Integrated Conference of BAQ 2014 and Intergovernmental 8th Regional EST Forum in Asia

Session Topic: EST Plenary Session 7

The High Shift Scenario: How Cities can save $100 Trillion by 2050 for More Public Transport, Walking and Cycling with Lower Car Use

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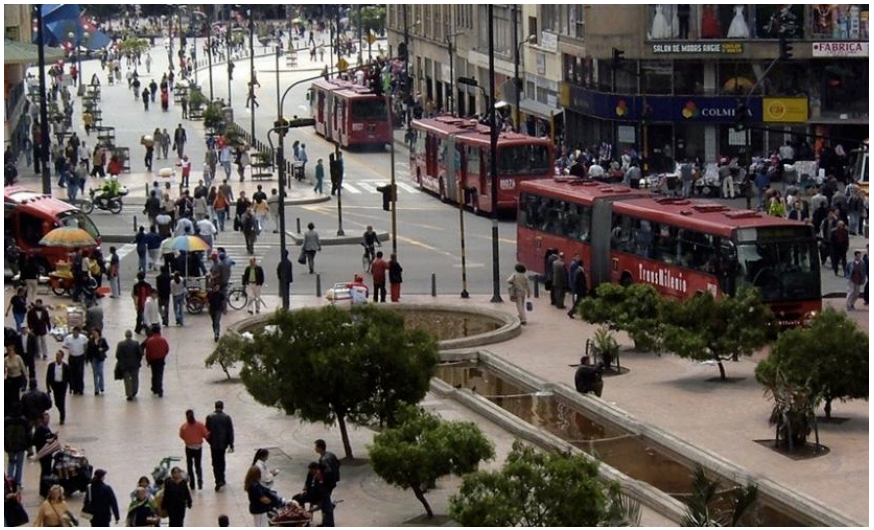
Study Inspiration: Rio+20 Voluntary Commitments

- 8 MDBs: $175b for more sustainable transport
- UITP: double public transport mode share by 2025
- ITDP: promote *BRT and TOD Standards*, national transport policy best practice, and evaluate impacts of 17 Rio+20 sustainable transport commitments



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Global High Shift Scenario Study

- Analysis led by UC Davis, in cooperation with International Energy Agency (IEA) and supported by ITDP, with assistance of International Council on Clean Transportation (ICCT)
- Funded by Ford Foundation, ClimateWorks, Hewlett Foundations
- Project advisory committee includes World Bank, InterAmerican Development Bank, Asian Development Bank, ICCT, EMBARQ, IEA, and others
- Findings of Phase I summary report presented now
- Documentation report forthcoming October 2014

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Analysis Approach

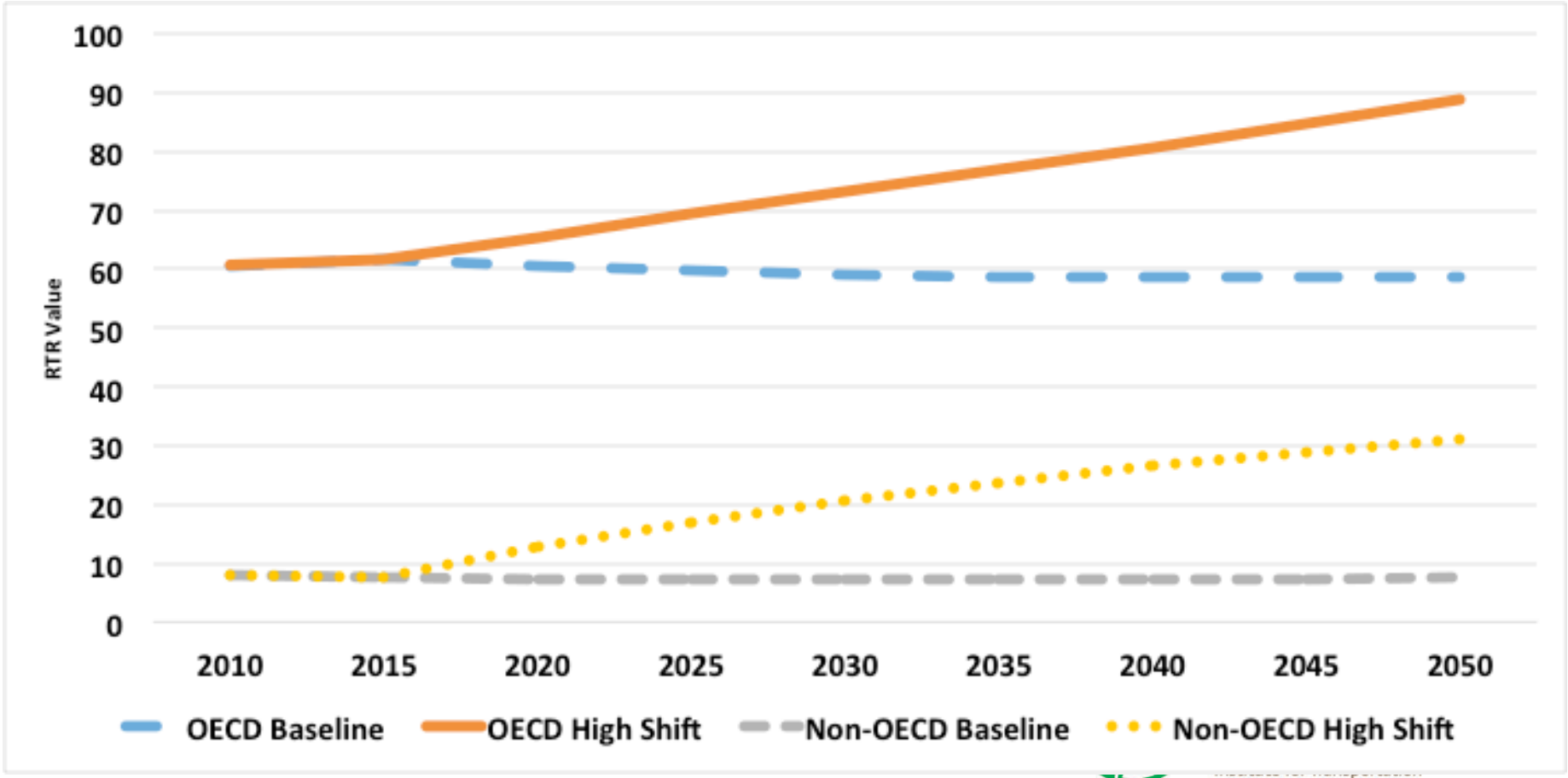
- Global travel projected to 2050 using an urban model adapted from the International Energy Agency's Mobility Model
- World modeled at level of 33 countries/regions
- Detailed reporting for 13 groupings with major economies like the U.S., China and India broken out.
- More detailed breakouts and analysis of urban travel modes than MoMo
- Modal shift based on potential to boost capacity of transit/NMT systems to allow fewer cars

Comparison of Two Scenarios

- "High Shift" Scenario:
  - Projection of cities by size through 2050
  - Increased rapid transit km per million population
  - Encourage walking and cycling for short trips
  - E-bikes expand in lieu of motor cycles and some cars
  - Preserve total projected growth in personal mobility in low and middle income (non-OECD) countries to 2050
  - Cut car travel in cities by half by 2050 in High Shift scenario compared to Baseline Scenario
- "Baseline" Scenario aligns with the IEA 4 degree scenario
  - About 25% improvement in fuel economy to 2050 (slight additional improvements in High Shift scenario)
  - No shift away from car growth trends
  - Other modes static or slow growth

