



Disruption.
Implications.
Choices.

Rethinking Transportation 2020-2030

The Disruption of Transportation and the Collapse of the Internal-Combustion Vehicle and Oil Industries

We are on the cusp of one of the fastest, deepest, most consequential disruptions of transportation in history. By 2030, within 10 years of regulatory approval of autonomous vehicles, 95% of U.S. passenger miles will be traveled in on-demand autonomous electric vehicles owned by fleets, not individuals, in a new business model we call “transport as a service,” or TaaS.

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“It’s not easy to blow my mind. But earlier this week, I sat down and read a research report by RethinkX. I’ve been picking up the pieces of my consciousness ever since.”

The Motley Fool

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The TaaS disruption will have enormous implications across the transportation and oil industries, decimating value chains, causing oil demand and prices to plummet, and destroying trillions of dollars in investor value — but also creating trillions of dollars in new business opportunities, consumer surplus and GDP growth.

RethinkX bases its conclusions on analysis of data, market, consumer and regulatory dynamics, using well-established cost curves and assuming only existing technology. Unlike traditional analyses, which produce linear and incremental forecasts, our modeling incorporates systems dynamics, including feedback loops, network effects and market forces that reflect the reality of fast-paced technology-adoption S-curves.

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“A stunning new forecast... If Arbib and Seba are right the oil industry is about to face an unprecedented existential crisis.”

VICE

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Summary of findings

- In the near future, transport-as-a-service (TaaS) will offer vastly lower-cost transport alternatives to what currently exist. TaaS will be four to ten times cheaper per mile than buying a new car, and two to four times cheaper than operating an existing vehicle by 2021.
- Cost savings will be the key factor driving consumers to adopt TaaS.
- This reduced cost is due to ten-times-higher vehicle utilization rates, 500,000-mile vehicle lifetimes and far lower maintenance, energy, finance and insurance costs. Because of these cost factors, TaaS fleets will quickly transition from human driven, internal combustion engine (ICE) vehicles to autonomous electric vehicles (A-EV), offering consumers transportation at a fraction of today's price.
- The approval of autonomous vehicles will unleash a highly competitive market-share grab among existing and new Pre-TaaS (ride-hailing) companies in expectation of the outsized rewards of trillions of dollars of market opportunities and network effects. Winners-take-all dynamics will force large upfront investments to provide the highest possible level of service.
- Other revenue sources from advertising, data monetization, entertainment and product sales will open a road to free transport in a TaaS Pool model.
- Adoption will start in cities. Non-adopters will be largely restricted to the most rural areas, where cost and wait times are likely to be higher.
- High vehicle utilization, with TaaS used at least 10 times more than individually owned cars, will mean that far fewer cars will be needed in the U.S. vehicle fleet.

Add it up, and this analysis forecasts a fast and extensive disruption: By 2030, 40% of U.S. vehicles will still be individually owned ICE vehicles, but they will provide just 5% of passenger miles.

"The future of transportation—cheaper, cleaner, less congested—could be great for consumers."

THE WALL STREET JOURNAL.

The combination of 1) TaaS's dramatically lower costs compared with car ownership and 2) exposure to successful peer experience will drive more widespread usage of the service. Consumers can try TaaS easily and increase usage as their comfort level rises.

"The downloadable report is a must-read for everyone in the industry."



The far-reaching impacts of the TaaS disruption:

Economic

- Savings on transportation costs will boost annual disposable income for U.S. households by a total of \$1 trillion by 2030.
- Productivity gains as a result of reclaimed driving hours will boost GDP by an additional \$1 trillion.
- As fewer cars travel more miles, the number of passenger vehicles on American roads will drop from 247 million to 44 million, opening up vast tracts of land for other, more productive uses.
- Demand for new vehicles will plummet: 70% fewer passenger cars and trucks will be manufactured each year. This could disrupt the car value chain, with dealers, maintenance and insurance companies suffering almost complete destruction.
- Car manufacturers that adapt will either become assemblers of A-EVs or TaaS providers. The value in the sector will be mainly in the vehicle operating systems, computing platforms and the TaaS platforms.
- The transportation value chain will deliver 6 trillion passenger miles in 2030 (an increase of 50% over 2021) at a quarter of the cost (\$393 billion versus \$1,481 billion).

