

Consumption Trends and Implications for a Decarbonized Logistics System

Session 4. Sustainable Freight – Achieving
California's ZEV Truck Transition Targets

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Students and Post-Docs



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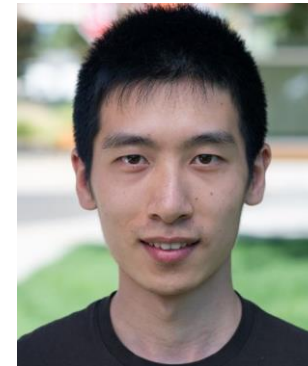
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Xiuli Zhang



Daniel Rivera



Elham
Pourrahmani



Xiaodong Qian



Tri Dev Acharya

**Are we on track to
decarbonize freight?**

**...we are playing catch up,
we can't act fast enough**

Decarbonizing and Mitigating Local Impacts

Where we hope to get to...

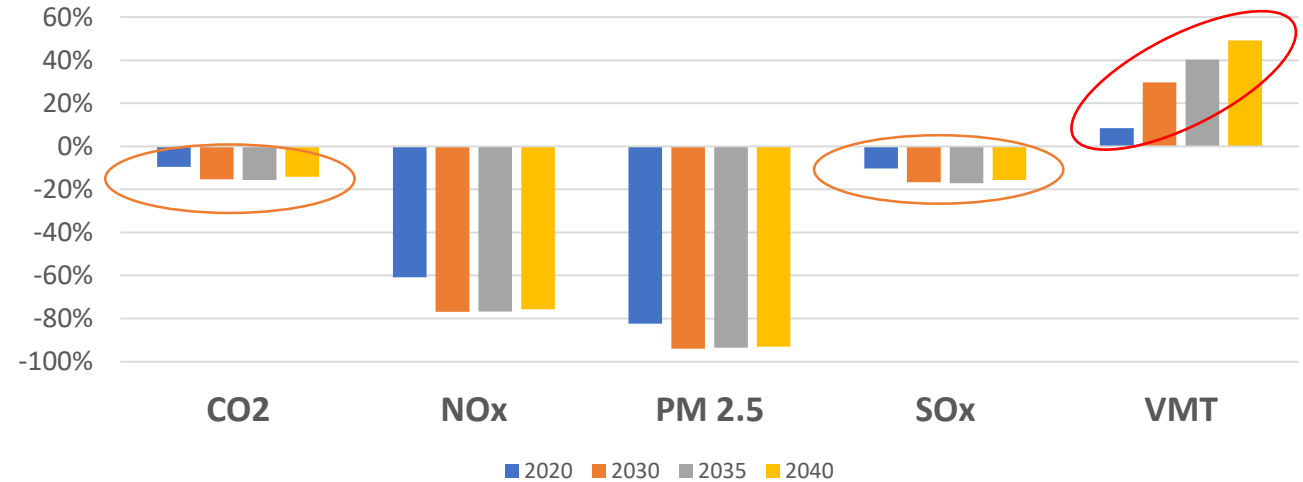
The Good!

Environmental Impacts - Freight

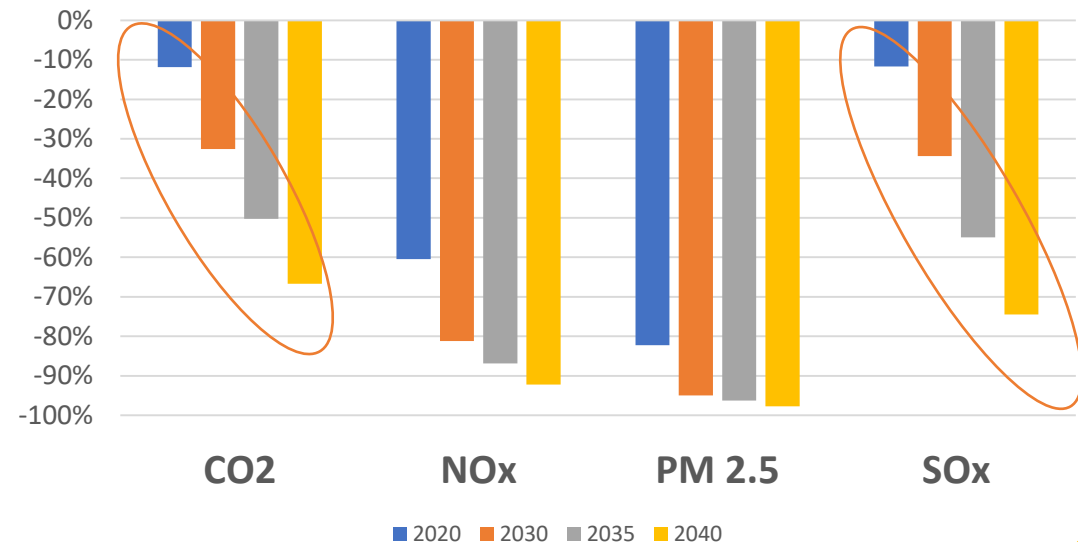
- Availability & introduction of ZEVs
 - Battery electric
 - Fuel Cell
- Fuel & emission standards
- Incentives and programs

- Estimates for Southern California
 - CSTDM flows
 - EMFAC rates

Previous Policies and Strategies (Pre-ACT)
(Reductions from 2012)



