The NEV standardization in China

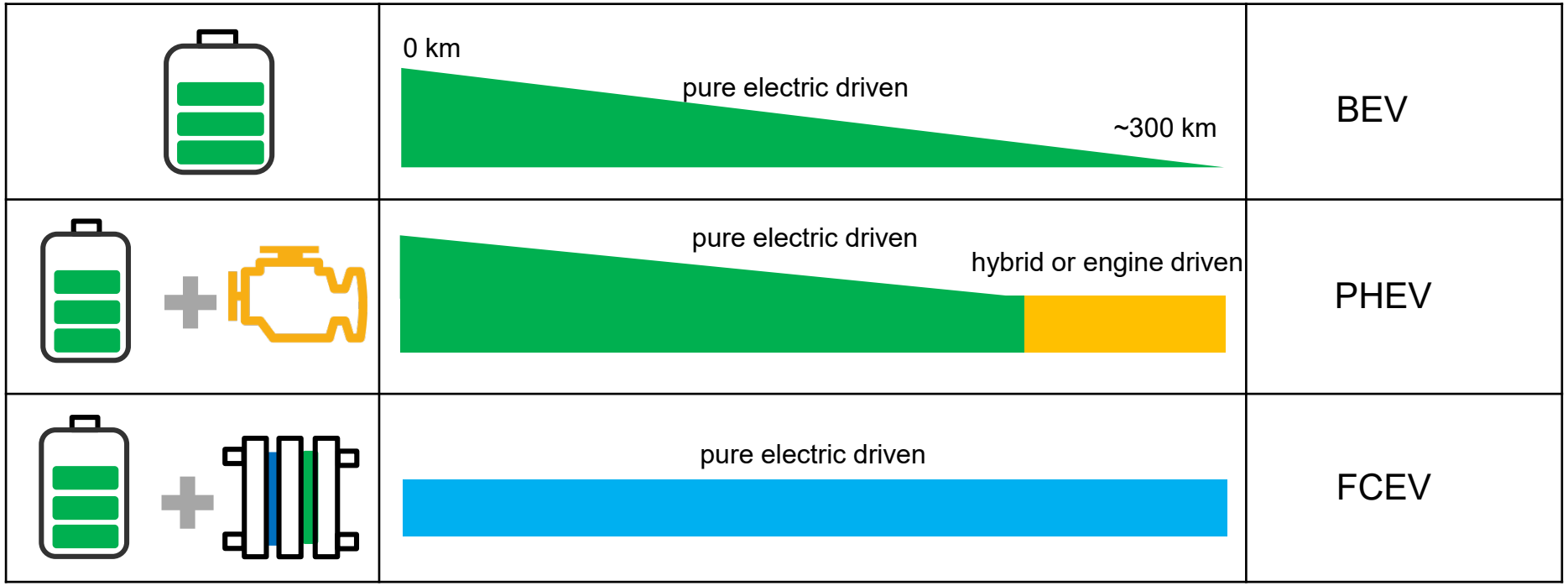
National Technical Committee of Auto Standardization (NTCAS)

China Automotive Technology and Research Center Co,Ltd. (CATARC)

Foreword

Definitions:

■NEV: new energy vehicles, in China, NEV refers to Battery Electric Vehicle (BEV), Plug-in Hybrid Electric Vehicle (PHEV) and Fuel Cell Electric Vehicle (FCEV).



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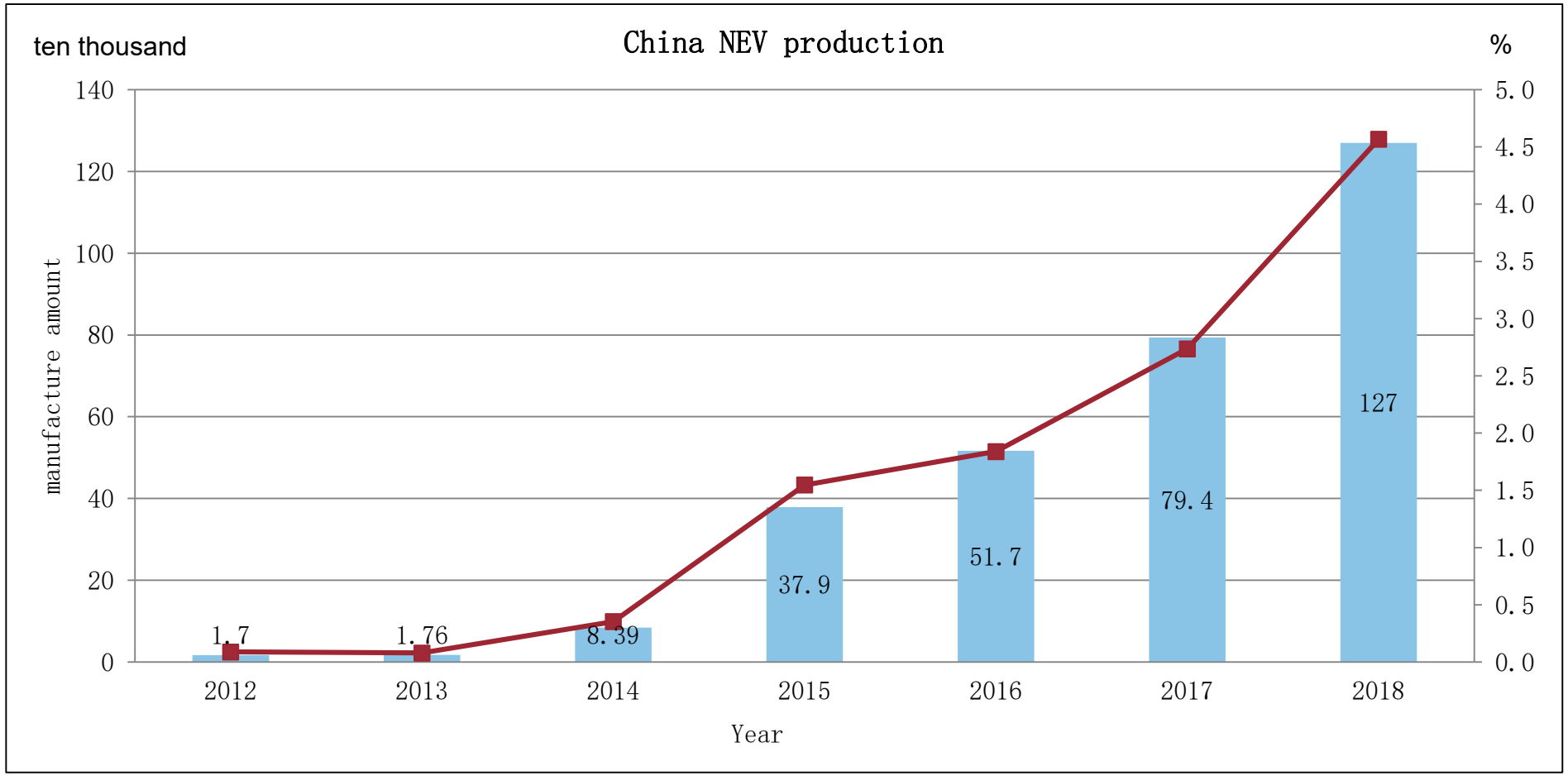
Status quo of Chinese NEV market

Chinese NEV industry has made great achievements in recent years.

