

Assessment of New Energy Passenger Vehicle Incentives in Chinese Cities

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International Council on Clean Transportation

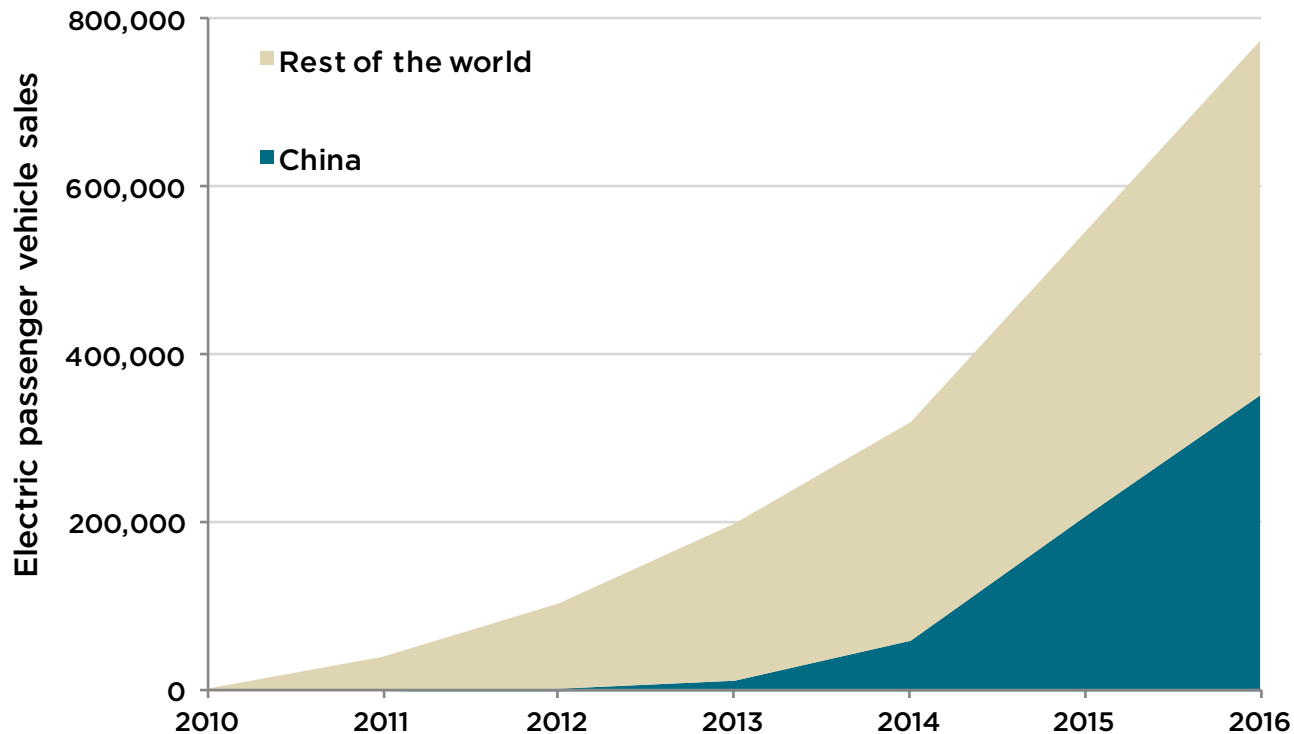
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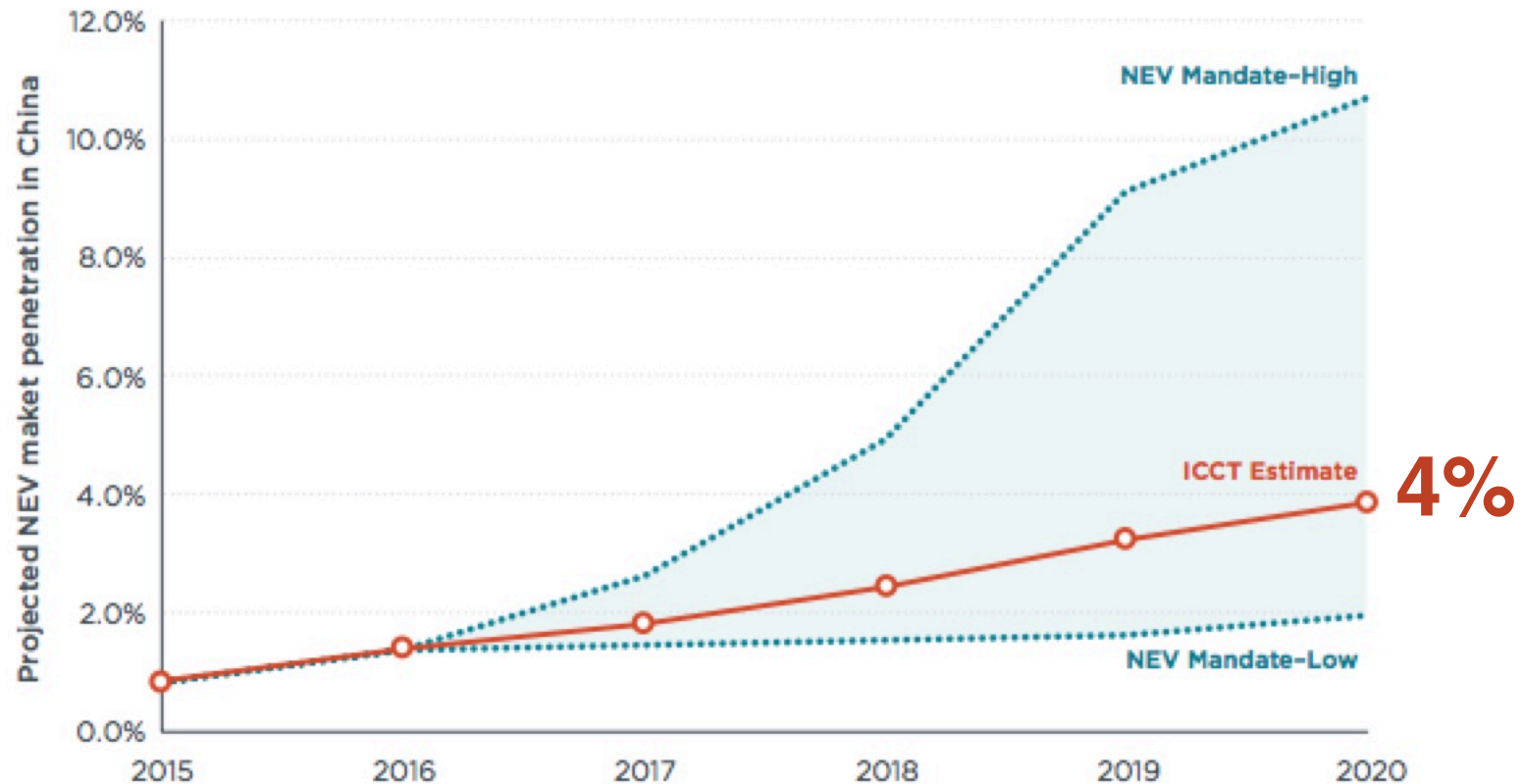
China's EV sales is skyrocketing under strong policy actions at both national and city levels.

- China accounted for 37.8% and 45.4% of the global sales of electric passenger vehicles in 2015 and 2016, respectively.
- By the end of 2015, the Chinese national government has poured 33.4 billion yuan (~\$4.87 billion) into its NEV market.