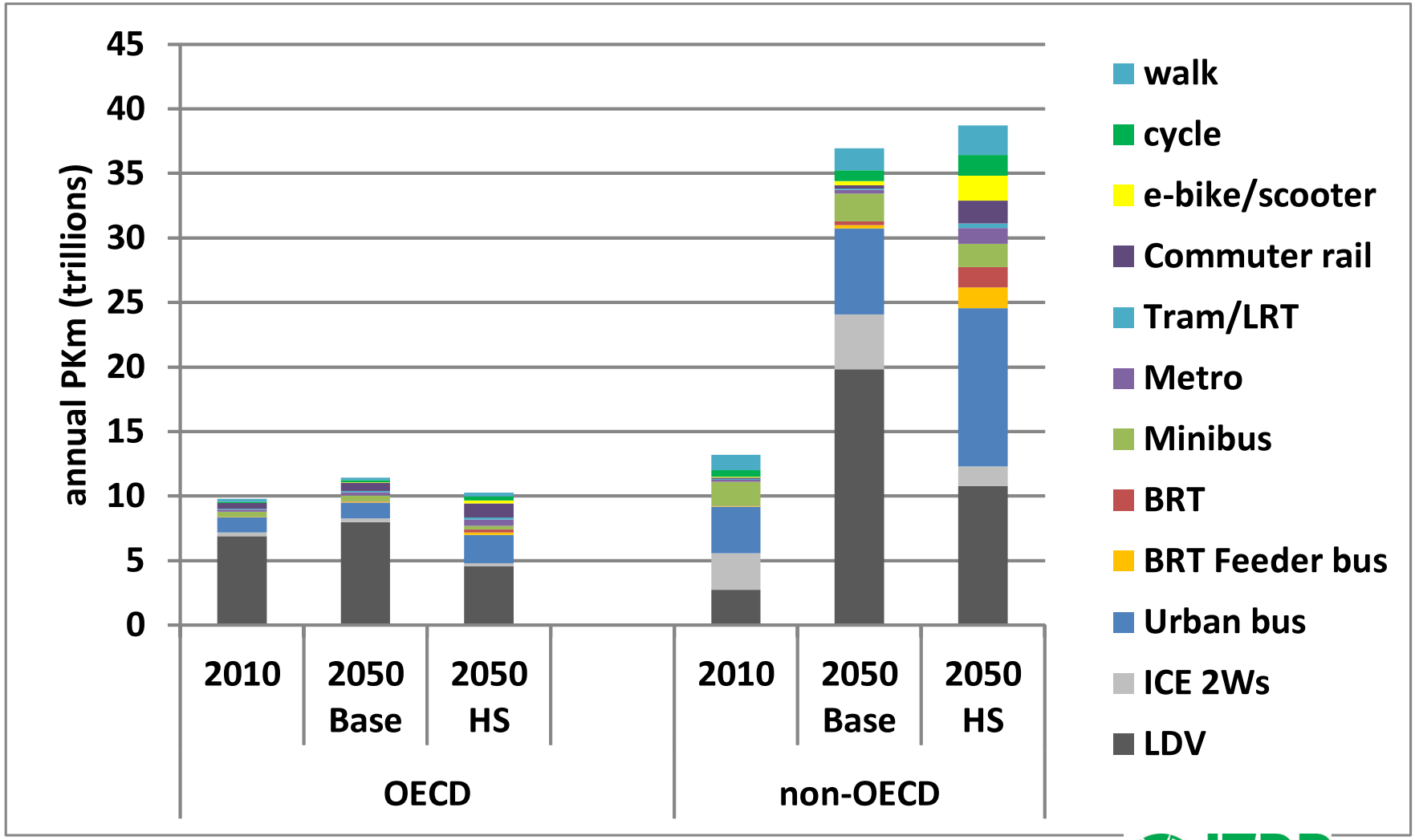
Rapid Transit per Resident (RTR) to 2050 : combined length of transit systems per capita to 2050

	2010		4DS 2030		4DS 2050		High Shift 2030		High Shift 2050	
	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD
Metro	7.1	1.8	6.8	1.5	6.9	1.4	8.8	4.8	10.7	6.4
BRT	0.6	0.7	0.8	1.0	1.0	1.1	4.6	9.0	8.1	13.5
Tram/LRT	11.5	3.0	10.9	2.5	11.1	2.3	13.2	4.0	15.2	4.6
Commuter rail	32.5	1.9	31.0	1.6	31.5	1.4	42.3	10.2	52.6	14.8



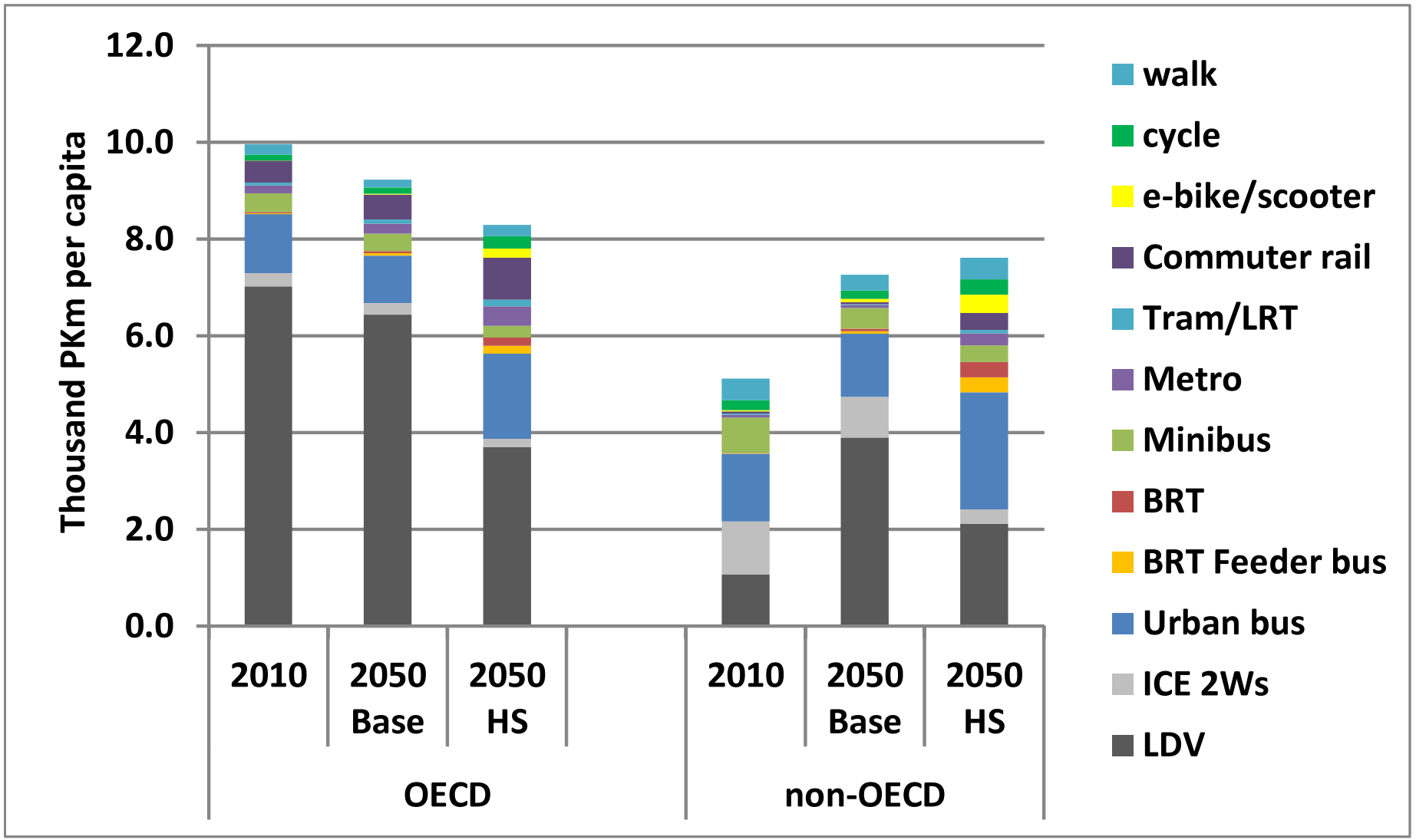
The Base and High Shift Scenario

Doubling of public transport and NMT urban travel and about a halving of LDV travel in 2050 v. Baseline



