The scale-up of China E-mobility: Policy drivers, Pathways and Air quality benefits

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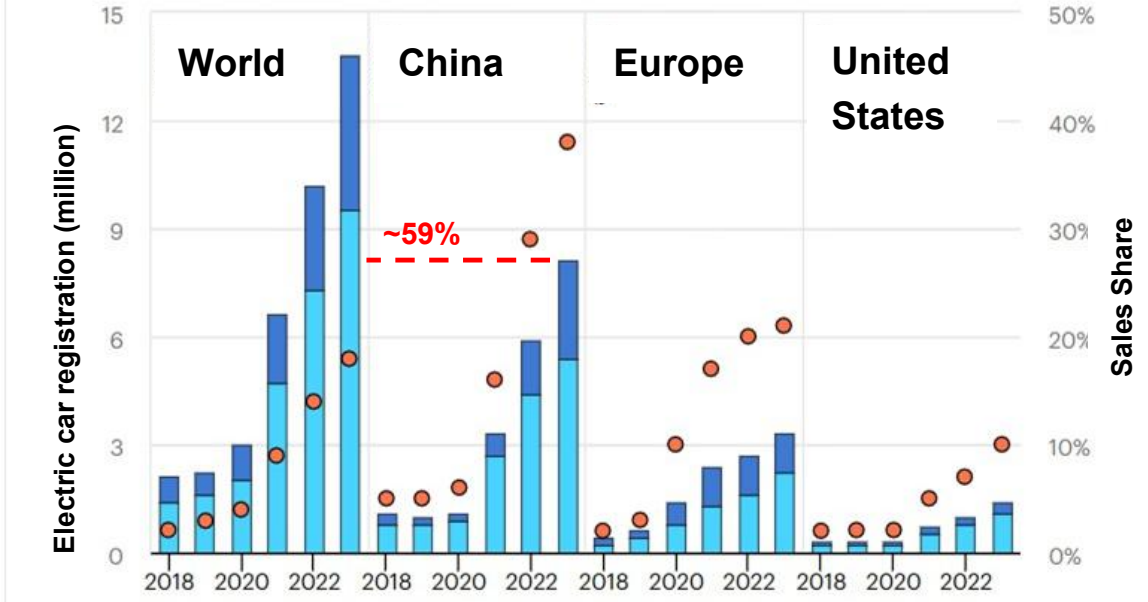
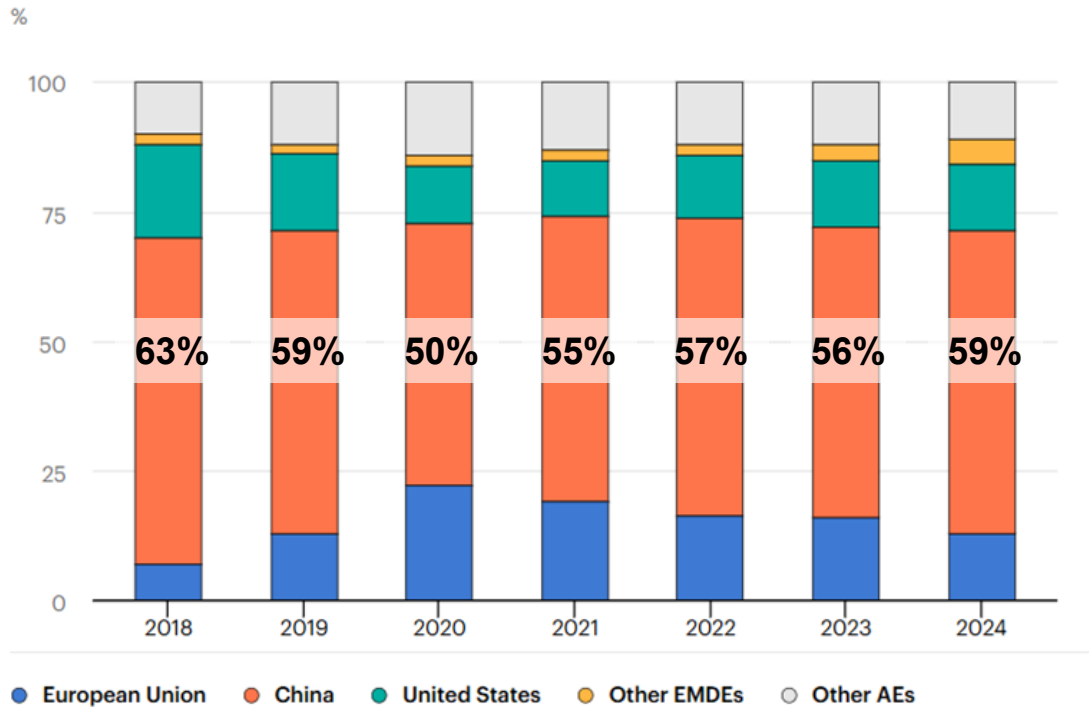
Rapid Development of E-mobility in China

