STEPS

SUSTAINBLE TRANSPORTATION ENERGY PATHWAYS

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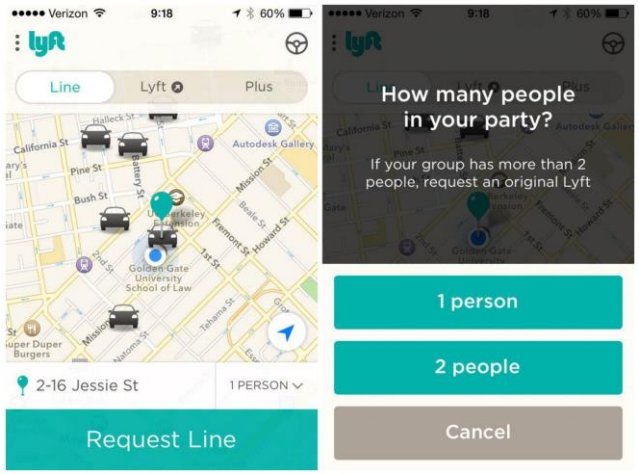
Session 1:
Three Revolutions



Charting the Path to a Sustainable Mobility Future: Three Revolutions in Global Transportation by 2030/2050

Project description and preliminary results

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ITDP Institute for Transportation & Development Policy

Project Background

- This research project grows out of two previous “High Shift” studies done by ITDP and UC Davis
- This focus on 3 major impending transportation “revolutions” not included in the two previous studies: electrification, shared mobility and automation/connected vehicles
- Scenario study to 2050 focused on potential scenario impacts on CO2, energy use, costs
- Study supported by STEPS Funds and by Climate Works, Hewlett Foundation, Barr Foundation
- Project time Frame: September 2016-March 2017
- Project advisory board established

Study scope – two main aspects

- Investigate and report on the current (2016) status of a range of types of new mobility services around the world
- Create 3 Revolutions urban passenger/vehicle travel scenarios to 2030, 2050

Creating 3 Revolutions scenarios to 2030, 2050

- Explore scenarios related to how much the technologies and services could grow and shape future transport
- How may patterns vary in different countries?
- What types of overall mobility, energy and environmental impacts might these services have in the context of broader urban transport system developments?
- Explore interactions between the three revolutions
- Develop narratives on how each scenario could develop
- Identification of policies that could steer existing trends to maximize mobility and sustainability benefits to cities

Scenario methodology

- Study works from MoMo-model based system used in two previous studies to create new scenarios to 2030, 2050
- Basically an accounting “ASIF” model, that has global coverage. IEA and UCD have built up the urban focus in recent years
  - We will use a somewhat simplified urban accounting framework for this study, without using the full MoMo model
- Build on our previous studies’ projections of urban travel worldwide broken into at least 8 world regions
  - Starting with five major economies for deep dives
- Three scenarios:
  - BAU – similar to 2 previous studies – aligned with IEA projections
  - 2R will keep most BAU travel aspects but adds very high LDV/bus electrification and autonomy by 2050
  - 3R involves a “revolution” in mobility - featuring shifts to much higher transit and shared mobility levels by 2050

Rough guide to the three scenarios

	Electrification	Automation	Shared Vehicles	Urban Planning/ Pricing/TDM Policies	Aligned with 1.5 Degree Scenario
Scenario 1: Modified BAU, Limited Intervention	Low	Low	Low	Low	No
Scenario 2: Technology-dominant 2R	HIGH	HIGH	Low	Low	YES
Scenario 3: Avoid Shift Improve 3R	HIGH	HIGH	HIGH	HIGH	YES

Variable coverage

- **Variables we will attempt to quantify (left side) and treat qualitatively (right side):**

- Mobility patterns/mode and technology shares
  - Modal stocks, VKT, PKT
  - Vehicle characteristics
- Energy use
- CO_2 emissions
- Market-related costs

- Accessibility
- Convenience
- Traffic congestion
- Land use/livability
- Air pollution impacts
- Health benefits

Timetable, outputs

- Preliminary findings by November 2016
- Full draft report by January 2017
- Final report and all output materials by end February 2017
  - 25-30 page main report
  - Various infographic materials
  - 2-page policy brief
  - Ppt slide decks
- Presentation at several conferences in 2017 (suggestions welcome)

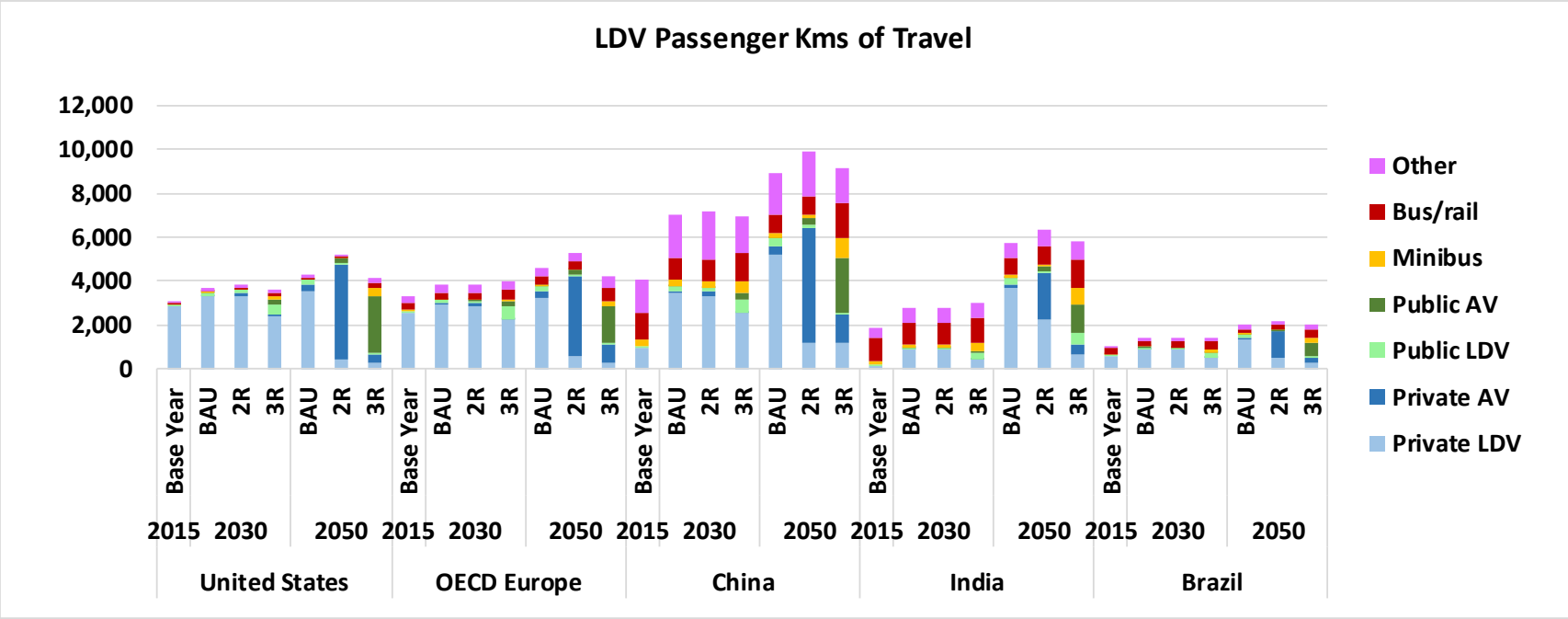
More details and preliminary results in following slides

