AARTI

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

Auto Product Recycling in China

Implementing extended producer responsibility

Prepared for the MAI Aftermarket Conference 2013 in Kuala Lumpur

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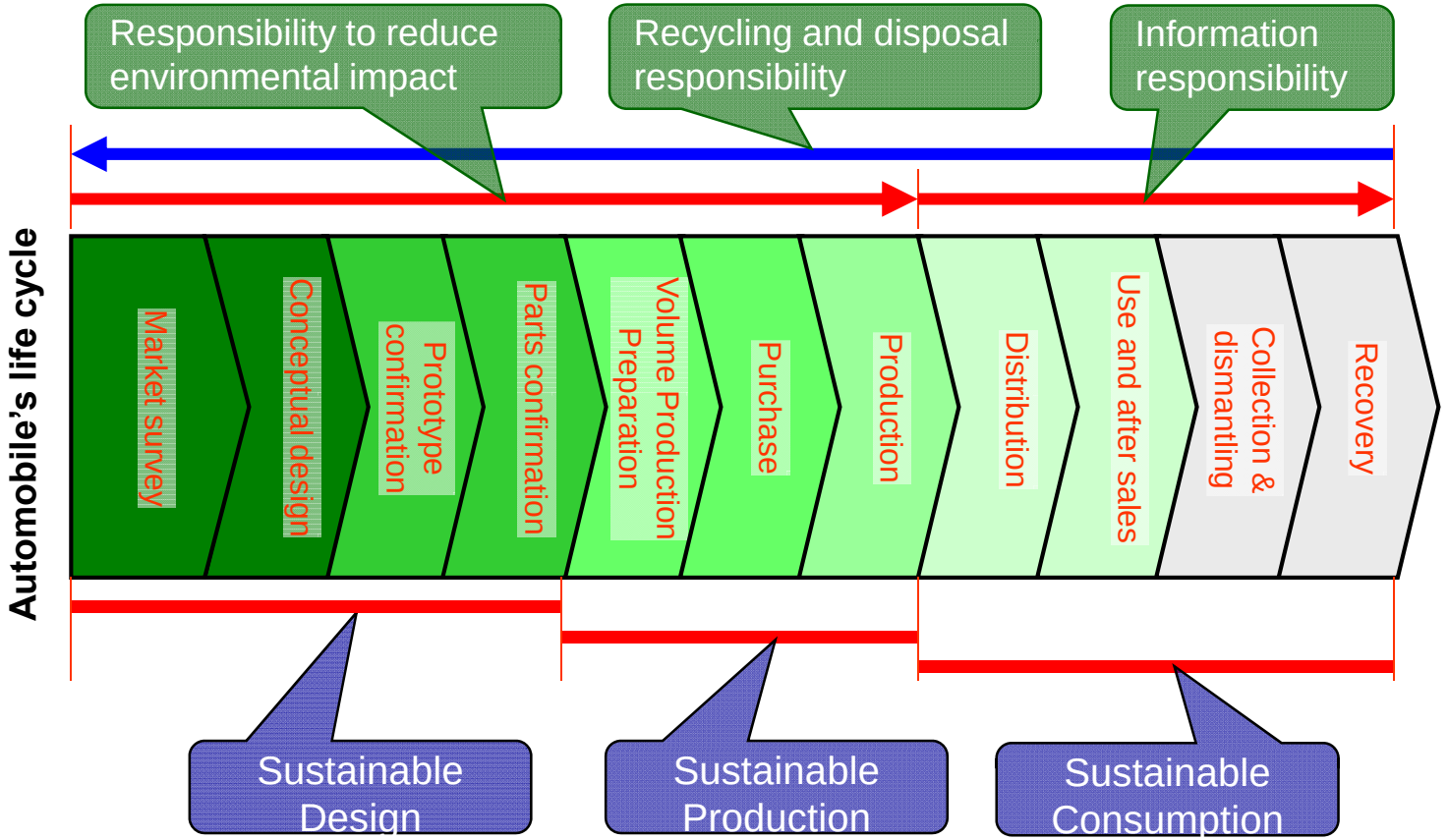
Alliance of Auto Recovery Technology Innovation