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“According to RethinkX, self-driving vehicles... soon will become so culturally ubiquitous that it will lead to the abandonment of car ownership, a \$1 trillion boost in disposable income and a “catastrophic” shift for the oil industry and driver economy.”

USATODAY

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- Oil demand will peak at 100 million barrels per day by 2020, dropping to 70 million barrels per day by 2030. Oil prices will collapse, heading to an equilibrium cost of \$25.4 per barrel. This will disproportionately affect oil companies, countries, and infrastructure tied to high-cost oil.
- The collapse of oil prices throughout the oil industry value chain will begin to be felt as soon as 2021.
- In the U.S., an estimated 65% of shale oil and tight oil would no longer be commercially viable.
- Approximately 70% of the potential 2030 production of Bakken shale oil would be stranded under a 70 million barrels per day demand assumption.
- Infrastructure such as the Keystone XL and Dakota Access pipelines would be stranded, as well.
- Oil fields facing volume collapse include offshore sites in the U.K., Norway and Nigeria; Venezuelan heavy-crude fields; and the Canadian tar sands.
- Conventional energy and transportation industries will suffer substantial job losses.

Environmental

- The TaaS disruption will dramatically reduce air pollution and greenhouse gases from the transport sector, and improve public health.
- The TaaS transport system will reduce energy demand by 80% and tailpipe emissions by over 90%.
- Assuming a concurrent disruption of the electricity market by solar and wind, we may see largely carbon-free road transportation by 2030.

Geopolitical

- The geopolitical importance of oil will vastly diminish.
- The speed and scale of the collapse in oil revenues may lead to the destabilization of oil-producing countries with a high dependence on oil “rents.”
- The geopolitics of lithium and other key inputs to A-EVs are different from oil politics.

Social

- TaaS will dramatically lower transportation costs and increase mobility and access to jobs, education and health care, especially for those restricted in today’s model, like the elderly and disabled.
- TaaS will contribute to cleaner, safer and more walkable communities.
- A pathway to free transportation is possible through the TaaS Pool model (a subset of TaaS that entails sharing a ride with other people who are not in the passenger’s family or social group — the equivalent of today’s Uber Pool or Lyft Line). Corporations might sponsor cars or offer free rides to market goods or services to commuters (i.e. Starbucks Coffee on wheels).
- Public and private transportation will merge, and the role of public transportation authorities will change from owning and managing transportation assets to managing TaaS providers to ensure equitable, universal access to low-cost transportation.

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“Seba’s work is seminal. It should be taken very seriously by corporate executives, politicians and governments, workers and their unions, and investors.”

NORTH AMERICAN ENERGY NEWS

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Looking ahead

At critical junctures, investors and policymakers will face choices that will either accelerate or slow down the transition to TaaS. Follow-on analyses by RethinkX will look more closely at these junctures, and at the implications of potential decisions. RethinkX hopes to start a global conversation on the scale, speed and impact of the impending disruption in the transportation and oil sectors.

RethinkX provides evidence-driven systems analysis that helps decision-makers who might otherwise have to rely purely on mainstream analysis. Decisions made based on the latter risk locking in investments and infrastructure that are sub-optimal, and that make societies poorer by locking them into expensive, obsolete, uncompetitive assets, technologies and skill sets. RethinkX's systems analysis approach is designed to facilitate decisions that maximize the benefits and minimize the costs -- economic, social, and environmental -- of technology disruption.

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“Arbib and Seba saw that policymakers and others tend to make decisions without understanding how exponential change happens, and founded a new nonprofit, RethinkX, to study those disruptions.”

FAST COMPANY

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About RethinkX

RethinkX is an independent think tank that analyzes and forecasts the speed and scale of technology-driven disruption and its implications across society. We produce compelling, impartial data-driven analyses that identify pivotal choices to be made by investors, businesses, policymakers and civic leaders.

Rethinking Transportation is the first in a series of reports that analyzes the impacts of technology-driven disruption, sector by sector, across the economy. We invite you to learn more at www.rethinkx.com.