Bundesministerium
für Wirtschaft
und Energie

MITTELSTAND
GLOBAL
EXPORTINITIATIVE ENERGIE

E-Mobility Pathway of China

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Durchführer

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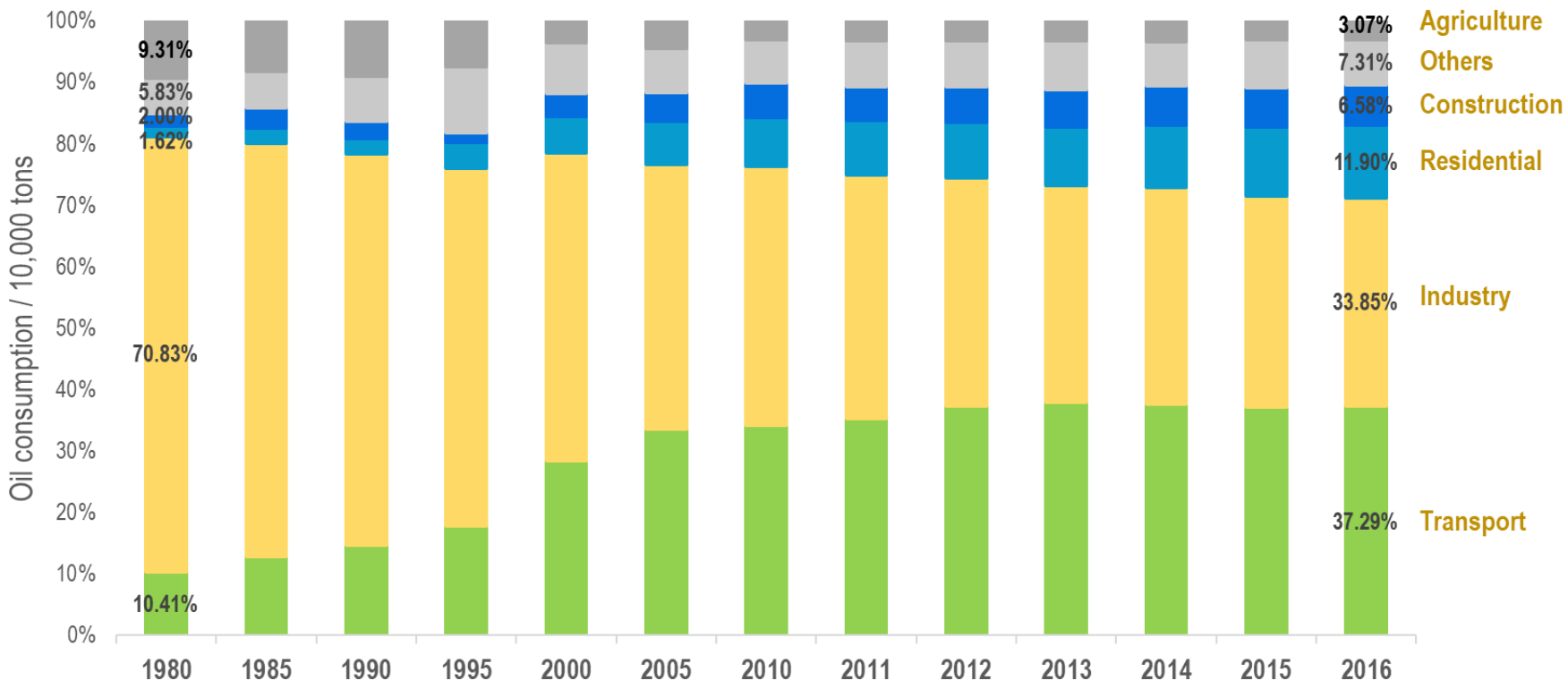
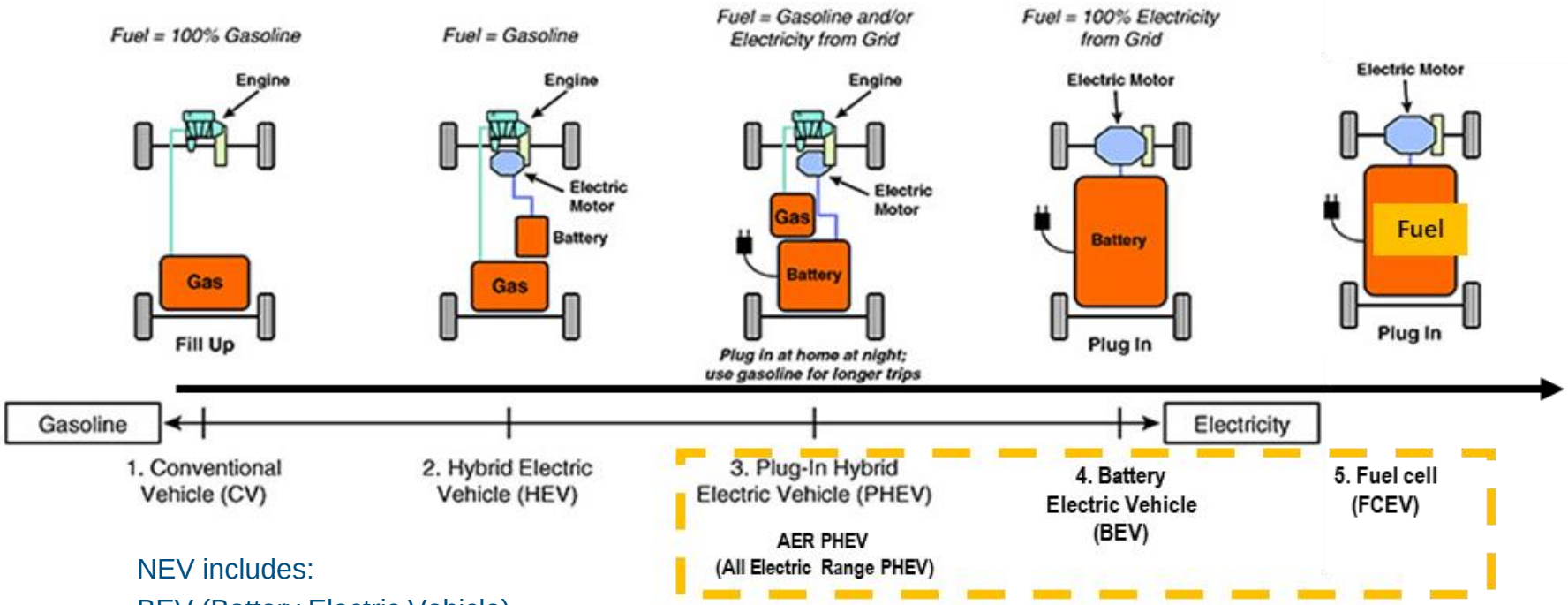
Background of EV development



China Defining New Energy Vehicles



NEV includes:

BEV (Battery Electric Vehicle)