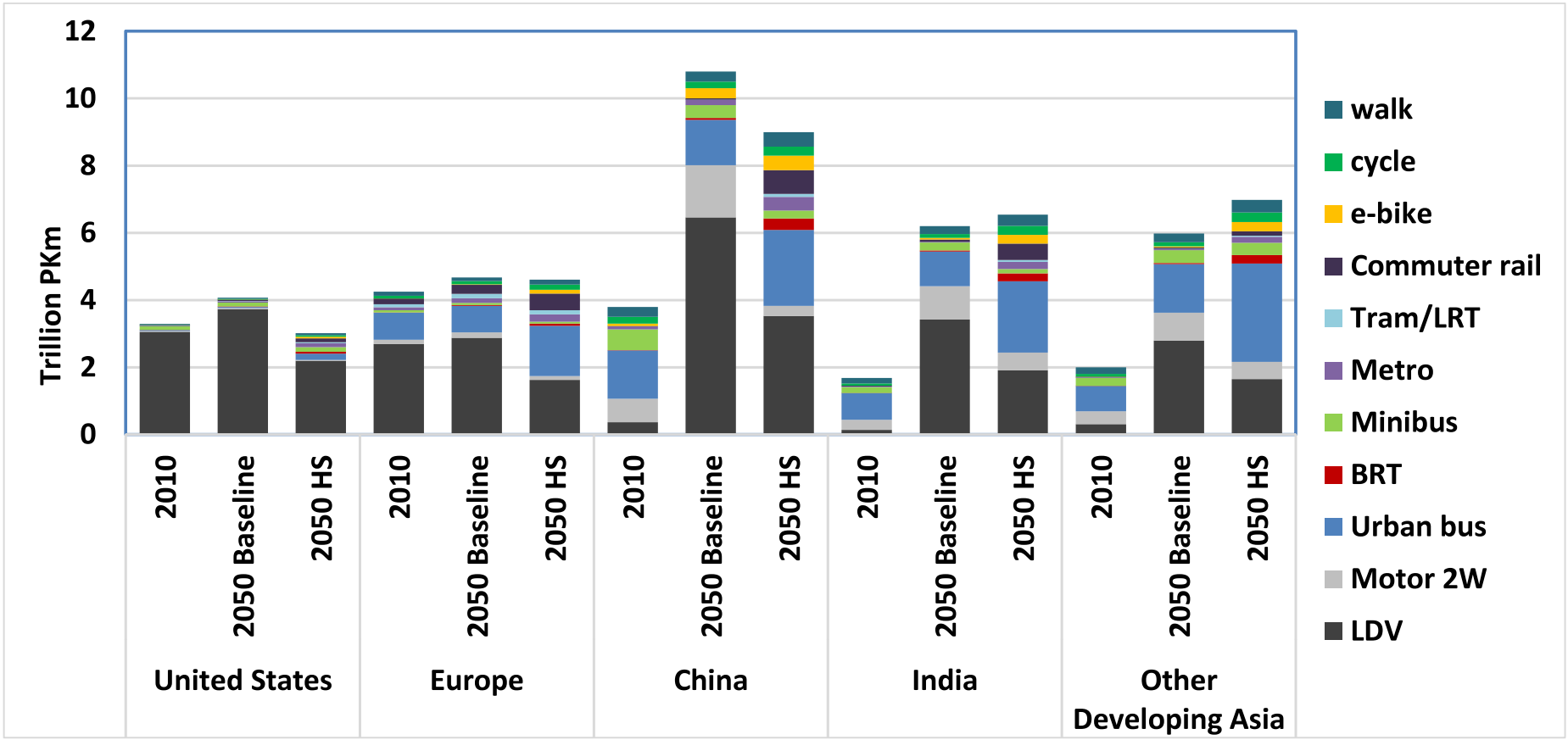
High Shift Scenario – travel per capita

Total travel in non-OECD preserved, travel reduced some in OECD



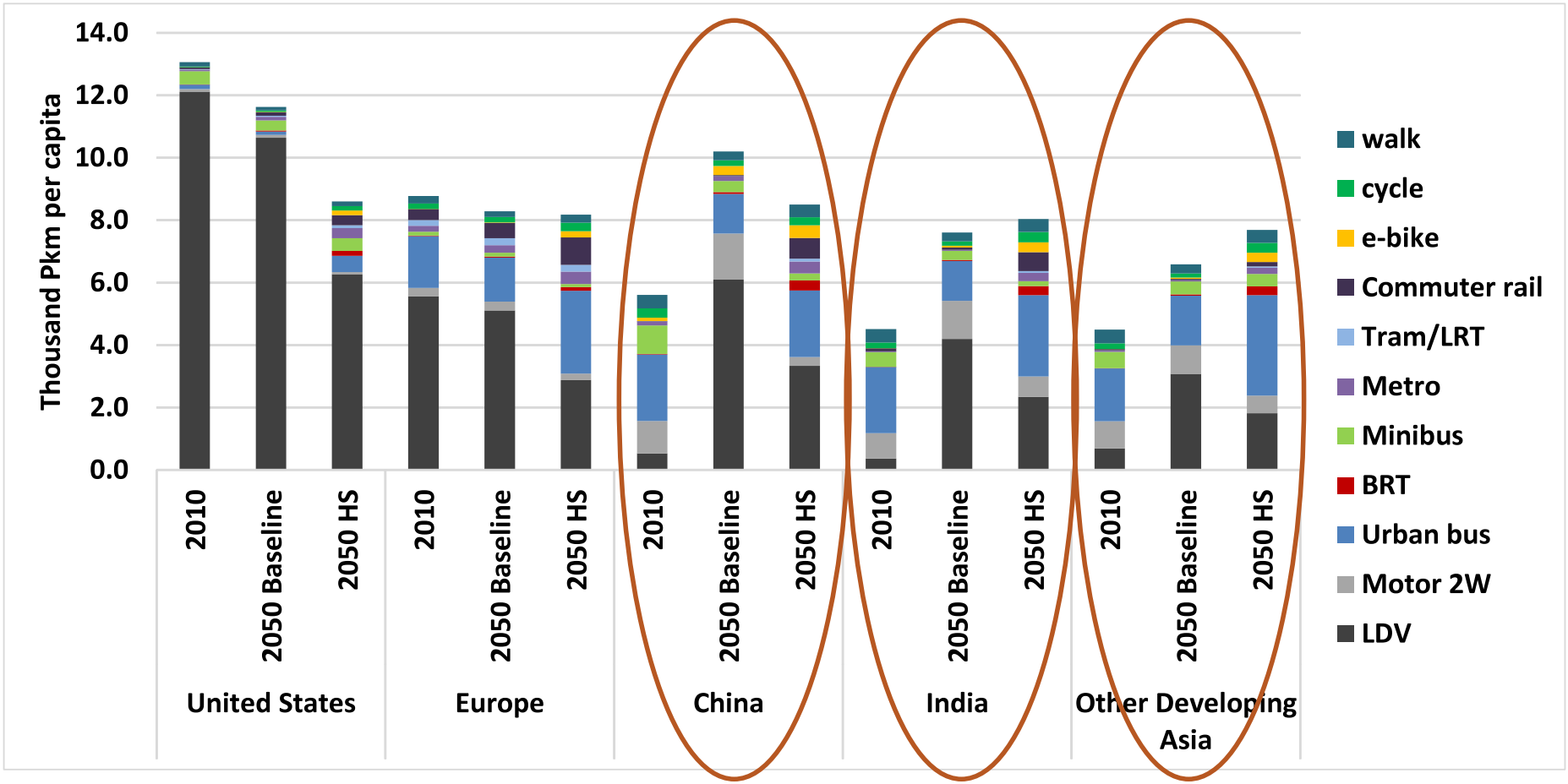
High Shift Scenario – Spotlight on Asia

Rapid growth in urban bus travel, big drop in ICE 2W travel



High Shift Scenario – travel per capita for Asia

Convergence toward 8000 kms per person per year

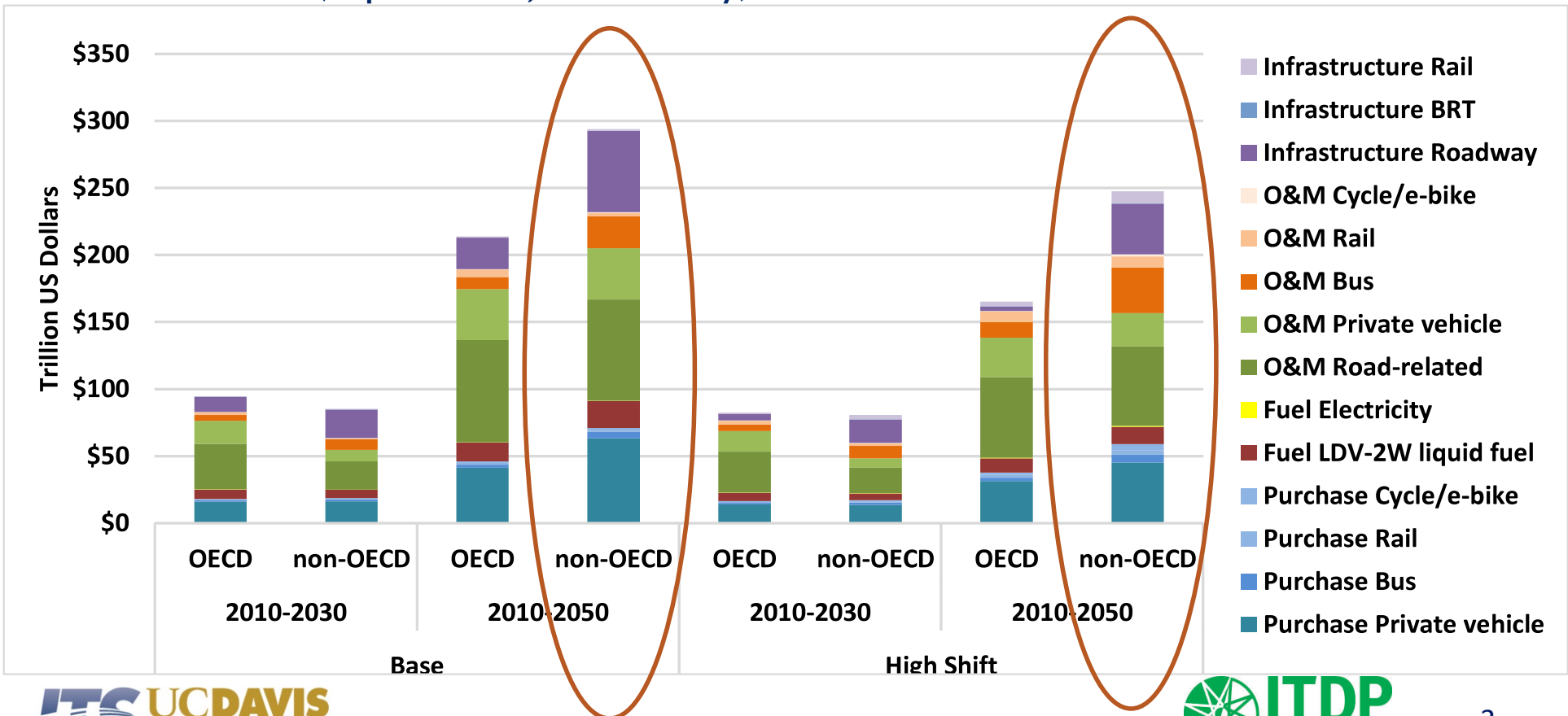


