The Future of Transportation?

- 2020s to be most disruptive decade ever for transportation
- Because of technology cost curves—every new car will be an EV by 2025
- The number of passenger vehicles on American roads will drop from 250 million in 2020 to 45 million in 2030, a nearly 80 percent reduction
- Cars are our 2\textsuperscript{nd} largest capital expense (avg. new car = $33k). Cars are parked 96\% of the time. 4\% asset utilization is disruption waiting to happen.
- Transportation as a service (TaaS) will replace personal car ownership. San Francisco – 20\% of VMT is in an Uber or Lyft as of 2017.
- 10\% of Americans that traded in cars last year weren’t replacing them—switching to car sharing and ride-hailing.
- ACES = 80\% reduction in parking needs
“EVs can be thought of as just another energy-efficient appliance, like an LED bulb or a heat pump that does the same job as a prior technology but using less energy.”
EVs: 100X fewer Moving Parts

ICE (Gas) Vehicle

2,000+ moving parts (1)

Transmission, driveshaft, clutch, valves, differentials, pistons, gears, carburetors, crankshafts...

Electric Vehicle (EV)

18 moving parts (1)

› EVs 10X-100X cheaper to maintain!
Electric Vehicle Global Warming Pollution Ratings and Gasoline Vehicle Emissions Equivalents by Region

U.S. average (EV sales-weighted): 68 MPG

Note: The MPG (miles per gallon) value listed for each region is the combined city/highway fuel economy rating of a gasoline vehicle that would have global warming emissions equivalent to driving an EV. Regional global warming emissions ratings are based on 2012 power plant data in the EPA’s eGRID 2015 database (the most recent version). Comparisons include gasoline and electricity fuel production emissions. The 68 MPG U.S. average is a sales-weighted average based on where EVs were sold in 2014.

SOURCE: EPA 2015C.
Self-Driving Cars

• LiDar-- $70,000 to less than $1,000 in less than 10 years
• Could be the “cure” to 40,000 deaths per year?
• Will make TaaS significantly cheaper
U.S Vehicle Fleet Shrinks by 80%
Business-as-Usual Scenario
20th Century Technology
Through 2050, we continue to use vehicles with internal combustion engines at an increased rate, and use transit and shared vehicles at the current rate, as population and income grow over time.

2 Revolutions (2R) Scenario
Electrification + Automation
We embrace more technology. Electric vehicles become common by 2030, and automated electric vehicles become dominant by 2040. However, we continue our current embrace of single-occupancy vehicles, with even more car travel than in the BAU.

3 Revolutions (3R) Scenario
Electrification + Automation + Sharing
We take the embrace of technology in the 2R scenario and then maximize the use of shared vehicle trips. By 2030, there is widespread ride sharing, increased transit performance—with on-demand availability—and strengthened infrastructure for walking and cycling, allowing maximum energy efficiency.

Number of Vehicles on the Road by 2050
- 2.1 billion
- 2.1 billion
- 0.5 billion

CO2 Emissions by 2050
- 4,600 megatonnes
- 1,700 megatonnes
- 700 megatonnes
What we control and what we do not

• EV readiness
• Design Bellingham for people—not for cars
• Density is the key
  • Rapid expansion has consumed land at almost three times the rate of population growth, and caused CO2 emissions from cars to rise, even as it has reduced the amount of forest land available to absorb CO2.