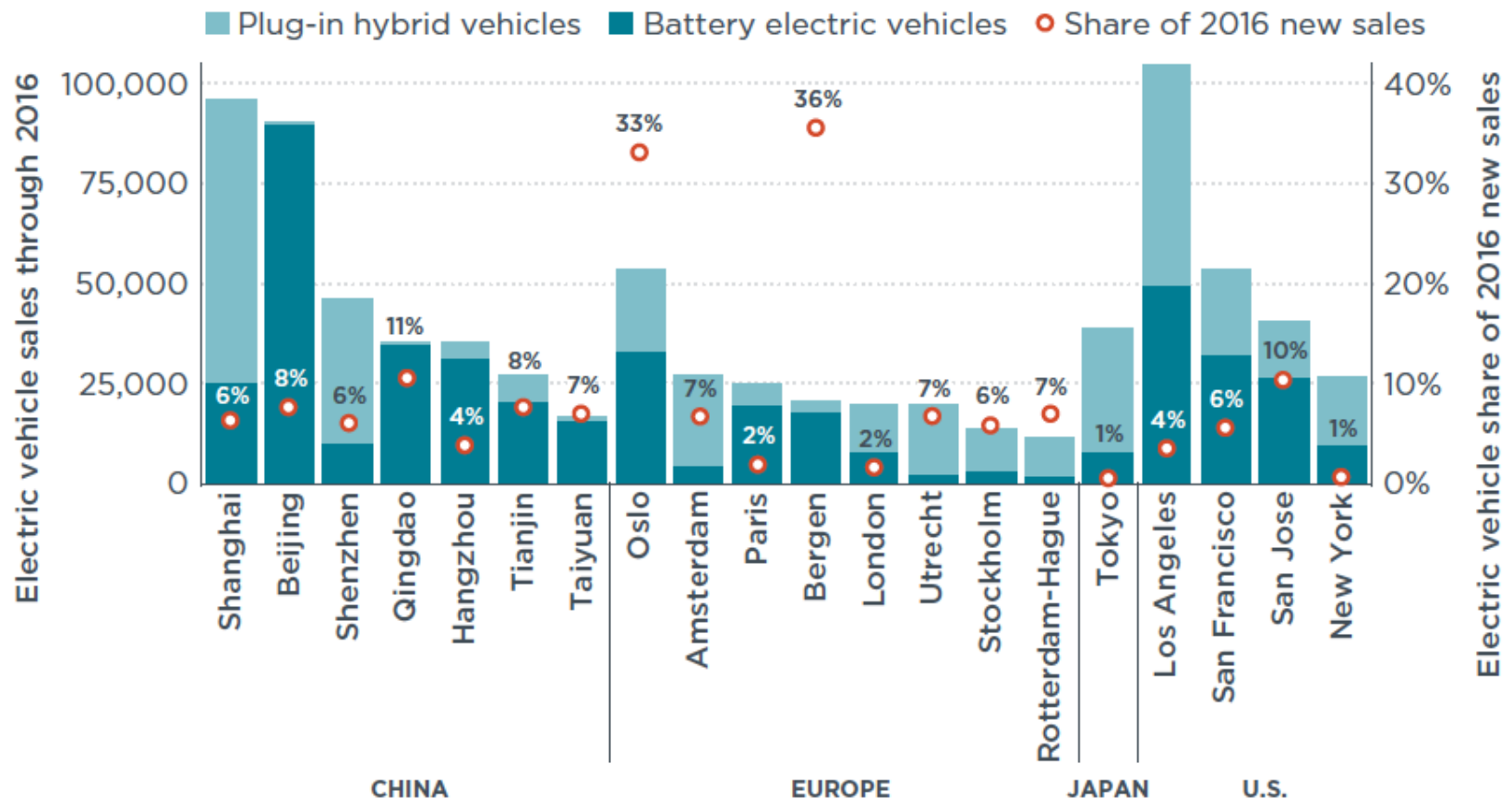
Transitional period: national subsidies phasing down; NEV mandate (Dual Credit Policy) released

- NEV mandate will boost NEV **supplies**, but does not guarantee market acceptance of this many NEVs.
- In the post national subsidy era, effective city-level incentives will be the key to boost **demands** of NEVs.



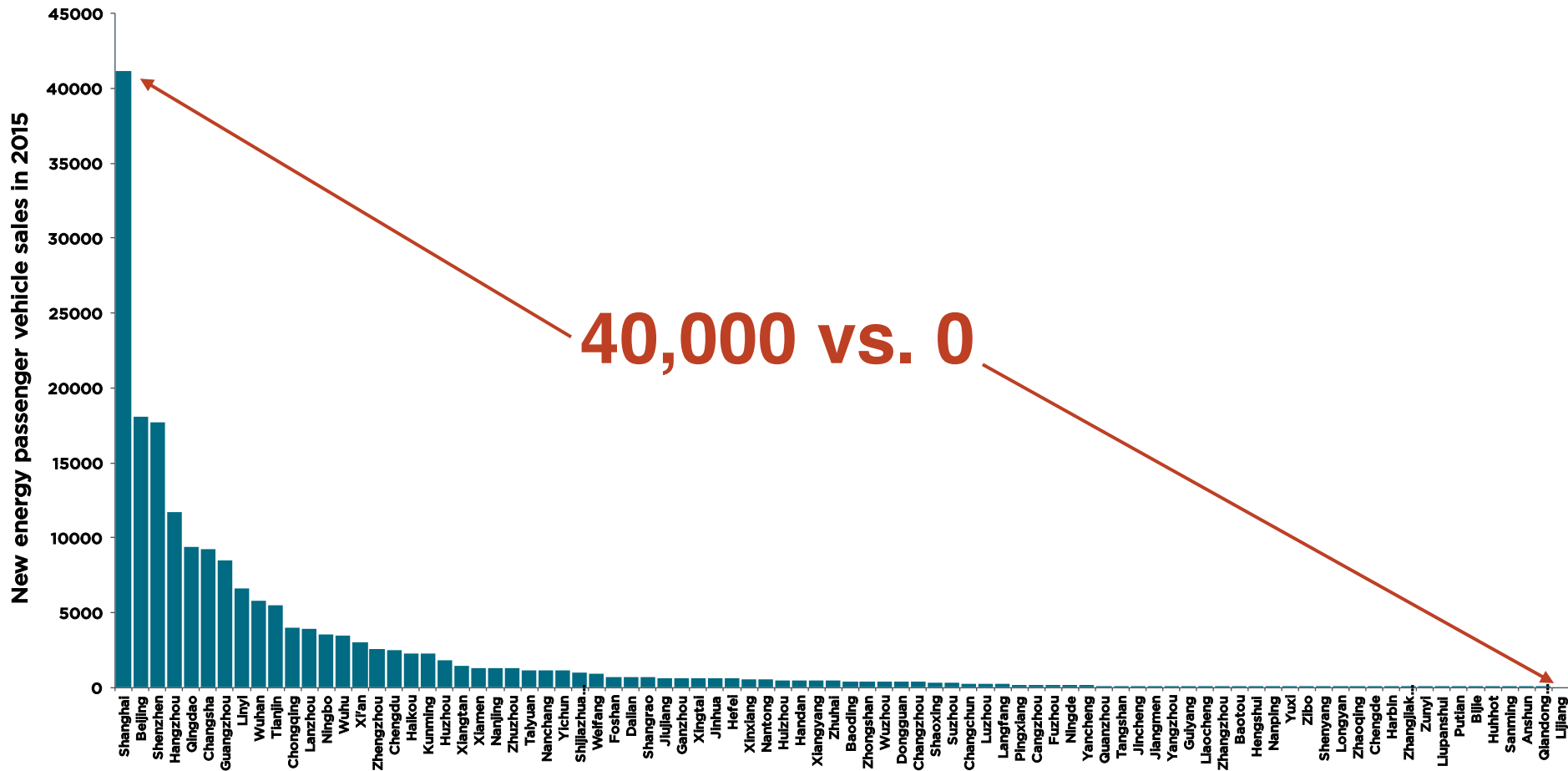
Several Chinese cities are leading the world in EV uptake

- Global EV Capitals : 20 cities accounting for 43% of global EV sales in 2016
 - 7 Chinese cities: Shanghai, Beijing, Shenzhen, Qingdao, Hangzhou, Tianjin, Taiyuan



However, progress in different Chinese cities varied greatly.

- Since all the cities enjoy the same national incentives, city-level incentives played an essential role in resulting in this difference.