Public and Private Direct Costs

High Shift Scenario lowers total costs in all categories

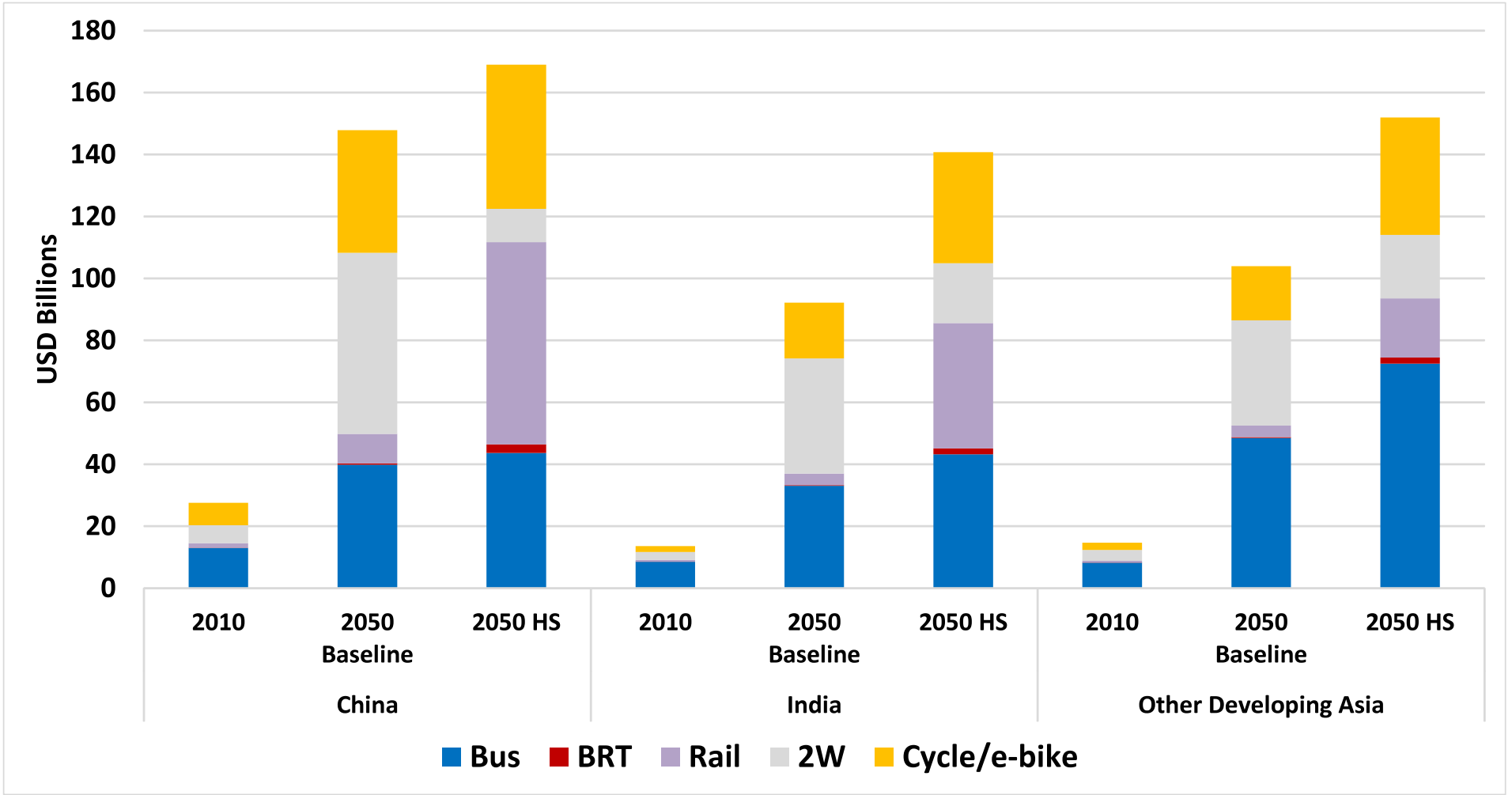
- Vehicle purchase costs (all modes)
- System infrastructure costs (road, rail)
- Vehicle and system operating costs
- Fuel costs (liquid fuel, electricity)

Cumulative Savings of $100 trillion 2010-2050



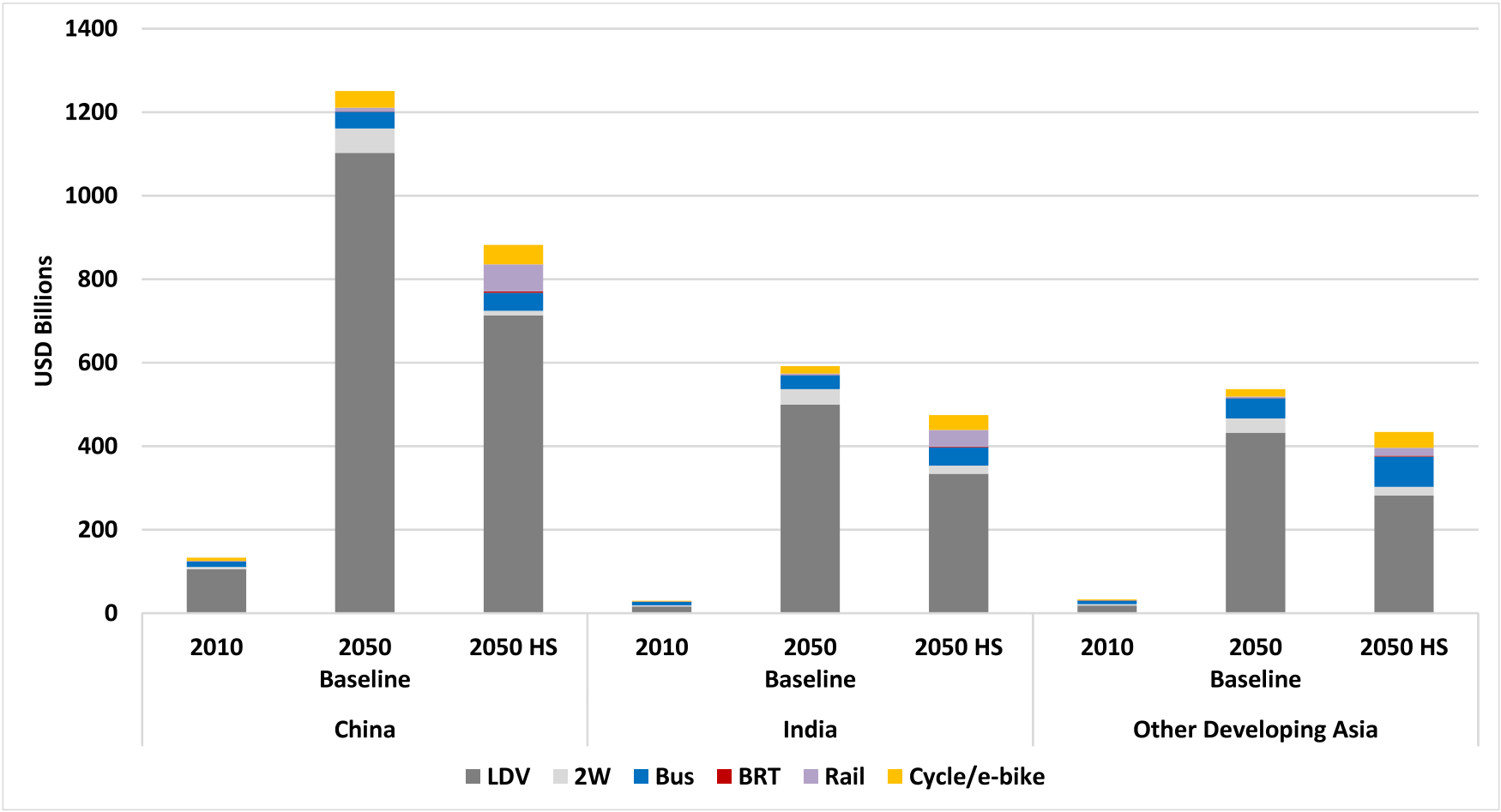
Asia High Shift: vehicle purchase costs – excluding LDVs