ALL RESULTS PRELIMINARY!

Please do not cite

Passenger kms of travel, all years, scenarios, modes

- Huge growth in travel in China/India, 2015 to 2030
- 3R travel lower than 2R due to more compact cities, various TDM policies
- This will be elaborated in our narrative, will include an analysis of costs of modes and mode shares



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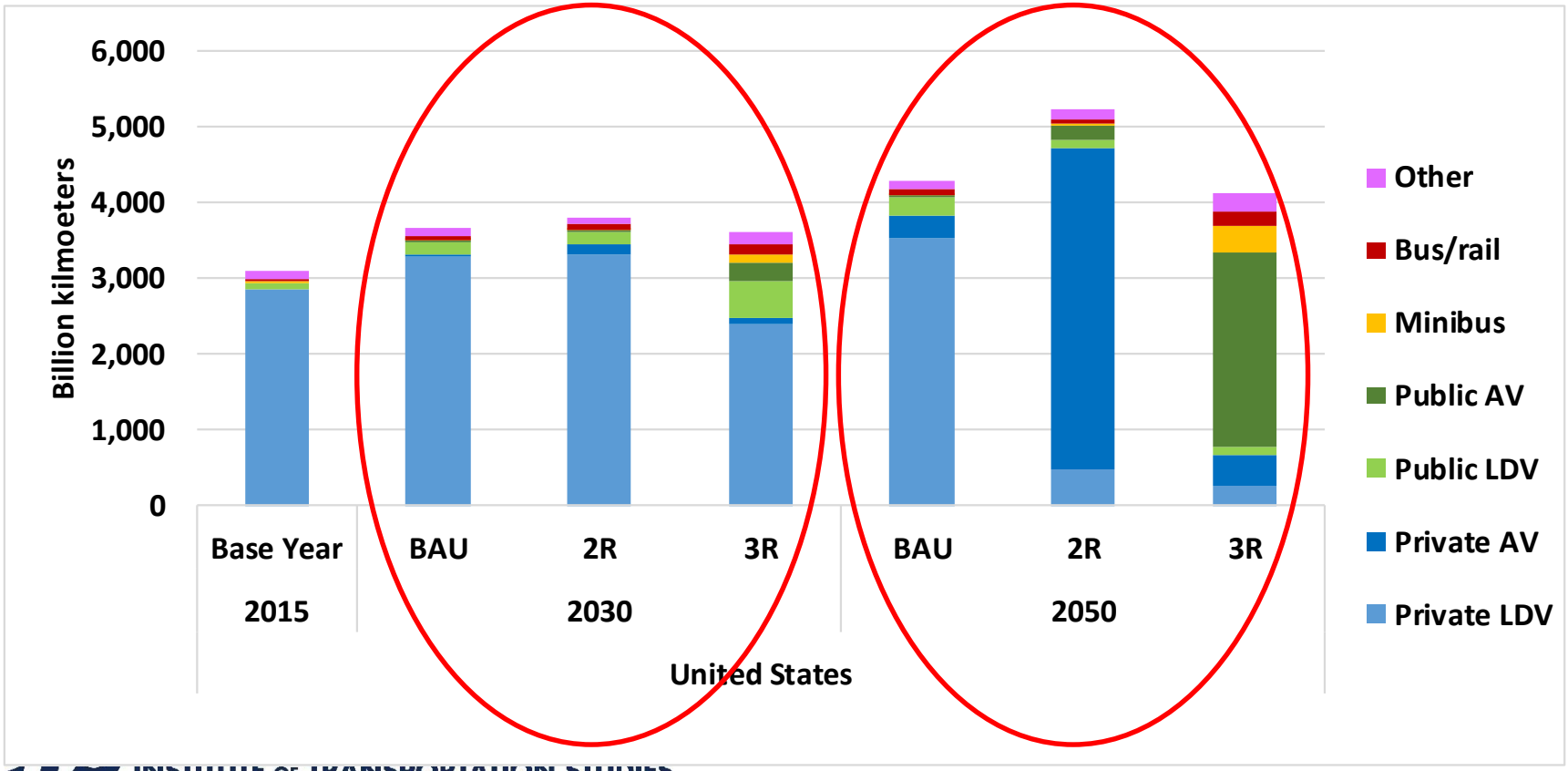
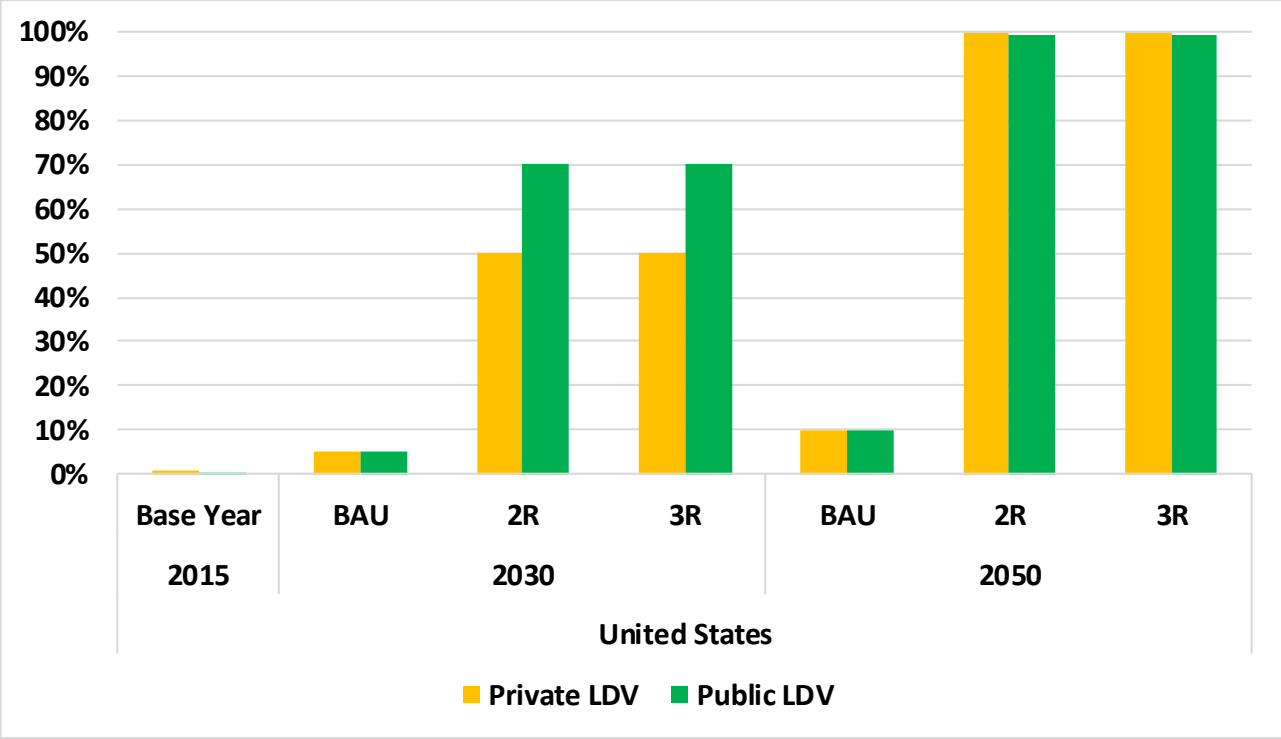
Passenger kms of travel, aggregated modes, USA