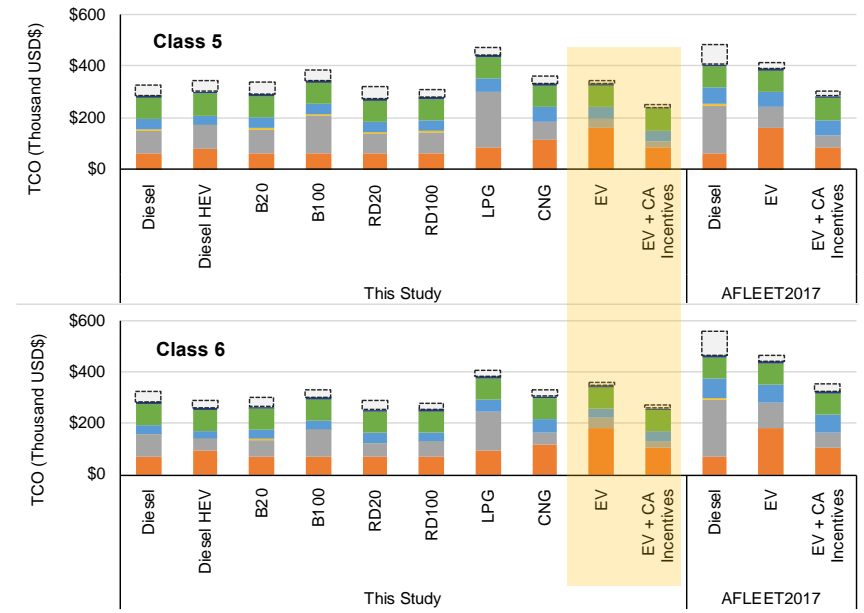
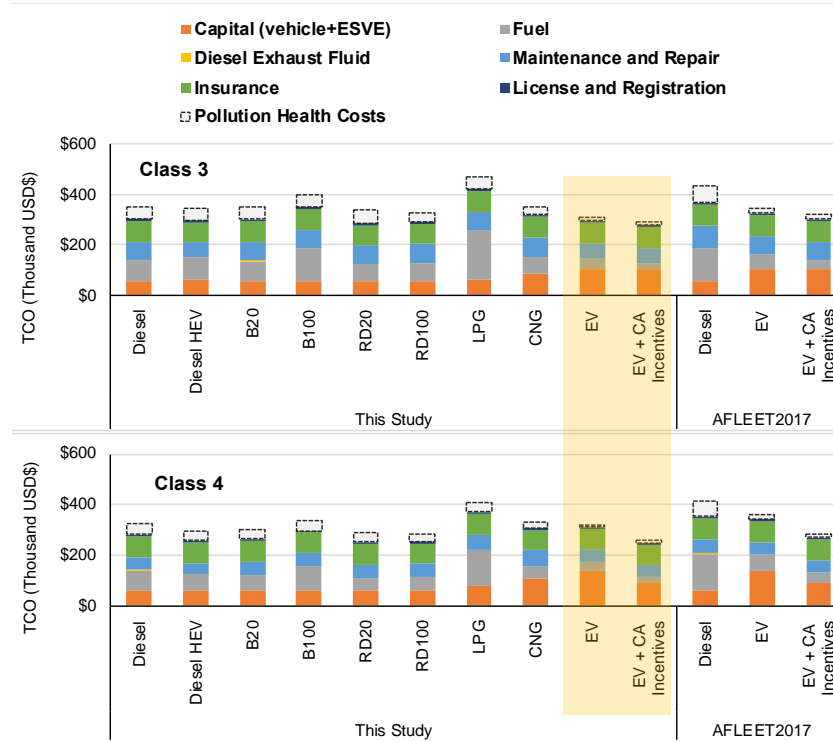
Decarbonization Scenario (Reductions from 2012)