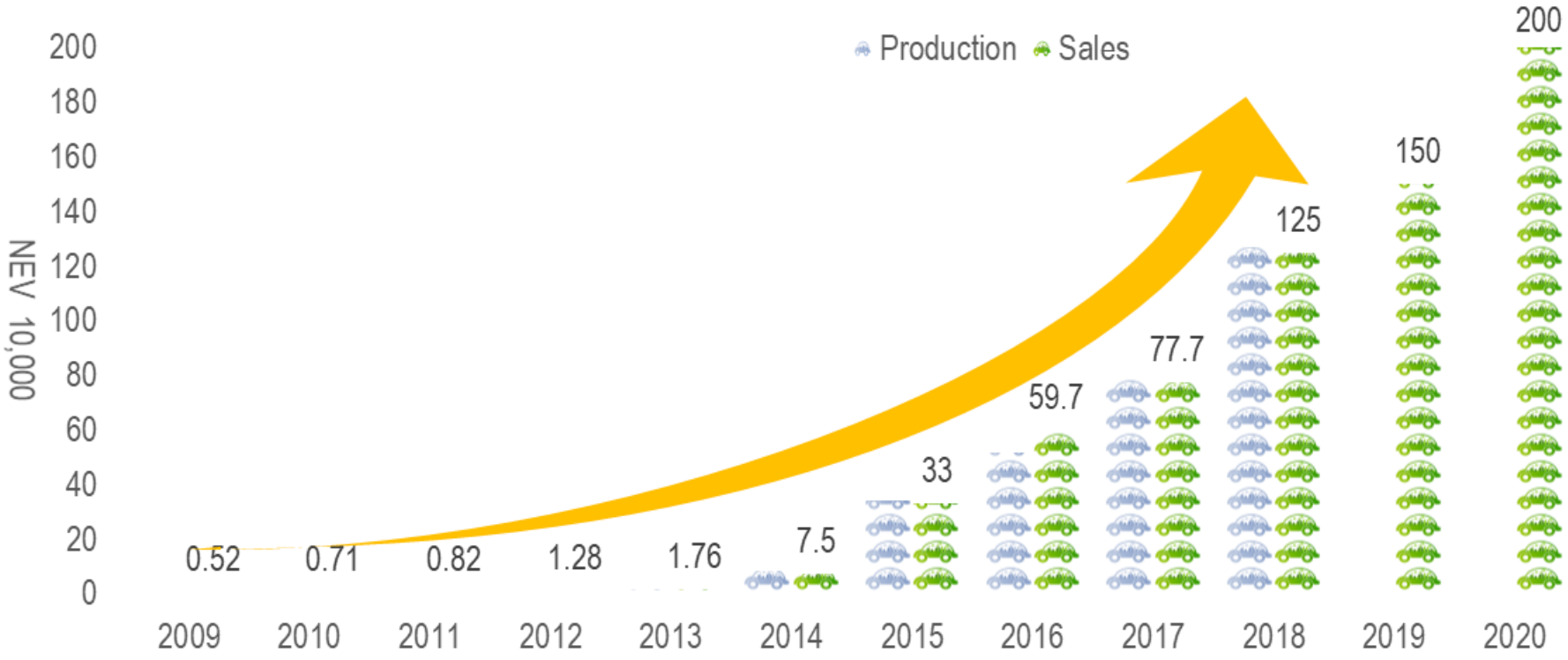
PHEV(Plug-in Hybrid Electric Vehicle)

AER PHEV (All Electric Range PHEV)

FCEV(Fuel Cell Electric Vehicle)

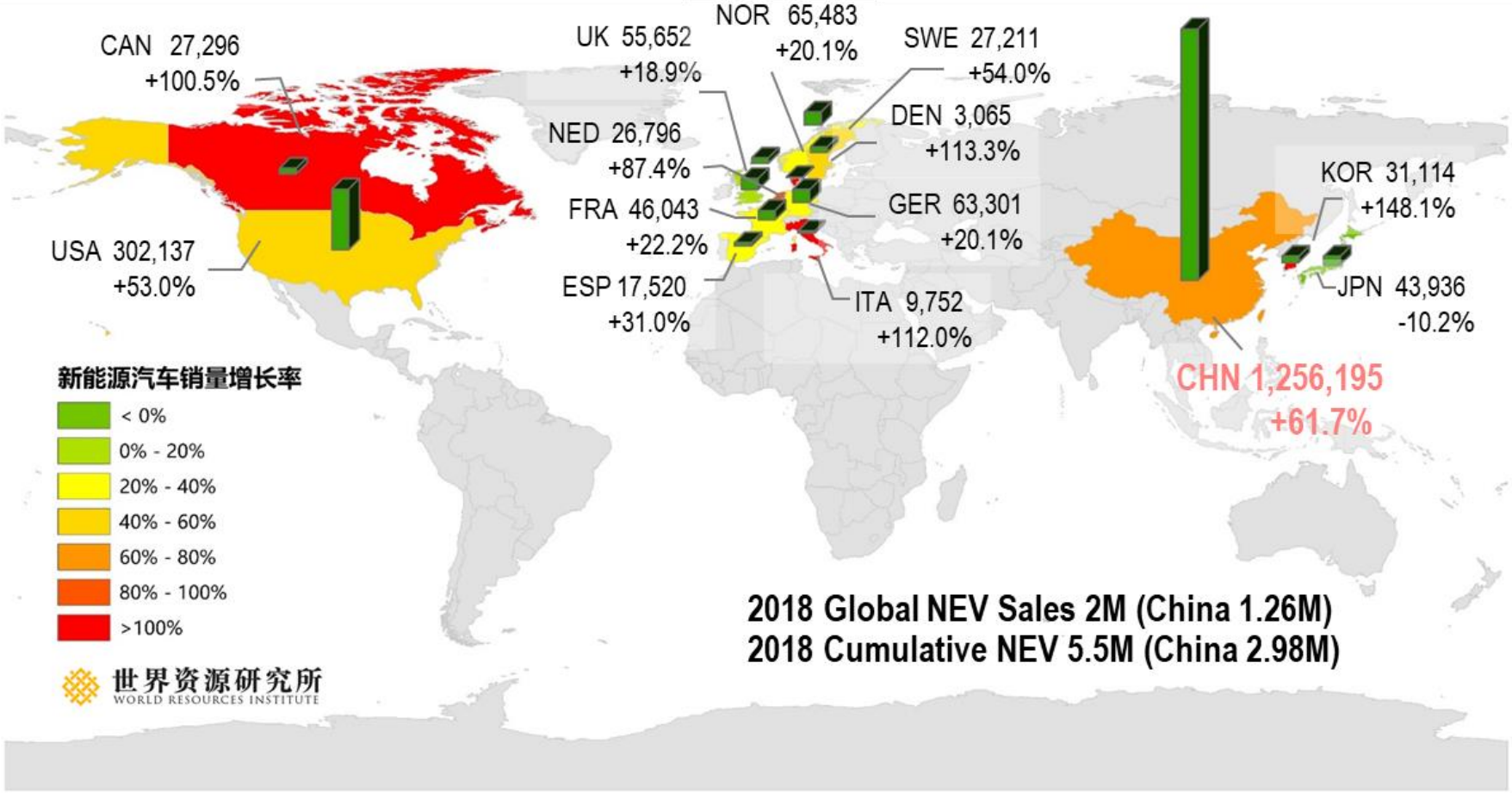
Other types named as Energy Saving Vehicle (HEV CNG LNG…).