Big increases in rail car costs



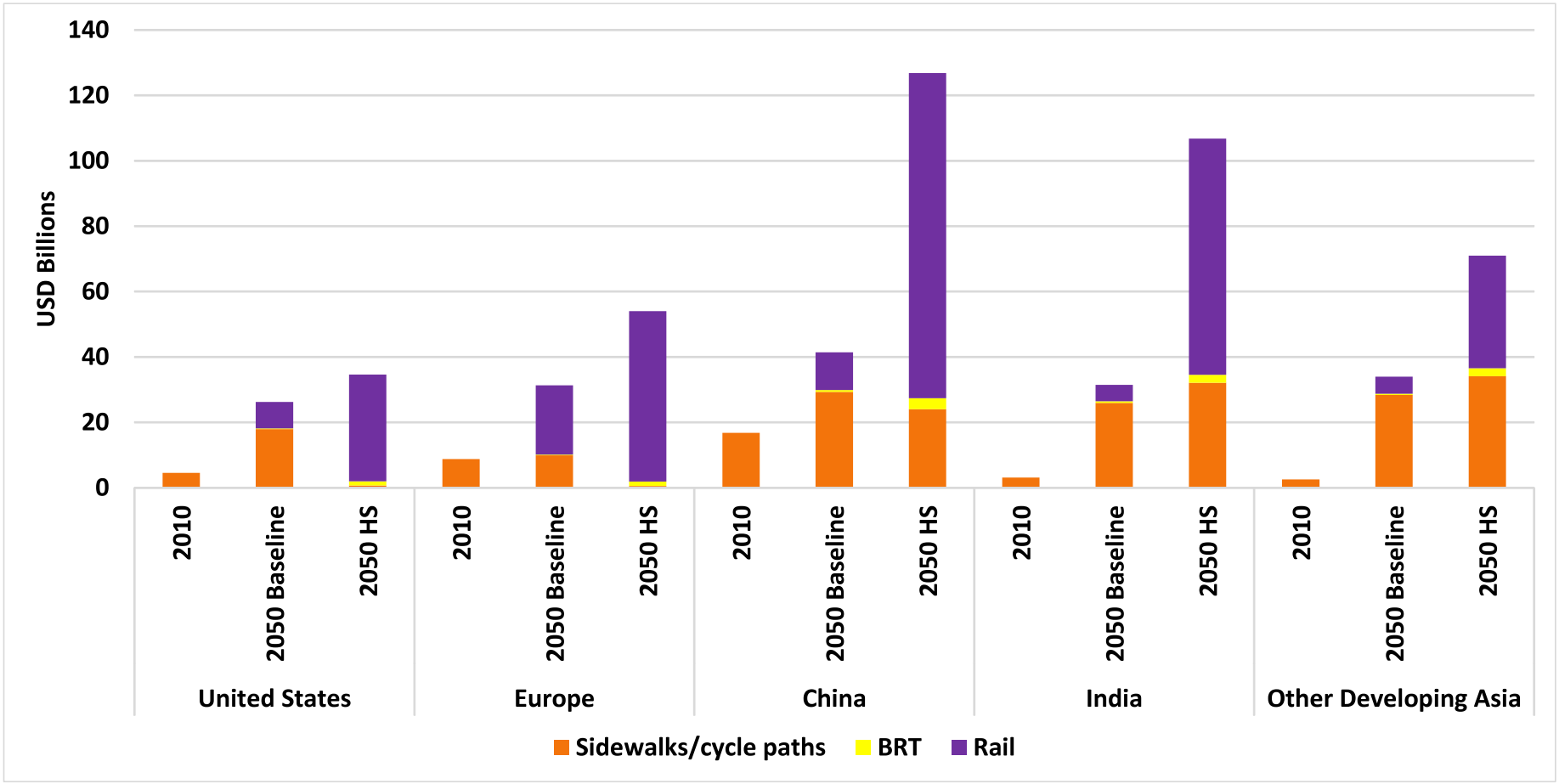
Asia High Shift: vehicle purchase costs including LDVs

…but massive increases in car purchase expenditures in Asia



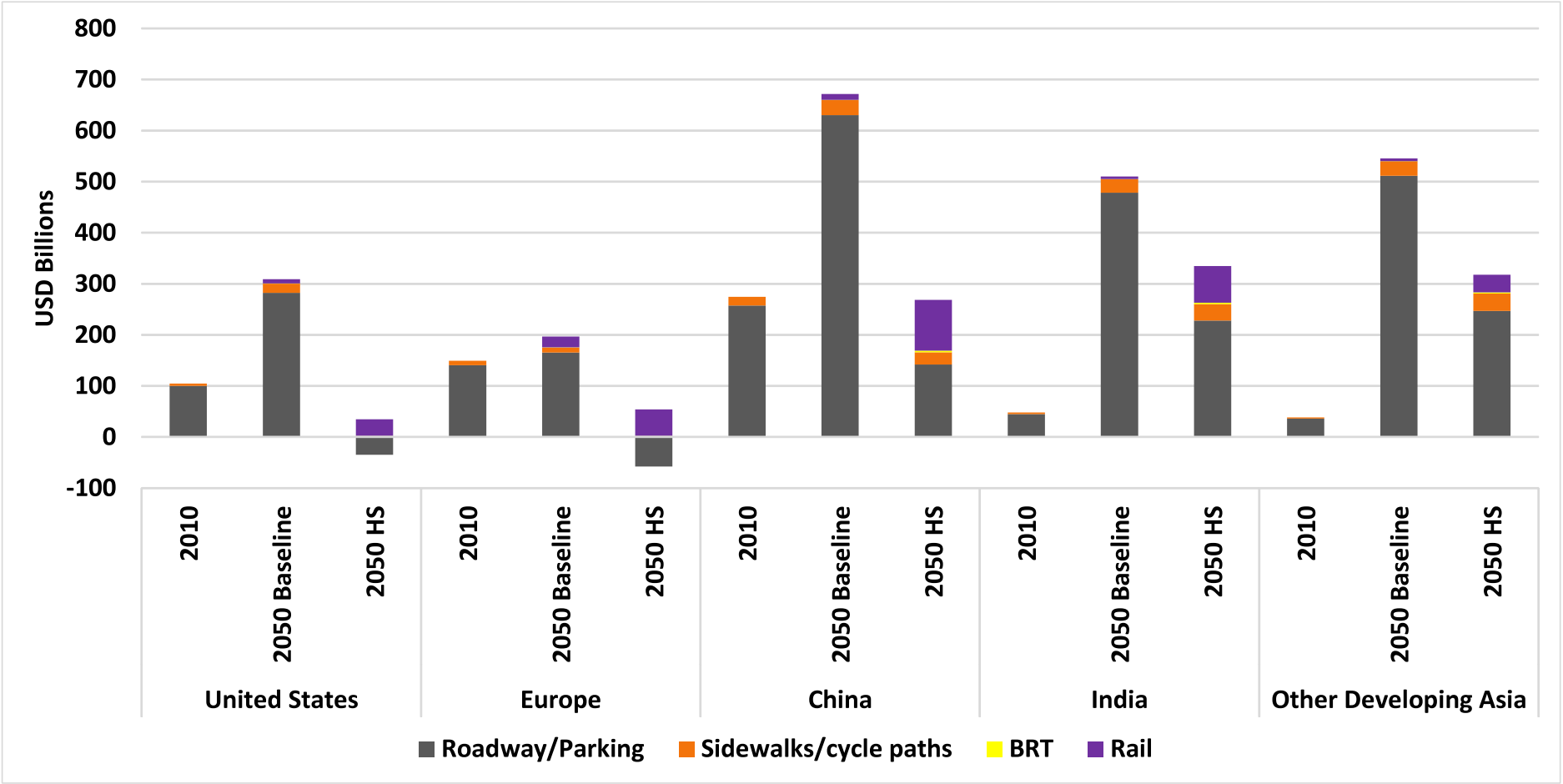
Asia Infrastructure Costs - excluding roads/parking

