



上海交通大學  
SHANGHAI JIAO TONG UNIVERSITY

**Green, Low-carbon and Circular Development of China's Automobile Industry**

# **National Progress Report**

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Malaysia



# Outline

Shifts in Philosophy, Automotive Industry, and Towards E-Mobility

Current Challenges of Carbon Emissions and Automotive Recycling in China's Automotive Industry

Goals of Green, Low-Carbon, and Circular Development in China's Automotive Industry

Roadmap for Green, Low-Carbon, and Circular Development

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# The Shift in Philosophy

- **The transformation in the relationship between humans and nature:** from the dualistic opposition of "conquering and transforming nature" to the harmonious coexistence between humans and nature.

**The shift is endogenous, bottom-up, and systematic**

the concept that "**green mountains and clear waters are mountains of gold and silver**" has taken deep root in people's hearts, ultimately forming a nationwide action.

**The shift is at the core of global governance**

climate change is a common challenge faced by all of humanity. The Chinese commitment to "**strive to reach peak carbon dioxide emissions before 2030, and endeavor to achieve carbon neutrality before 2060**" is a fundamental path to building a community with a shared future for mankind.

**The shift represents the values of China's ecological civilization in the new era**

it is the people's aspiration for a beautiful environment and the pursuit of a high-quality life, and it is the fundamental path to high-quality development and high-level protection.

# The Shift in the Automotive Industry

- **Green, low-carbon, and circular development is a common choice** for the global automotive industry to address climate change and is also an intrinsic demand for the high-quality development of China's automotive industry.

**E-Mobility has become the focus of a new round of industrial competition**

carbon-based technical barriers and trade barriers becoming apparent; the level of green, low-carbon, and circular development of the industrial chain will directly determine the future global competitiveness of the automotive industry.

**E-Mobility is the coordinated development of energy, transportation, and environment**

it is not only the improvement of the automotive industry but also a fundamental change in the social energy and transportation infrastructure.

**Chinese automotive industry must develop new productive forces**

achieve a revolutionary breakthrough in technology, innovative allocation of production factors, and in-depth transformation and upgrading of the industry, to significantly enhance total factor productivity.

# The Shift Towards E-Mobility

## The transformation in the supply side of energy and electricity

Smart grids and national carbon markets play a significant role in increasing the proportion of clean and renewable energy in the energy structure.

## The transition of the petrochemical industry

Low-carbon and zero-carbon fuels such as hydrogen, ammonia, advanced bioliquid fuels, and renewable synthetic fuels.

## E-Mobility is the main direction for the low-carbon development of automotive products

Internal combustion engine vehicles continuously improve the integration, intelligence, and efficiency of the internal combustion-electric power drive system through the combination with electric drive technology and the integration with intelligent control.

## The transformation and development of the automotive manufacturing industry

The industry is moving towards a clean energy structure, digital production methods, and circular resource utilization.

## The transformation on the demand side of E-Mobility

The re-planning of gas stations and charging facilities, the support of digital infrastructure such as smart cities, the cultivation and encouragement of sustainable consumption habits in society, and the active participation of consumer organizations.

# Current Challenges of Carbon Emissions in China's Automotive Industry

- The scale of China's automotive industry has been the largest in the world for **14** years, with an annual output and sales volume of about **27 million** vehicles, and an average annual compound growth rate of **12.3%** since 2000. The vehicle ownership exceeds **300 million**, ranking **No.1** in the world, with **immense pressure for carbon emission reduction**.
- There is significant pressure for carbon emission reduction in vehicle operation, with **commercial vehicles being the current main source of emissions** (**11%** of volume accounts for **55%** emissions).
- The carbon emissions in **automotive manufacturing** are relatively **low**, mainly indirect carbon emissions from electricity consumption. **The carbon emissions per unit of increased value have decreased by more than 70%** compared to 2005.

# Current Challenges of China's Automotive Recycling Industry

## Market Scale

- The recycling of scrapped motor vehicles reached **4 million**, a year-on-year increase of **32.9%**
- By **2027**, it is expected to reach **10 million**.

## Upgrade of regulations and re-qualification of enterprises

- *Regulations on the Administration of the Recycling of Scrap Motor Vehicles* (State Council Order No. 715)
- *Detailed Rules for the Implementation of the Regulations of State Council Order No. 715*
- *Technical Specifications for the Recycling and Dismantling of Scrap Motor Vehicles* (GB 22128-2019)
- *Technical Specifications for Pollution Control of Scrap Motor Vehicle Dismantling Enterprises* (HJ 348-2022)
- In 2023, there were more than **1,460** enterprises **with qualified certifications** for the recycling and dismantling of scrapped motor vehicles.
- On April 12<sup>th</sup>, ***Action Plan for Promoting the Exchange of Old for New Consumer Goods*** released, aiming to increase the recycling volume of ELVs by **50%** compared to 2023 by 2025, **double** by 2027, second hand car trading volume increased by **45%** compared to 2023.