- Automated vehicle travel not significant by 2030 in any scenario, but dominates in 2050. Results in much higher travel in 2R
- US remains car dominated to 2050 - increase in travel mode mix in 3R, but mostly due to TNCs. Also significant minibus travel. Non-car travel reaches 18% in 3R



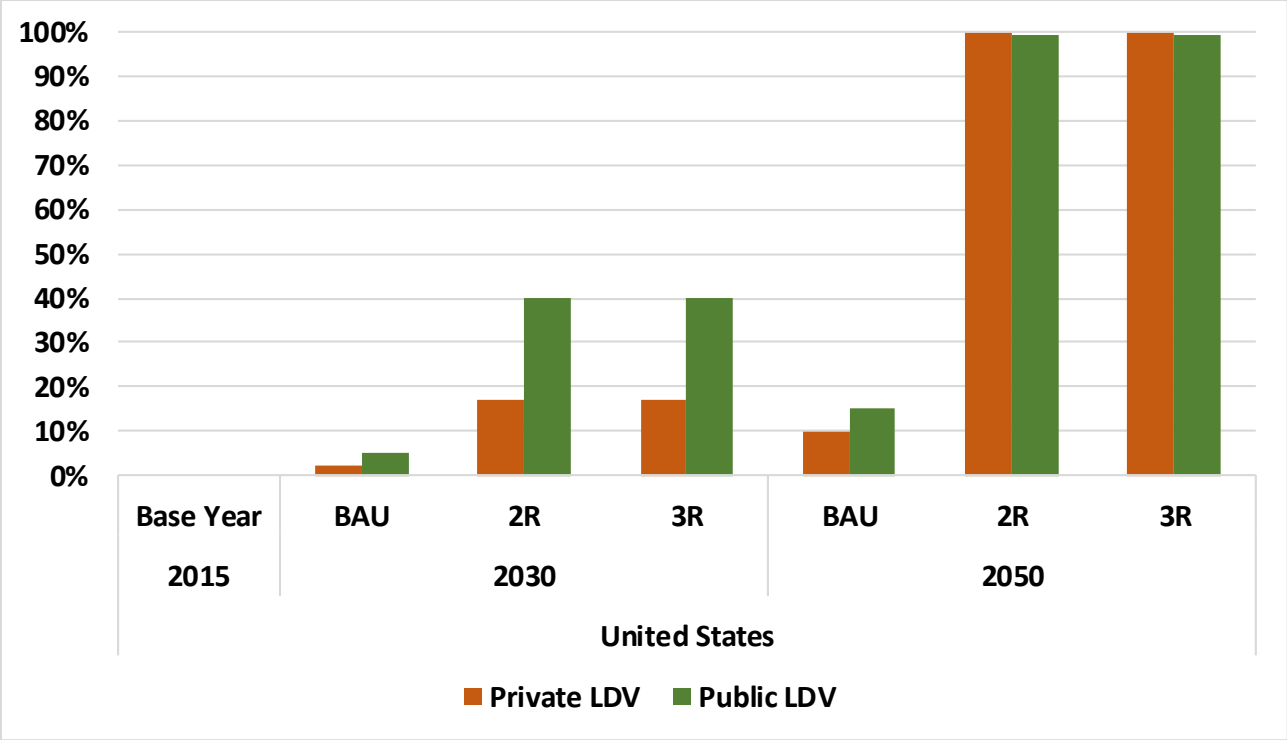
United States – electrification

- We assume the following for electrification:
  - Very strong policies in 2R/3R to spur uptake of EVs and PHEVs, and technology keeps improving
  - By 2050 100% sales share