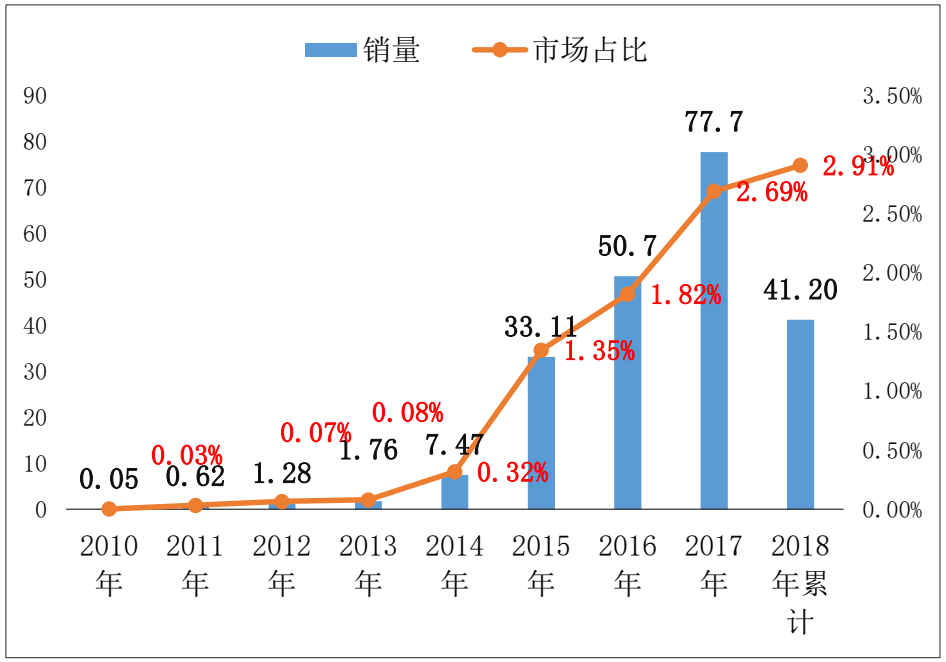
- The number of production and sales volume increased rapidly in the past five years.
- The proportion of NEVs in the entire auto production is becoming greater and greater, but the exact number is still very low.



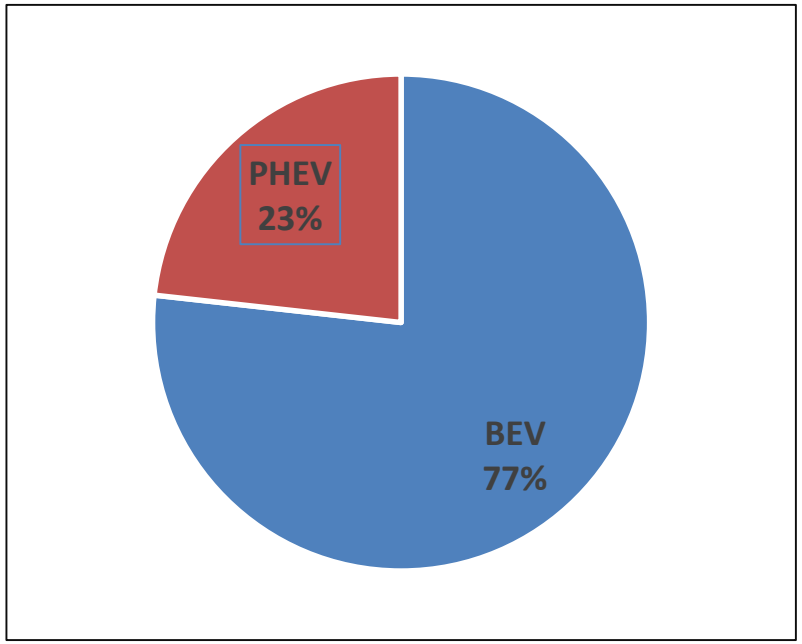
Status quo of Chinese NEV market

Structure

- By the end of Juen 2018, the accumulative sales volume of NEVs in China exceeded 2.1 million units
- The sales volume of NEVs in 1-6 2018 was 412 thousand units, increasing by 112 compared to the same period in 2017 and accouting for 2.9% of the total sales volume of motor vehicles.
- Distribution in terms of type of drive system: PHEV-100 thousand units, BEV-312 thousand units



Sales volume of NEVs in 2013-2018



Distribution of NEVs in 1-6 2018

Source: CAAM **10 thousand units**

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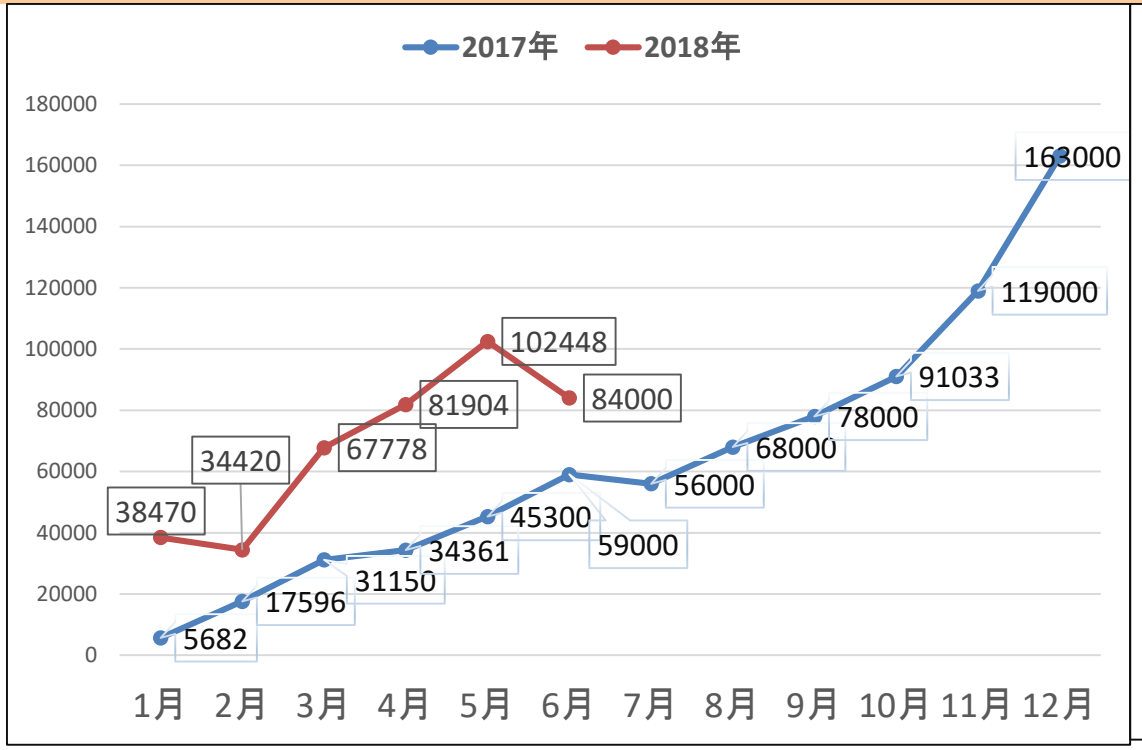
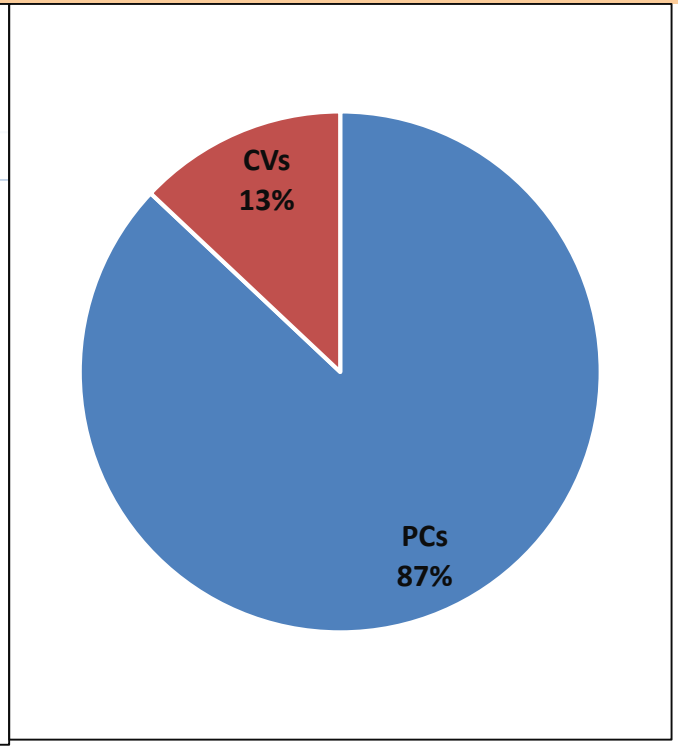
Status quo of Chinese NEV market

