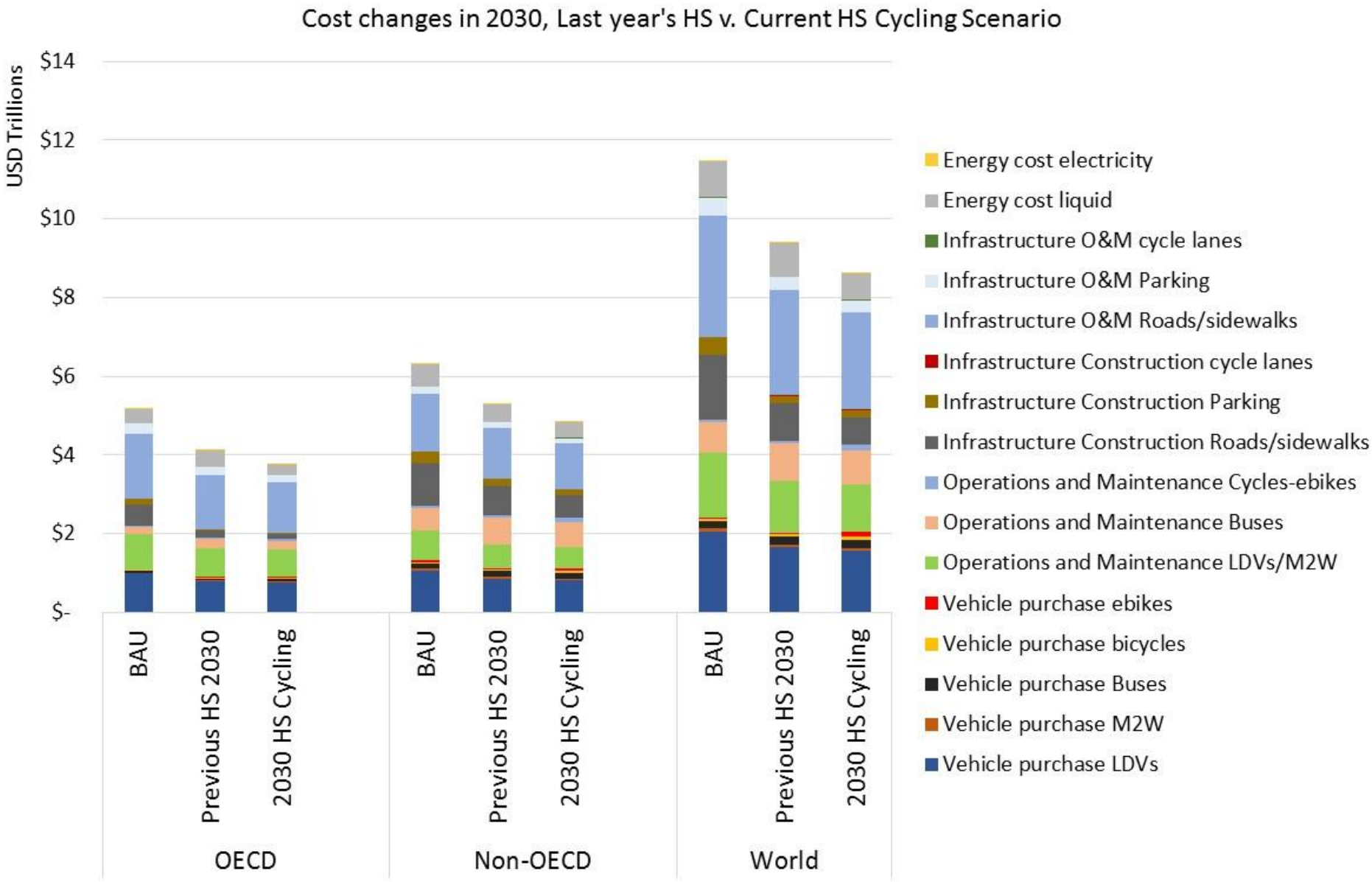
- Universal Cycling Database
- Include quantification of health benefits and economic impact of improved societal health
- Include quantification of congestion relief
- More case studies of successful 'High Cycling' cities
  - How to transfer their strategies to other cities