- China accounted for **59% of global Electric Vehicle (EV) sales in 2023,** and achieved a **>50% penetration rate** in domestic vehicle market in 2025.
- China held a **~60% share** of global EV battery demand.

Global Electric Car Registrations and Regional Sales Share (2018-2023)



Global Electric Vehicle Battery Demand by Region (2018–2024)



Source: IEA, 2026

China’s EV development policies and programs

Automobile Industry Policy
Environmental Policy
Key Programs/Policies

Pilot Cities
Financial subsidy
Tax exemption

Air Pollution Prevention Action Plan
- Propose direct licensing and financial subsidies
- NEVs and clean fuel vehicles >60% of new buses in Beijing, Shanghai, Guangzhou, etc.

The 13th Five-Year Plan for Environmental Protection
Basically realize NEVs for public transport before 2018 in certain cities

Medium- & Long-Term Development Plan for the Automotive Industry
2020: NEV sales >2 million
2025: NEV penetration >20%

NEV Development Plan （2021—2035）
Full electrification for vehicles in public sector

Subsidy phase-out

2009 2010 2013 2016 2017 2018 2020 2023

“Ten Cities Thousand Vehicles” Program
- 13 NEV Pilot Cities
- Financial subsidies for NEVs in public sector
- 25 NEV Pilot Cities
- Financial subsidies for private passenger NEVs

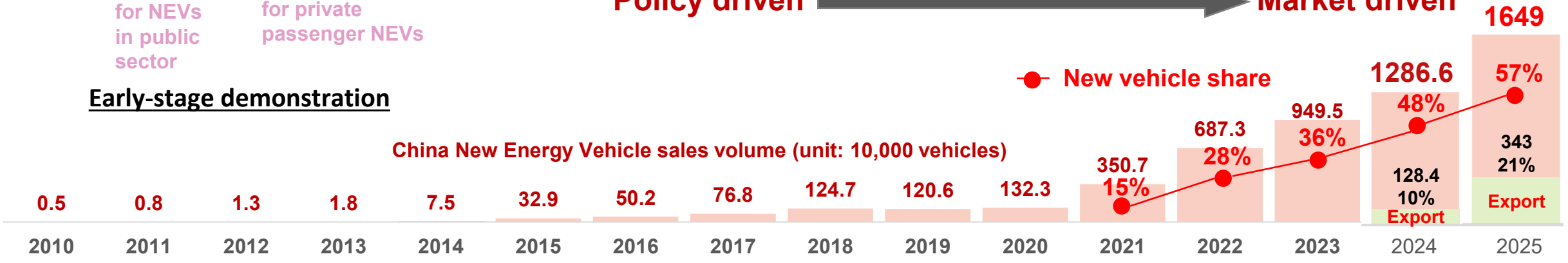
Subsidy phase-in
Adjust subsidy standards, and clarify battery requirements and subsidy caps