Distribution in terms of vehicle type:

- In 1-6 2018, the sales volume of new-energy PCs and CVs was 355 thousand units (87%) and 58 thousand units (13%) resptively.



Sales Volume of NEVs (2017- June 2018)



Sales of NEVs (1-6 2018)

Source: CAAM

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Policies

A policy system has been established to support the regulation, R&D, subsidiary, taxation, infrastructure and recycling of NEV industry.

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NEV standard system

The NEV standards support NEV industrialization.

- Standard specifies necessary technical requirements of NEV and its key parts, covering NEV products performance, availability, reliability, and safety.
- Standard provides electricity or H2 energy refill interface which can easily connect to facility and promote large scale application of NEV.
- Standard used for NEV market access, type approval and quality guarantee.

general requirement	• safety protection/interchange
guide technology	• technical exchange/new technical apply
promote production	• ensure quality/lower cost/increase competitive/export promotion
support management	• type approval/market access

NEV standard system

The NEV standard created through standardization needs.

- The reasons for developing the NEV standard mostly due to the power train energy supply difference.
- The REESS, FCS, electric propel power train system, charging, H2 refill, electricity performance, and other relevant to NEV internal character should develop standards.
- The NEV external character not the same as internal combustion vehicle should be specified in a standard, for instance, electrical safety, battery safety, electrical consumption ratio, H2 escape, and EMC performance.
- A new standard or revise the standard which may satisfy the NEV standardization needs.

Internal combustion vehicle is fundamental of the electric vehicle.

internal character:
——energy store system：tank→battery, H2 tank, super capacitance…
——propel system：internal combustion engine +transmission→electric motor+
——energy refill：gas refill→charging, compressed H2 refill
——electrical system：12¥24V low voltage→~800V high voltage +low voltage

external character
——safety：electrical safety、battery safety…
——dynamic：electric driven
——energy consumption：pure EV、hybrid EV
——environment：pollution, H2 escape, EMC

NEV standard system

The target of NEV standardization is creating one standard system.

■ The purpose of standardization should reflect the top level design of national industrial strategy and policy, meanwhile, it should represent the demand from enterprise R&D, industry, market, or international situation.

■ The standard system of China NEV industry should follow three principles in below:

1-The NEV standard system should has moderate of technical level, have advantage to China NEV industry.

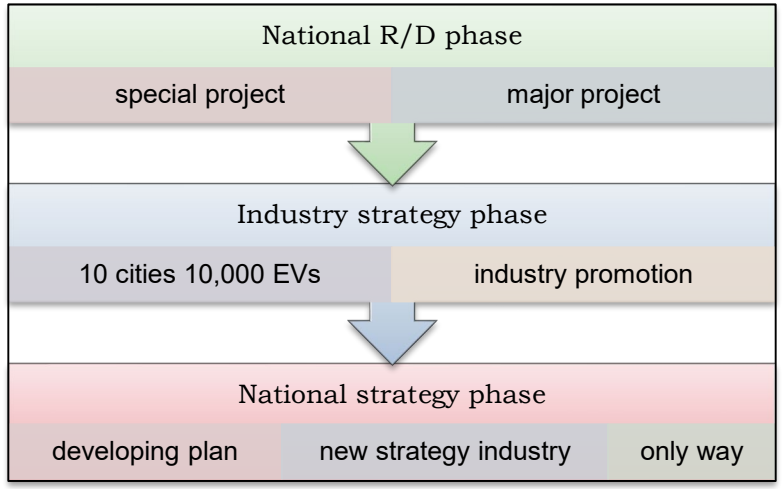
2-To fulfill the request of manufactory, company, test laboratory, certification organization, government management .

3-Have strong influence ability to international standards and regulations.

NEV standard system

China NEV standard system construction process spent more than 20 years.

- In the beginning, China establishes serials of technical research and development project to prove NEV practicability, the first batch standard has been published.
- In the stage of part industrialization, China released more standards to support NEV promotion, the standard system established.
- Now, in China, developing NEV as a national strategy, the standards from individual to system, from quantitative to qualitative change, and from domestic to international.