- **Large rail infrastructure costs; lower sidewalk costs offset higher bike lane expenditures**



Asia Infrastructure costs including roads/parking costs

- Road/parking construction costs dominate in Asia



Conclusions

Although the scenario saves over $100 T through 2050, there are challenges:

- **The outright expenditures on transit systems would have to rise several fold in coming decades**
- **Cutting car growth will be extremely challenging**
- **Policies to discourage car use and raise revenues for transit investments are key**
- **This can include fuel taxes, vehicle taxes, road user charges**
- **If 20% of what would have been spent on cars/roads can be "re-routed" to transit and NMT, this will provide most of what is needed.**

Next Steps

The work continues:

- Currently fleshing out a high BRT scenario
- Will examine the net effects on government revenues and expenditures in different scenarios
- Data is still week – deep dives in individual cities, countries and regions would help
- A policy analysis to achieve HS is desirable
- An similar analysis of freight and intercity travel would be valuable

Thank you for your attention!

Lew Fulton

Co-Director, STEPS Program, UC Davis

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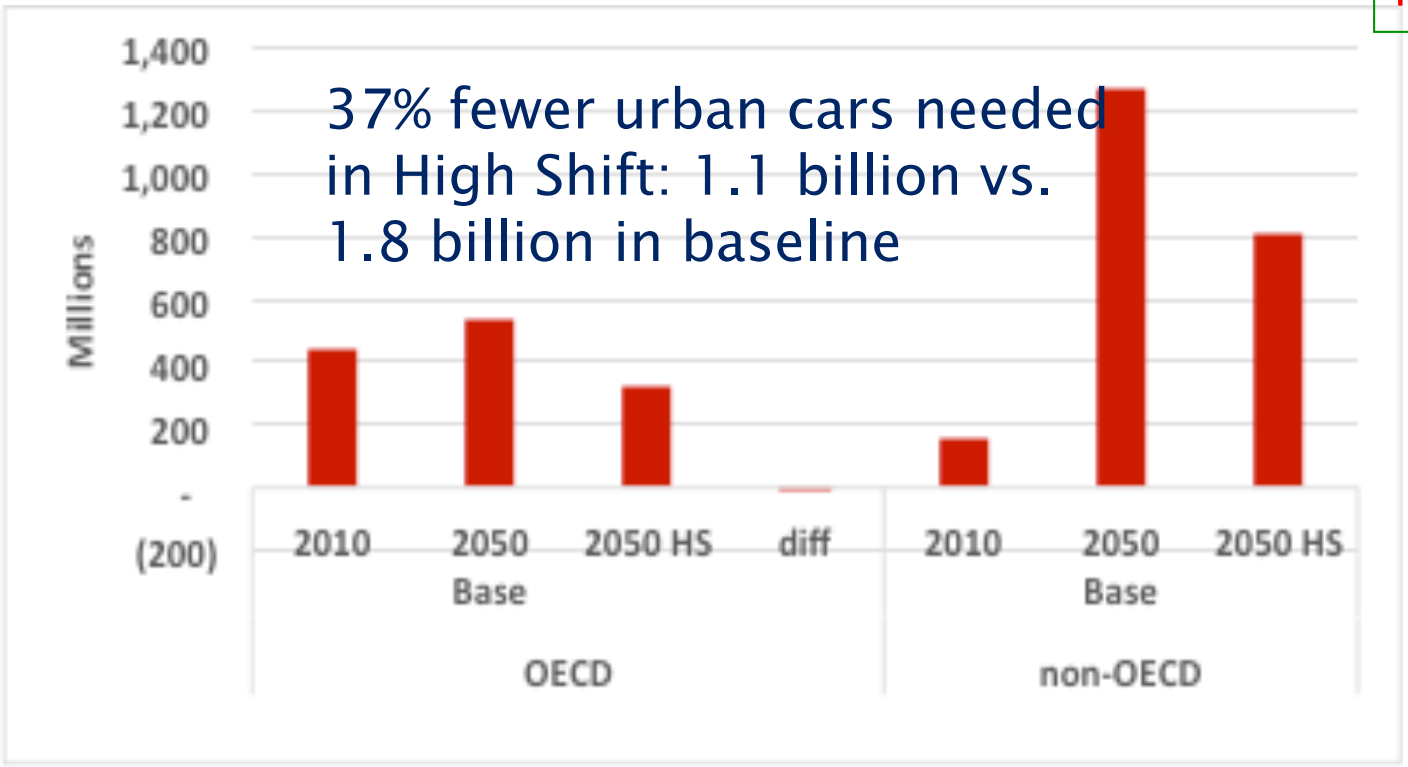
SUSTAINABLE TRANSPORTATION ENERGY PATHWAYS

Estimating Direct Cost of Scenarios

- Vehicle purchase costs (all modes)
- System infrastructure costs (road, rail)
- Vehicle and system operating costs
- Fuel costs (liquid fuel, electricity)

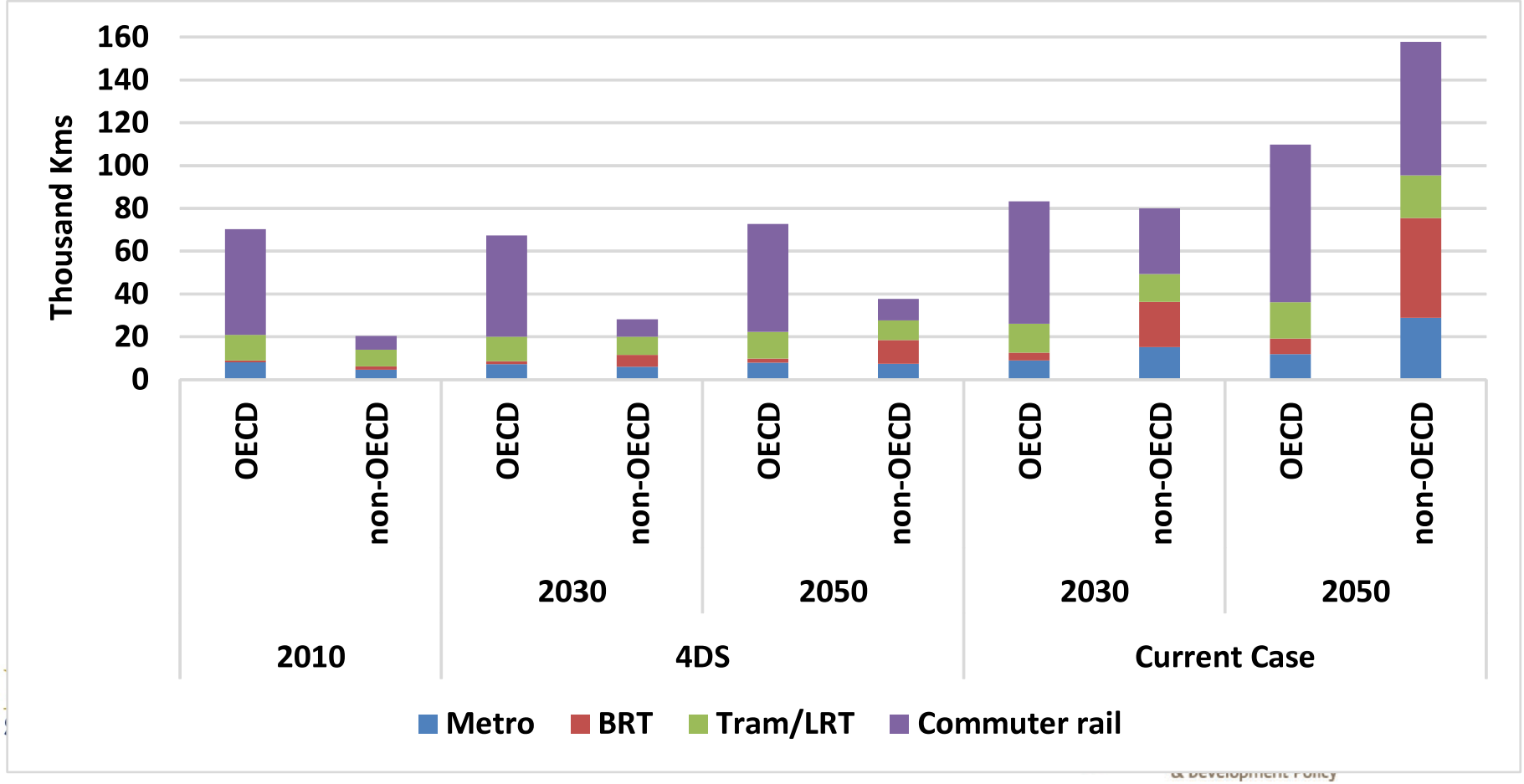
Note: there are an added 500 million non-urban cars in 2050, so total global car stock is 1.6b in High Shift vs. 2.3b in 2050 Baseline, a 30% reduction