Dual-Credit Policy
Adjust subsidy standards, and add adjustment factor

Full Electrification Pilot Zone
15 cities
Public sector
Promote >600,000

Policy driven → **Market driven**

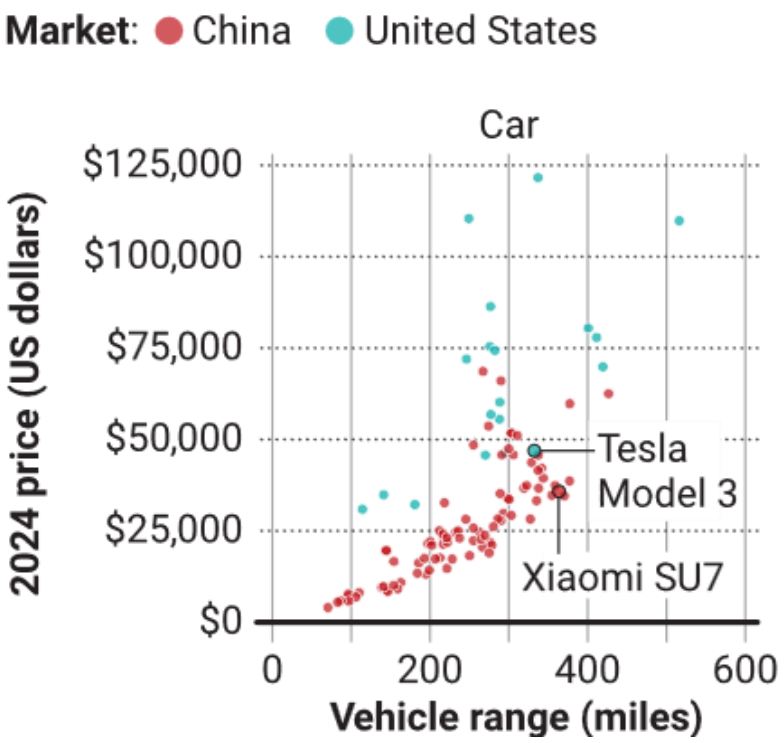
Early-stage demonstration



China’s advantage in Cost, Range, and Infrastructure

- More EV models at more affordable prices with higher driving ranges are available in China
- Chinese BEVs achieve a lower total cost of ownership (TCO) , driven by lower purchase and operating costs, as well as more charging infrastructure

BEV Price-Range Performance: China vs. US (2024)



Source: Helveston et al., Science, 2025

Tech-economic Comparison for BEV and ICEV

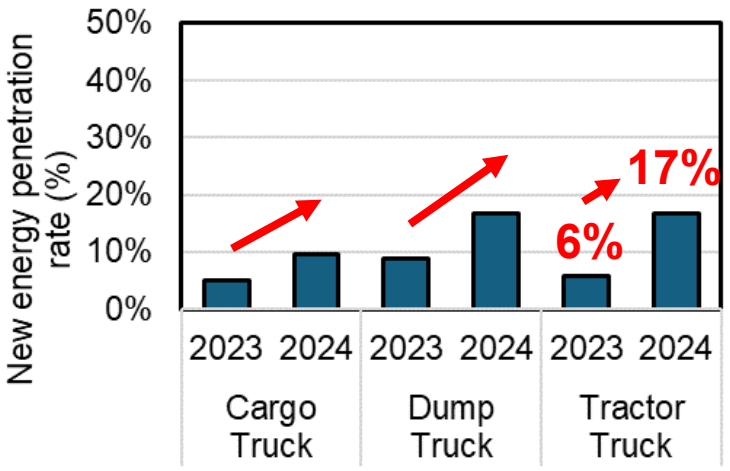
Region & Type	BEV in US	BEV in China	ICEV in China
Model	Tesla Model 3 	Xiaomi SU7 	Passat (330TSI) 
Battery Range (km)	510	700	/
Official Energy consumption	12 kWh /100 km	12.3 kWh/100 km	8.1 L /100 km
Purchase price (RMB)	250,000	216,000	225,000
Total Cost of Ownership	1.91 RMB/km	1.47 RMB/km	2.07 RMB/km

Note: Calculation basis: Total mileage 150,000km; China electricity price 0.5 RMB/kWh, China fuel price 7 RMB/L; US electricity price 0.29 USD/kWh.