In 1998, starting to set the first batch of standards, mainly about the vehicle standards test methods;
In 2001, first batch of 16 standards publish and implement;
In 2002, China High-tech R&D (863)program offers support to draft EV standards;
In 2005, first batch of 16 HEV standards publish and implement;

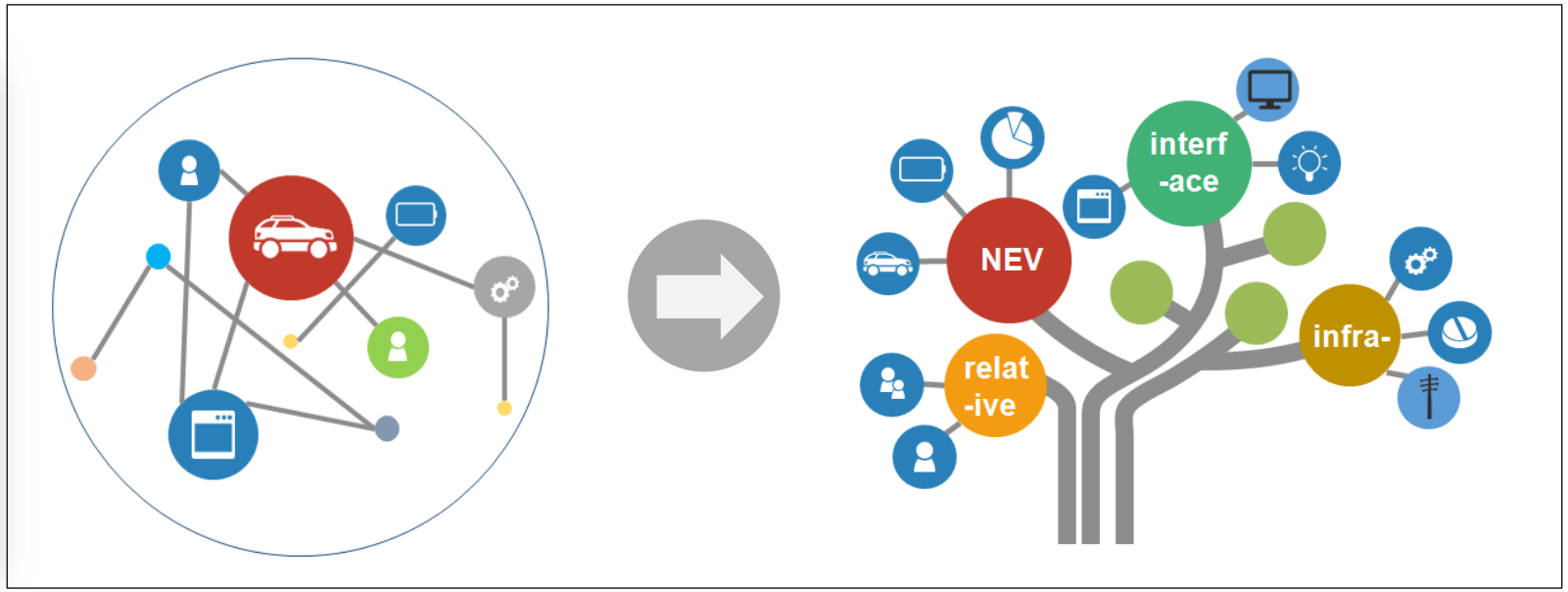
The EV industry gradually develop from scientific research to vehicle production and part industrialization;
The standard system initial establishment, meet the demand of market access;

In 2011, under the WP29 framework set up EVE and EVS, as a vice presidency, China undertake formulating international standards;
communicating and discussing with Europe, United States, Japan;

NEV standard system

The "China standardization roadmap for NEV" as a tool to interpret the standard system.

- China has published two versions of standardization roadmap, respectively, in 2017 and 2018.
- The roadmap categorizes the standards from mess to a system through 4 aspects, that is electric vehicle, interface, infrastructure, and relative.
- The roadmap is a draft instruction of standard system, it is a schedule of the standardization project plan.

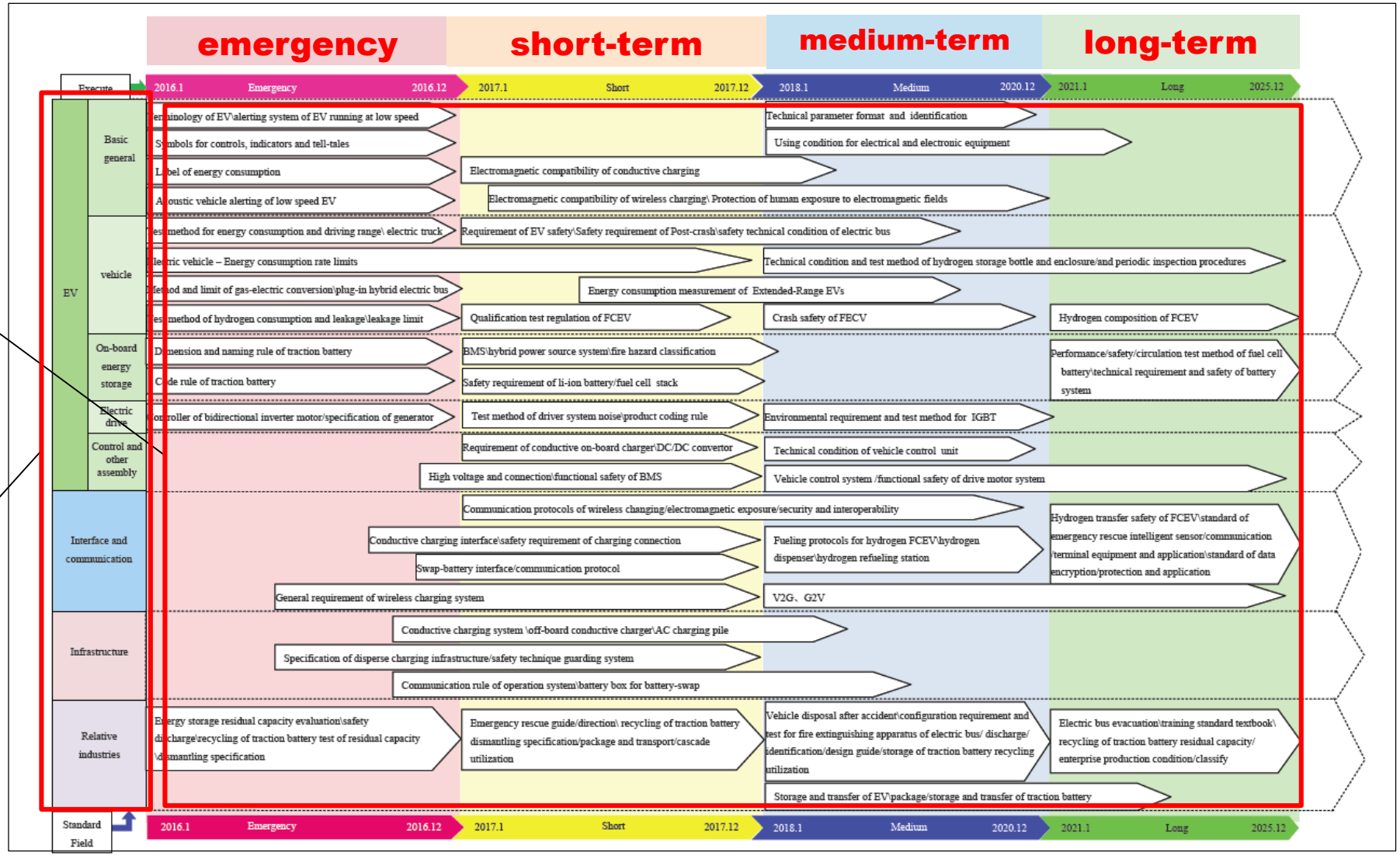


NEV standard system

The roadmap had listed the standard projects in one figure to demonstrate the working period.