ZEV Technology Readiness

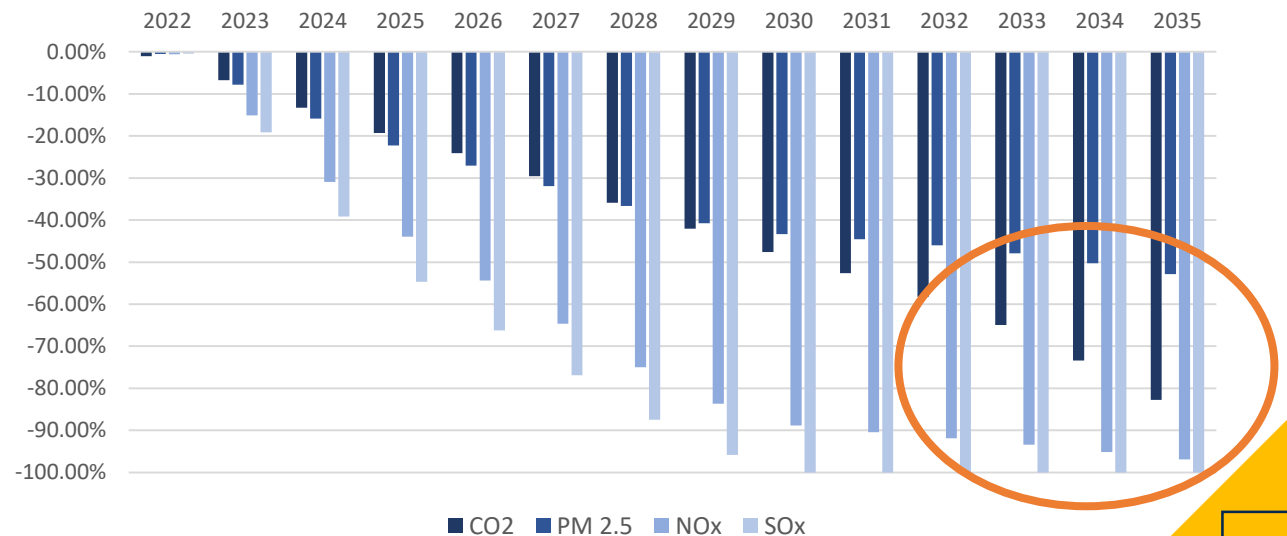
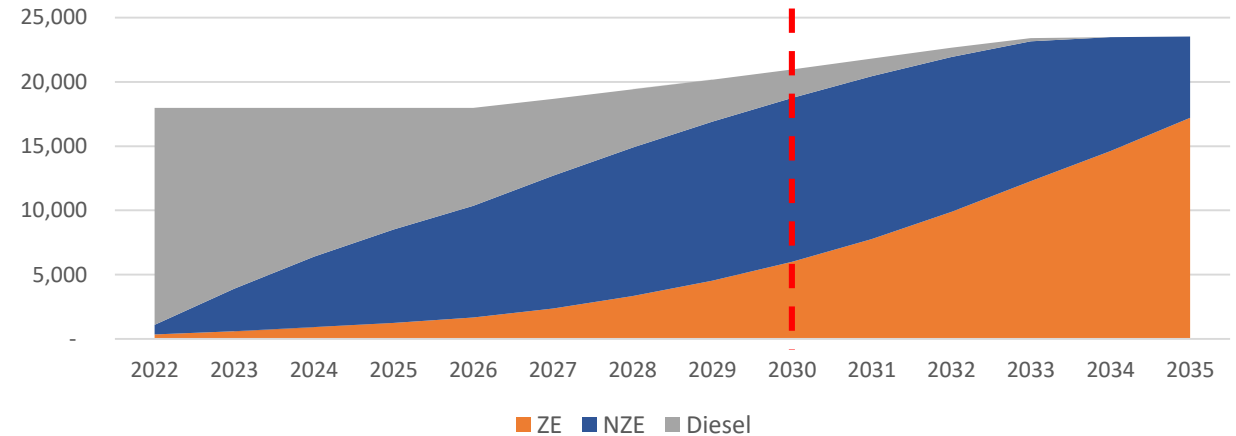
Parcel Deliveries

- TCO
 - Technical feasibility
 - Incentives (purchase & LCFS)



Potential Efforts at POLA/LB

- Transition 17,000+ trucks by 2035
- Incentives will be needed
- Emissions reduction:
 - 10.3 million metric tons CO₂
 - ~50% PM
 - ~95% NO_x & SO_x

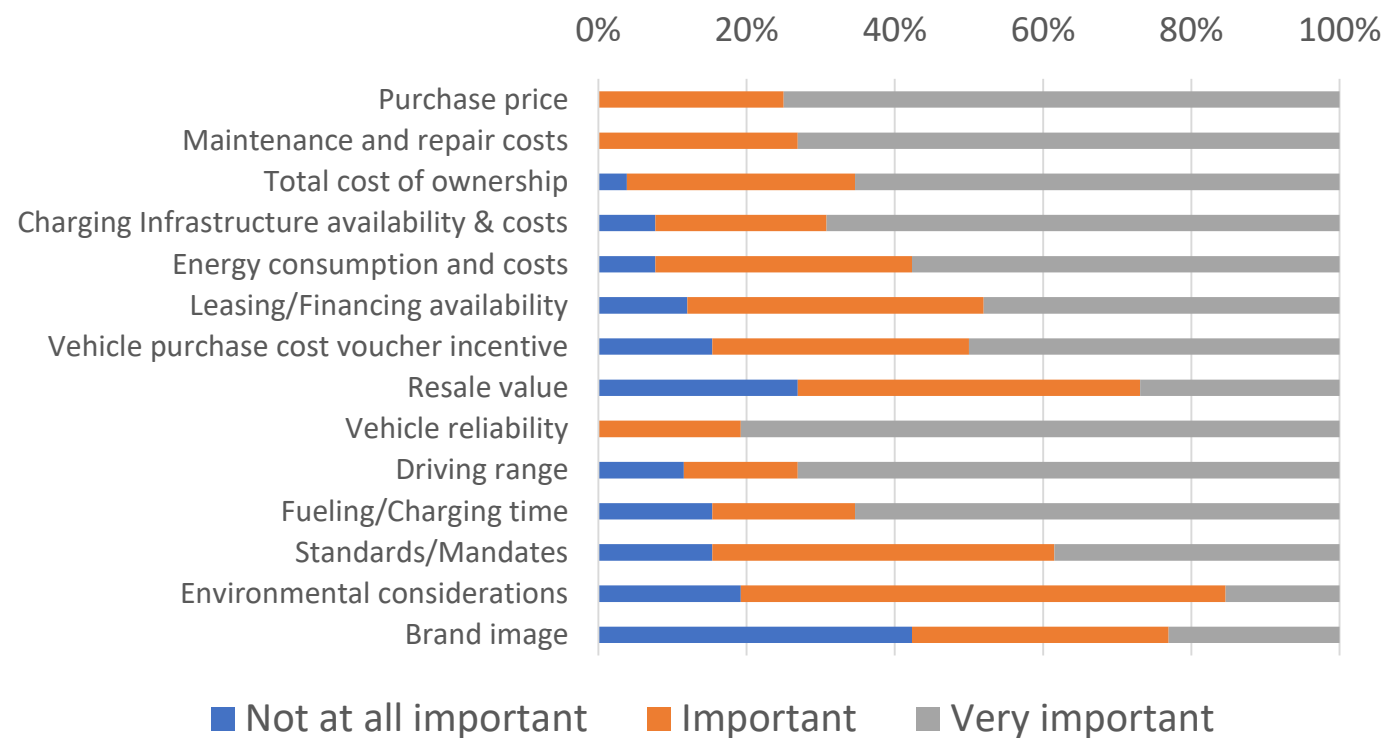


Where we are...