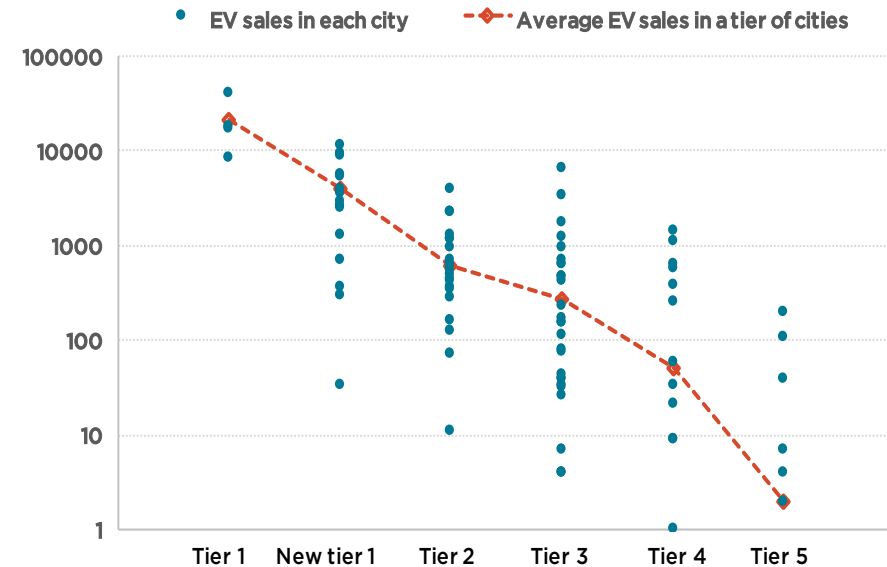
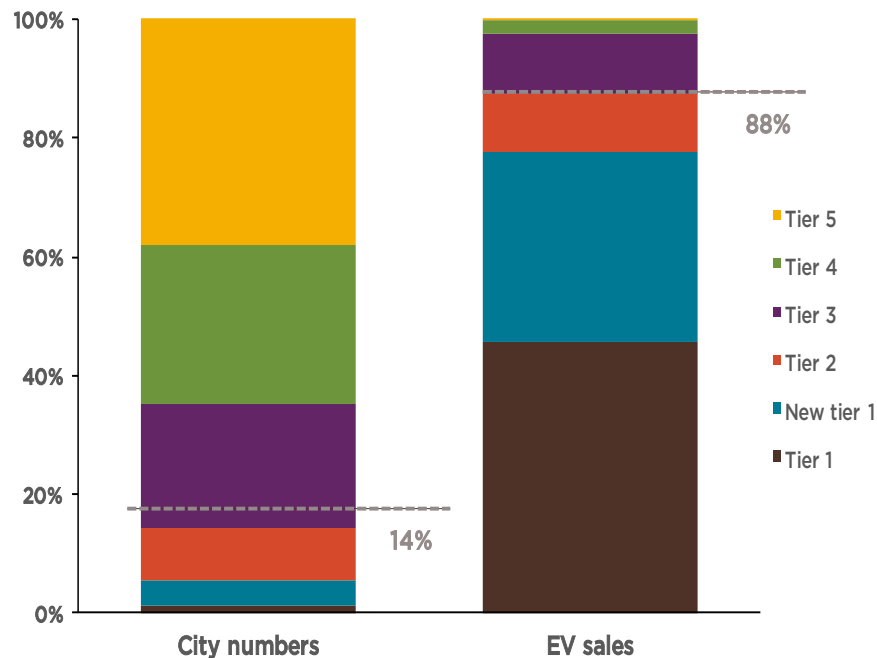
How to achieve sustainable development of NEV market in the post national subsidy era?

- Research content:
 - Analyze the characteristics of new energy passenger vehicle markets in Chinese cities;
 - Systematically summarize and compare new energy passenger vehicle promotion policies at the city level;
 - Investigate the relationship between promotion policies and new energy passenger vehicle market shares in different cities by conducting quantitative evaluations;
 - Identify practical policies and activities that may lead to sustainable development of new energy passenger vehicle market in the post national subsidy era.

EV market characteristics in Chinese cities

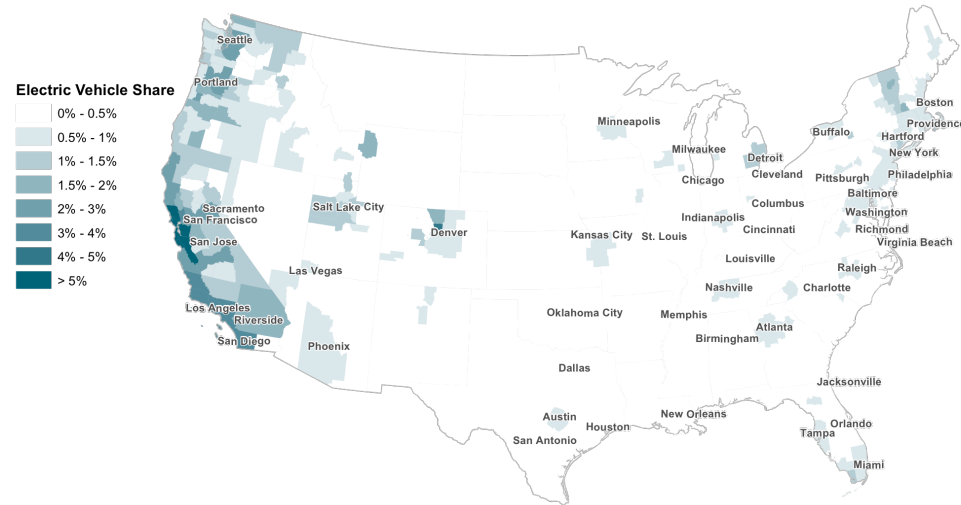
1. A few mega cities contributed a majority of EV sales in China.

- Tier 1, new tier 1 and tier 2 cities, only accounting for 14% of Chinese cities, contributed 88% of China's electric passenger vehicle sales.
- Tier 2-4 cities have great potential in EV deployment in the future.