project

category



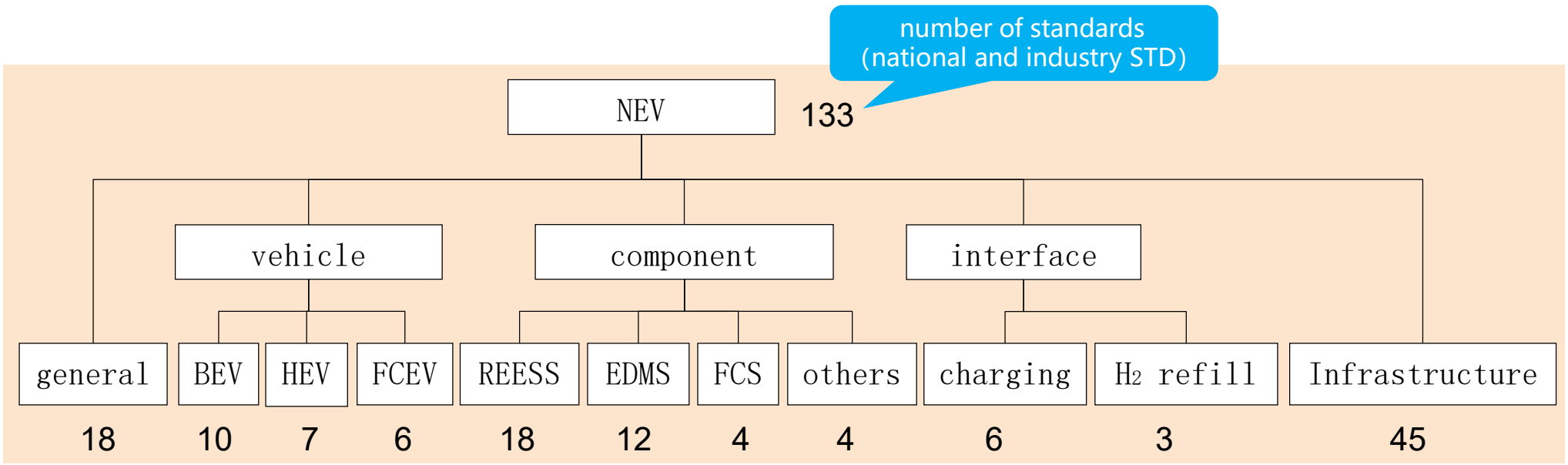
NEV standard system

This the below figure shows the structure of NEV standard system.

■ The whole vehicle standard is divide into BEV, HEV, and FCEV.

■ REESS, EDMS, and FCS are the key of the NEV component, the others component contains DC/DC convert, on-board charger, IGBT and so on.

■ NEV’ s energy refill include charging and H2 refill, the infrastructure is the fundamental of NEV application.

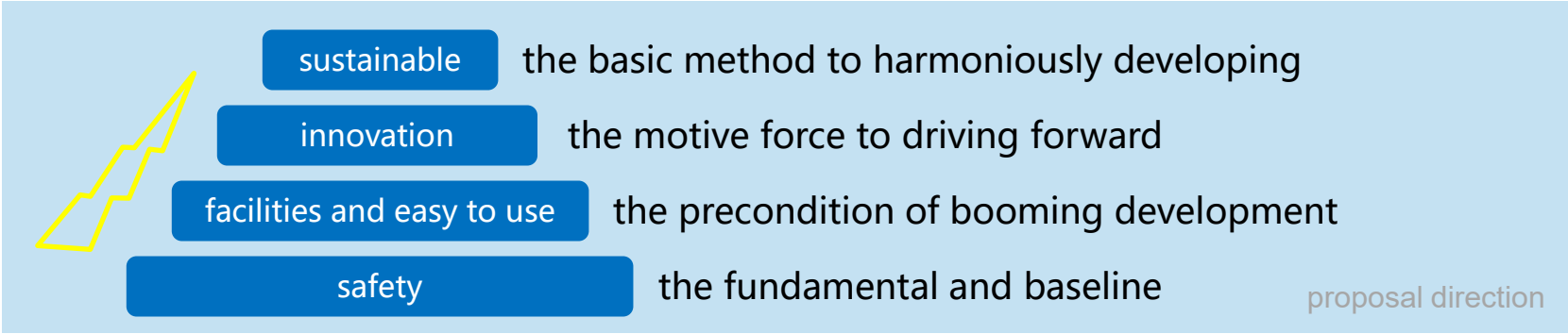


REESS: rechargeable electric energy storage system. EDMS: electric drive motor system. FCS: fuel cell system

NEV standard system

The standardization trend of NEV.

- NEV safety standard is the fundamental and baseline of the industry, it can stabilize the market.
- Charging and refill infrastructure standard is the precondition of booming development, it will convince the NEV user.
- FCEV and high-performance traction battery are the relations to high technology, that technology help the industry full of power.
- Traction battery recycle standard will enhance the resource saving, it is a basic method to harmoniously developing.