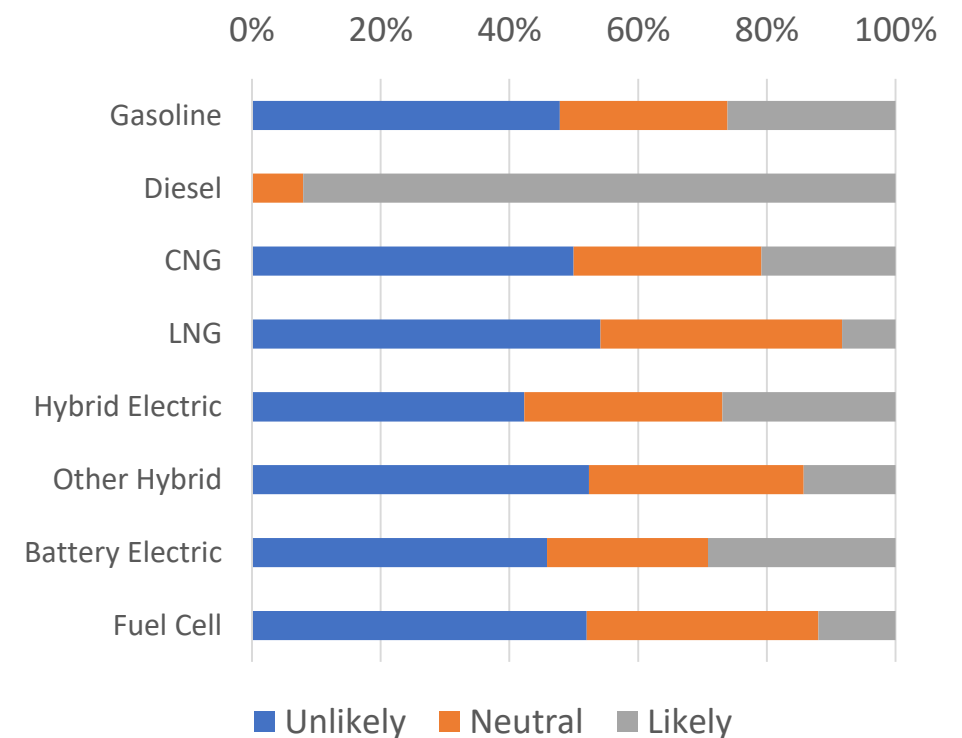
Reality Check

Diesel Dominate the Market

Determinant factors for vehicle purchase

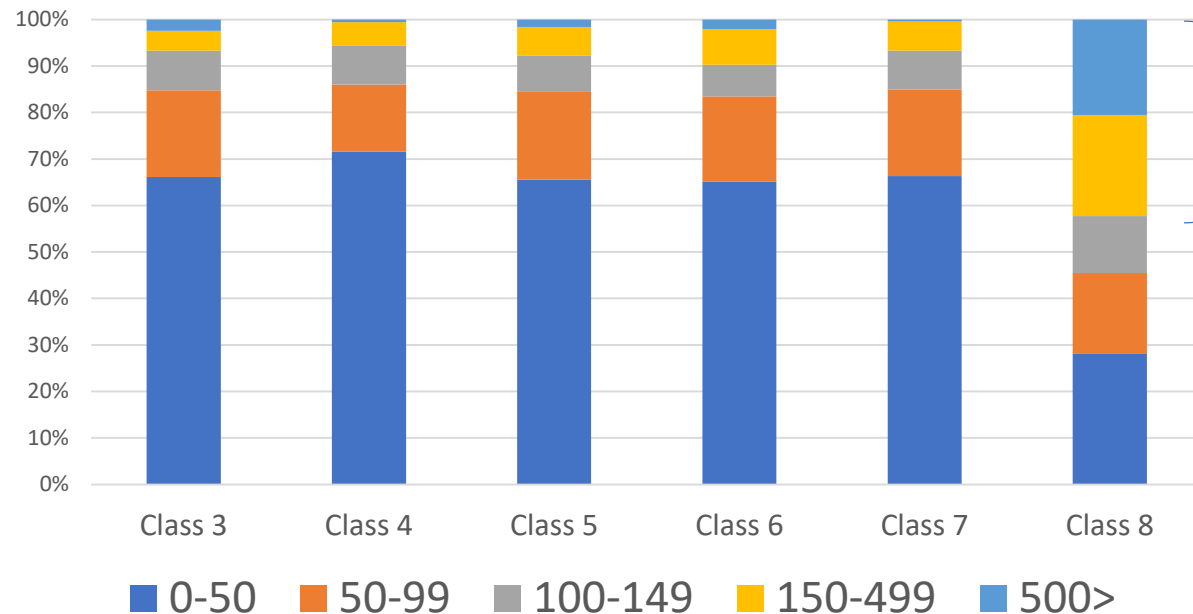


Next purchase



Various Vocations & Requirements