Thank you!
SUPER LE TOUR 12.2
SCHWINN

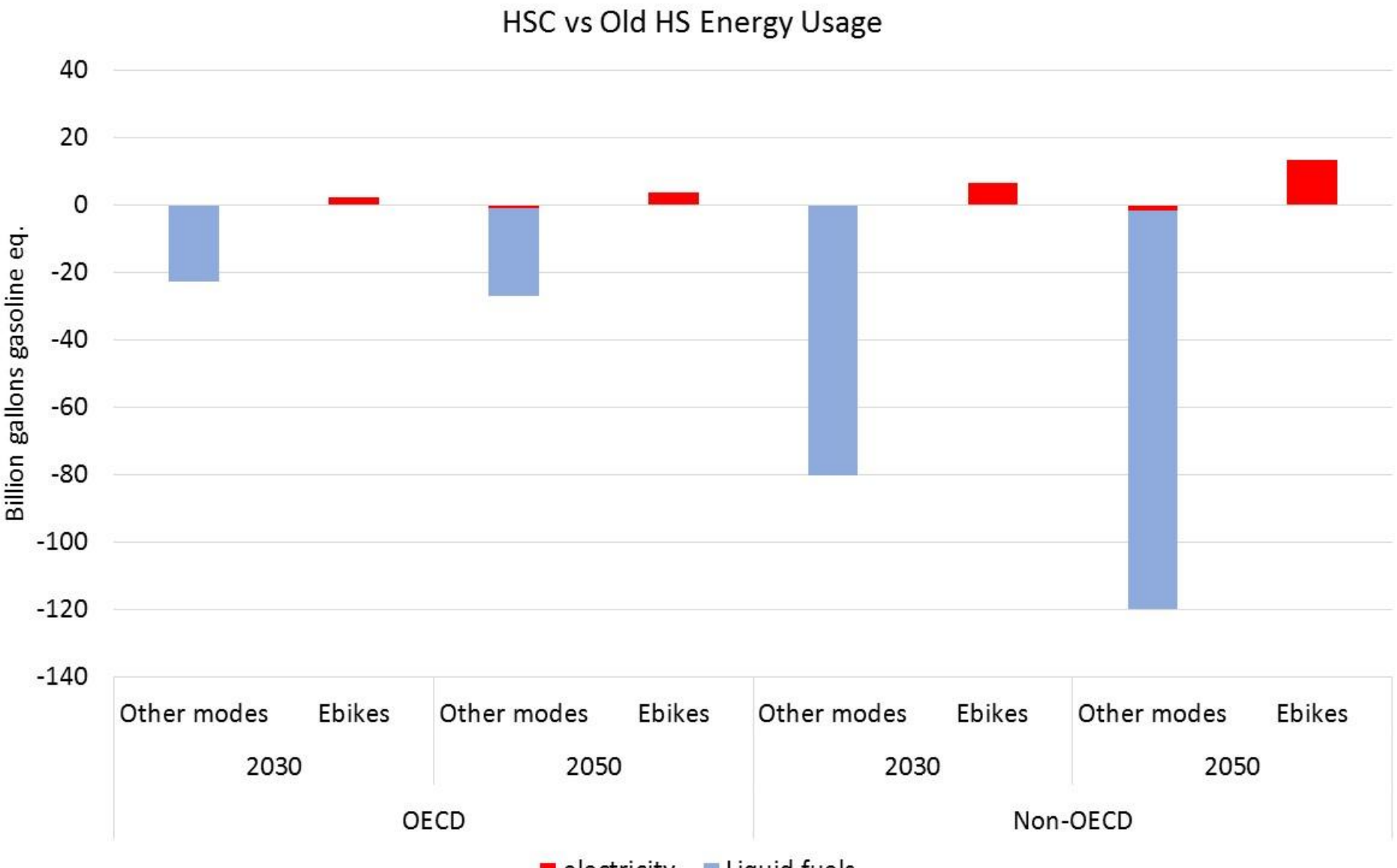
CO_2 Emissions – deep reductions via modal shift and cycling



Costs – massive savings from lower vehicle, fuel and infrastructure costs



Comparing HSC to our previous High Shift Scenario - energy use impacts of cycling



Summary Statistics

Better conditions for cycling and public transit in HS scenario relative to BAU:

- Saves an estimated $130Trillion USD cumulatively thru 2050
- Cuts CO_2 emissions from urban passenger transit by nearly 50% in 2050

Cycling and e-biking in HSC accounts for:

- $25Trillion USD cumulative cost reduction to 2050
- A 7% CO_2 reduction in 2050
- An estimated $700Billion average yearly savings in vehicle, fuel and infrastructure cost