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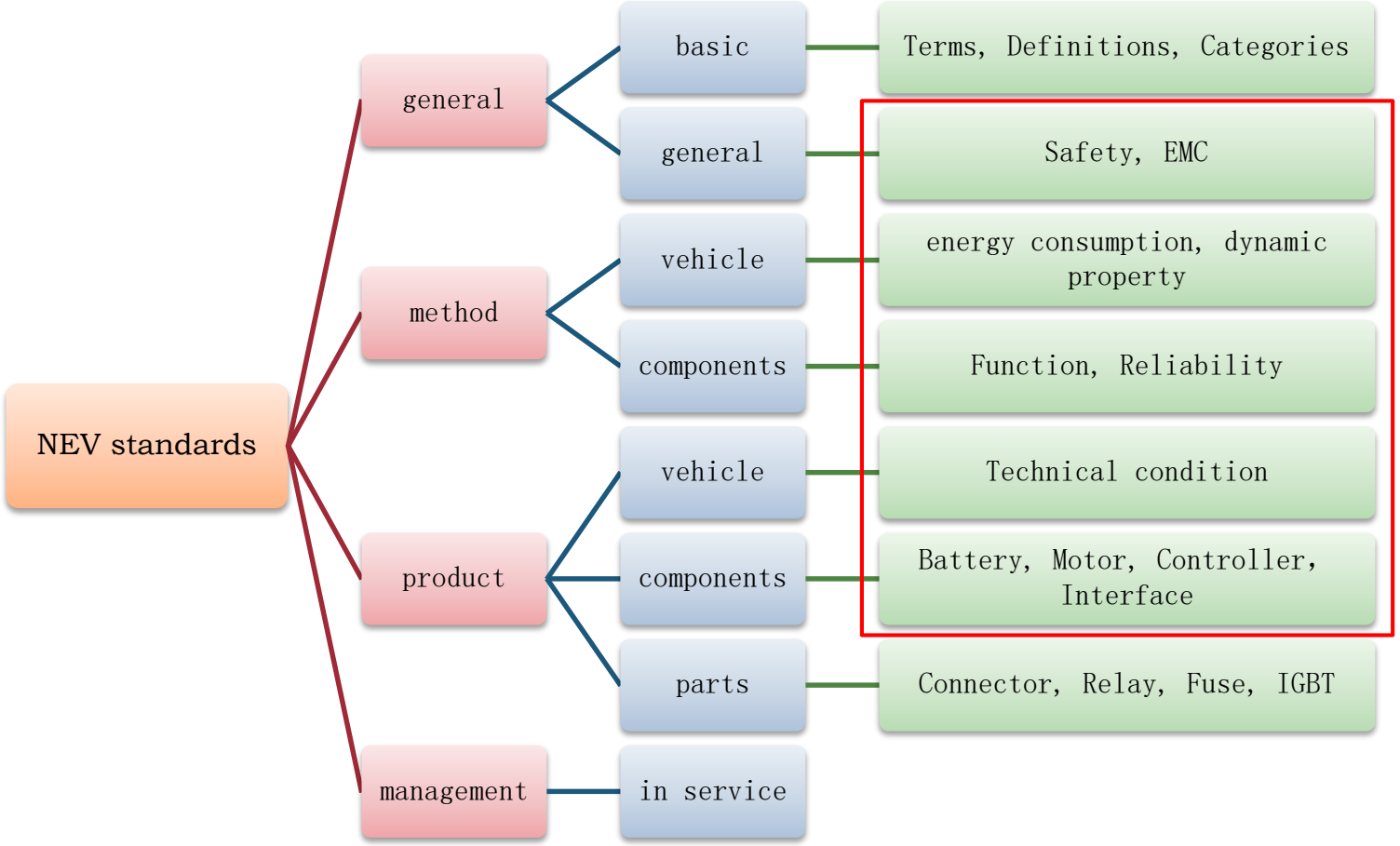
Key standards

NEV standard has divided into several types.

- Those standards can be classified due to the standard’ s property, object, and purpose.
- Some of the standard used for NEV type approve.

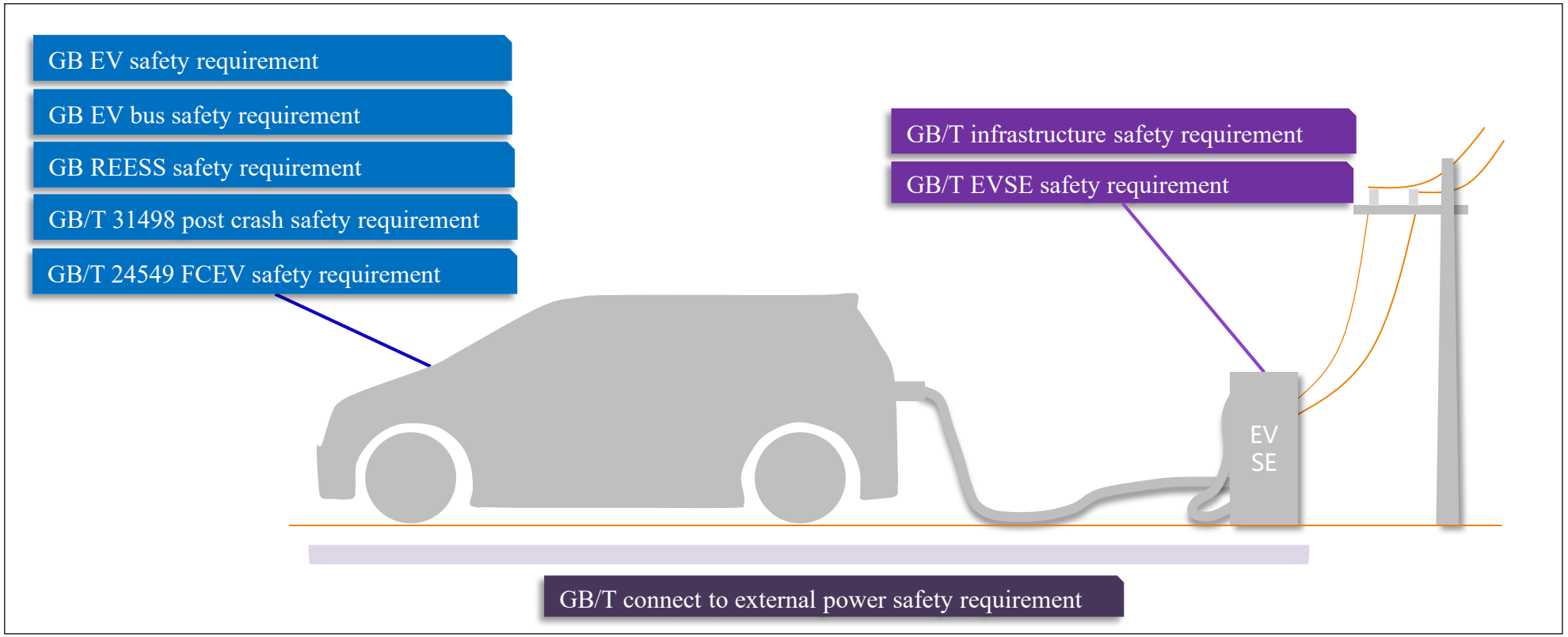


No.	Field of standard for type approve
1	EV safety
2	EMC
3	Traction battery
4	Electric motor and controller
5	Energy consumption
6	Vehicle technical condition
7	Interface for charging, H2 refill, and data

Key standards

This figure shows the NEV safety standards.

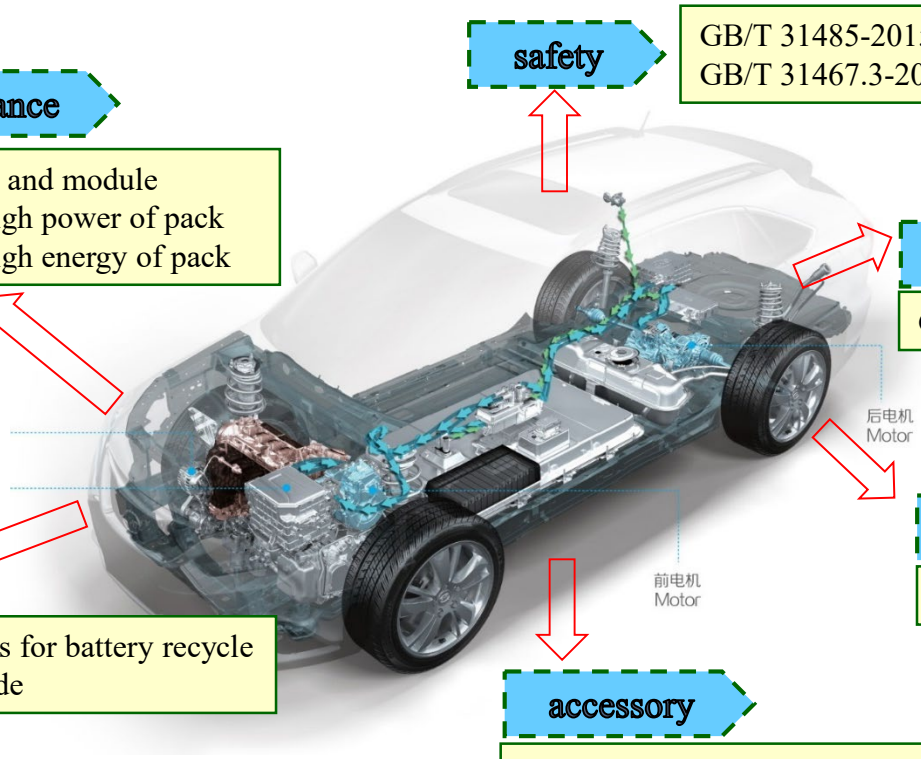
- For vehicles, safety requirement includes general usage, battery, post crash, and FCEV.
- For supply equipment, equipment safety requirement and infrastructure safety are needed and important.
- For the system which combines the vehicle and charging equipment, the connect to power safety requirement should be considered and development.