2018 NEV Sales in China (1.25 Million, 4.4% of all sales)

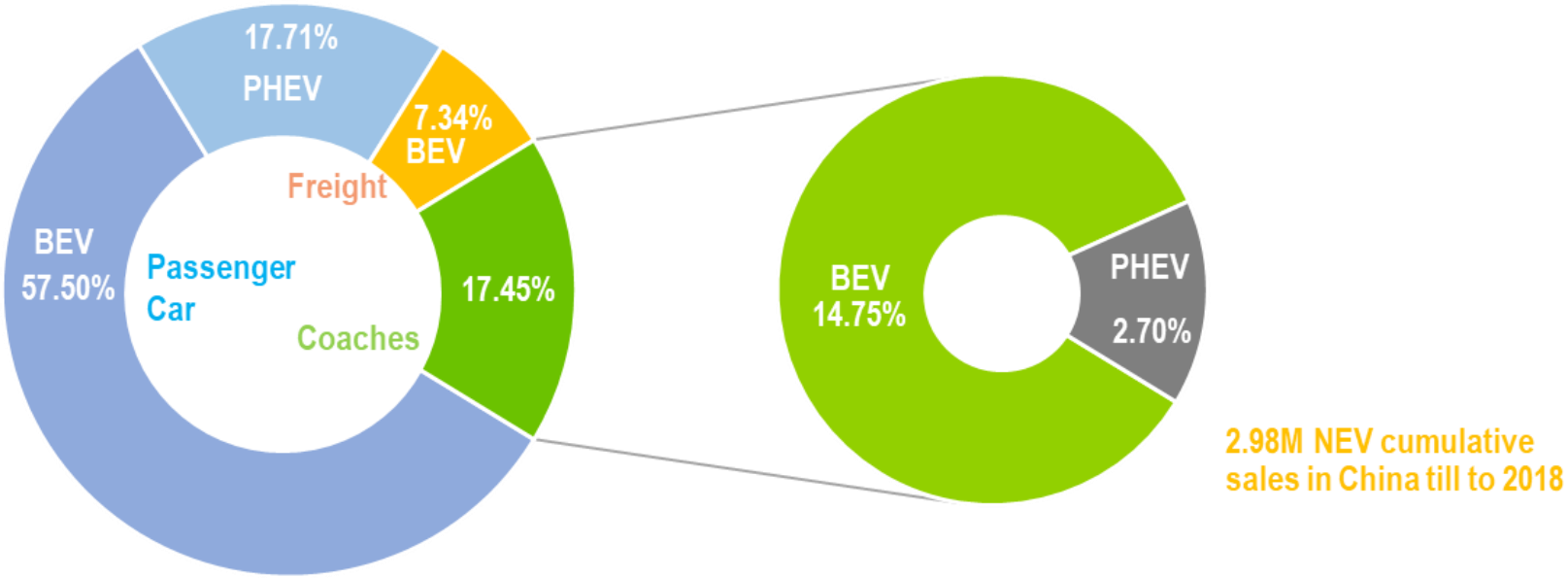


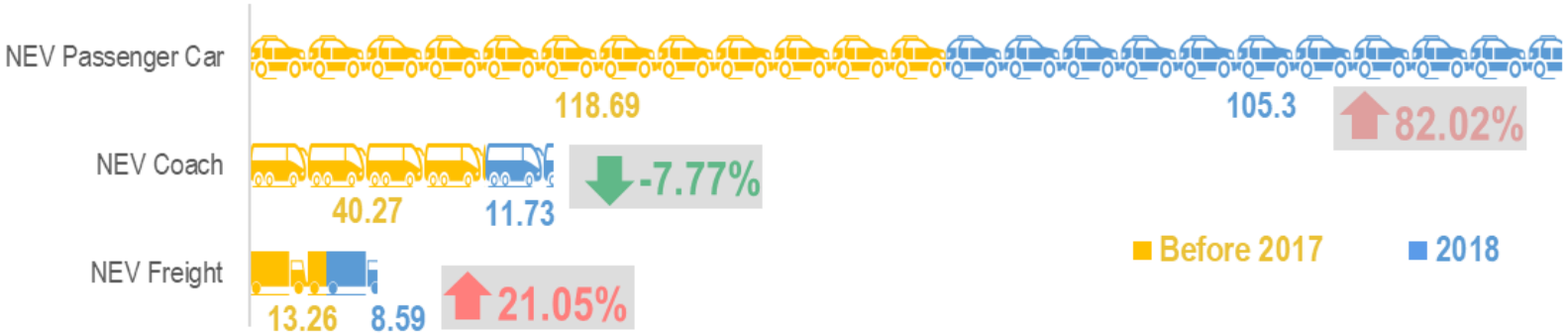
Source: China Association of Automobile Manufacturers 2018