Urban Car Stock by Scenario, Year, Region



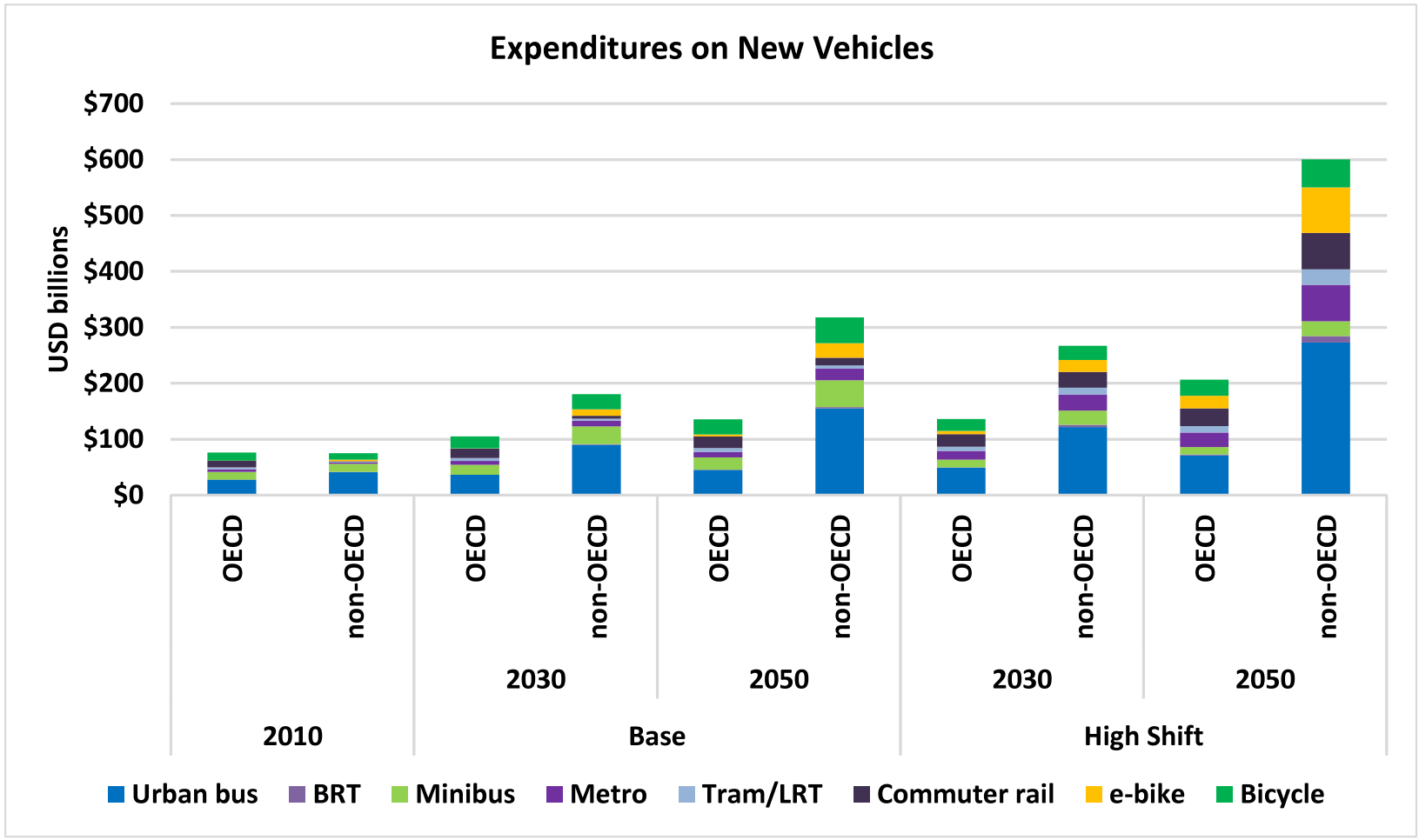
Combined length of transit systems to 2050

	2010		4DS				High Shift			
			2030		2050		2030		2050	
	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD
Metro	6,336	4,883	6,970	6,103	7,604	7,324	9,078	18,922	11,820	32,962
BRT	574	1,910	862	3,820	1,149	5,729	4,740	35,781	8,905	69,652
Tram/LRT	10,221	7,983	11,243	9,979	12,266	11,975	13,516	15,896	16,810	23,809
Commuter rail	28,915	4,967	31,806	6,209	34,698	7,450	43,478	40,488	58,040	76,009



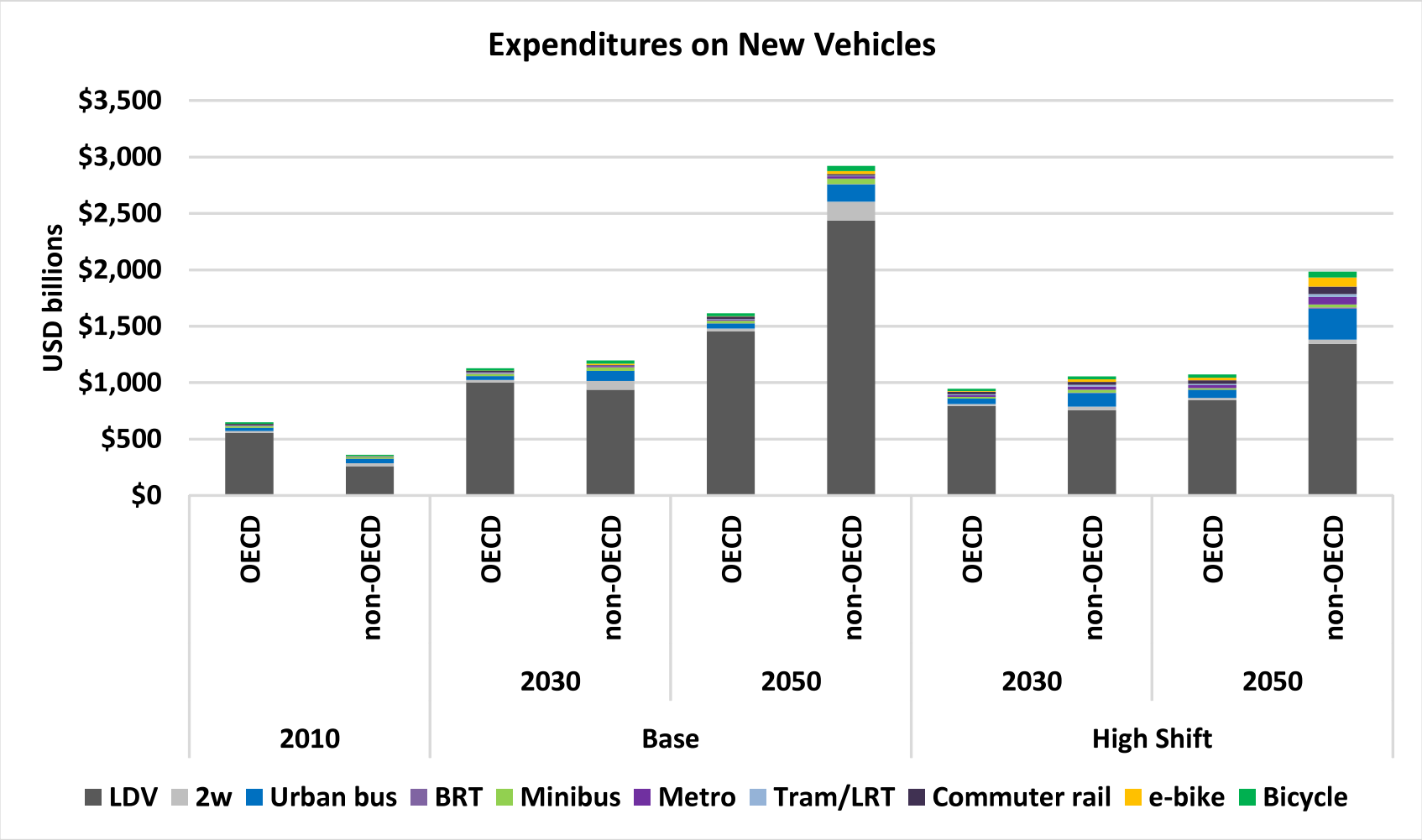
Vehicle purchase costs across all modes – without cars/2Ws