United States – automation

- We assume the following for automation:
  - Mass-market automated vehicle sales begins early 2020's in 2R/3R
  - TNC cars lead, reaching 50% in US/Eur/China by 2030
  - TNC cars that are automated are electric



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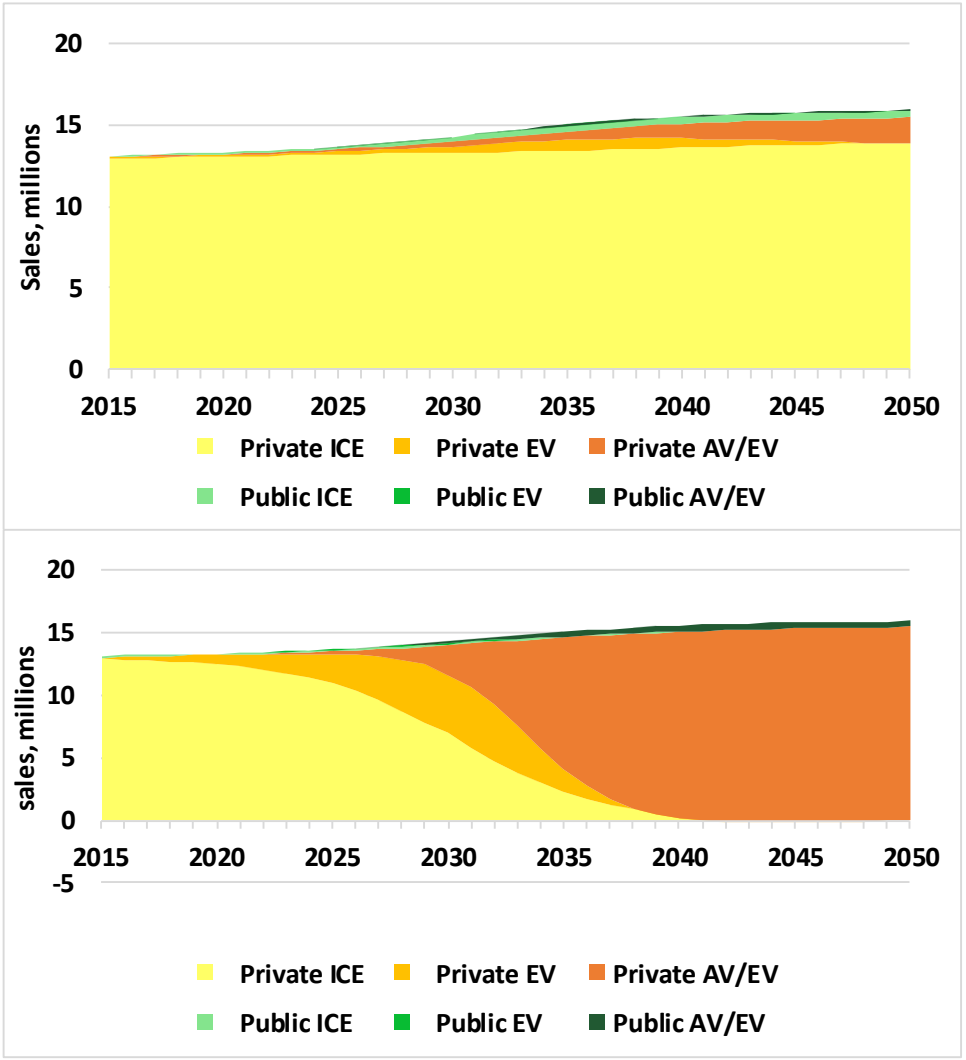
US LDV sales evolution in BAU, 2R Scenarios

- BAU Case – sales rise slowly with little change in vehicle types
- 2R Case – sales rise slowly with major changes in private vehicles, but few public vehicles



