China's Blade Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV) Technology Roadmap[1]

Source: 1. China Automotive Engineering Institute, <Energy Saving and New Energy Vehicle Technology Roadmap>, Oct. 2016

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Blade Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV) _Developing Strategy[1]

- For mid-size and upper mid-size vehicles, scale development of blade electric vehicles (BEV) will be the major direction, in order to expand the application of blade electric technology on family vehicles, official vehicles, rental vehicles and short-distance commercial vehicles;

- For compact and above size vehicles, scale development of plug-in hybrid electric vehicles (PHEV) will be the major direction, in order to expand the application of plug-in electric technologies on private vehicles, official vehicles and other areas with short daily travel distance;

- Improve competitiveness of finished vehicles and promote exporting critical components in batches via breakthroughs in power batteries and driving motors;

- Promote electric vehicles in large scale via establishing charging infrastructure and nation wide service network.

Source: 1. China Automotive Engineering Institute, <Energy Saving and New Energy Vehicle Technology Roadmap>, Oct. 2016

Blade Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV) _Targets, major focus and technical path[1]

Targets

Driving range of BEV

2020	2025	2030
300km	400km	500km

Unit load quality power consumption of buses (kWh/100km.t)

2020	2025	2030
3.5	3.2	3.0

Fuel consumption of PHEV in hybrid model

2020	2025	2030
25% lower than ICE in 2020	10% lower than PHEV in 2020	20% lower than PHEV in 2020

Technical Path

Blade Electric Vehicles (BEV)

- Increase the energy density of power batteries
- Increase the efficiency of electric drive systems
- Customization of chassis for electric vehicles

Plug-in Hybrid Electric Vehicles (PHEV)

- Optimize the conformation of hybrid power systems
- Predictive control of finished vehicles based on multi-information
- Integrated design of power system

Charging Infrastructures

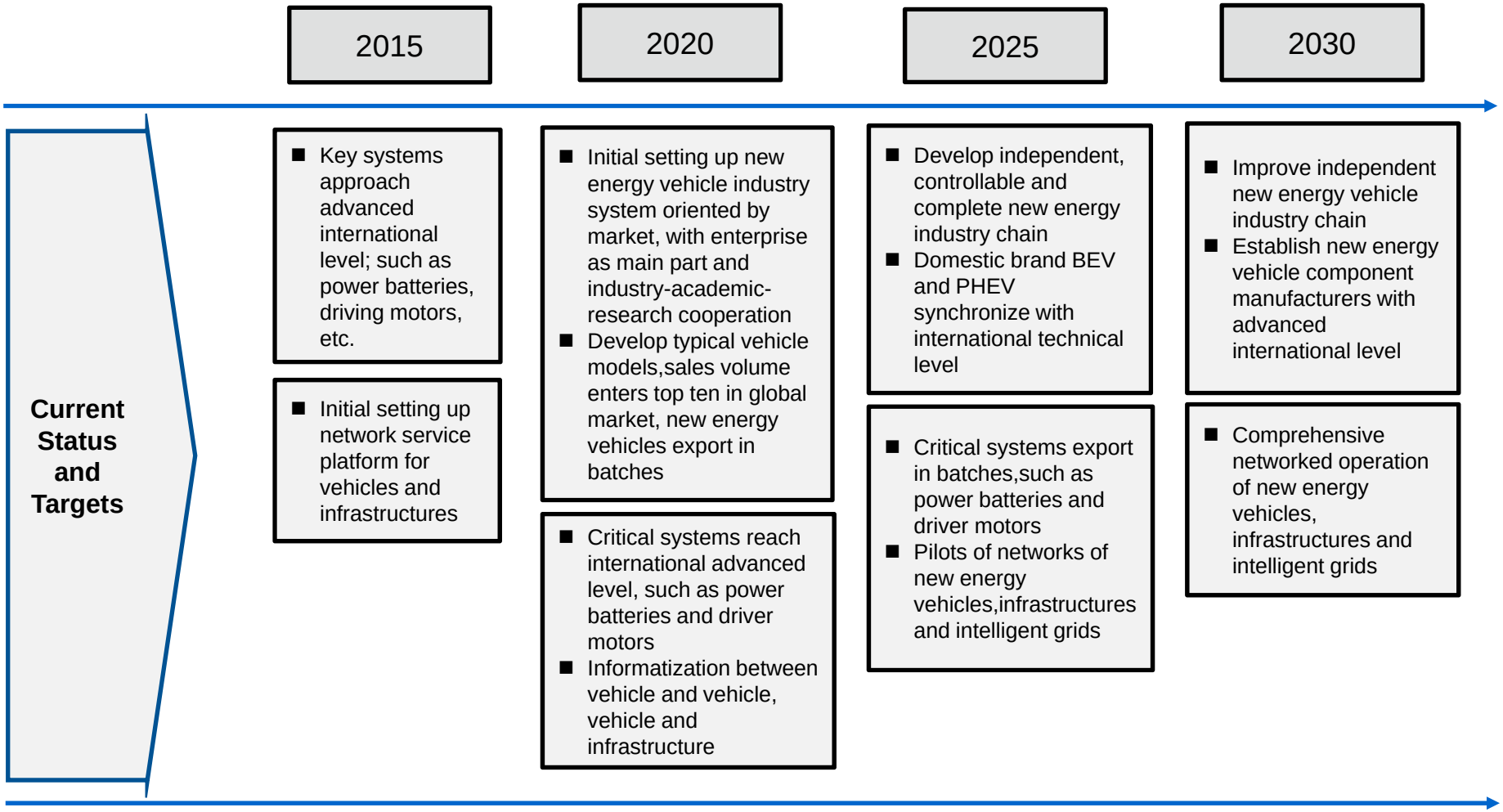
- Quick charging technology
- Inter-connection and inter-working technology
- Convenience for charging