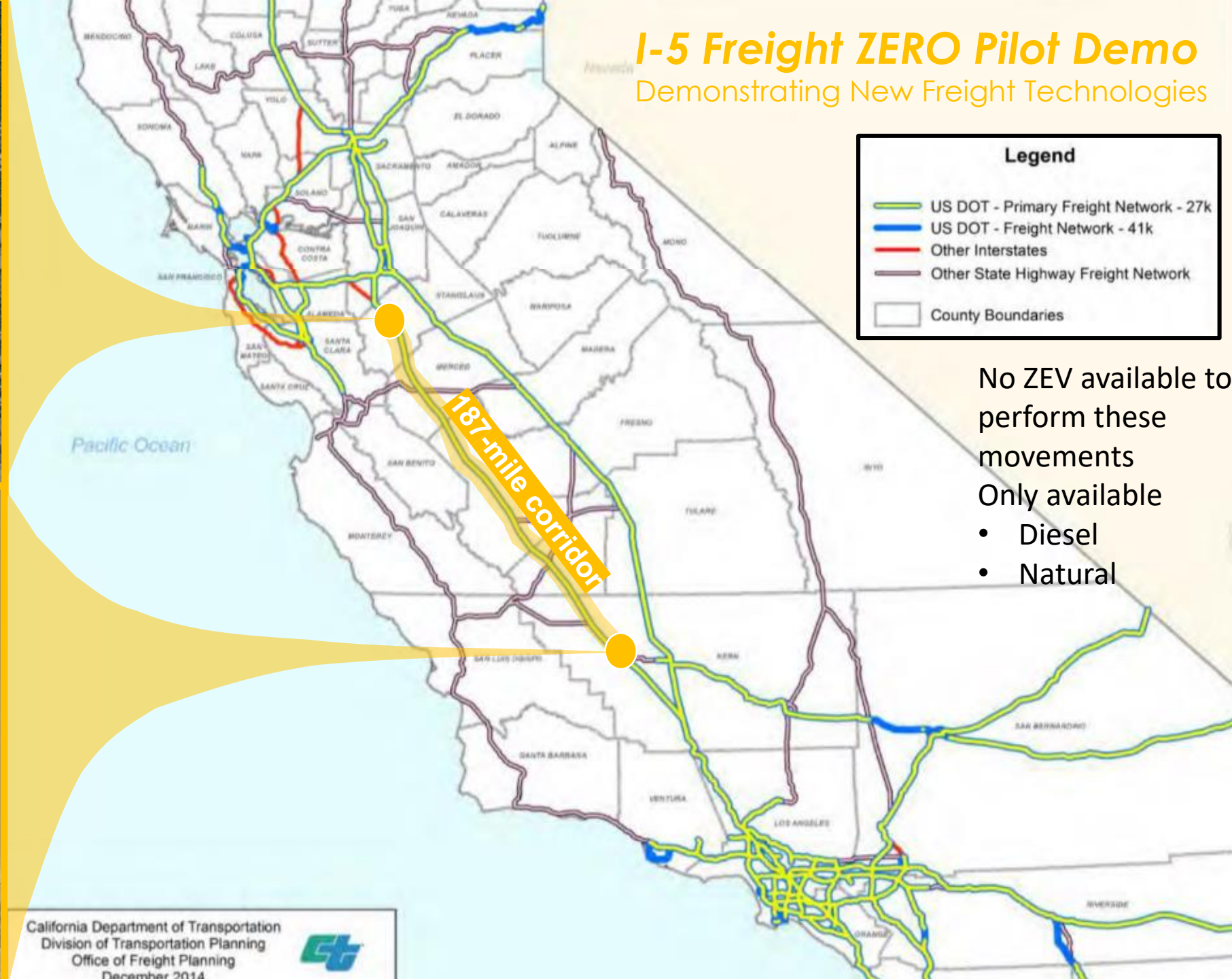
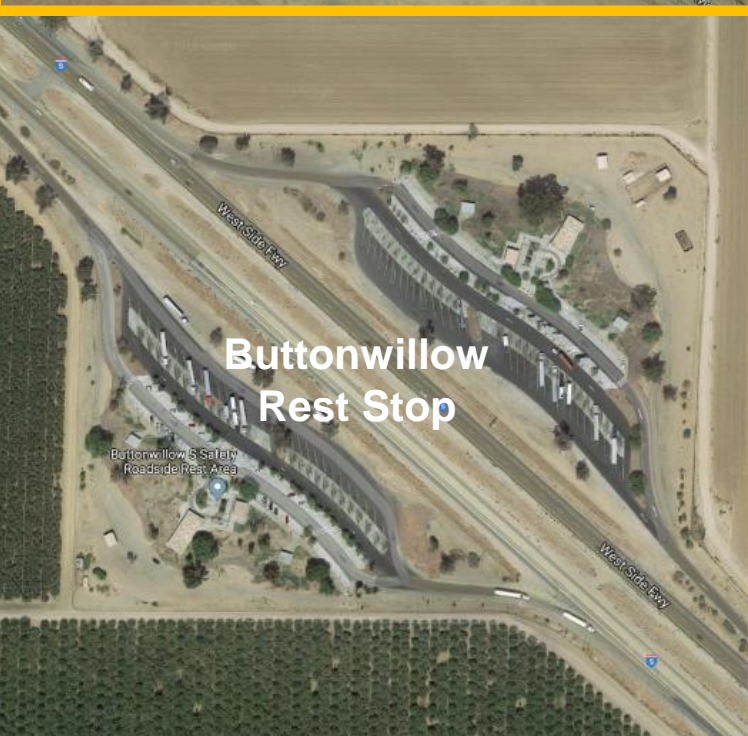
- Classes 3 – 7
 - >90% travel less than 150 miles per day
- Class 8
 - <60% travel less than 150 miles per day
 - ~20% travel more than 500 miles per day