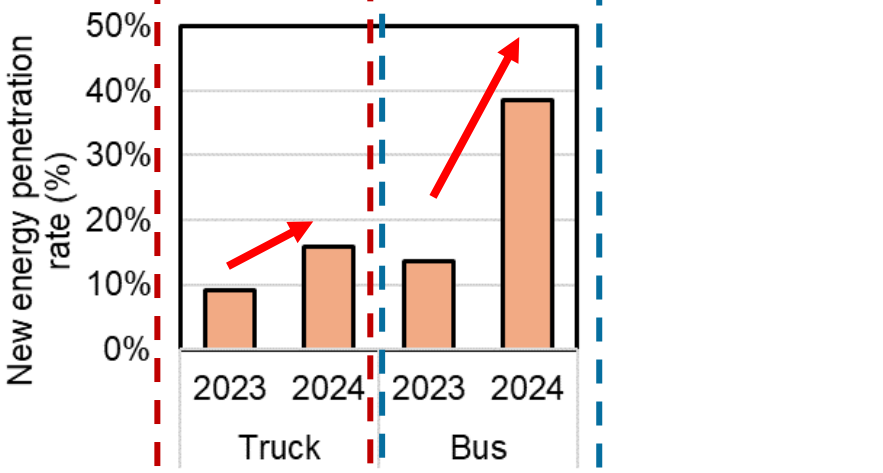
The Electrification of Commercial Vehicles Accelerates

- Commercial vehicle electrification in China is advancing rapidly after 2023: current EV penetration rates are ~20% for trucks and 40% for buses (over 80% for the public transit bus segment)
- Truck electrification is shifting from policy-driven (e.g., environmental requirements) to market-driven growth (e.g., business investments in electric trucks and ultra-fast charging/battery swap facilities)

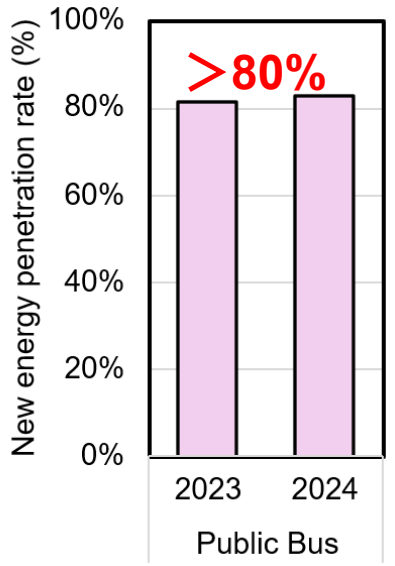
New Energy Truck Penetration by Type



New Energy Commercial Vehicle Penetration by Application



Public transit buses



Policy-driven: new energy transition for steel industry trucks

2019

The Opinions on Promoting the Implementation of Ultra-low Emissions in the Iron and Steel Industry

- **Bulk materials clean transport ≥80%**
- Differentiated environmental management

2020

Technical Guidelines for Emergency Emission Reduction Measures for Key Industries in heavy Pollution Weather

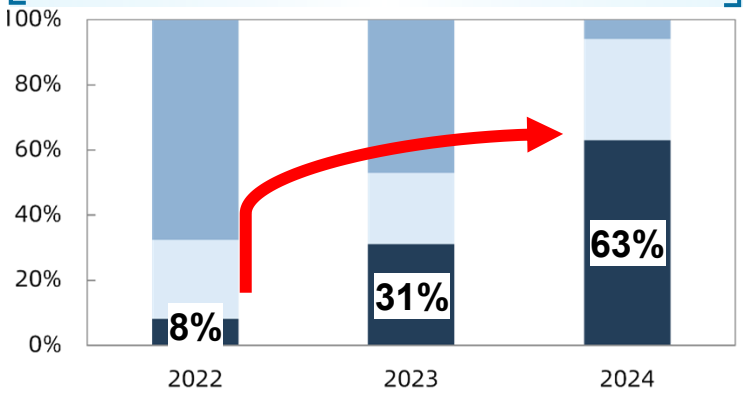
- Establish steel industry performance grading index system
- **Tiered management by grading**

