



Smart Prosperity Institute
Green Growth Symposium
Ottawa, February 28, 2020

Enabling the 3 Revolutions: Some perspectives

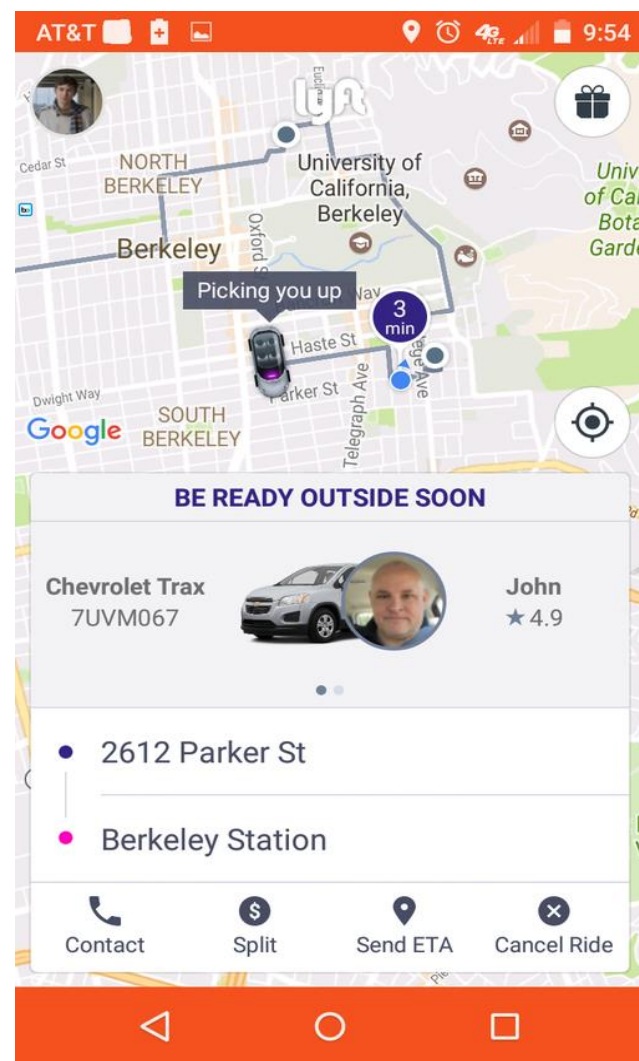
Lew Fulton, ITS-STEPS Director

Passenger Transport Revolutions

1. Streetcars/metros (~1890)
2. Automobiles (~1910)
3. Airplanes (~1930)
4. Limited-access highways (1950s....)
5. High-speed rail (1970s...)

2010+

1. Vehicle electrification
 - low carbon vehicles and fuels
2. Real-time, shared mobility
 - less vehicle use
3. Vehicle automation (2025?)
 - Uncertain impacts