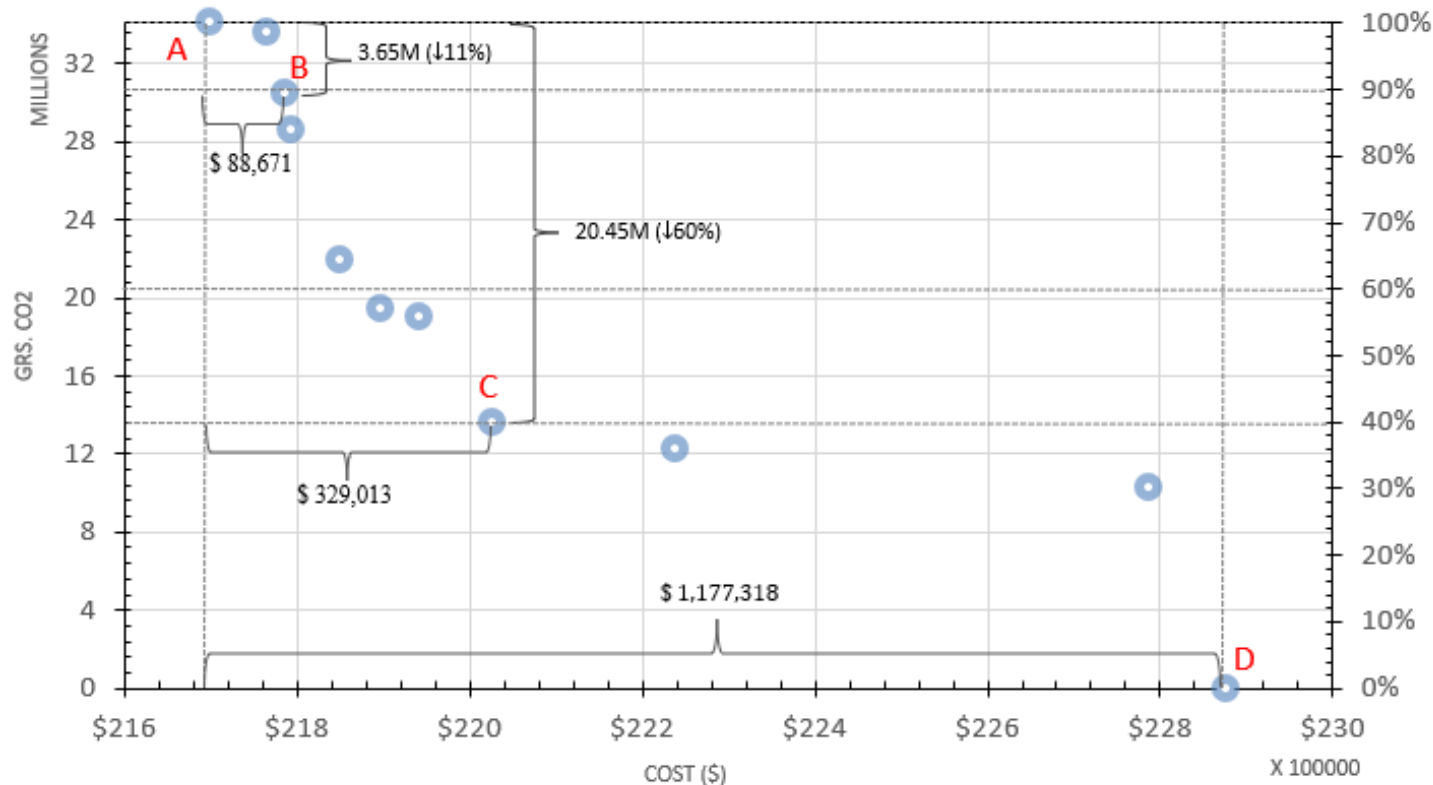
Electrification is very difficult

Battery weight eats from payload capacity

Source: Estimated by the team from CA-VIUS Data



Significant Emissions Reductions can be Costly and Non-efficient



Solution	Diesel		For-Hire		Hybrid		EV	
1 (A)	-	-	14	1.00	-	-	-	-
2	3	1.0	8	1.00	4	1.00	-	-
3 (B)	1	1.0	8	1.00	5	1.00	1	1.00
4	3	1.0	8	0.92	2	1.00	3	1.00
5	7	1.0	2	1.00	-	-	7	1.00
6	8	1.0	-	-	-	-	9	1.00
7	2	1.0	3	1.00	4	1.00	9	1.00
8 (C)	-	-	-	-	8	1.00	11	1.00
9	-	-	-	-	6	0.65	20	0.79
10	-	-	-	-	8	0.75	13	1.00
11 (D)	-	-	-	-	0	-	23	0.88

Each Colum: Number / Use rate

Reducing emissions by 60% increases:

- Replenishment costs by 1.52%,
- Transportation costs by 160.97%.