Key standards

This figure shows the traction battery standards.

■ The battery is the most important sub-system in electric vehicle, it influences the product cost, vehicle performance, and safety.



safety

GB/T 31485-2015 cell and module
GB/T 31467.3-2015 pack

electrical performance

GB/T 31486-2015 cell and module
GB/T 31467.1-2015 high power of pack
GB/T 31467.2-2015 high energy of pack

cycle life

GB/T 31484-2015 cell, module and pack

interchange

GB/T 34013-2017 dimensions

recycle

GB/T serials standards for battery recycle
GB/T 34014-2017 code

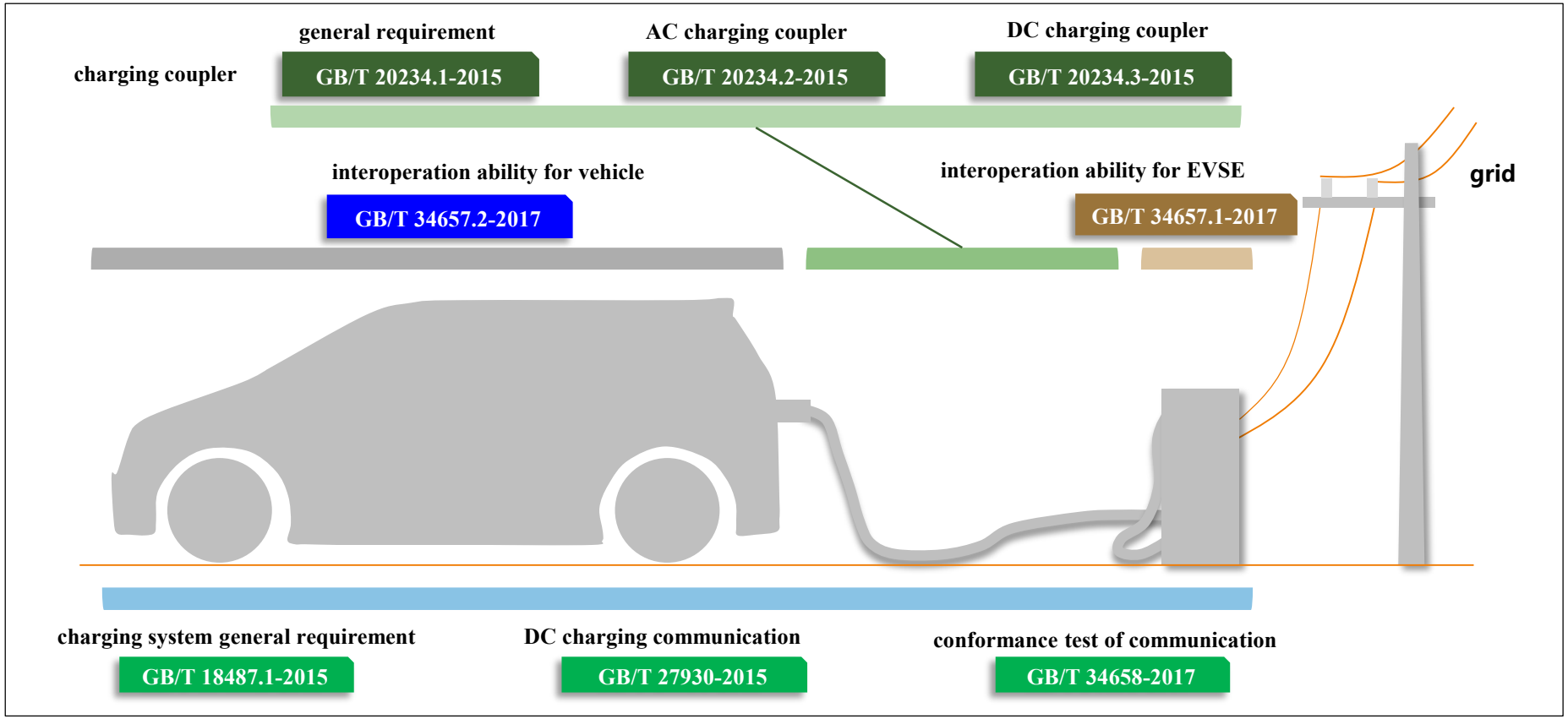
accessory

GB/T product requirements and function safety of BMS
QC/T 989-2014 battery tank or cabin

Key standards

The conductive power transfer standards.