2023

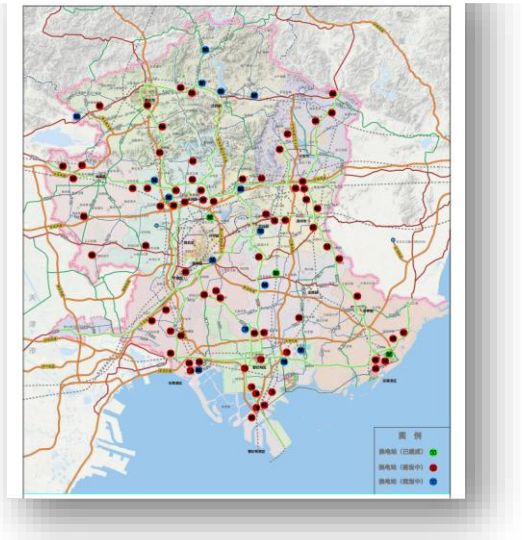
Action Plan for Continuous Improvement of Air Quality

- **Ultra-low emission target: ≥80% steel capacity upgraded by 2025**
- NEV promotion in key industries & logistics parks

Rapid growth in NEV share for on-site industrial transport



Infrastructure Planning



NEV Application

Market driven: Technological Progress in Electric Trucks

Battery & Range

Battery Capacity

282 kWh → 423 kWh (mainstream), some＞800 kWh
Mainstream capacity up by **>50%**

Drving Range

~150 km → ＞250 km (mainstream)
Mainstream capacity up by **>50%**

Application Scenarios

Short-hall and closed sites → **medium- & long-distance** transport.

Replenishment

Charging Power

120 kWh → 1C **fast charging** / **Megawatt Ultra-Charge**

Charging Time

~2 h → <1 h (mainstream)
Charging time reduced by over 50% (mainstream)