# Green, Low-Carbon, and Circular Development Goals of China's Automotive Industry

**Goal:** Strive to achieve carbon peak before 2030 and carbon neutrality in the automotive industry by 2060, supporting China's carbon peak and carbon neutrality development goals to be realized on schedule.

**By 2025**

the penetration rate of new energy vehicles is expected to reach 45%, the average fuel consumption of passenger cars is targeted to be 4.6L/100km, the electric energy consumption of pure electric passenger cars is to reach 12kWh/100km, the average fuel consumption of commercial vehicles is to decrease by 15% compared to 2020, and the carbon dioxide emissions per unit of increased value for the entire industry are to be reduced by 18% compared to 2020.

**By 2030**

the penetration rate of new energy vehicles is expected to reach 60%, and the average fuel consumption of passenger cars is targeted to be 3.0L/100km.

**After 2030**

low-carbon and zero-carbon vehicles are gradually expected to become the mainstay of the automotive market and road traffic, with continuous reduction in energy consumption and carbon emissions in automotive production and manufacturing, and a sustained increase in the level of recycling and utilization of automotive resources and materials.



# Roadmap for Green, Low-Carbon, and Circular Development of China's Automotive Industry

- 1 Promote the low-carbon and zero-carbon transformation of traditional energy power systems centered on internal combustion engines
- 2 Expand the market size of electric vehicles and reduce the electricity consumption per 100km of electric vehicles
- 3 Promote green supply chain management in automotive manufacturing enterprises
- 4 Promote the clean energy structure and digital production methods in automotive manufacturing processes
- 5 Promote the low-carbon transformation of vehicle fuels
- 6 Strengthen the integration and interaction between new energy vehicles and the power grid
- 7 Promote the low-carbon development through the integration of the automotive industry and transportation
- 8 Promote the construction of a circular development system in the automotive industry