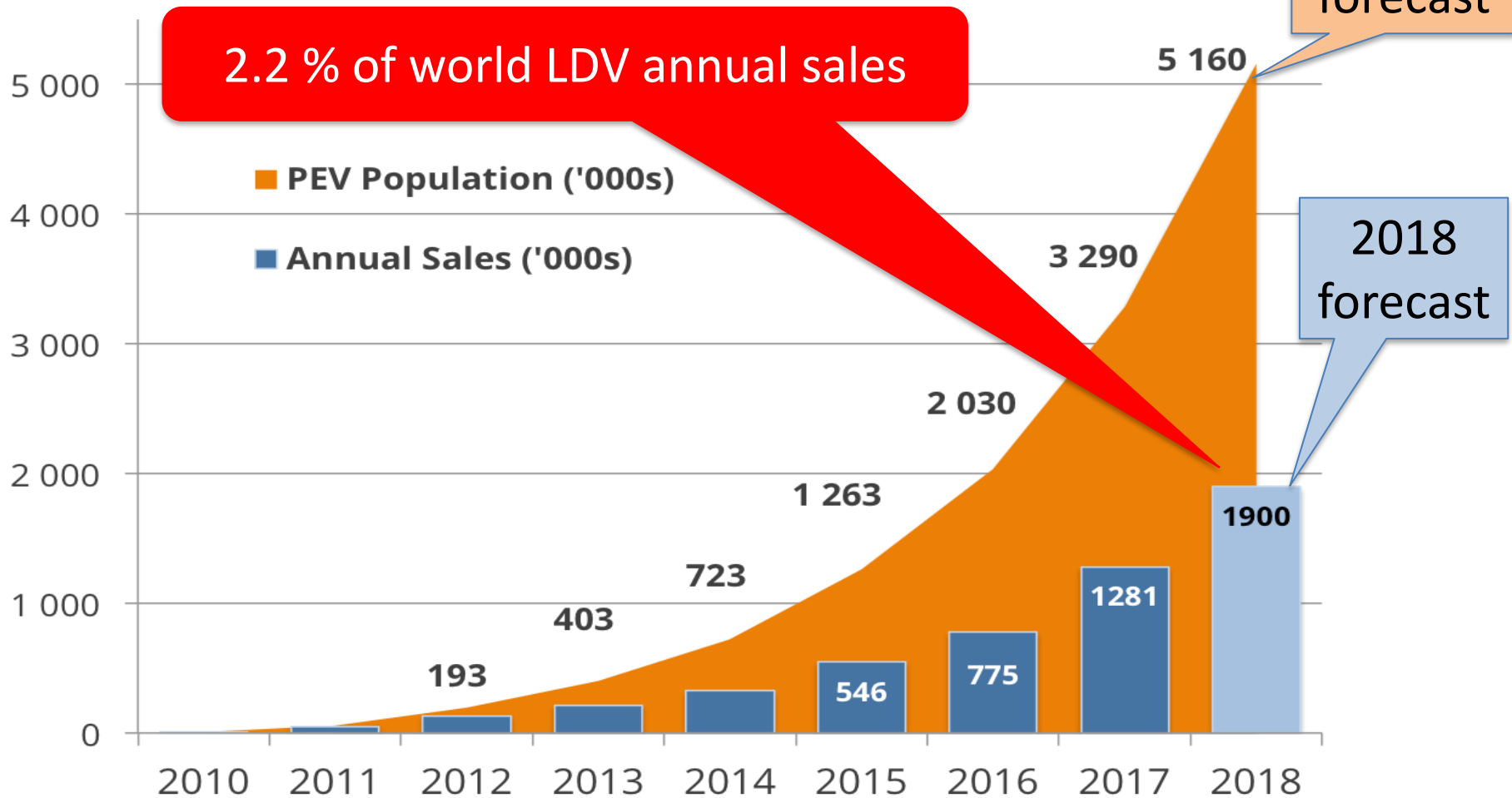


The total number of PEVs in the world at end of 2018 will likely exceed 5 million (.5% of 1 billion total LDV) & exceed 1.9 million in sales (out of 88 million total LDV sales) - about 160,000 LDV PEVs per month.

ROG has been 40 to 100% per year

Global Plug-in Vehicle Population

EV VOLUMES.COM



Car of the future?

*Accelerating the Next Revolution
In Roadway Safety*



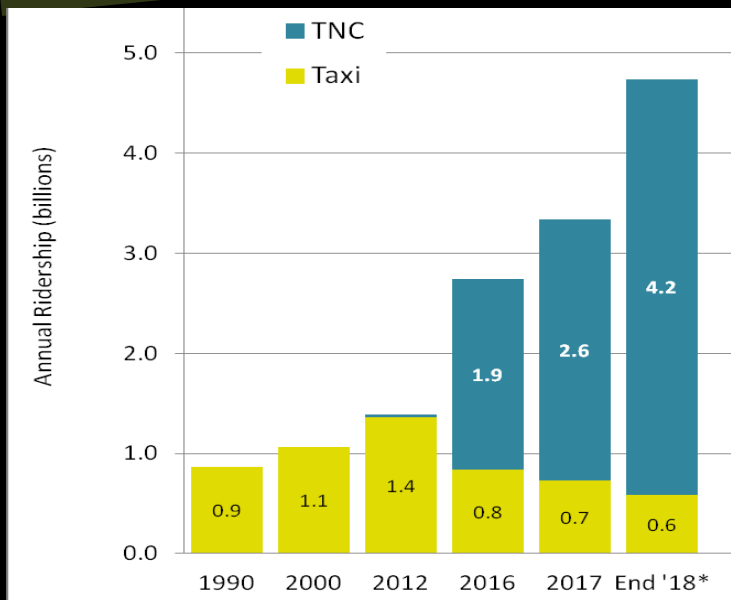
September 2016

Or this?



Ride-hailing in the U.S. currently is substituting for taxis, bus and rail more than private cars

Rapid growth in U.S. Taxi/TNC ridership



Ridership by end of 2018:

- Taxi/TNC 4.8 billion
 - Local bus 4.7 billion
 - Urban rail 4.3 billion
- (Annual rate)

Source: The New Automobility: Lyft, Uber and the Future of American Cities, Schaller Consulting, July 2018.