2018 NEV Global Sales and Growth Rate

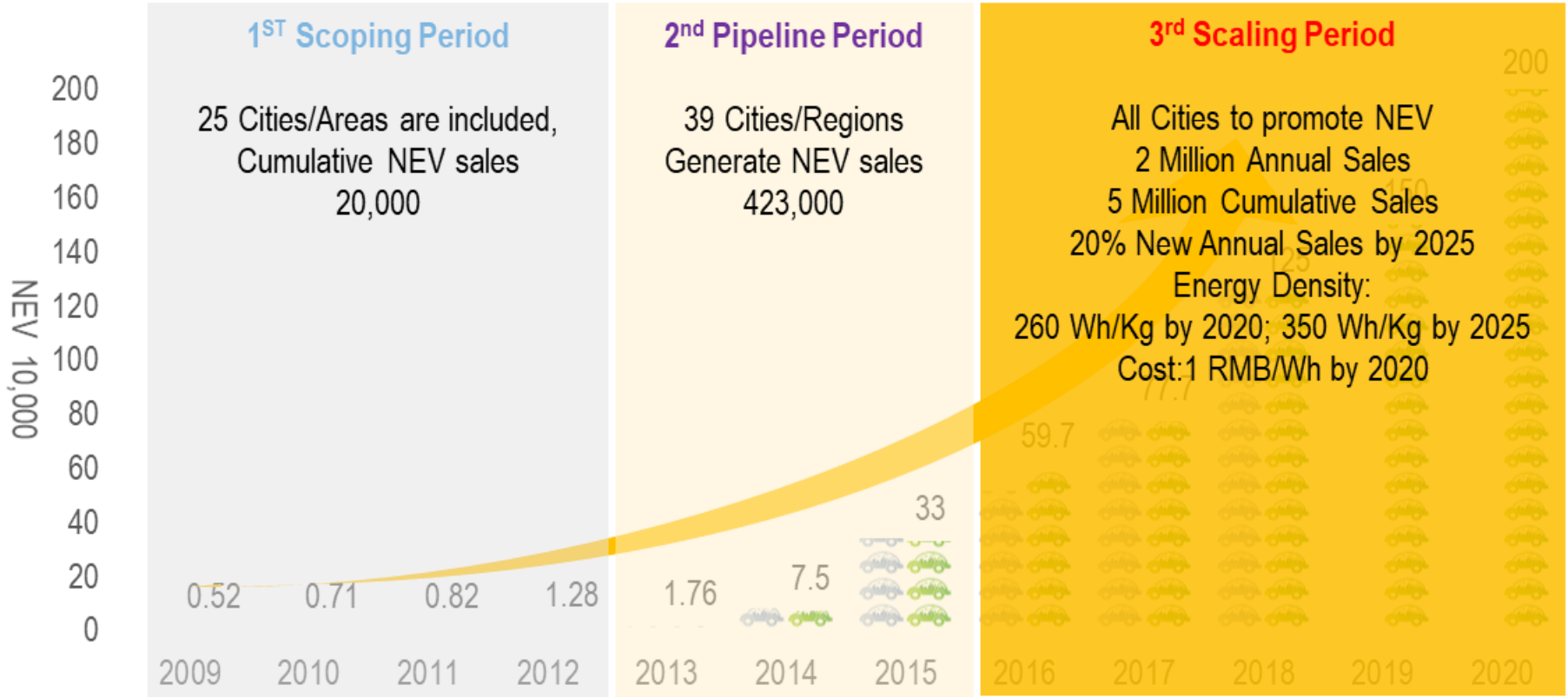


NEV Sales in Vehicle Types

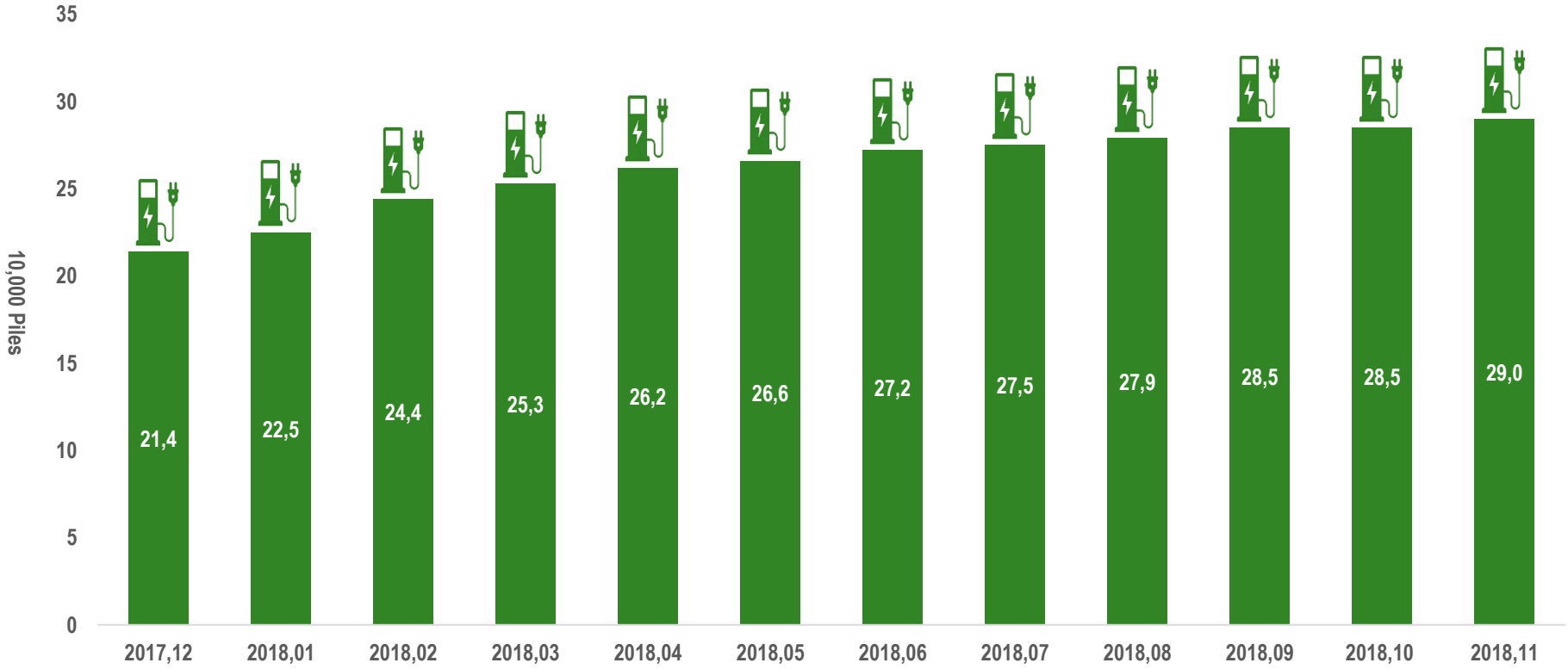




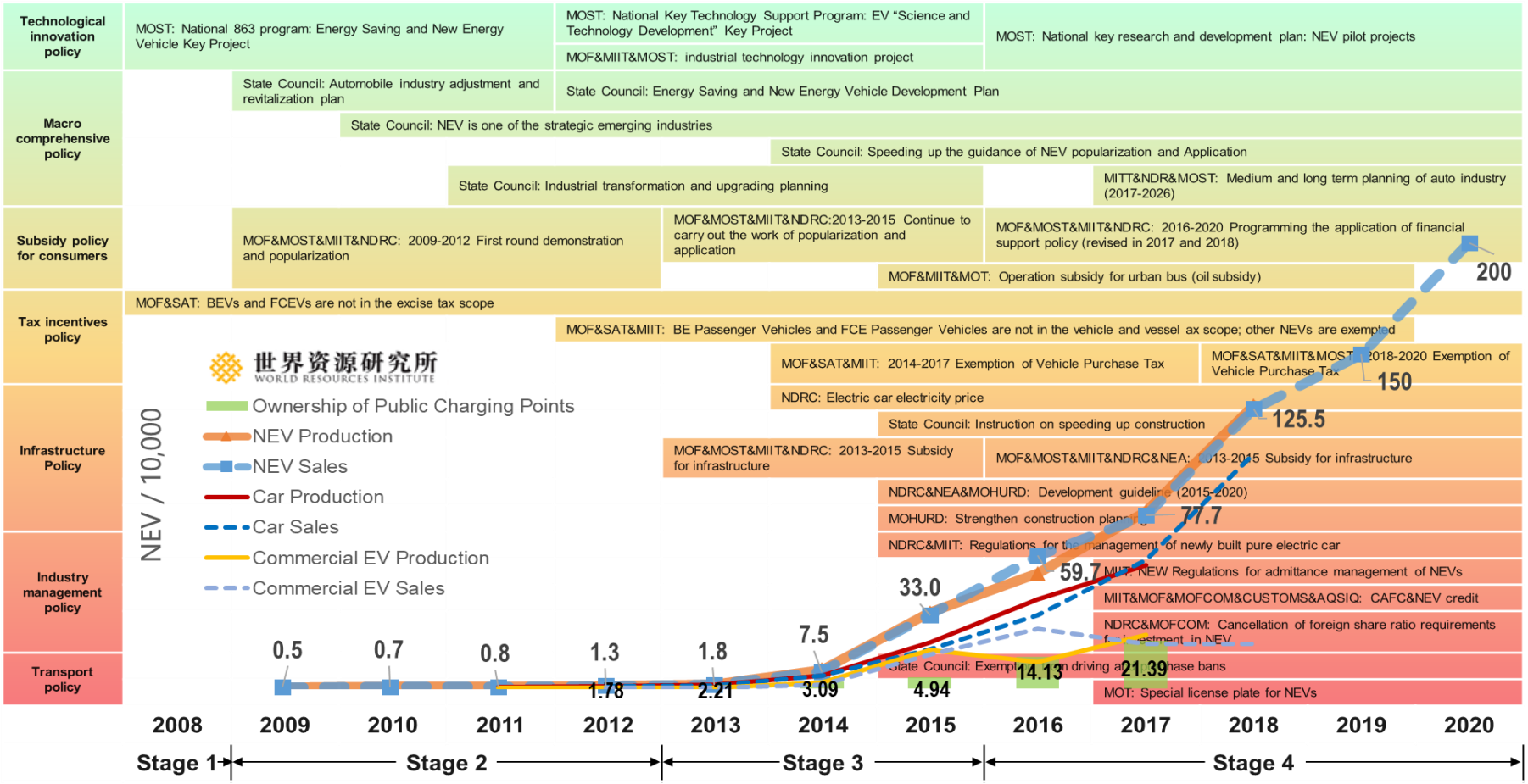
Targets for Three Stages



Public Chargers Operated



Systematic Policies Tools



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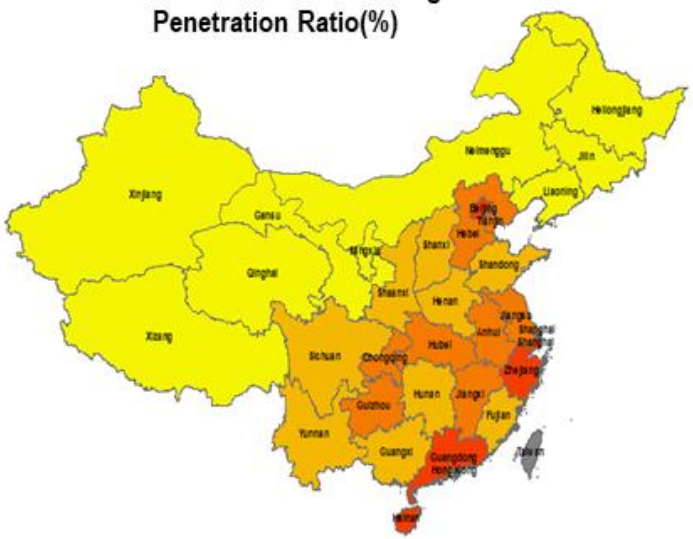
Systematic Policies Tools

- By 2050, in the stated policy scenario: 1. *CAFC&NEV credits, 2 tax exemption, 3 subsidy by 2026*
- Electric passenger vehicles: 55.4% of the total passenger vehicle fleet-480 million
- Light- and heavy-duty freight trucks: 30.3% of the total light- and heavy- duty trucks-27 million

2050 Provincial-level Electric Passenger Vehicle Penetration Ratio(%)



Targeted vehicle types	Difficulties
Heavy-duty trucks	6
Long-distance coaches	6
Private cars	5
Light-duty trucks	4
Urban freight	3
Public service vehicles	3
Business cars	2
Taxis	2
Buses	1

Source: CARTARC 2018

Systematic Policies Tools

Fiscal Incentives

Purchasing subsidy (phasing out)
Exemption of vehicle purchase tax