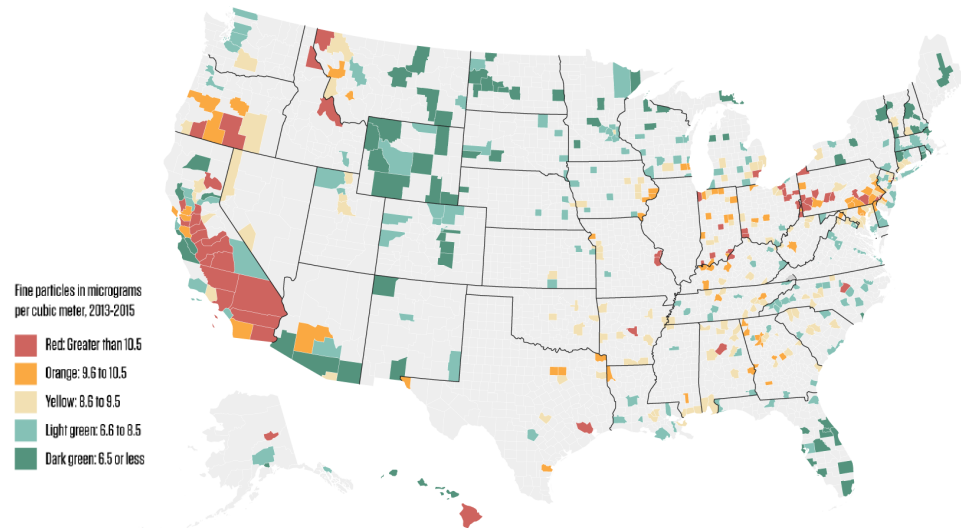


2. Promoting EVs has not been utilized as an approach to improve air quality in most Chinese cities.

EV market shares

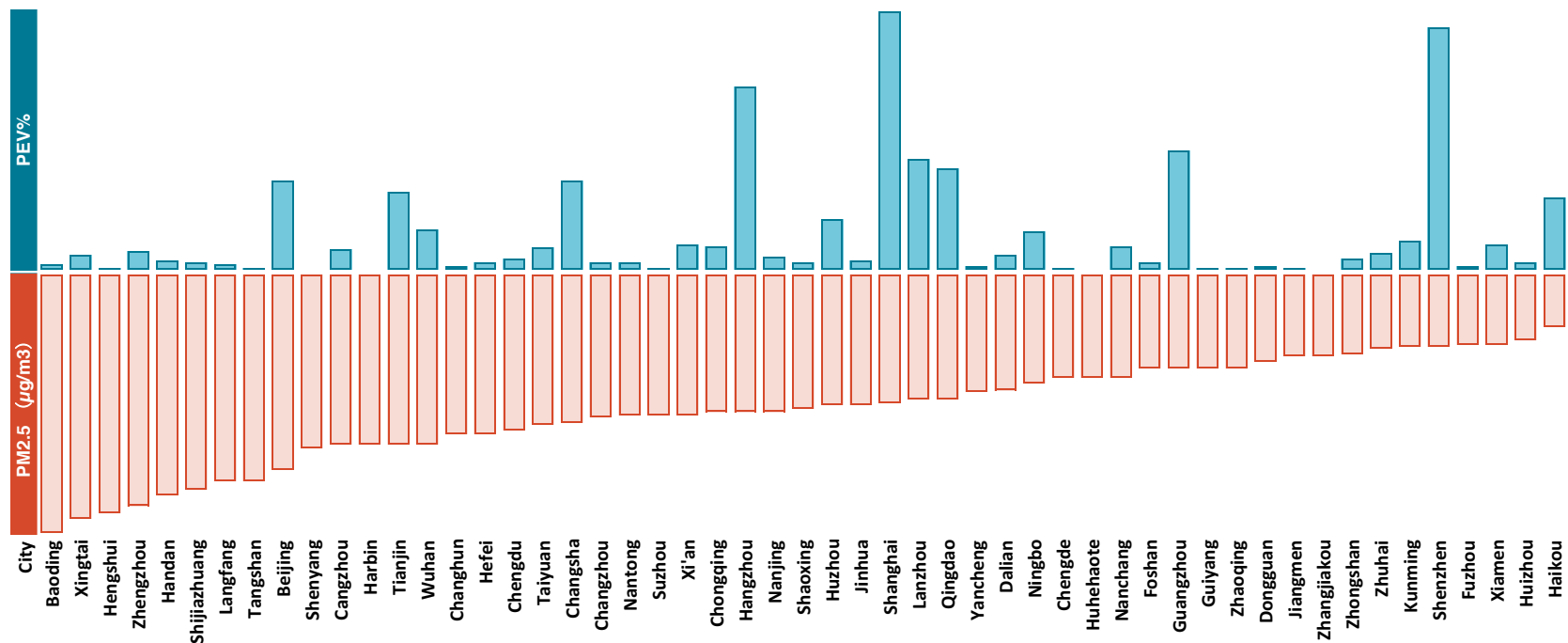


PM_{2.5} concentrations



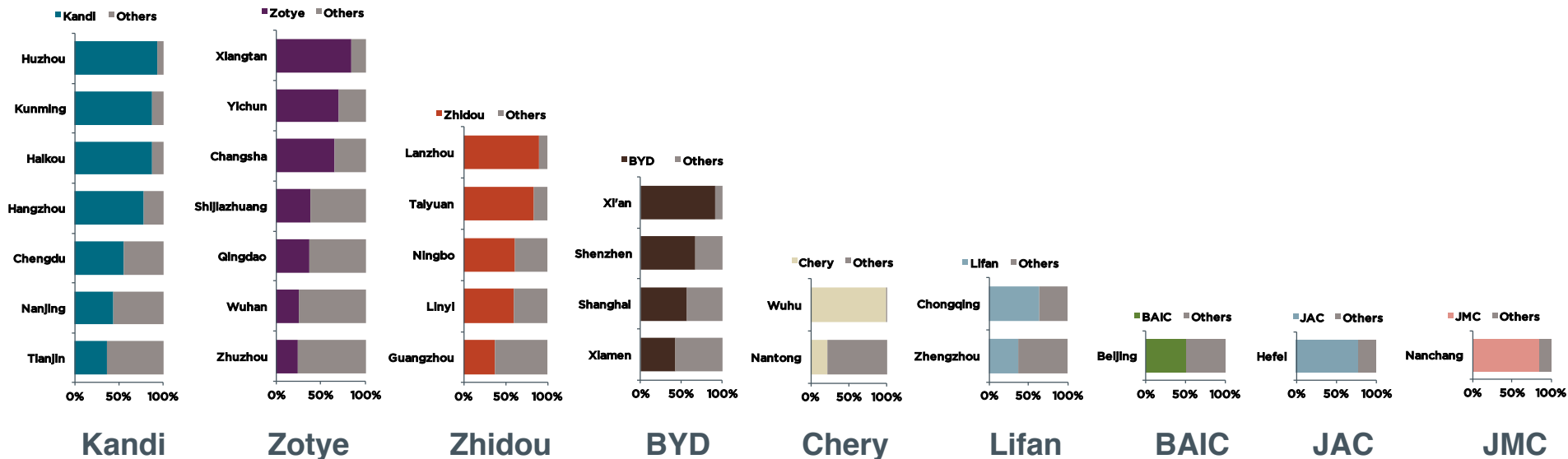
2. Promoting EVs has not been utilized as an approach to improve air quality in most Chinese cities.

- No clear correlation between annual average PM_{2.5} concentration (red bars) and new energy passenger vehicle market share (blue bars) in 53 Chinese cities
- Promoting EVs can be used as an approach to improve city air quality in the future.
- EV promotion policies can be designed from an environmental protection perspective.



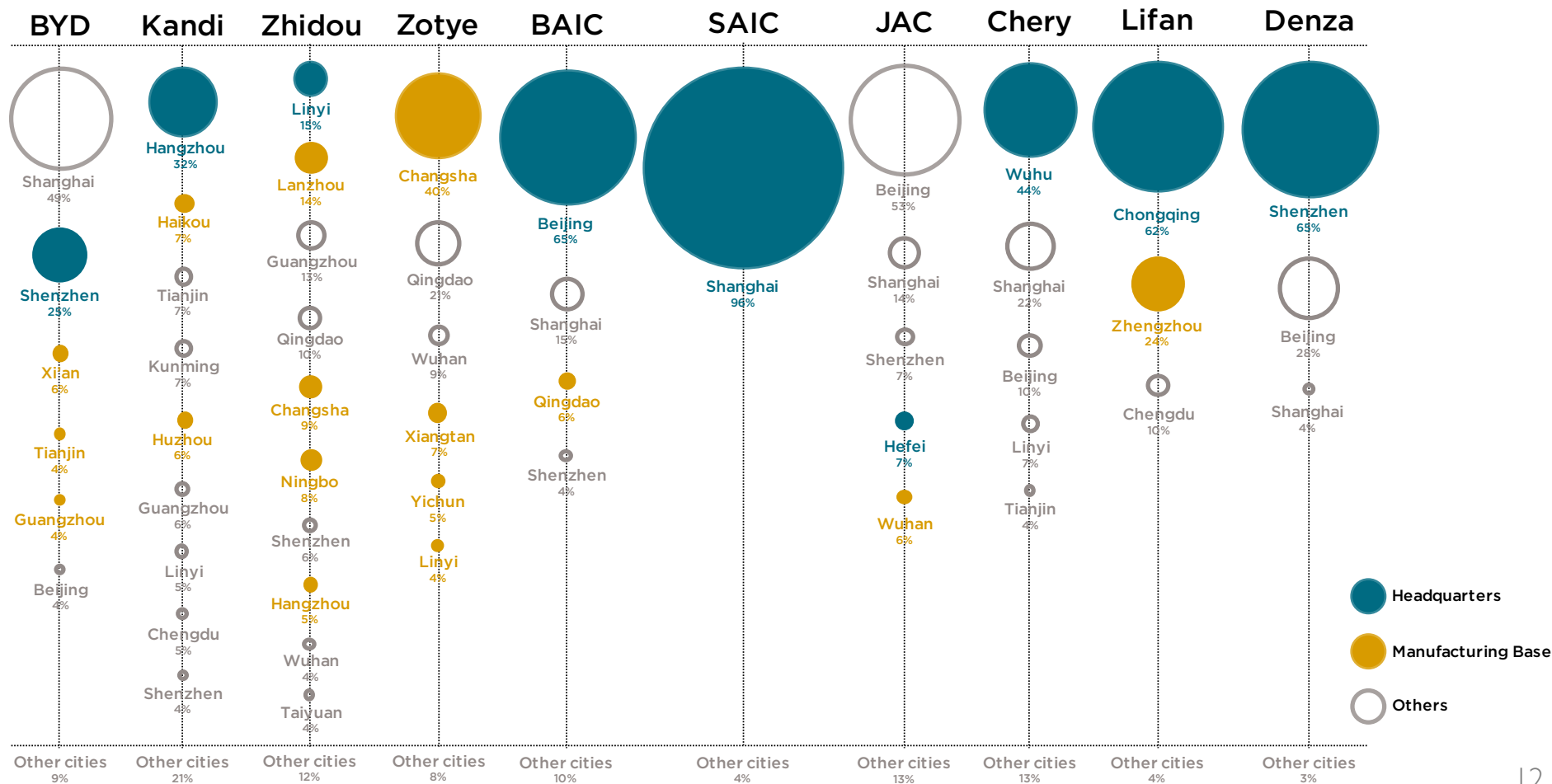
3. Monopoly existed in most cities' EV markets (local protectionism)

- In 20 cities, one OEM accounted for more than 50% of local EV sales.
- In 16 cities, the dominating OEM was a local one.