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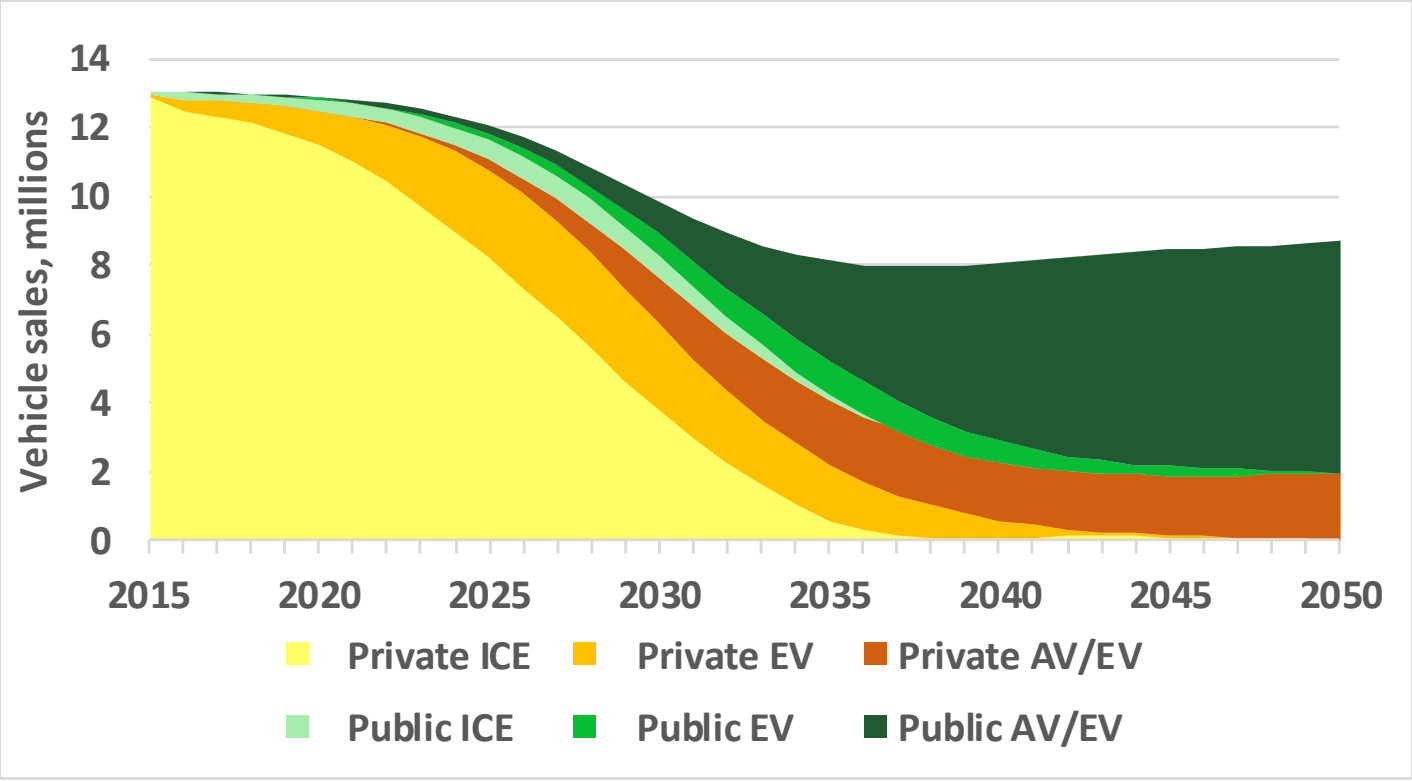
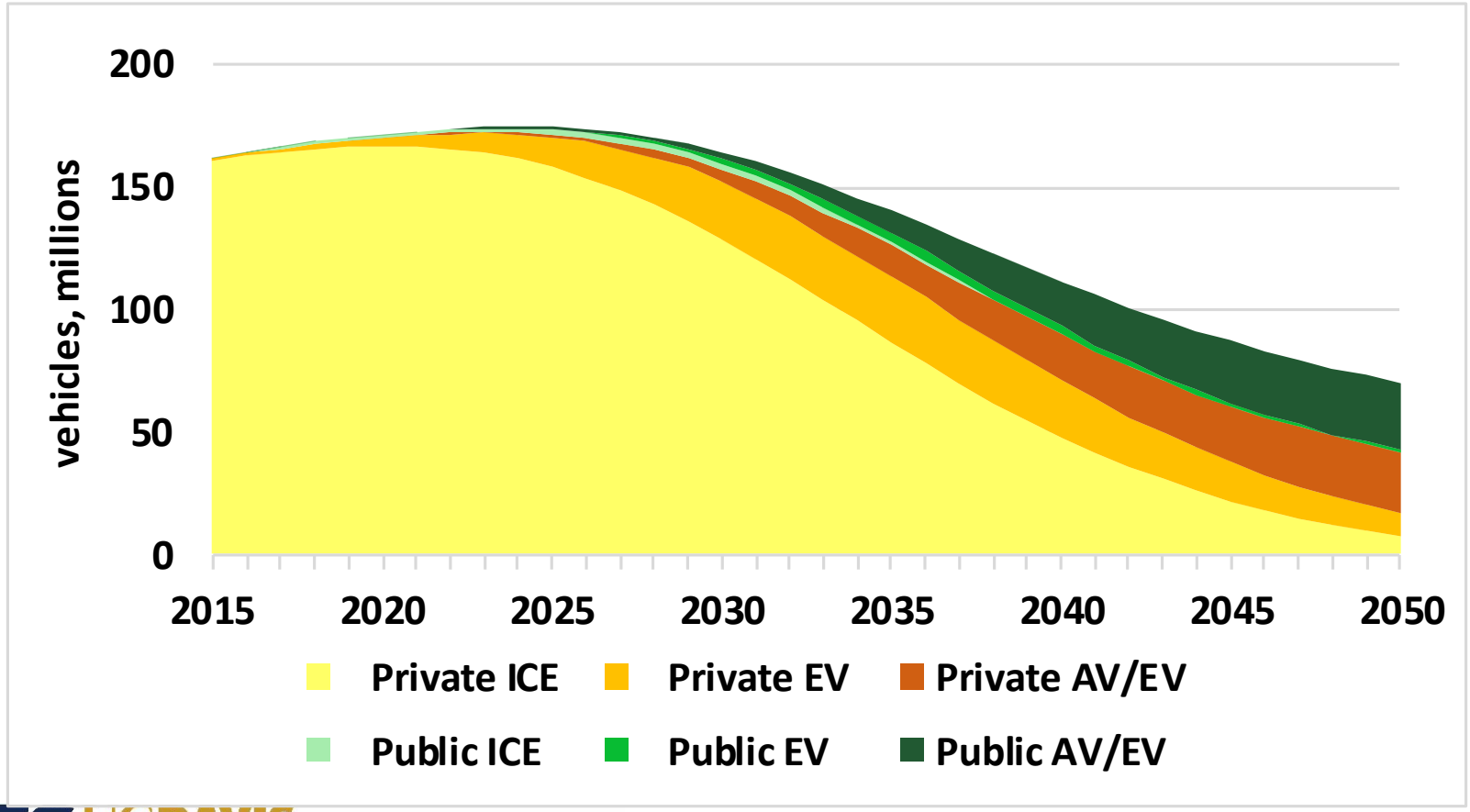
US LDV sales evolution, 3R scenario

- Sales declines quickly through 2035, then recovers somewhat
- Sales remains below 2030 levels given travel demand patterns in 3R