Double credits

Non-fiscal Incentives

LEZ and other traffic restriction exemptions
Green-color special license plate for EV

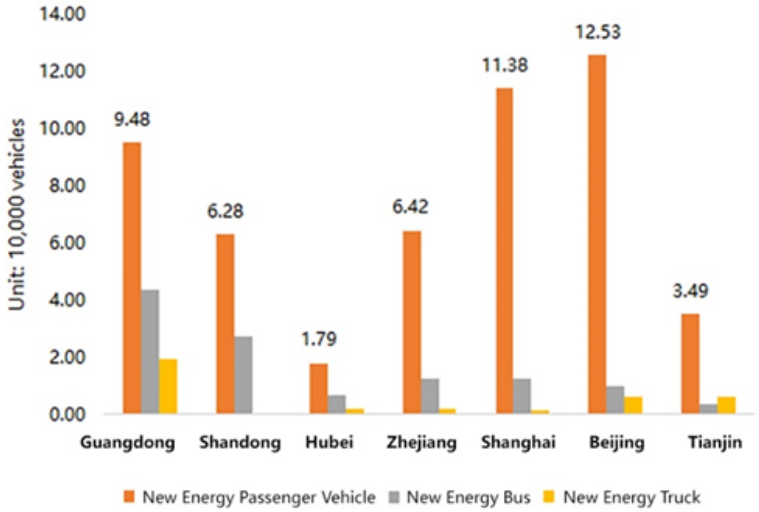
Zero Emission and Blue Sky

To deploy 100% e-public fleet and commercial in key cities
NEV new car sales requirements

Systematic Policies Tools

Demand-side non-fiscal policies will become the main focus of China's EV policies in the future:

- Beijing and Shanghai are leading the uptake of electric passenger vehicles, due to private vehicle purchase and registration incentives.
- Shenzhen is leading the adoption of commercial electric fleets, such as electric buses and electric urban freight, thanks to traffic restriction, registration incentives, operational subsidies, and political will.



Source: China Statistical Yearbook 2017 (population), motor vehicle insurance data (EV ownership)

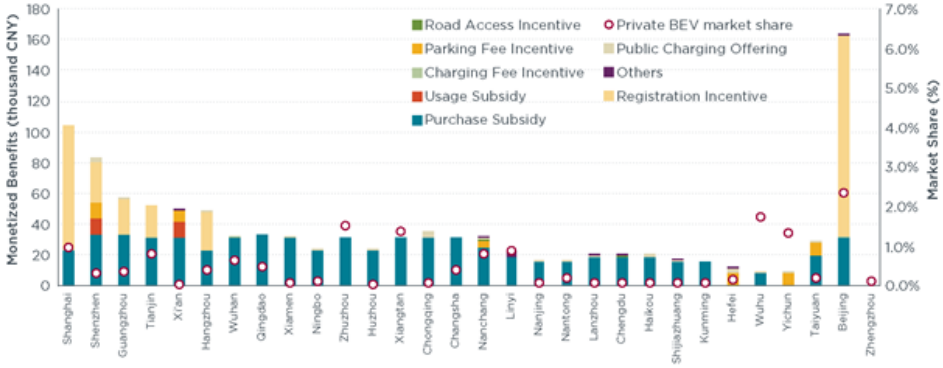


Figure ES 3. Private BEV market share and monetized benefits to consumers (ordered according to the magnitude of monetized benefits provided to private BEV consumers).