Urban bus costs dominate though BRT/Rail car costs rise in HS case toward 2050



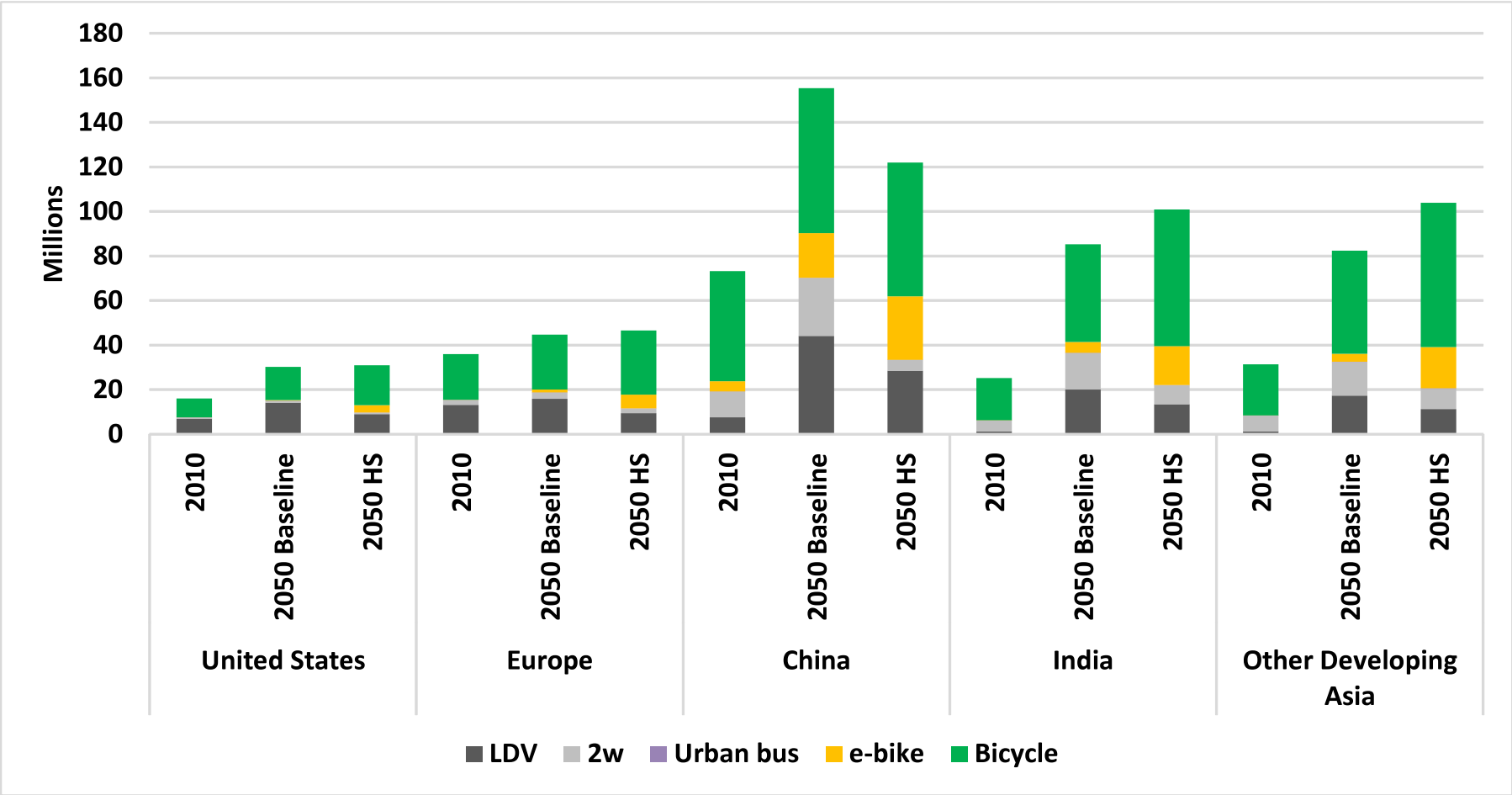
Vehicle purchase costs across all modes – costs in specific year

Car purchase costs dominate, drop substantially in High Shift



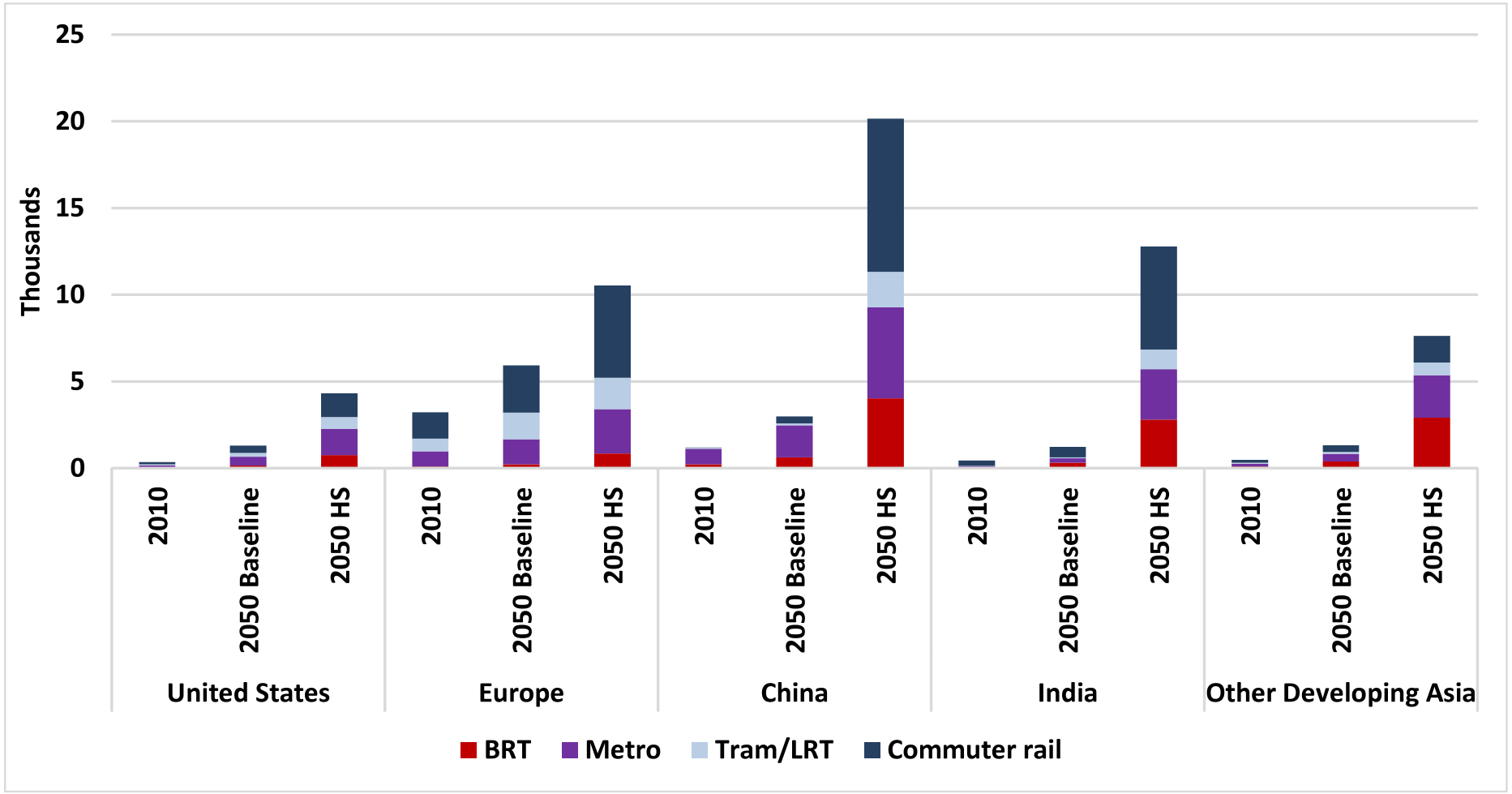
What drives costs: annual purchases of vehicles

Numbers of LDVs, 2 wheelers, e-bikes and Bicycles are in 10's of millions…



What drives costs: annual purchase of vehicles

…while BRT and rail car purchases are a few thousand even in HS



Infrastructure investment costs across all modes

- **Road/parking costs dominate, followed by metros and side walks (foot paths)**

Annual Costs