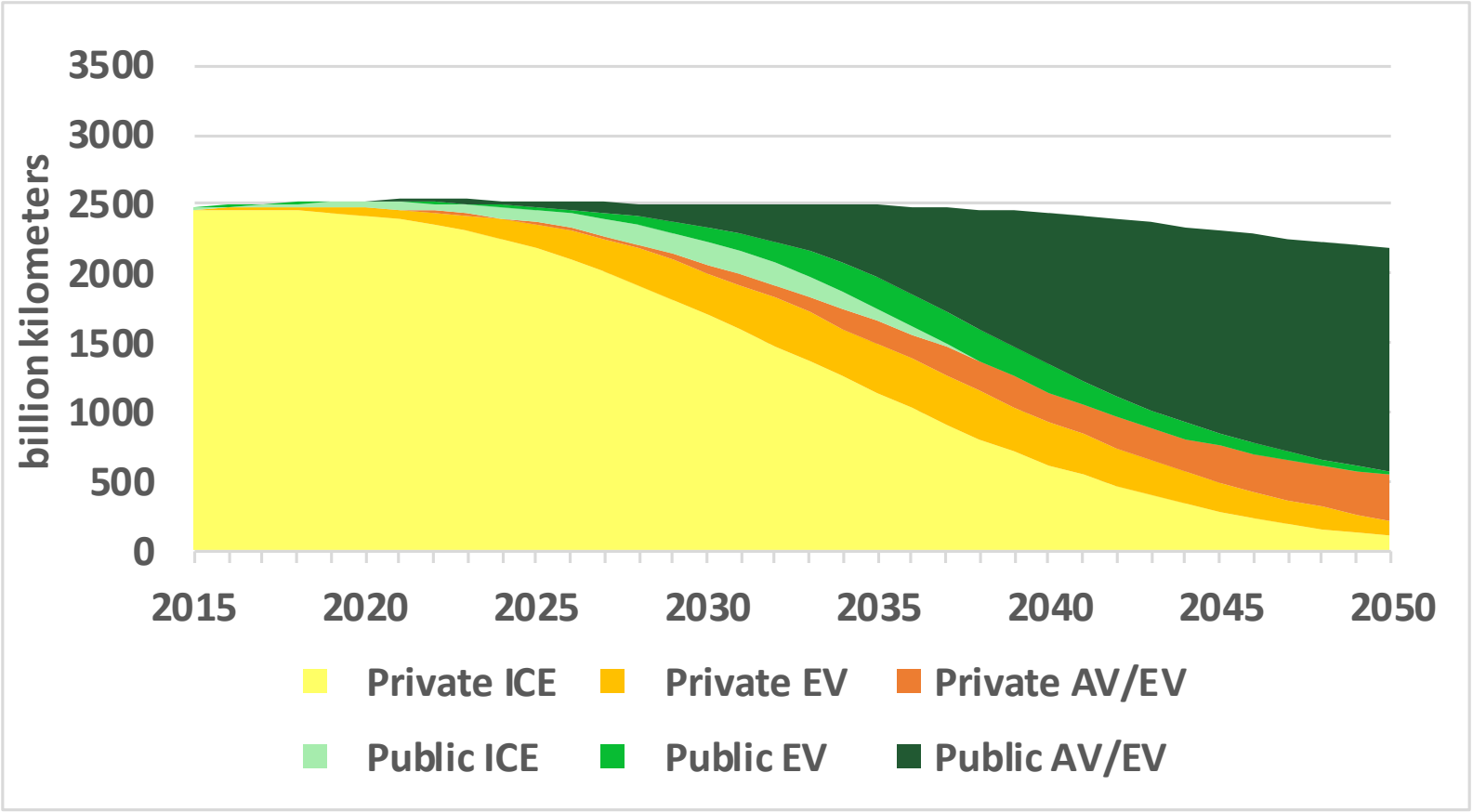
US LDV stock evolution, 3R scenario

- Stocks strongly decline after 2030, due to intensive vehicle use and higher load factors