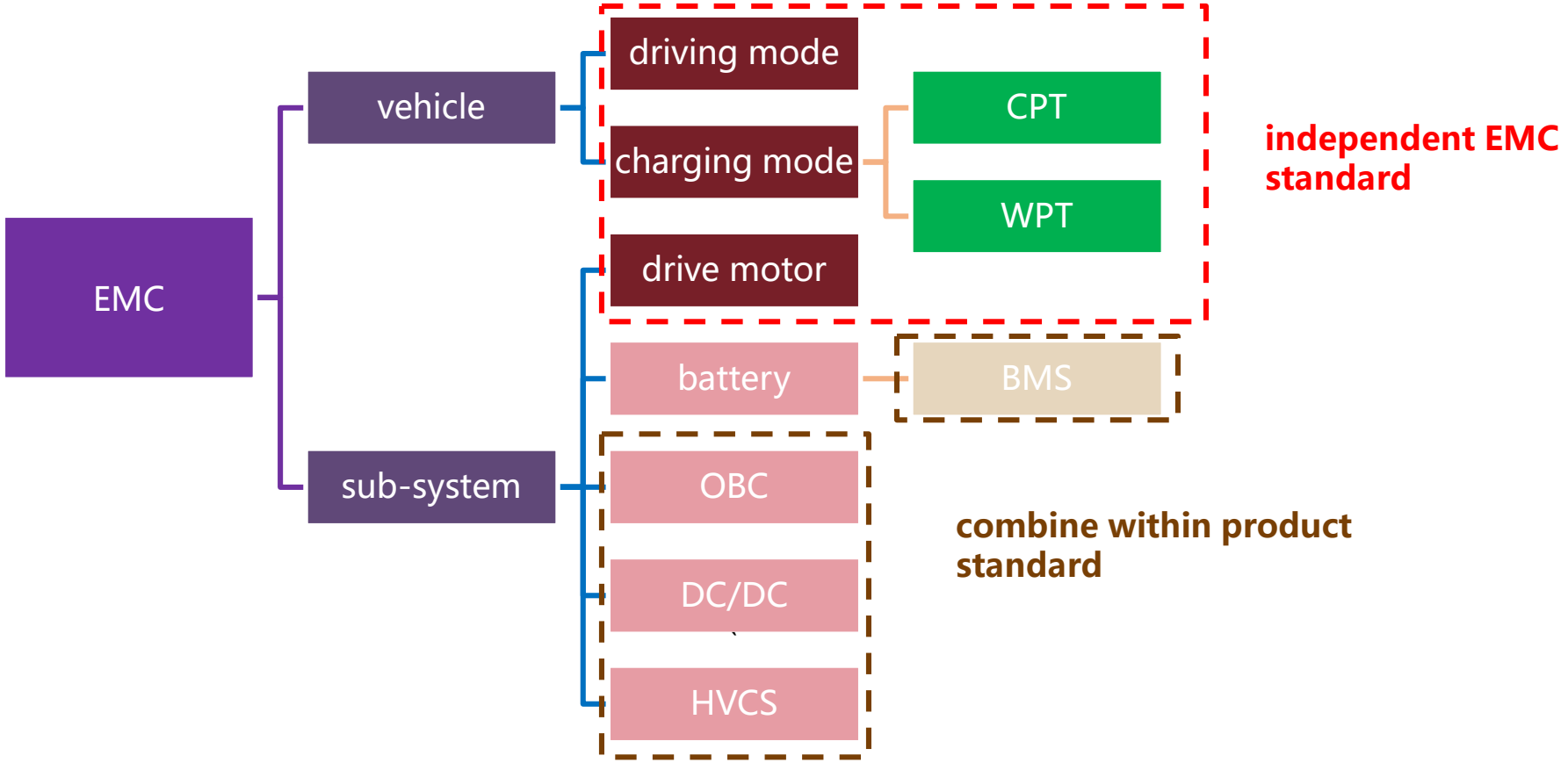
■ Those standards make the charging able vehicle and charging equipment connection and energy transfer, achieve the interchange.



Key standards

This figure shows the EMC standards.

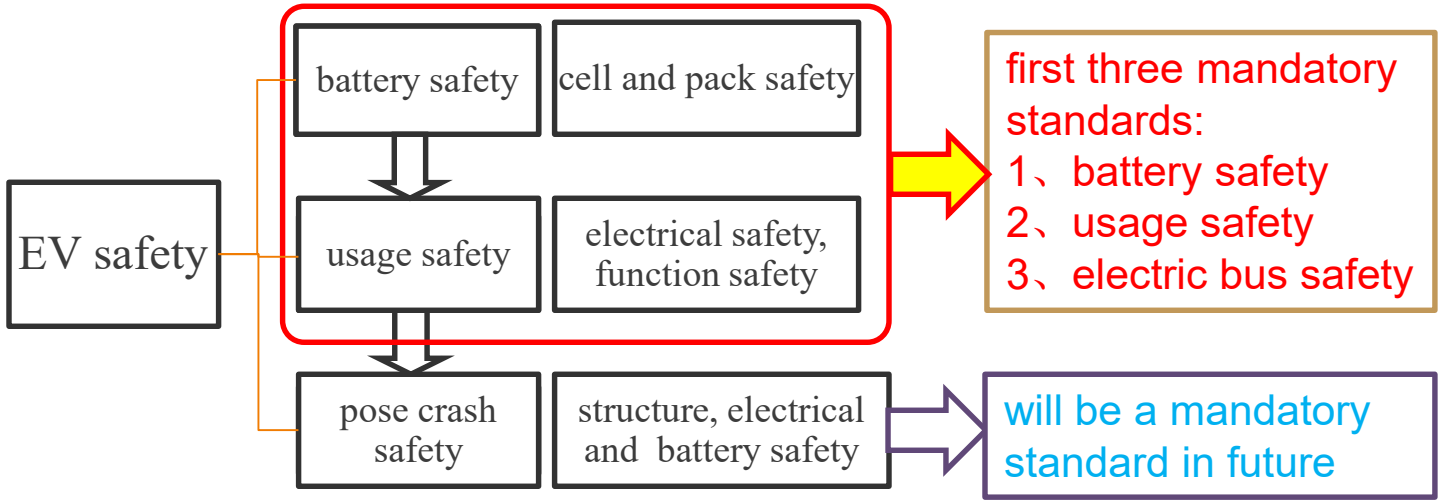
- The EMC standards reflected NEV running and electromagnetic environment demands.



Key standards

The electric vehicle safety attracted the focus of the entire industry.

- China has developed the three mandatory standards which harmonic with ISO and GTR 20.
- China was one of the leads and main member of drafting GTR 20.



	EVS-GTR	China STD
1	Usage safety	GB EV safety
2	Post crash safety	GB/T 31498 post crash safety
3	REESS installation and function requirement	GB EV safety& GB battery safety
4	REESS usage safety	GB battery safety
5	REESS post crash safety	GB battery safety
6	Bus safety	GB EV safety& GB battery safety

Key standards

China has hosted some international standards or regulations which according to the china standards.

GTR20 EV safety

IEC 62196-3:2014 DC charging coupler

ISO 18243:2017 Li-ion traction battery for electric motorcycle
ISO/TR 13062:2015 terms for electric motorcycle

IEC/TS 62840-1:2016 general requirement for battery swapping
IEC 62840-2:2016 safety requirement for battery swapping

Key standards

Some important standards currently in progress of researching and drafting.

Field	Project name
general	Safety requirement of connecting to external power for electric vehicle
general	EMC requirement of conductive charging system for electric vehicle
general	EMC requirement of wireless charging system for electric vehicle
REESS	Technical specifications of battery combination with ultra capacitor for electric vehicle
charging	General specifications of battery cabin for electric vehicle
Other components	DC/DC convert for electric vehicle
Other components	On board charger for electric vehicle

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Conclusions

- 1-China has been built the NEV standard system which has basically satisfy the demand of NEV industry.
- 2-The NEV standard system supports the rapid development of industry, so the system is succeeding.
- 3-There were some standard system tools, for examples, the standardization roadmap, key project per year.
- 4-There are also have some gap between China NEV standardization and international or developed country standardization.
- 5-There are lots of standard project under development, the interested party still have to create more dedications.

Thank you for your attention!

National Technical Committee of Auto Standardization

www.catarc.org.cn

Tianjin, China