4. Most products were sold to local consumers (local protectionism)

- For most OEMs, major sales territory were cities where their headquarters and manufacturing bases were located.



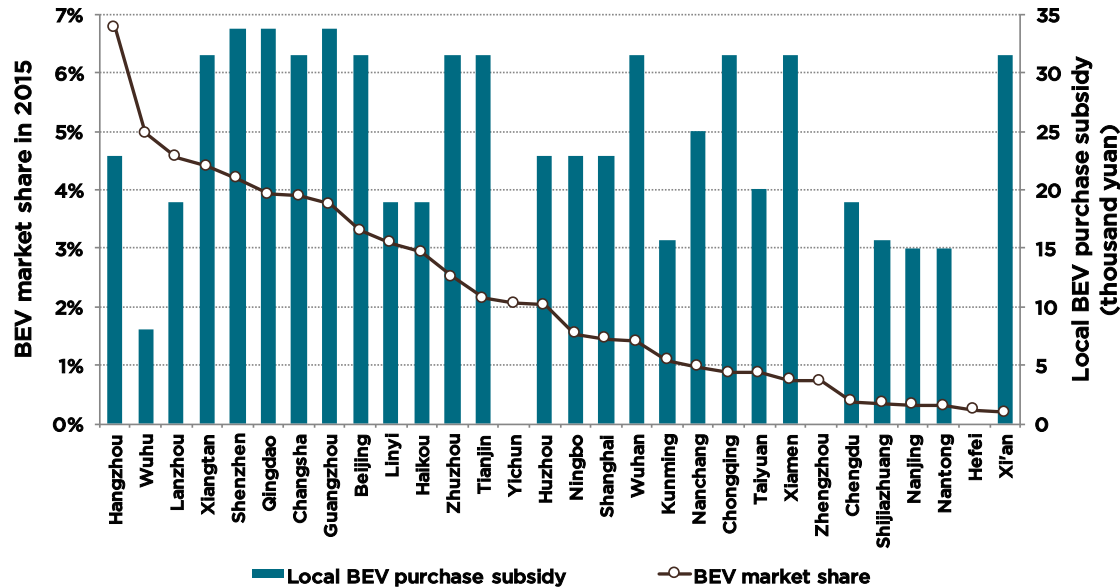
City-level EV promotion policies and their relationship with EV uptakes

A wide variety of city-level EV promotion policies were adopted in Chinese cities.

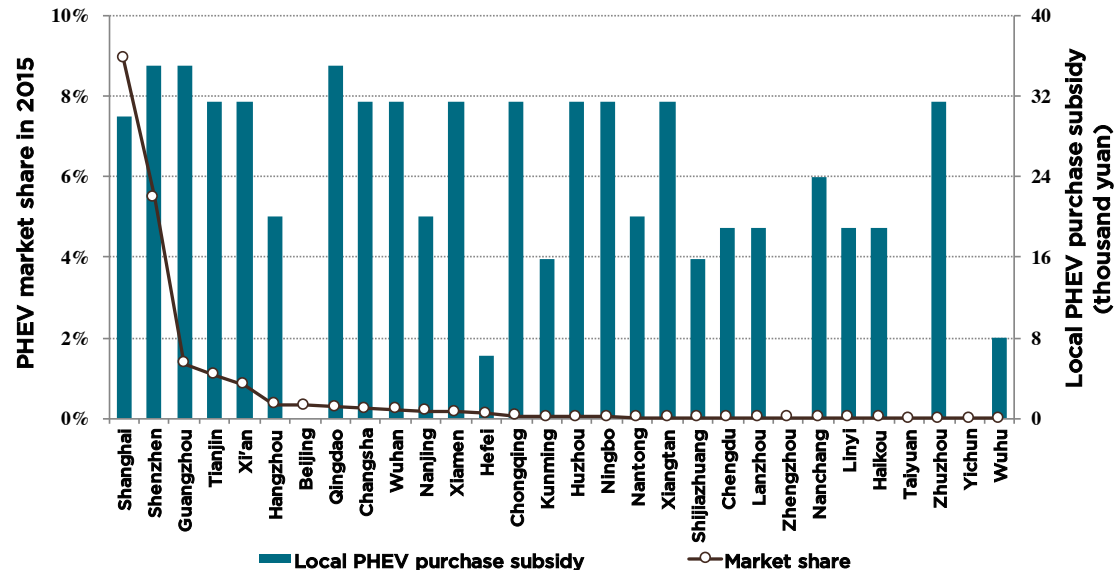
NEV promotion policies at the city level		Pilot cities																										Number of cities with this incentive						
		Shanghai	Shenzhen	Hangzhou	Guangzhou	Wuhu	Lanzhou	Xiangtan	Qingdao	Changsha	Beijing	Tianjin	Linyi	Haikou	Zhuzhou	Huzhou	Yichun	Wuhan	Ningbo	Kunming	Xi'an	Nanchang	Chongqing	Xiamen	Taiyuan	Zhengzhou	Nanjing		Chengdu	Shijiazhuang	Hefei	Nantong		
Direct Incentives	Local BEV purchase subsidy	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	29		
	Local PHEV purchase subsidy	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	27		
	Exemption from vessel & vehicle tax	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	30		
	Parking fee reduction		x														x				x	x			x					x		6		
	Licence production cost reduction																				x								x	x		3		
	Charging fee reduction	x	x			x					x	x						x				x											7	
	One-time usage subsidy		x															x															2	
	Trade-in subsidy					x															x				x					x			4	
	Car insurance fee reduction																				x													1
	Home charger subsidy													x																				1
	Toll fee reduction																													x				1
Indirect incentives	Public charger availability		x	x	x	x	x						x	x		x	x		x			x	x	x	x		x		x	x	x	18		
	Reserved parking space																x				x												2	
	Exemption from purchase restrictions	x	x	x	x						x	x																					6	
	Exemption from driving restrictions						x				x	x						x				x						x					6	
Other incentives	Fleet purchase subsidy	x				x												x		x											x		5	
	Taxi purchase & usage fee reduction	x	x								x						x				x												5	
	Research and development subsidy	x									x		x				x				x	x											6	
	Battery recycle subsidy	x	x																												x		3	
	Car rental subsidy					x																											1	
Total incentives in this city		9	10	5	5	8	5	3	3	3	7	6	6	4	3	4	8	5	5	3	10	9	5	4	5	1	4	4	6	9	4			

Purchase subsidy alone could not explain the difference between cities on EV market shares.