Major Focus

- ✓ Development technology for hybrid power assembly with low cost and high efficiency
- ✓ Integrated technology for power motor and chassis
- ✓ Power system integration and control technology for BEV
- ✓ High-performance power motor technology
- ✓ New power motor controller technology
- ✓ Advanced charging technology
- ✓ Intelligent energy management for finished vehicles
- ✓ Finished vehicle control technology for BEV and PHEV

Source: 1. China Automotive Engineering Institute, <Energy Saving and New Energy Vehicle Technology Roadmap>, Oct. 2016

Blade Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV) _Technical Roadmap[1]



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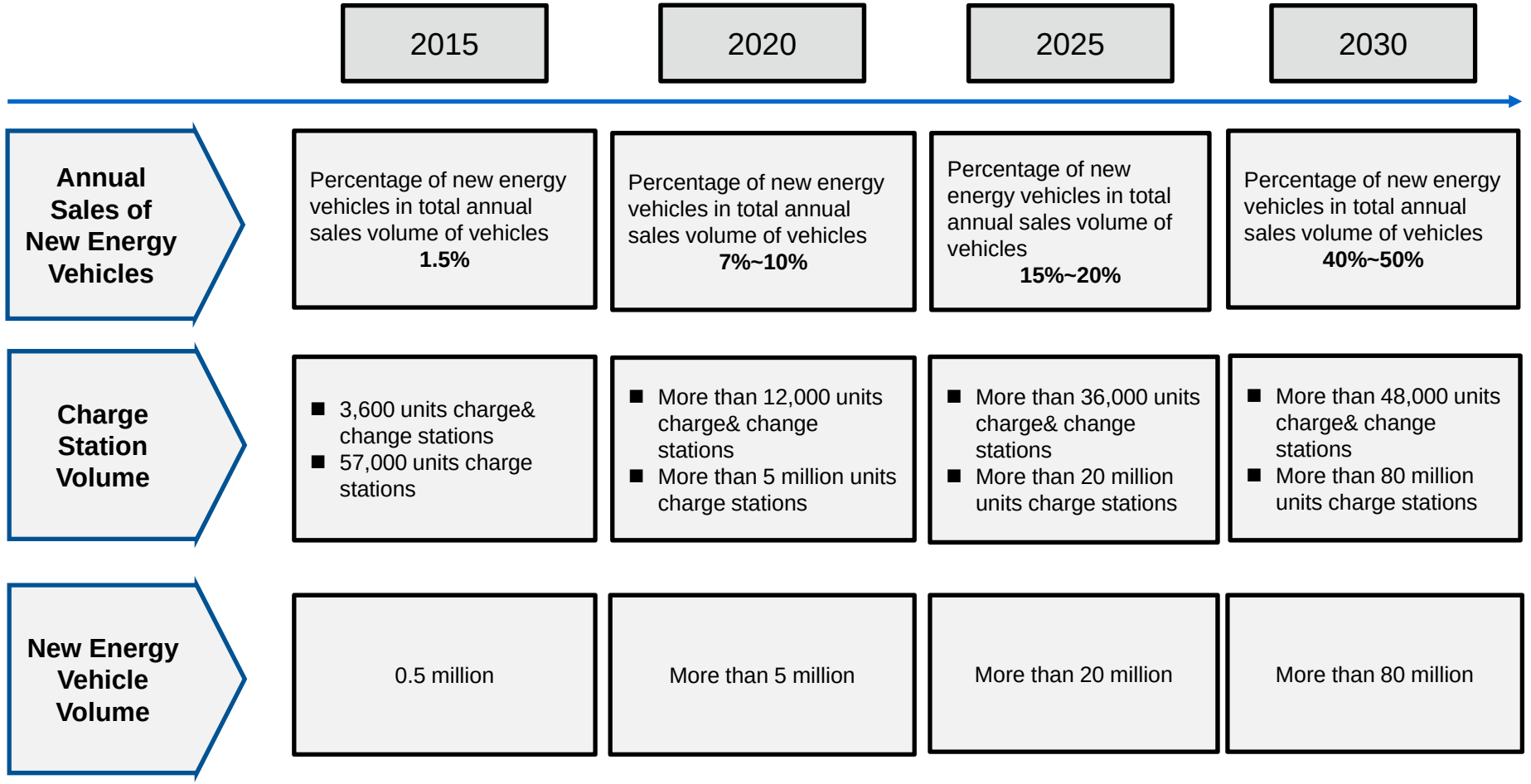
Blade Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV) _Technical Roadmap[1]



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Blade Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV) _Technical innovations and priority projects[1]

Project Types	Technical Innovations		Priority Project
Basic Prospective Study	• Theories and strategies of battery system safety and reliability management • Next generation power devices • Distributed drive control technology • Braking energy recovery system	• Multi energy drive system integrated technology • Smart grid technology with multi-energy and interconnecting with vehicles • Wireless charging technology • Powerplant integrated control development for BEV and PHEV	• Demonstration project of Next generation high-performance BEV industrialization • Critical components technical breakthrough and application demonstration project • Demonstration projects of renewable energy power generation system, smart power grids, intelligent community interconnecting to new energy vehicles
Applied Technology	• Chassis for integration and lightweight BEV • Integrated optimizing for battery system • Next generation motor drive technology • Electric heat pump air conditioning technology • Intelligent charging technology		
Demonstration and Industrialization Projects	• Next generation high-performance BEV industrialization • High-performance PHEV power plant industrialization • Next generation electric motor and controller industrialization • Battery system industrialization • Demonstration projects of renewable energy power generation system, smart power grids, intelligent community interconnecting to new energy vehicles		
Common Platform	• Standard and regulations research platform • Finished vehicles and critical components test and evaluation platform • Finished vehicles, critical components and materials industrial database • Finished vehicles and system security research platform • Research, monitoring, test and evaluation platform for smart power grids, micro grids, renewable energy, interconnection of BEV and PHEV, intelligent management and system security operation		

Source: 1. China Automotive Engineering Institute, <Energy Saving and New Energy Vehicle Technology Roadmap>, Oct. 2016