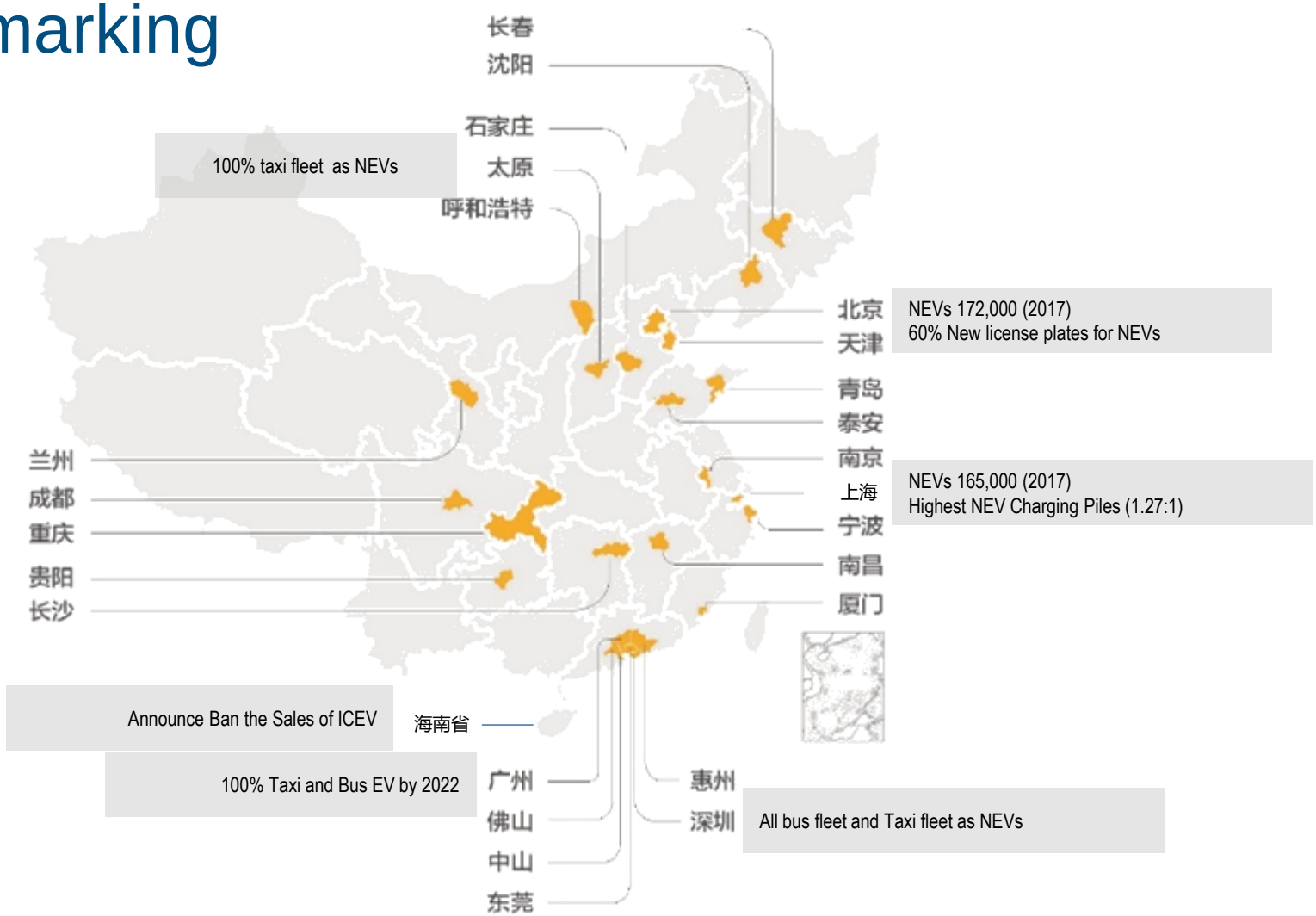
Low-emission zone

Traffic restrictions

Parking incentives

Source: ICCT 2018

Benchmarking



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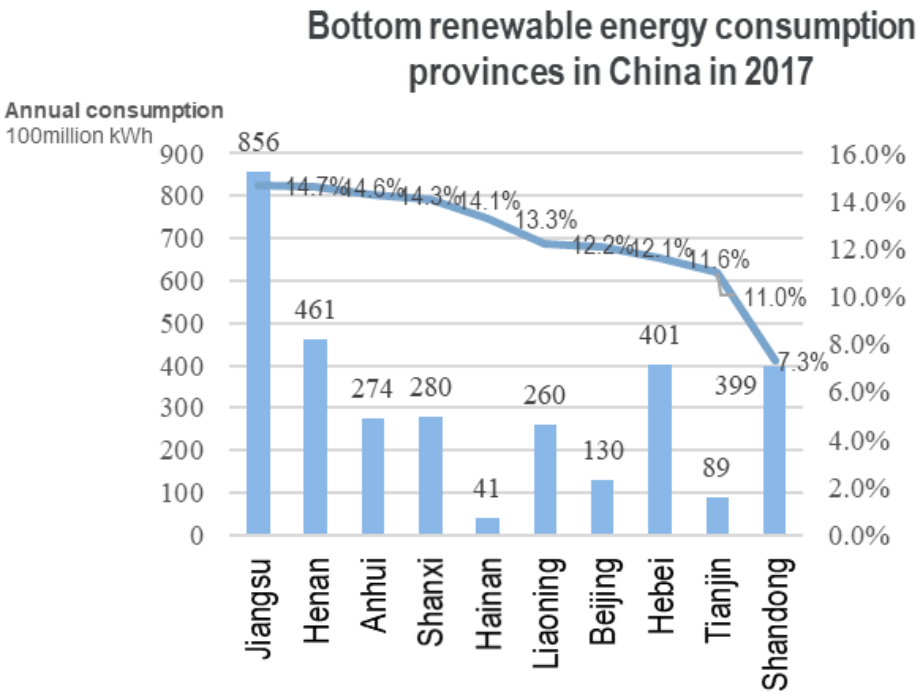
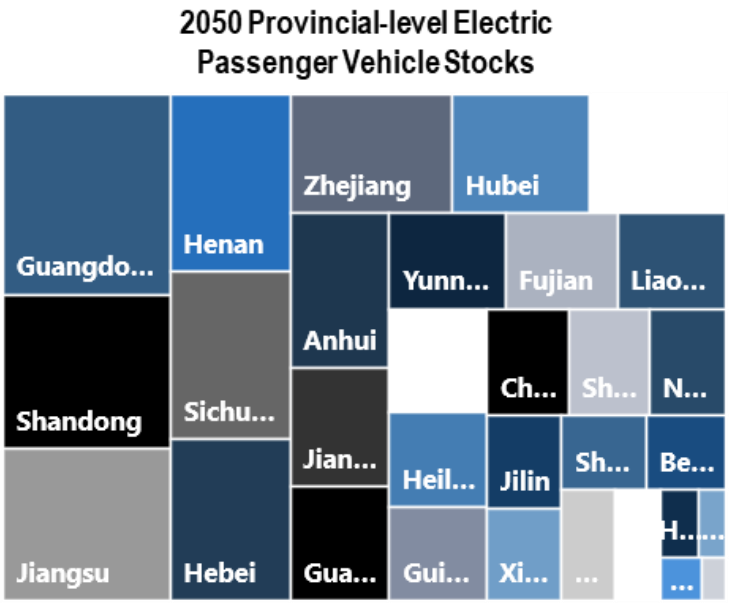
Energy System Impact