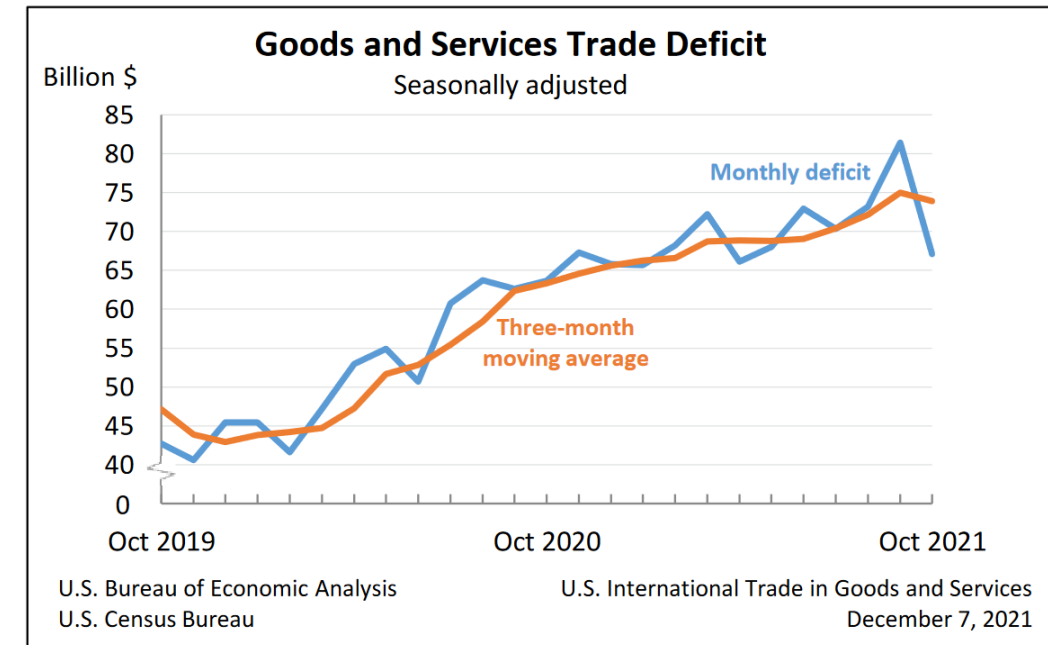
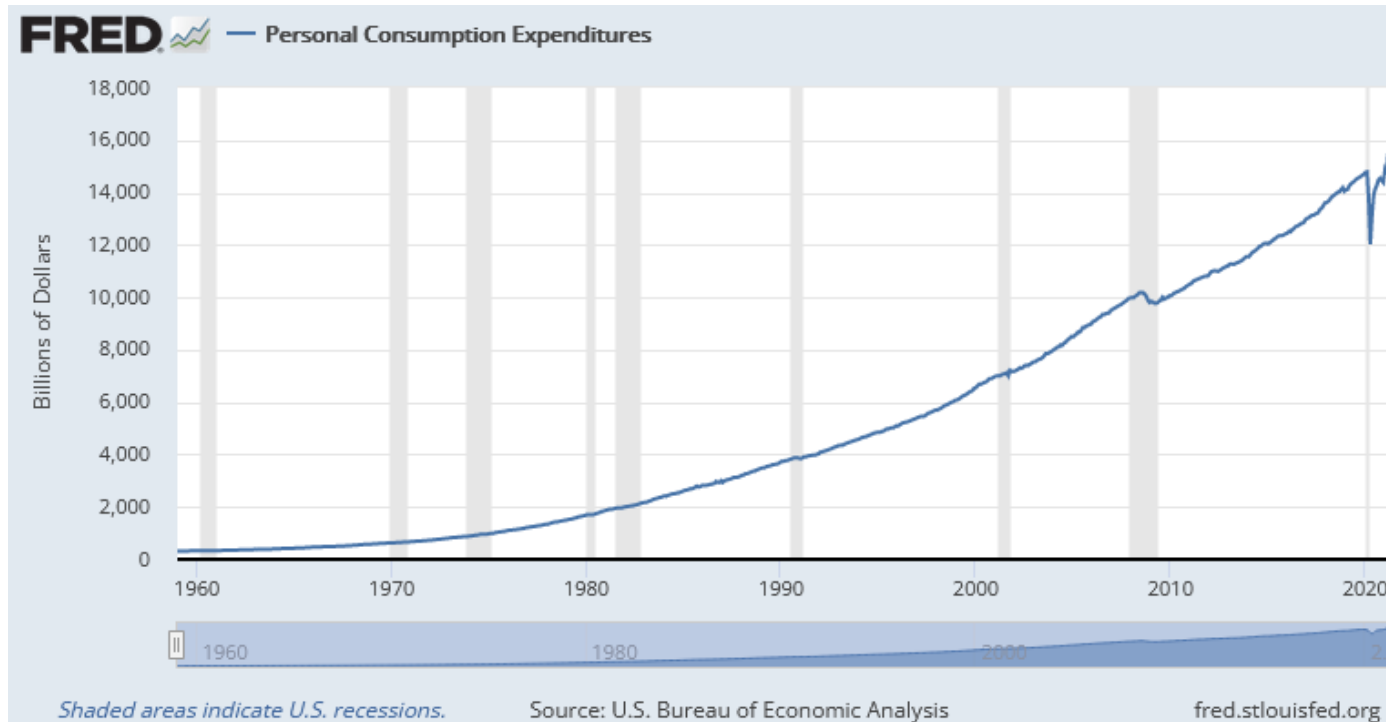
Reducing remaining 40% of emissions, increases:

- Replenishment costs by 5.43%
- Transportation by 232.71%.