Battery Swap

5 min swap + Zero-Emission Corridors

Vehicle & Battery Price

Vehicle Price

~1,000,000 RMB→ 300,000-600,000 RMB
Price reduced by 40%–70%

Battery Price

>1200 RMB/kWh → <700 RMB/kWh

Energy Consumption

Energy Consumption Rate

>150 kWh/100 km → ~120 kWh/100 km

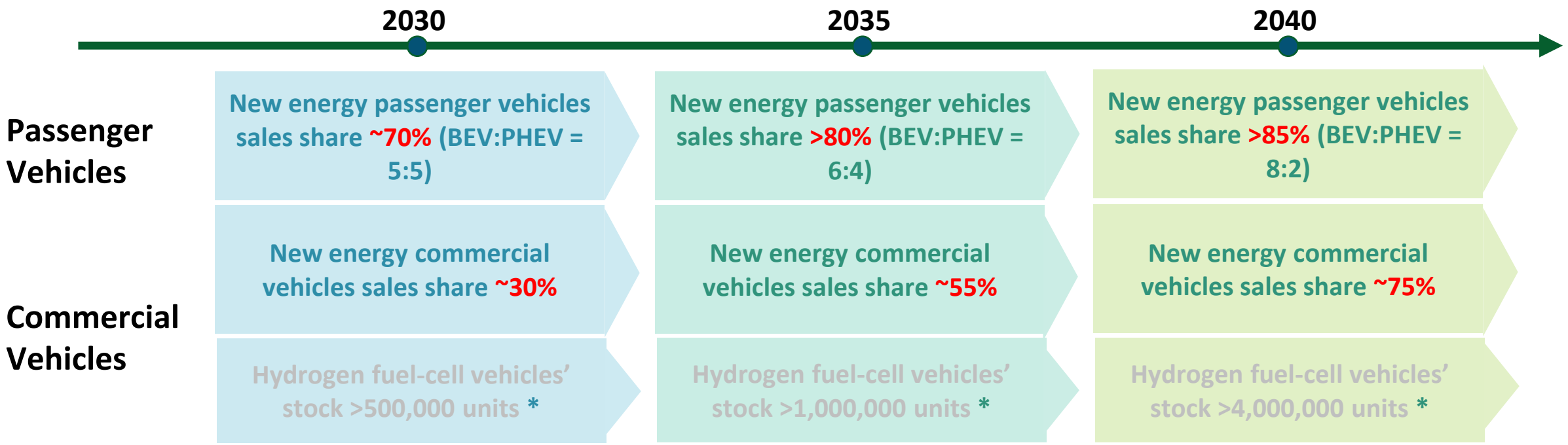
Tech Route

Retrofitting → **Forward R&D** + lightweight chassis

Note: Data and breakthroughs are compared between 2022 and 2025

China's Future NEV Targets (2030-2040)

- ***Technology Roadmap for Energy Saving and New Energy Vehicles 3.0:*** **NEVs will dominate the automotive market in the next decade ("EV as mainstream products before 2035" announced by China's new NDC plan)**
  - **2040 target: NEV passenger car penetration >85% (80% BEVs)**
  - **2040 target: NEV commercial vehicle penetration ~75%, capable for medium/long-distance transport**



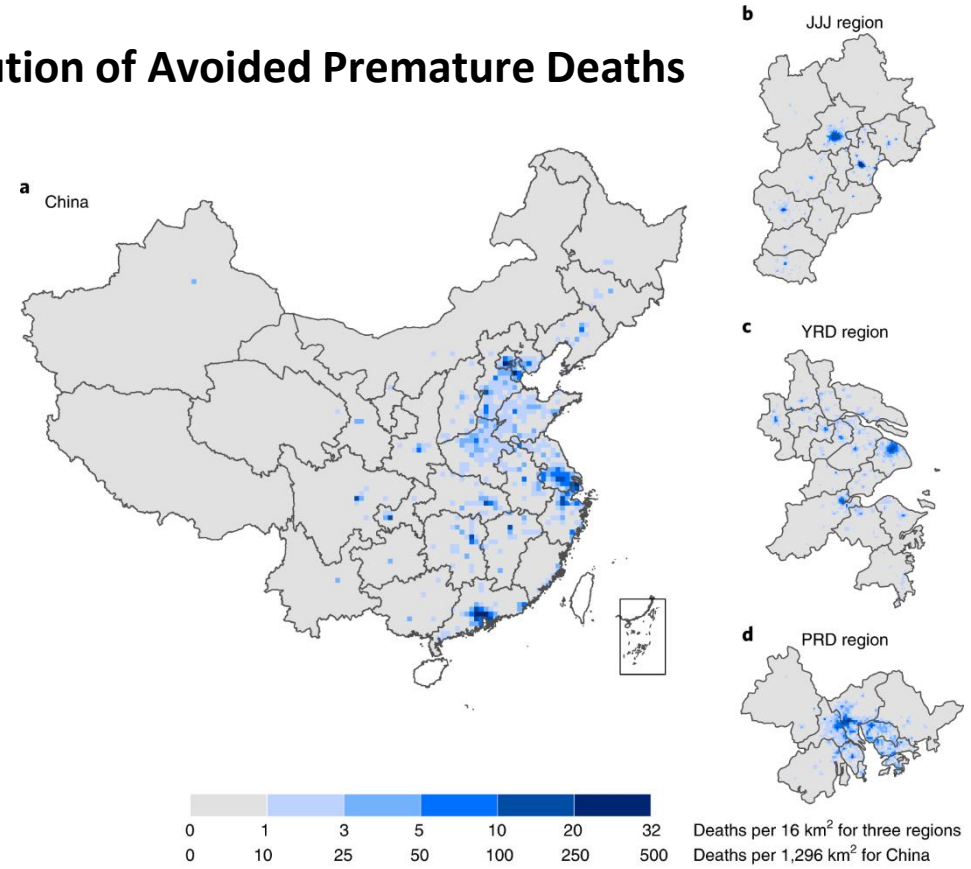
* China has not achieved its target of FCV number by 2025 (50,000 units). FCVs are estimated to be much more expensive than EVs