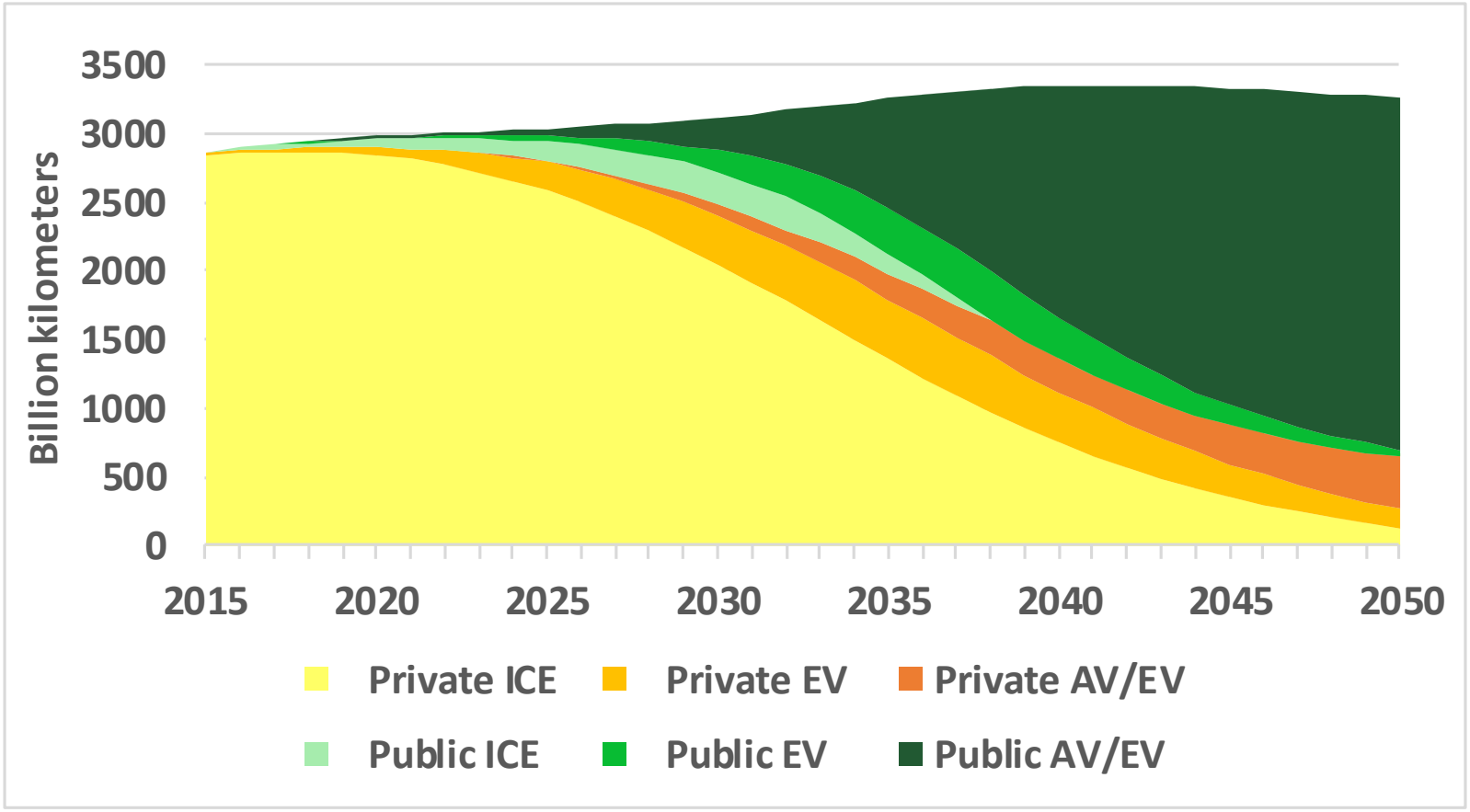
US LDV travel evolution, 3R scenario

- Vehicle travel remains flat, given high travel rates of public vehicles



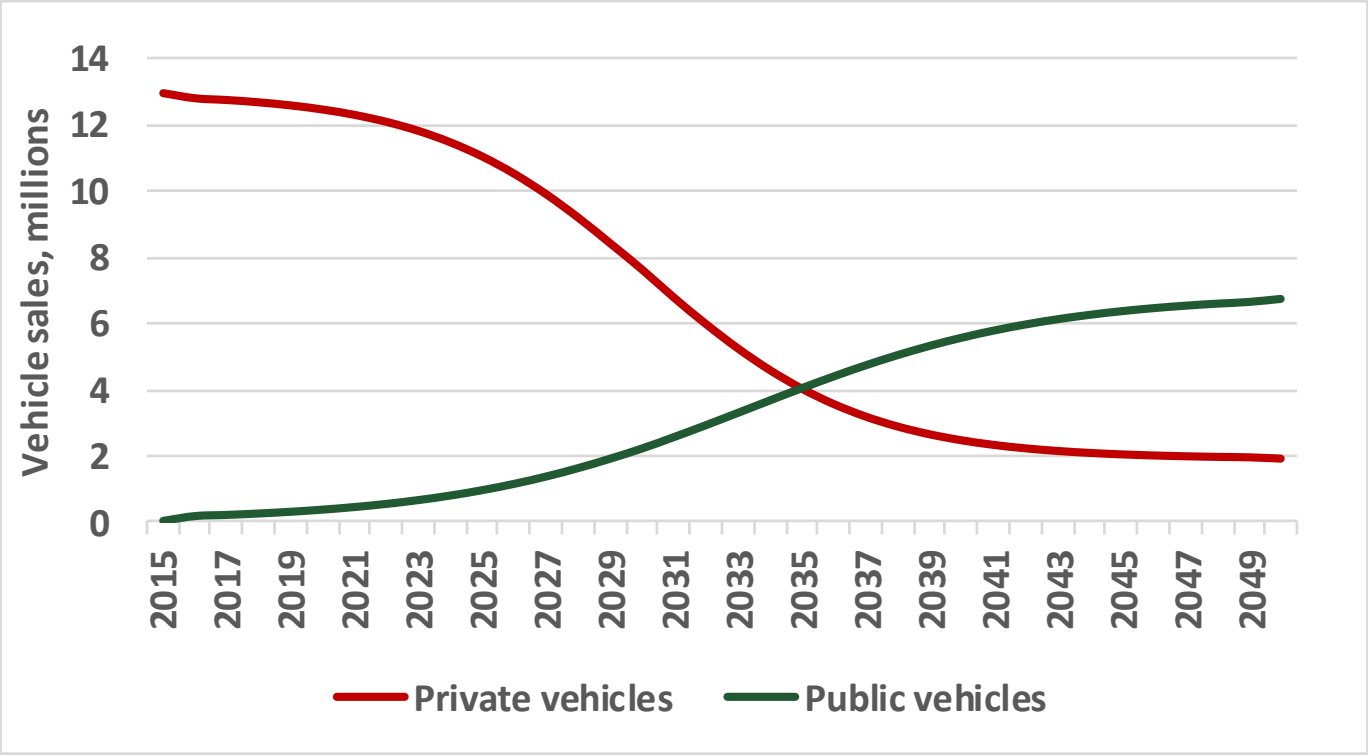
US LDV passenger travel evolution, 3R scenario

- Overall LDV passenger travel still rises somewhat, but far less than in other scenarios



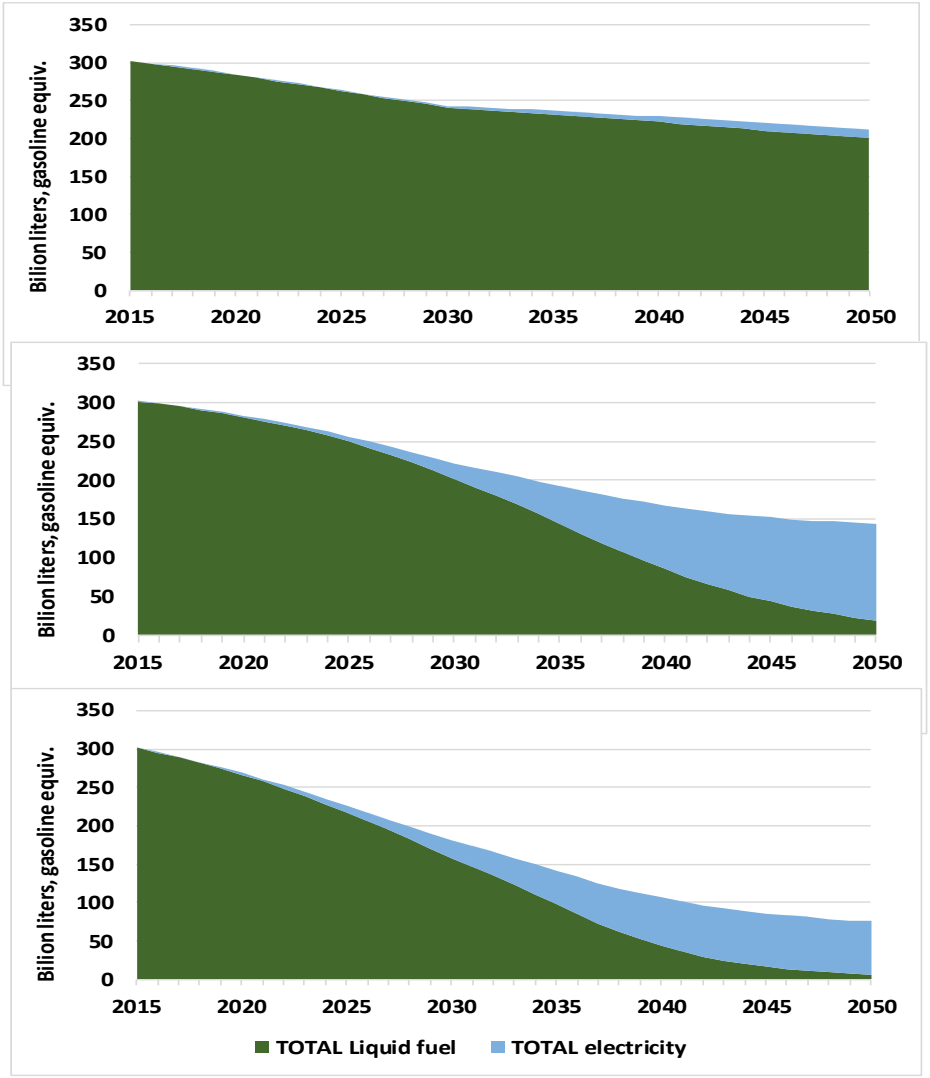
Why do sales drop so fast?