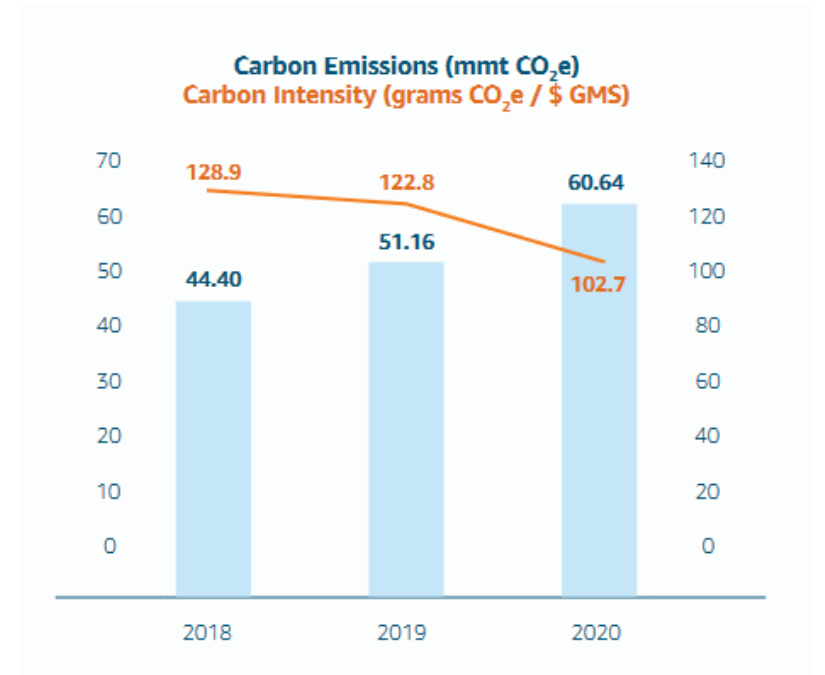
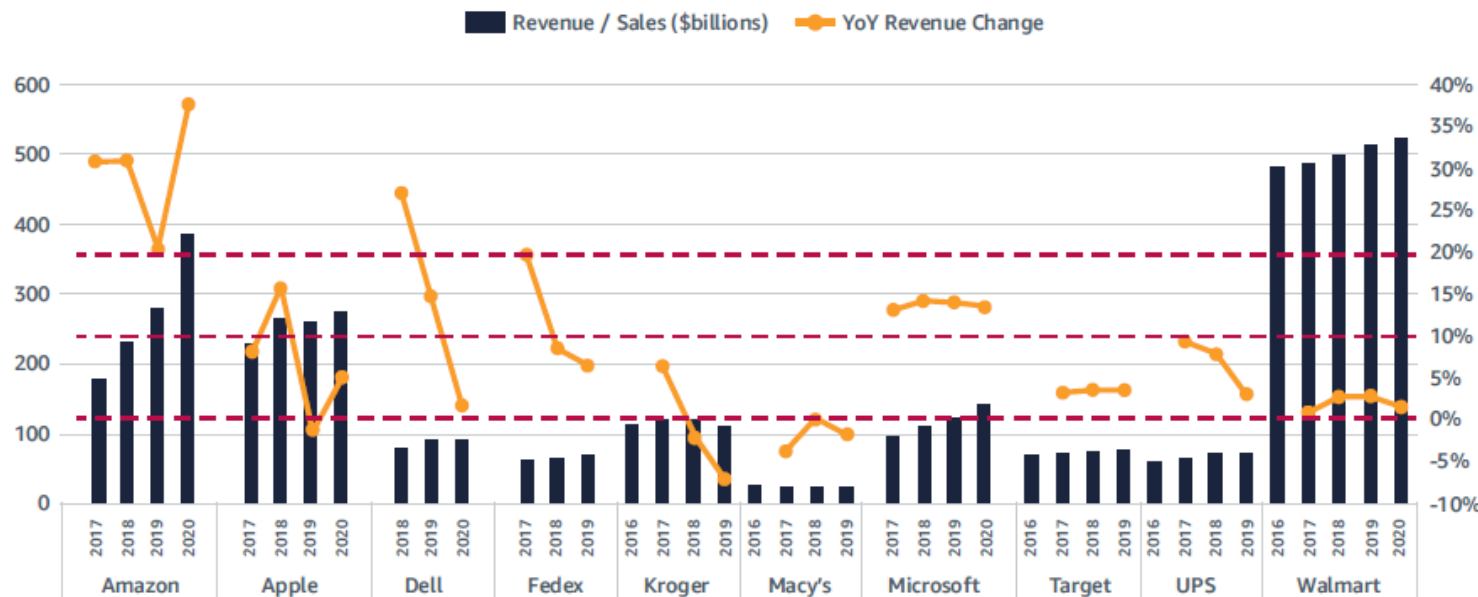
Consumption Trends...

Threats!

Consumption Trends



Hard to Keep Up



Net carbon emissions +19%

Carbon intensity -16%

Remarks!

Discussion

- We have a solid set of policies driving:
 - Innovation, adoption, and use (e.g., ACT, ACF)
- We will continue to need support (e.g., incentives) for:
 - Capital investments on vehicle technologies & infrastructure
- Hopefully, we have a fast ramp-up...we need it
 - Though, we are still waiting for the commercialization and market readiness of various technologies
- We need to start looking at the demand side of freight, the one that drives the system
 - We will always be playing catch up, if the measures are not able to reduce impacts faster than net emissions

Questions?

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