Source: Technology Roadmap for Energy Saving and New Energy Vehicles 3.0, 2025

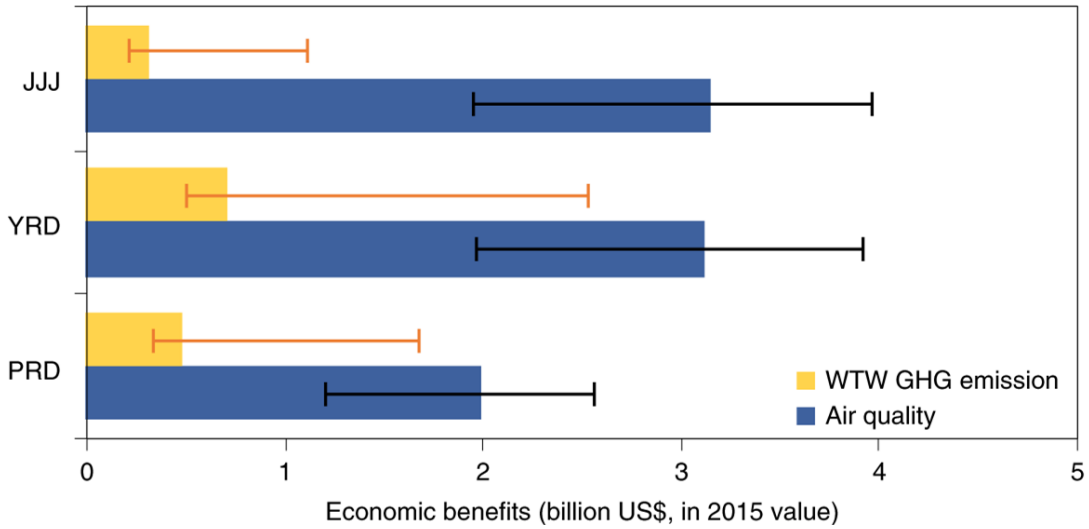
Health Benefits from Fleet Electrification in China

- **Electrification of ~30% of passenger cars and more commercial vehicles in bus, taxi and urban logistic fleets in China can reduce air pollution ($PM_{2.5}$, summertime O_3 and NO_2) and thus avoid ~20,000 premature deaths annually in 2030**

Distribution of Avoided Premature Deaths



Assessment of Health Benefits and GHG Emission Reductions from Fleet Electrification



Source: Liang et al., Nat. Sustain., 2019

Key takeaway

- **A Rapid scale-up of EV market in China.** China accounts for nearly 60% of global EV sales and battery demand, making it the world's largest EV market and a core driver of global transportation electrification.
- **Market Transition from Policy to Demand**. Through pilot programs, environmental regulations and automotive industry policies, China's EV market has successfully transitioned from a policy-driven to a market-driven one.
- **Passenger Vehicle Beyond 50% Penetration.** EV penetration in China's passenger car market has exceeded 50%. While plug-in hybrid electric vehicles and extended-range EVs are gaining share as transitional models in the near term, battery electric vehicles are set to dominate the long-term market.
- **Commercial Vehicles Expand to Medium/Long-Haul Scenarios**. Advances in vehicle and replenishment technology are enabling electric commercial vehicles to break into more medium- and long-haul transport scenarios in the near future.
- **Air Quality and Public Health Co-Benefits**. Fleet electrification in China could prevent approximately 20,000 premature deaths annually by 2030, with the greatest benefits in densely populated urban clusters.

Thank you!

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