BEV

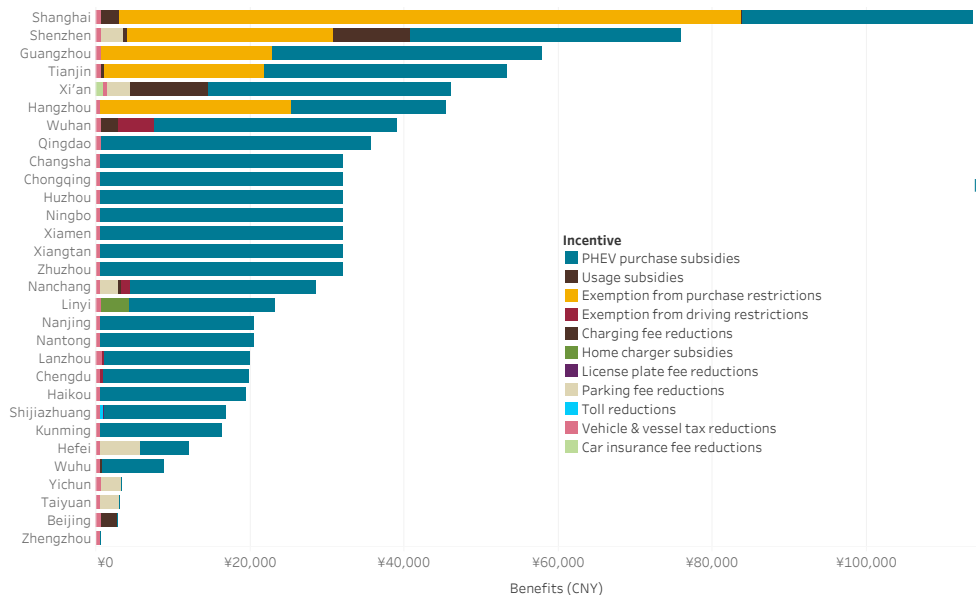


PHEV

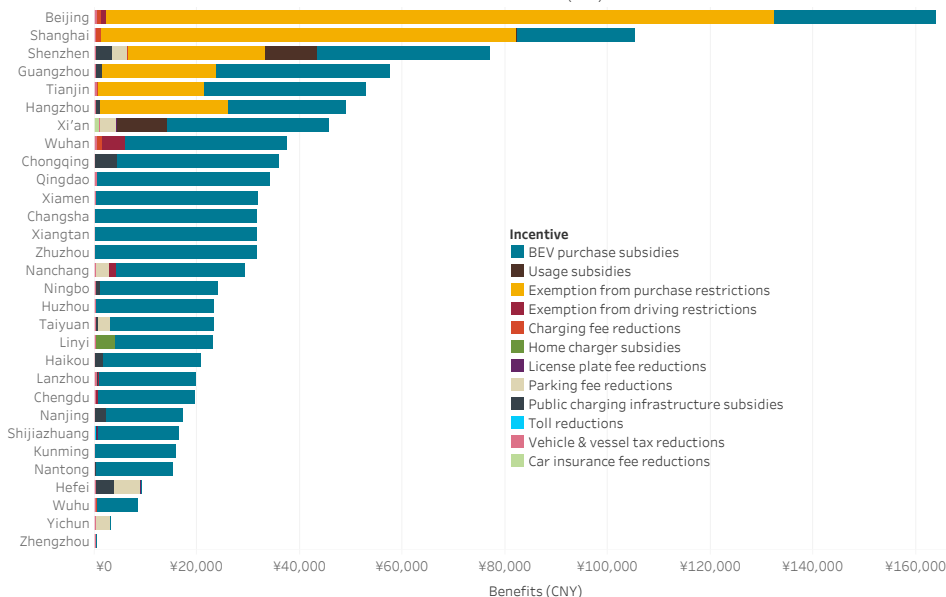


Total consumer benefits resulted from a package of city-level EV promotion policies

PHEV



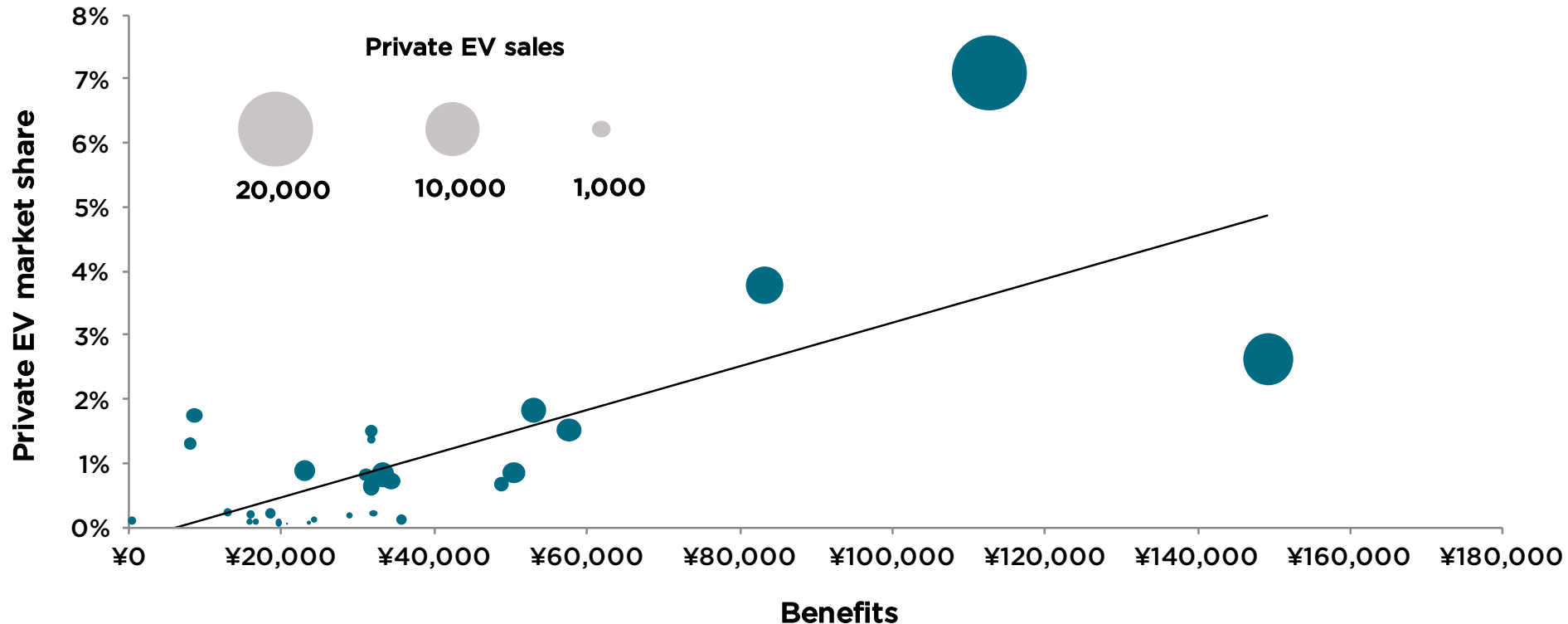
BEV



- In most cities, local purchase subsidy was the most valuable incentive. However, in several megacities, compulsory administrative means (e.g., exemption from purchase restrictions) played an even more important role.
- Current incentives mainly focused on purchasing phase. The effectiveness of usage-phase incentives was relatively weak.
- Total consumer benefits varied greatly among Chinese cities.

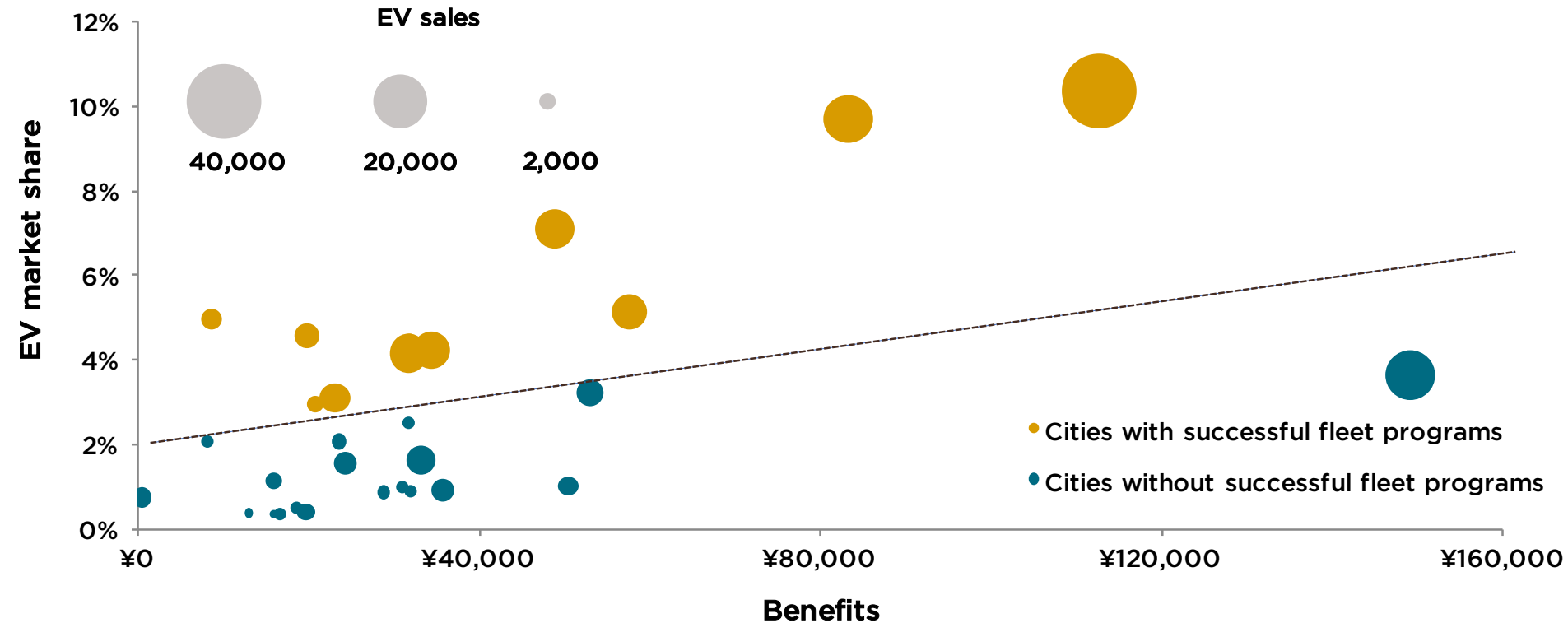
A package of incentives together could lead to increased EV uptakes by providing enough consumer benefits.