# Facilitating the Transition of Consumers to E-Mobility

**Improve policy incentive mechanisms**

**Increase financial support**

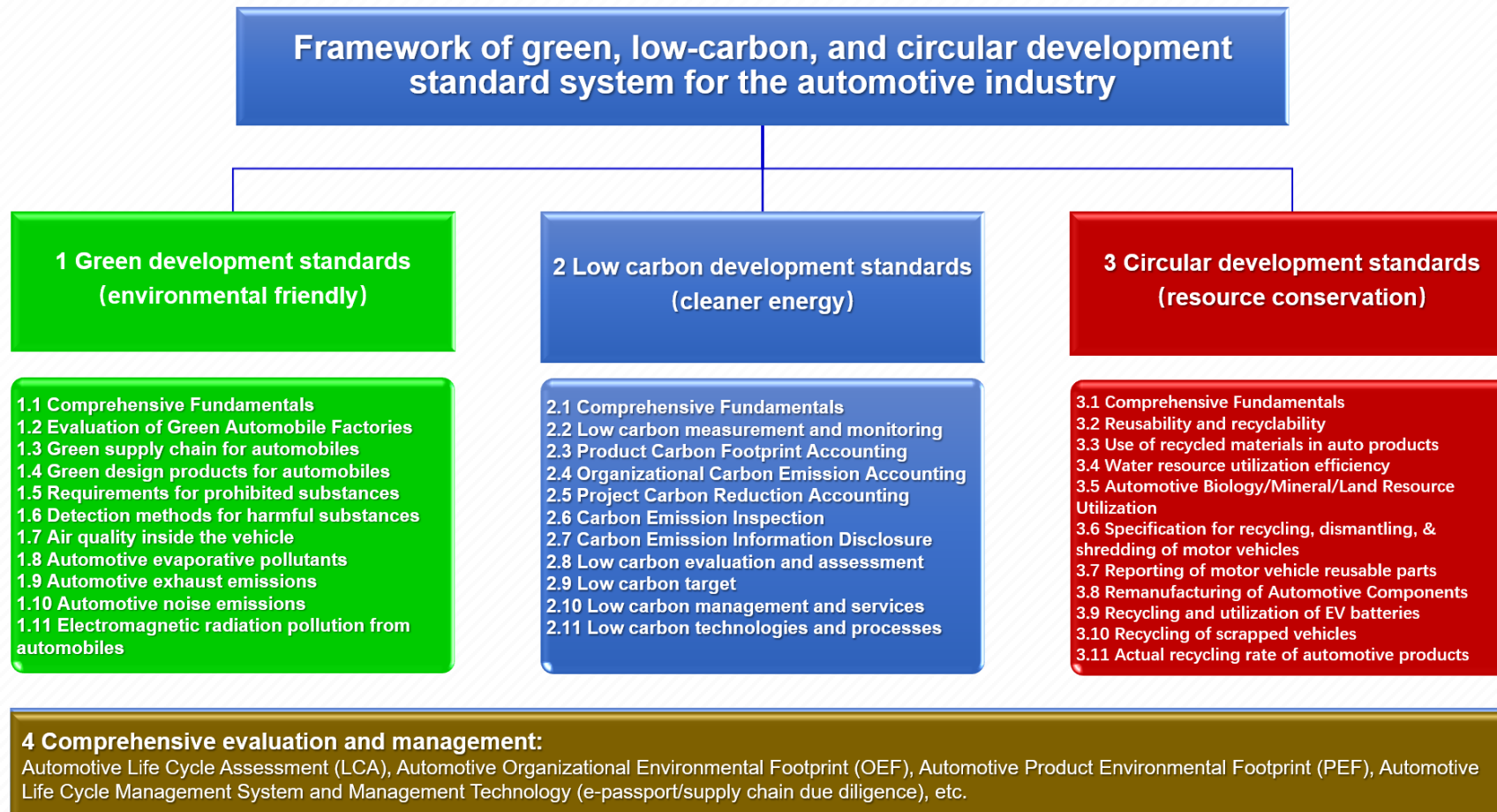
**Improve infrastructure construction**

**Enhance green transportation support policies**

**Improve the automotive product recycling and utilization system**

# Standard System

Develop a standard system for the **green, low-carbon, and circular development** of the automotive industry that focuses on **resources, energy, and the environment**.



# Remanufactured Products are New Products!

- **Regulatory framework:** Interim Measures for the Administration of Automotive Parts Remanufacturing (2021)
- **Quality responsibility body:** Remanufacturing enterprises.
- **Quality standards:**
  1. Adopt standards equivalent to those of the original new products;
  2. Perform the same inspection, testing, or certification as the original new products before leaving the factory.
- **Quality assurance:** Provide quality assurance and after-sales service that are no less than those of the original new products.
- **Quality disclosure:**
  1. Clearly mark the remanufacturing enterprise's trademark and "**remanufactured product**" logo in a prominent position, and ensure it remains permanent.
  2. The packaging and product manual of remanufactured products should indicate the **name**, **address**, **production date**, and **product execution standards** of the remanufacturer.
  3. When selling and using remanufactured products, inform consumers that the **product is remanufactured**, and provide **quality certificates**, **quality assurance information**, and **after-sales service warranty manuals** for remanufactured products.



# New Quality of Productivity in Remanufacturing: Artificial Intelligence + Remanufacturing

**AI + Green Manufacturing** highly aligns with the characteristics of **new quality of productivity**, which are “**high technology, high energy efficiency, and high quality**” and conforms to the advanced productive quality state of the new development concept.

By applying **neuro-symbolic artificial intelligence** to the task planning of power battery disassembly, it solves the problem of **uncertainty** in the disassembly process under **unstructured environments**, achieving **autonomous, interpretable, and robust disassembly**, pointing the way for the intelligent disassembly of power battery.

The **embodied intelligent system based on neuro-symbolic AI** endows the BEAM-1 with human-like thinking abilities; ***it clearly knows its purpose, what it is doing at the moment, why it is doing it, and how to do it.***

*Battery Disassembly Autonomous Composite Robot*  
**BEAM-1 (video)**

<https://www.nsaihome.org.cn/en/>



## Conclusive Remarks

- **The green and low-carbon circular development of China's automotive industry is the necessary path to achieve sustainable development.**
- By promoting technological **innovation**, industrial structure **adjustment, transformation** of consumption patterns, and the **improvement** of the policy system, China's automotive industry will continue to move forward on the path of green and low-carbon circular development, making a positive contribution to **global climate change governance** and the construction of **ecological civilization**.
- In the future, China's automotive industry will continue to explore new **models of green development**, promote **industrial transformation and upgrading**, and achieve a **win-win** situation of **economic benefits and environmental protection**.

**Thank you very much for your attention!**

**AVRTI**

汽车产品回收利用产业技术创新战略联盟  
Alliance of Auto Recovery Technology Innovation



# New Quality of Productivity is Led by Innovation

**New quality of productivity** is the advanced productive quality state that is in line with the new development concept, characterized by high technology, high energy efficiency, and high quality. It is driven by revolutionary breakthroughs in technology, innovative allocation of production factors, and in-depth transformation and upgrading of industries. Its essence lies in the leap of laborers, labor materials, labor objects, and their optimized combination. The core indicator is the significant increase in total factor productivity, featuring innovation, focusing on quality excellence, and essentially representing advanced productive forces.