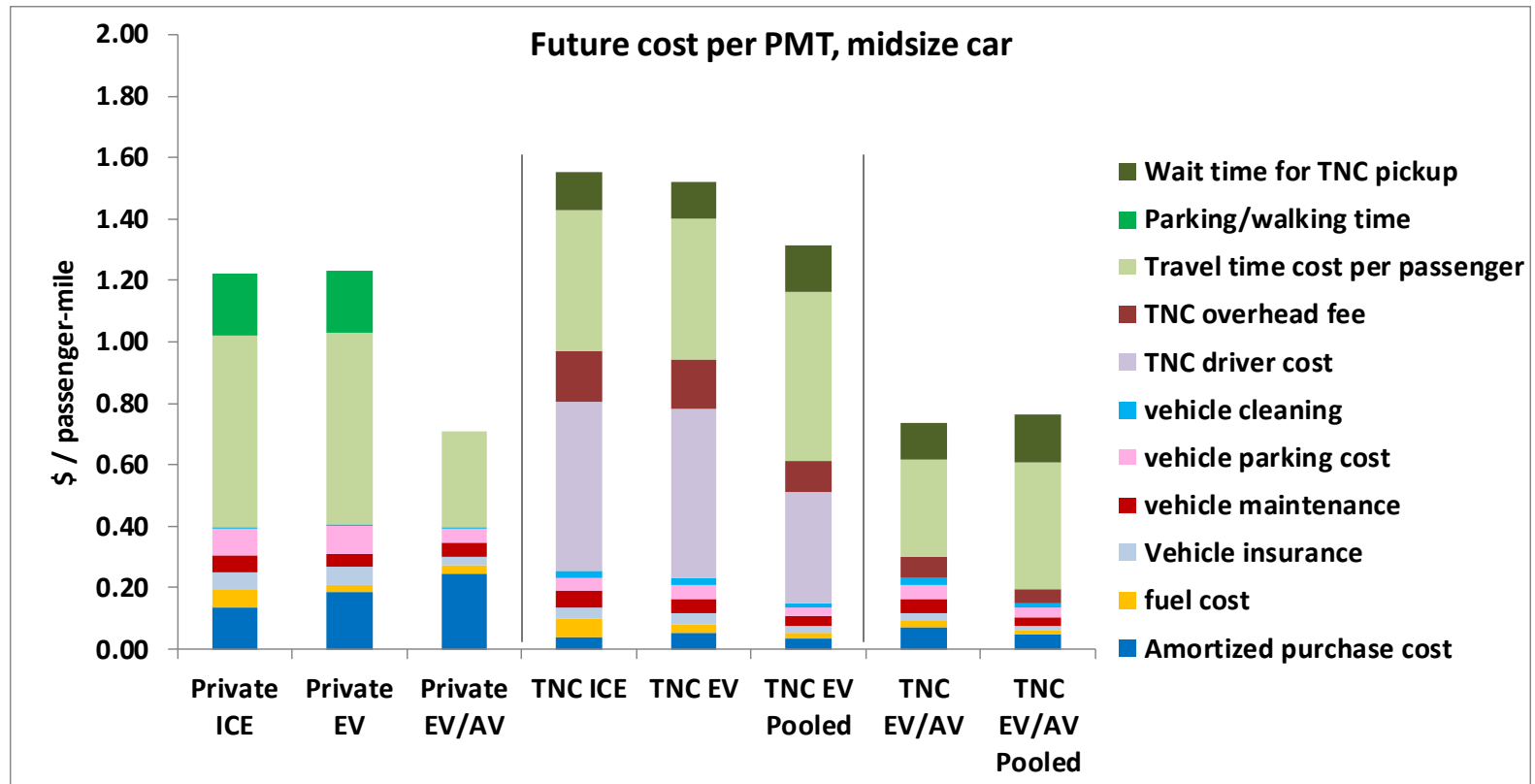
Bruce Schaller, 2018

Some 3R-related observations

- **There are basically 2 ways to get GHG reductions with 3Rs:**
 - Electrification
 - Ride sharing/pooling (not just vehicle sharing)
- **Automation: lower per-trip costs, lower “time cost” for being in vehicles**
 - No driver means TNC services could become very cheap
 - No driver means household vehicle travel could become very “time cheap”
- **Electrification goes with automation – does it really?**
 - Can we assume AVs will be electric? Can get the job done with upgraded electrical system (such as hybrids)
 - But electric running will be much cheaper – and durable?
- **Ride hailing: cost savings v. convenience and risk**
 - Complementary or at conflict with public transit use?
 - Will lower costs reduce the incentive to pool?

Trip cost comparison, future case, 6 mile trip, with out-of-pocket and some hedonic costs

- *Time costs are as big or bigger than out of pocket costs*
- *Automated electric vehicles will be low cost per mile*
- *Shared trips may not be particularly attractive*



The upshot for low CO2 pathways and policy (1)

- These revolutions are actually moving fairly slowly at this point – we cannot count on high market shares for EVs, ride sharing trips, or automated vehicles by 2025 or 2030
 - The good news is it gives us a little more time to plan this, and set some policies.
- Expensive up-front cost of high-technology vehicles easily amortized in a TNC situation
 - Plus faster vehicle turnover – could really help speed adoption of EVs
- Hedonic costs really matter and we need to understand these much better
 - Advantages of pooled vs solo ridesharing are apparent, but may be elusive
 - We can imagine needing **road pricing policies** that strongly promote this pooling

The upshot for low CO2 pathways and policy (2)

- In any case lower overall costs probably mean proportionately more passenger and vehicle travel
 - Travel rebound effects: **again, pricing**
- However, pricing is unpopular and you might need >\$0.20/mile types of fees to tilt the scales, which is the equivalent of a \$6/gallon gas tax
- So we regulate? How exactly?
 - Require minimum vehicle occupancy?
 - Restrict types of and access to automated vehicles?
 - Restrict some types of movement of automated vehicles?
 - Other ideas? More research needed!

Thank you

Lew Fulton

Director,

Sustainable Transportation Energy Pathways Program

ITS-Davis

lmfulton@ucdavis.edu