- Private vehicle sales can drop very fast given that the decline in stocks is much slower
- The intensity of use of public vehicles allows for slower sales ramp ups



US LDV energy use by scenario

- BAU - liquid fuels (green) dominates but drops due to efficiency improvements
- 2R – electricity (blue) dominant by 2050
- 3R – electricity use in 2050 about 40% lower than 2R level due to mobility changes



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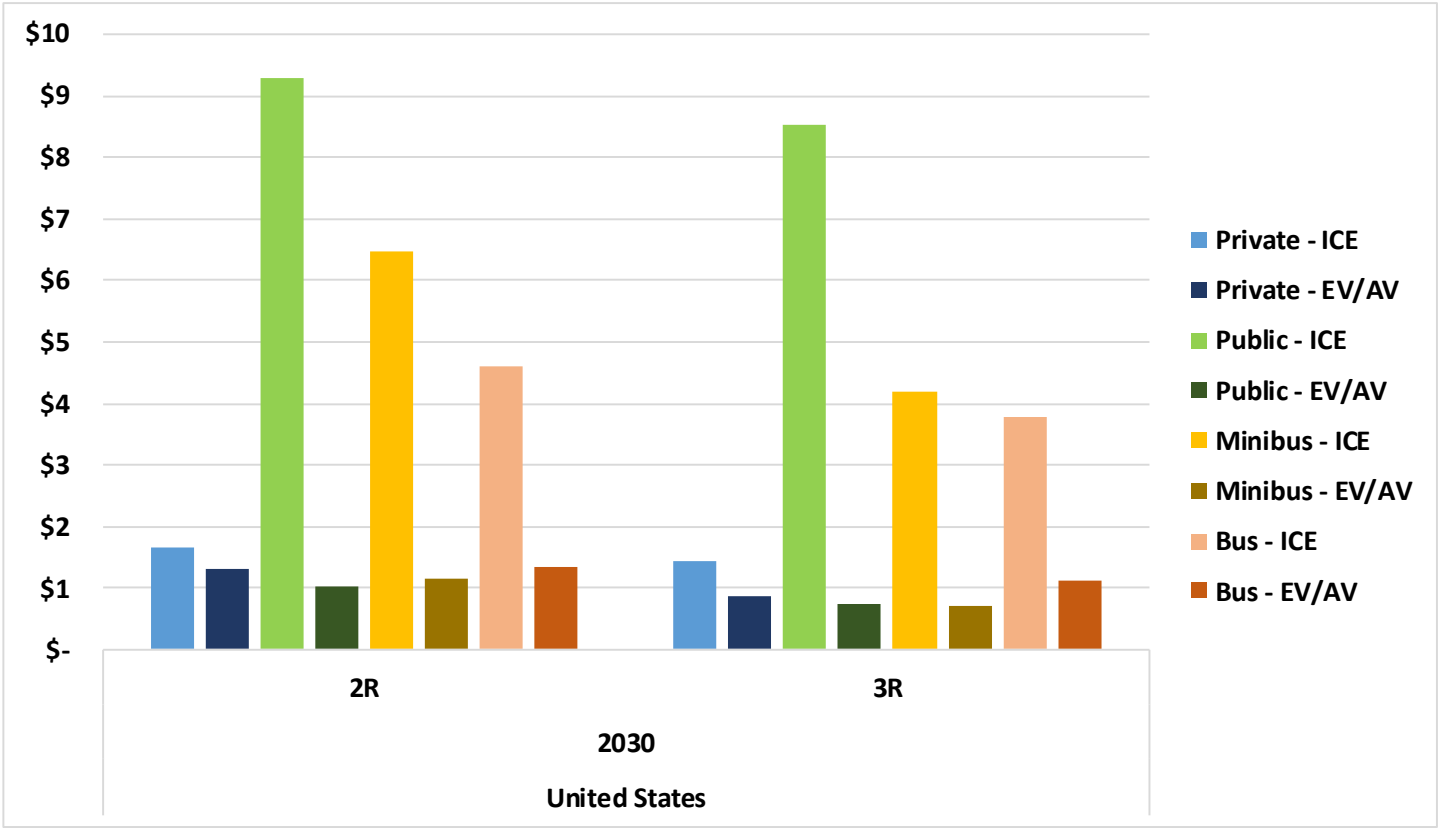
US –marginal (per-trip) costs in 2030 2R, 3R

- US – public mode costs plummet with no driver; buses more expensive than small modes
- Public costs are heavily dependent on load factors, assumed wage and markup rates



Next Steps

- Refine results, especially cost results
- Continued financial/policy analysis of modes, policy implications
- Deeper visualizations to output set
- Establish our full narratives
- Draft report by late January 2017

Thank you!