- There was a clear positive relationship between private EV market share and total consumer benefits.













Influential fleet programs played a very important role in driving EV sales.

- Cities with successful fleet programs tended to perform better in EV promotion.



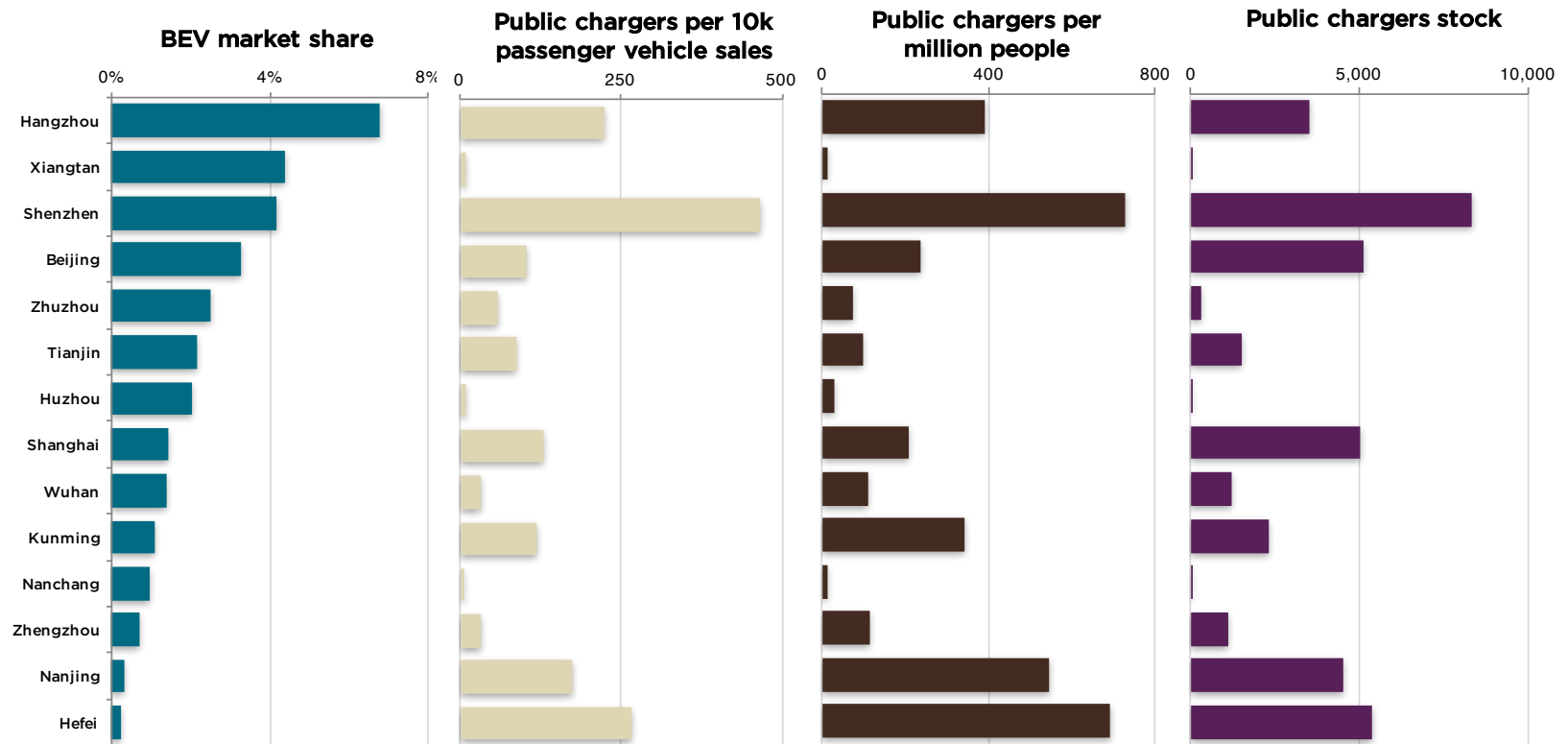
Typical fleet programs

- Influential fleet programs (car rental programs, taxi programs) based on EVs produced by local OEMs

Fleet programs' contribution to BEV sales	Cities with the largest BEV sales	Fleet programs	Operators	OEMs (local OEMs in red)
	Hangzhou	Micro public EV sharing program	Zuozhongyou car rental company	Kandi
	Wuhu	EV rental program	Kakay electric automobile rental company	Chery
	Lanzhou	EV rental & taxi program	Local car rental & taxi companies	Zhidou, BYD
	Xiangtan	Micro public EV sharing program	Local car rental companies	Zhidou
	Shenzhen	EV taxi program	Local taxi companies	BYD
	Qingdao	EV taxi & rental program	Local taxi companies; Qingdao Teld new energy company	BAIC, Zotye
	Changsha	Micro public EV sharing program	Hunan Dali new energy car rental company	Zotye
	Guangzhou	EV rental program	Dingdong car rental company	Zhidou
	Beijing	EV rental & taxi program	Yidu car rental company; local taxi companies	BAIC
	Linyi	EV rental program	Local taxi companies	Zhidou

Public charger availability?

- Whether the chargers are located at the right place
- Whether the chargers are functional



Typical cities

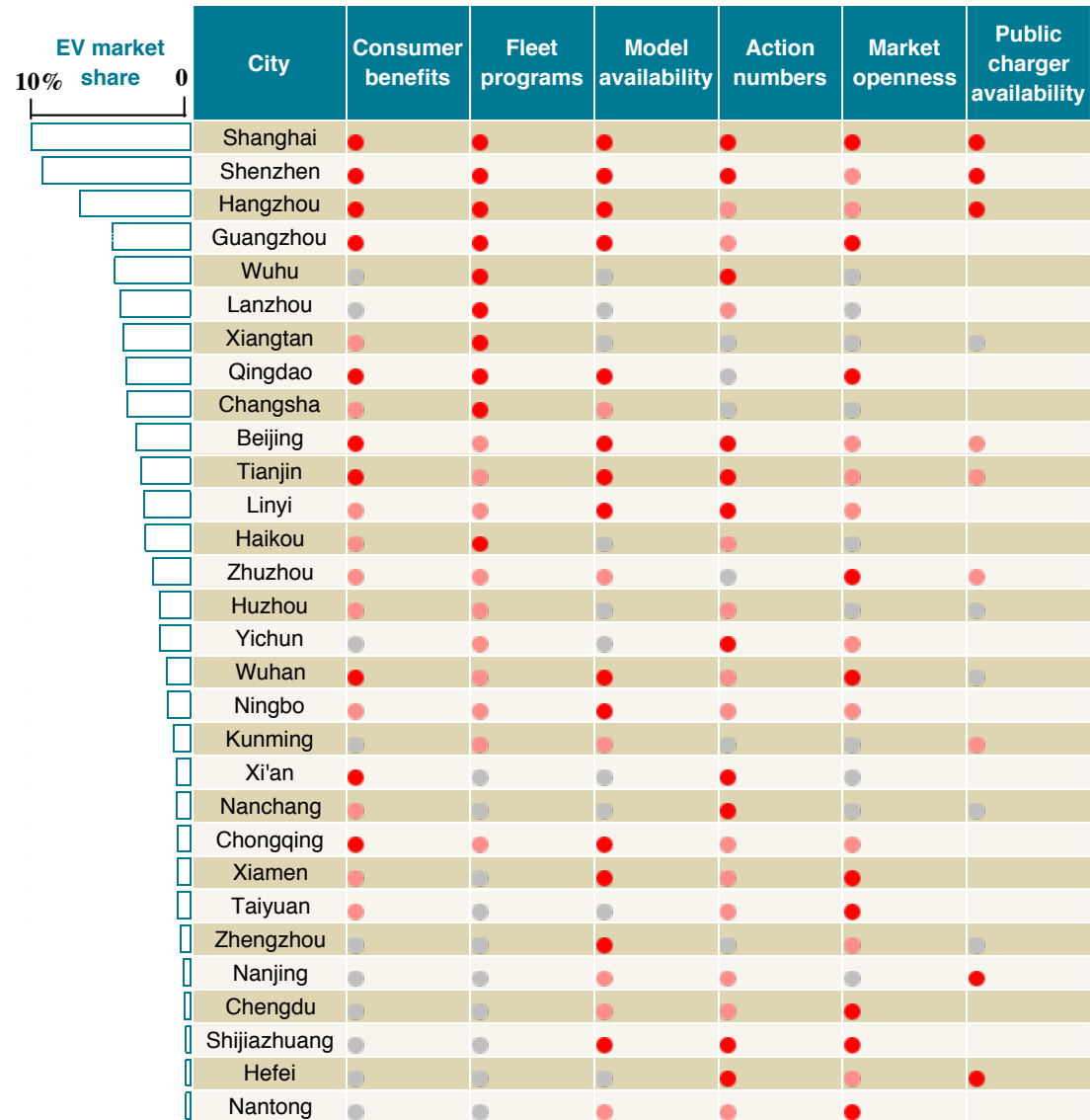
The overall mix of EV promotion policies and activities in different cities