- Goal: By 2050, China's EV will constitute 5% of the total electricity consumption. By 2050, renewable energy would account for 86% of the total electricity consumption (including hydrology, solar, wind, biomass, and geothermal).
- **Yet, the pathway from today to 2050 is unknown: on province-level, the uptakes of EV and RE are not in sync.**





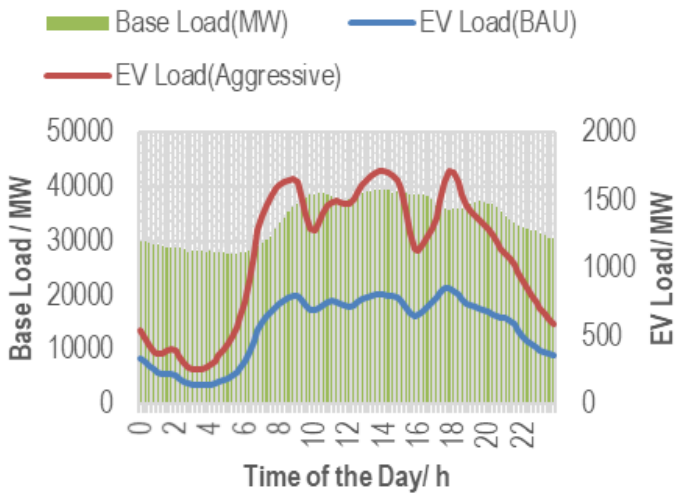
Source: ERI 2018, WRI 2018

Energy System Impact

Novel concepts for charging infrastructure and smart grids

- BAU scenario: 50-80% EV penetration, slow-charging is the mainstream
- Aggressive scenario: 80-100% EV penetration, prevalent adoption of fast charging (avg. power 200kW)

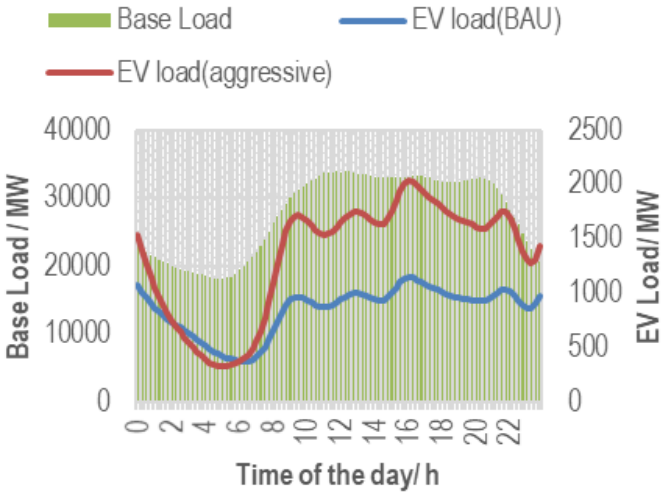
Suzhou 2050 Daily EV Load Curves



- **Electricity demand**: 1.6-3.1% total demand (industrial, agriculture, residential)
- **Power generation**: additional 801 - 1700 MW

Source: WRI 2019 (ongoing)

Beijing 2050 Daily EV Load Curves



- **Electricity demand**: 3.0-4.6% total demand (industrial, agriculture, residential)
- **Power generation**: additional 965 - 1692 MW

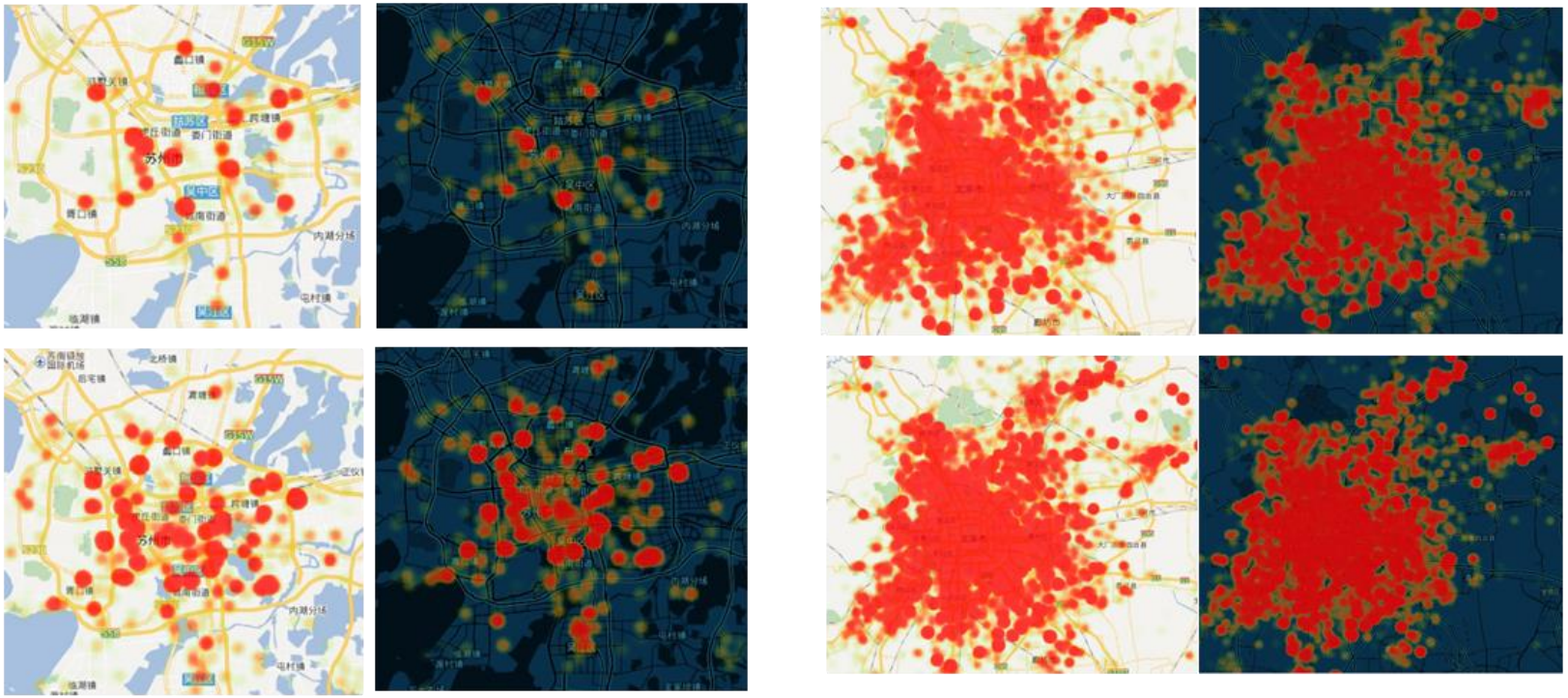
Energy System Impact

Suzhou Daytime and Night-time Charging hotspot

Beijing Daytime and Night-time Charging hotspot

July 2017

Mar 2018



Even the distribution network in China is very robust(**max. load factor=70-80%**), it still takes some hits now:

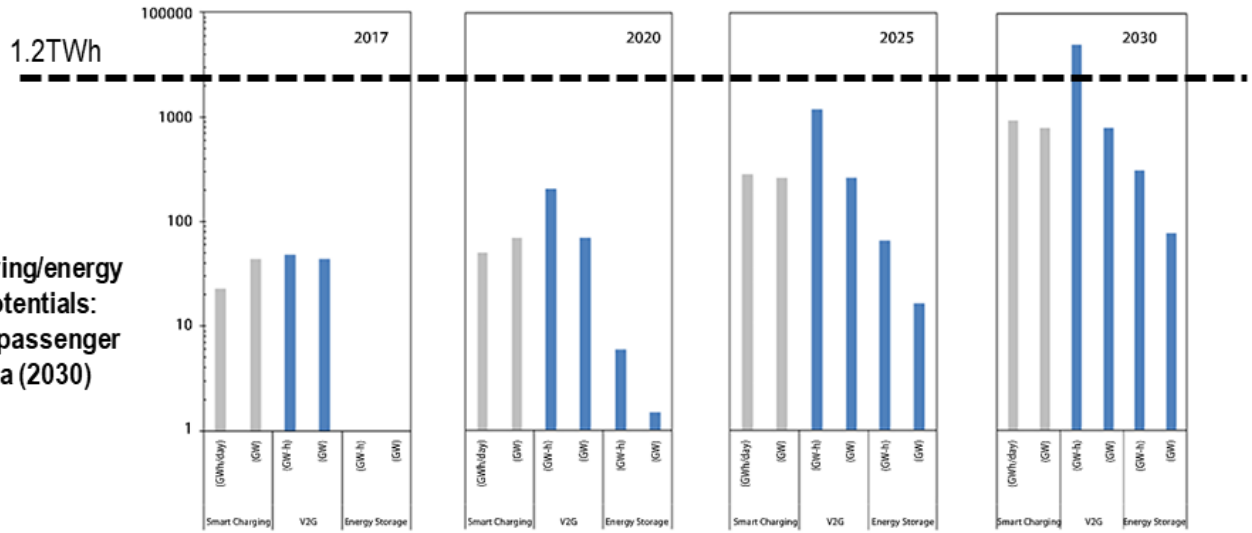
- 10kV distribution system will be mostly affected
- 110kV distribution system would be sometimes affected

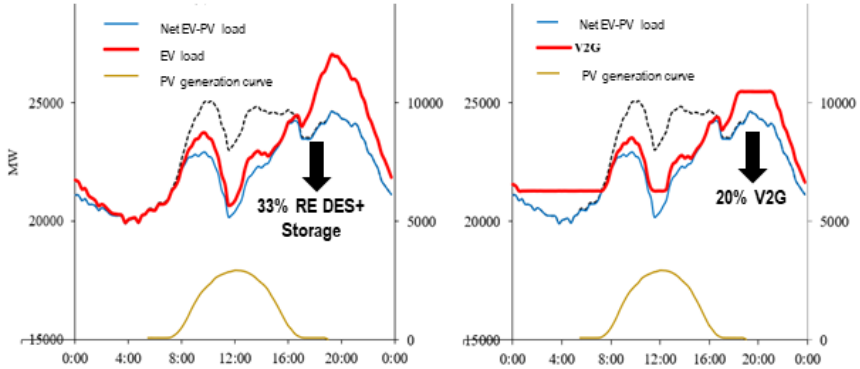
Source: WRI 2019 (ongoing)

- What is the scale of the impacts on the micro-level over time?
- How to plan the distribution system to cope with the impacts?

Energy System Impact

Peak-shaving/energy storage potentials: 10 million passenger EV in China (2030)





EV-grid integration initial analysis: 64,000 passenger EV in Suzhou (2017)

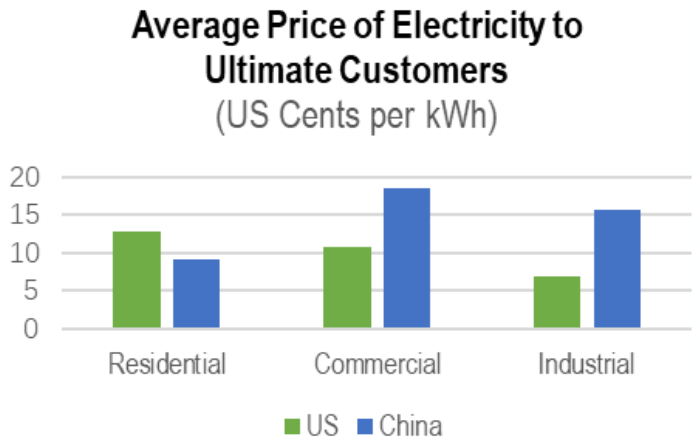
Source: ERI 2018 (ongoing with WRI)

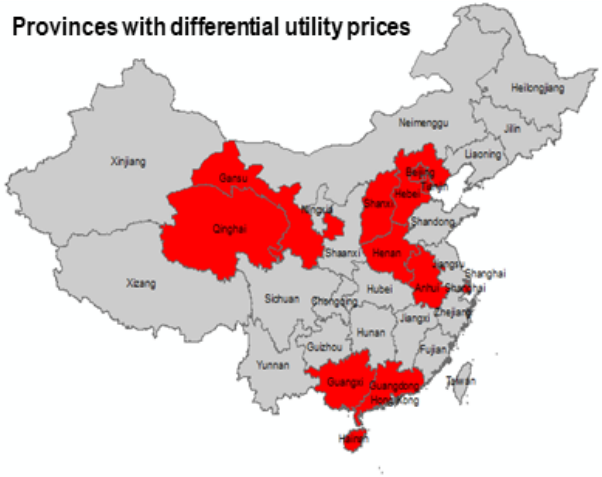
Energy System Impact

Novel concepts for charging infrastructure and smart grids

Country-specific context: novel business model and user cases are entailed.

- **Users' side**: Utility pricing structure in China favors residential usage; few provinces have adopted differential utility pricing mechanisms; Cost elasticity and market acceptance to smart charging/V2G are unknown.
- **Aggregators' side**: which party and what business model
- Some dense commercial areas and residential neighbourhoods leave little room for adequate distributed solar PV deployment.





Source: WRI summarized based on EIA and NEB databases, access in Dec 2018

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