Macro qualitative analysis based on micro quantitative analyses:

- Top 10
- Middle 10
- Bottom 10

General conclusions:

- A comprehensive set of measures were adopted in cities where EV uptakes were the highest.
- Fleet programs were effective in increasing promoting EVs.



Shanghai

Market overview:

- Far ahead of other cities in EV deployment
- Most EVs were sold to private consumers

Advantages:

- High market openness
- Abundant promotion policies
- High consumer benefits
- Abundant EV models
- High public charger availability

EV market share	City	Consumer benefits	Fleet programs	Model availability	Action numbers	Market openness	Public charger availability
10%	Shanghai	●	●	●	●	●	●
	Shenzhen	●	●	●	●	●	●
	Hangzhou	●	●	●	●	●	●
	Guangzhou	●	●	●	●	●	●
	Wuhu	●	●	●	●	●	●
	Lanzhou	●	●	●	●	●	●
	Xiangtan	●	●	●	●	●	●
	Qingdao	●	●	●	●	●	●
	Changsha	●	●	●	●	●	●
	Beijing	●	●	●	●	●	●
	Tianjin	●	●	●	●	●	●
	Linyi	●	●	●	●	●	●
	Haikou	●	●	●	●	●	●
	Zhuzhou	●	●	●	●	●	●
	Huzhou	●	●	●	●	●	●
	Yichun	●	●	●	●	●	●
	Wuhan	●	●	●	●	●	●
	Ningbo	●	●	●	●	●	●
	Kunming	●	●	●	●	●	●
	Xi'an	●	●	●	●	●	●
	Nanchang	●	●	●	●	●	●
	Chongqing	●	●	●	●	●	●
	Xiamen	●	●	●	●	●	●
	Taiyuan	●	●	●	●	●	●
	Zhengzhou	●	●	●	●	●	●
	Nanjing	●	●	●	●	●	●
	Chengdu	●	●	●	●	●	●
	Shijiazhuang	●	●	●	●	●	●
	Hefei	●	●	●	●	●	●
	Nantong	●	●	●	●	●	●

Hefei

Market overview:

- Not performing well in EV deployment

Advantages:

- Abundant promotion policies
- High public charger availability

Disadvantages:

- Low consumer benefits
- Limited EV models
- Lack of influential fleet programs

EV market share	City	Consumer benefits	Fleet programs	Model availability	Action numbers	Market openness	Public charger availability
10%	Shanghai	●	●	●	●	●	●
	Shenzhen	●	●	●	●	●	●
	Hangzhou	●	●	●	●	●	●
	Guangzhou	●	●	●	●	●	●
	Wuhu	●	●	●	●	●	●
	Lanzhou	●	●	●	●	●	●
	Xiangtan	●	●	●	●	●	●
	Qingdao	●	●	●	●	●	●
	Changsha	●	●	●	●	●	●
	Beijing	●	●	●	●	●	●
	Tianjin	●	●	●	●	●	●
	Linyi	●	●	●	●	●	●
	Haikou	●	●	●	●	●	●
	Zhuzhou	●	●	●	●	●	●
	Huzhou	●	●	●	●	●	●
	Yichun	●	●	●	●	●	●
	Wuhan	●	●	●	●	●	●
	Ningbo	●	●	●	●	●	●
	Kunming	●	●	●	●	●	●
	Xi'an	●	●	●	●	●	●
	Nanchang	●	●	●	●	●	●
	Chongqing	●	●	●	●	●	●
	Xiamen	●	●	●	●	●	●
	Taiyuan	●	●	●	●	●	●
	Zhengzhou	●	●	●	●	●	●
	Nanjing	●	●	●	●	●	●
	Chengdu	●	●	●	●	●	●
	Shijiazhuang	●	●	●	●	●	●
	Hefei	●	●	●	●	●	●
	Nantong	●	●	●	●	●	●

Lanzhou

Market overview:

- Performing well in EV deployment
- Most EVs were applied in fleet programs

Advantages:

- Relatively abundant promotion policies
- Influential fleet programs

Disadvantages:

- Low market openess
- Low consumer benefits
- Limited EV models

EV market share	City	Consumer benefits	Fleet programs	Model availability	Action numbers	Market openess	Public charger availability
10%	Shanghai	●	●	●	●	●	●
	Shenzhen	●	●	●	●	●	●
	Hangzhou	●	●	●	●	●	●
	Guangzhou	●	●	●	●	●	●
	Wuhu	●	●	●	●	●	●
	Lanzhou	●	●	●	●	●	●
	Xiangtan	●	●	●	●	●	●
	Qingdao	●	●	●	●	●	●
	Changsha	●	●	●	●	●	●
	Beijing	●	●	●	●	●	●
	Tianjin	●	●	●	●	●	●
	Linyi	●	●	●	●	●	●
	Haikou	●	●	●	●	●	●
	Zhuzhou	●	●	●	●	●	●
	Huzhou	●	●	●	●	●	●
	Yichun	●	●	●	●	●	●
	Wuhan	●	●	●	●	●	●
	Ningbo	●	●	●	●	●	●
	Kunming	●	●	●	●	●	●
	Xi'an	●	●	●	●	●	●
	Nanchang	●	●	●	●	●	●
	Chongqing	●	●	●	●	●	●
	Xiamen	●	●	●	●	●	●
	Taiyuan	●	●	●	●	●	●
	Zhengzhou	●	●	●	●	●	●
	Nanjing	●	●	●	●	●	●
	Chengdu	●	●	●	●	●	●
	Shijiazhuang	●	●	●	●	●	●
	Hefei	●	●	●	●	●	●
	Nantong	●	●	●	●	●	●

Conclusions

- A few mega cities contributed a majority of EV sales.
- Promoting EVs has not been used as an approach to improve air quality in most cities.
- Monopoly existed in most cities' EV markets. Most products were sold to local consumers.
- A wide range of city-level incentives were adopted to promote EVs in cities.
 - Purchase subsidy was the most direct incentive, but was not the only effective incentive.
 - Compulsory administrative means played a very important role.
 - Current incentives mainly focused on purchasing phase. The effectiveness of usage-phase incentives was relatively weak.
 - A comprehensive set of measures were adopted in cities where EV uptakes were the highest.
 - A package of incentives together could lead to increased EV uptakes by providing enough consumer benefits.
 - Influential fleet programs played a very important role in driving EV sales.

Recommendations

- Exploring the potential of tier 2-4 cities in EV deployment
- Designing EV promotion policies from an environmental protection perspective
- Avoiding local protectionism to achieve a sustainable and healthy development of EV market
- Designing EV promotion policies based on local conditions
- Driving EV sales by providing enough benefits to consumers through a package of incentives; Utilizing compulsory administrative means when necessary
- Strengthening usage-phase incentives
- Developing influential fleet programs (taxi program, rental program, official car program, car sharing program) to drive EV sales
- Speeding up electrification in HDV fleet (buses, logistics, trucks). Replacing HDV fleet with EVs gradually according to cost-effectiveness.

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Mission:

To dramatically improve environmental performance and efficiency of mobile sources (cars, trucks, marine, aviation) and fuels by supporting government regulatory agencies in world's top vehicle markets.



Thank you!

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