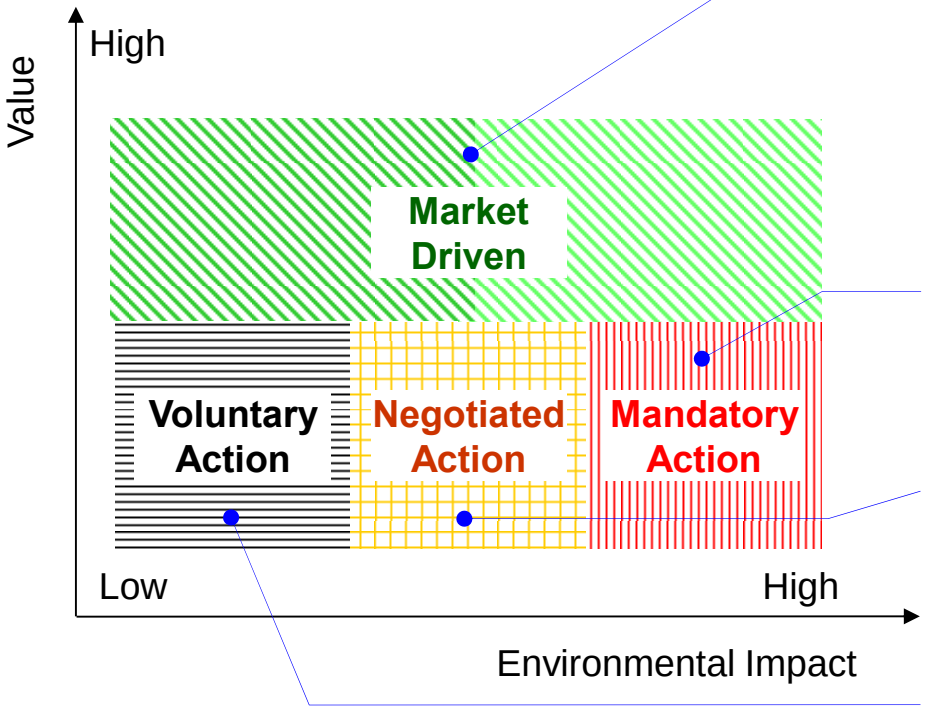
About AARTI

The Alliance of Auto Recovery Technology Innovation (AARTI) has been established on July 2010.
AARTI is a cooperation organization for technological innovation constituted by enterprises, universities, research institutions, and industry society and association, for automobile product recycling technology research, product R&D, production and service, etc, on the basis of voluntariness.

Extended producer responsibility in the life cycle of automobiles



Policy orientations affect auto product recycling in China



Market Driven Principle

(Policy Support/Market Access System/Policy Loans)

End-of-life Vehicle Dismantling, Shredding/ Scrap Metal Recycling/ Parts Reuse & Remanufacture/ Automotive Plastics Recycling/ Batteries Recycling

Mandatory Action Principle

(Principle of EPR, Producers/PRO/Government, Budget)

Waste Disposal/ Disposal of Parts of Hazardous, Banned & Harmful Substances/ ASR disposal

Negotiated Action Principle

(Policy Support/Government Subsidies /Policy Loans)

Tire and Rubber Recycling/ Reuse of Automotive Electronics

Voluntary Action Principle

(Policy Support/Government Incentives/Subsidies)

Responsibilities of Reduce to Environment Impact and Information Disclosure/ Vehicle Glass Recycling/ Thermoplastic Elastomer Recycling/ Reuse of Modified Organic Natural Materials

The legal system of auto product recycling

National Law: Circular Economy Promotion Law (Basic law)

Cleaner Production Promotion Law; Solid Waste Pollution Prevention Law

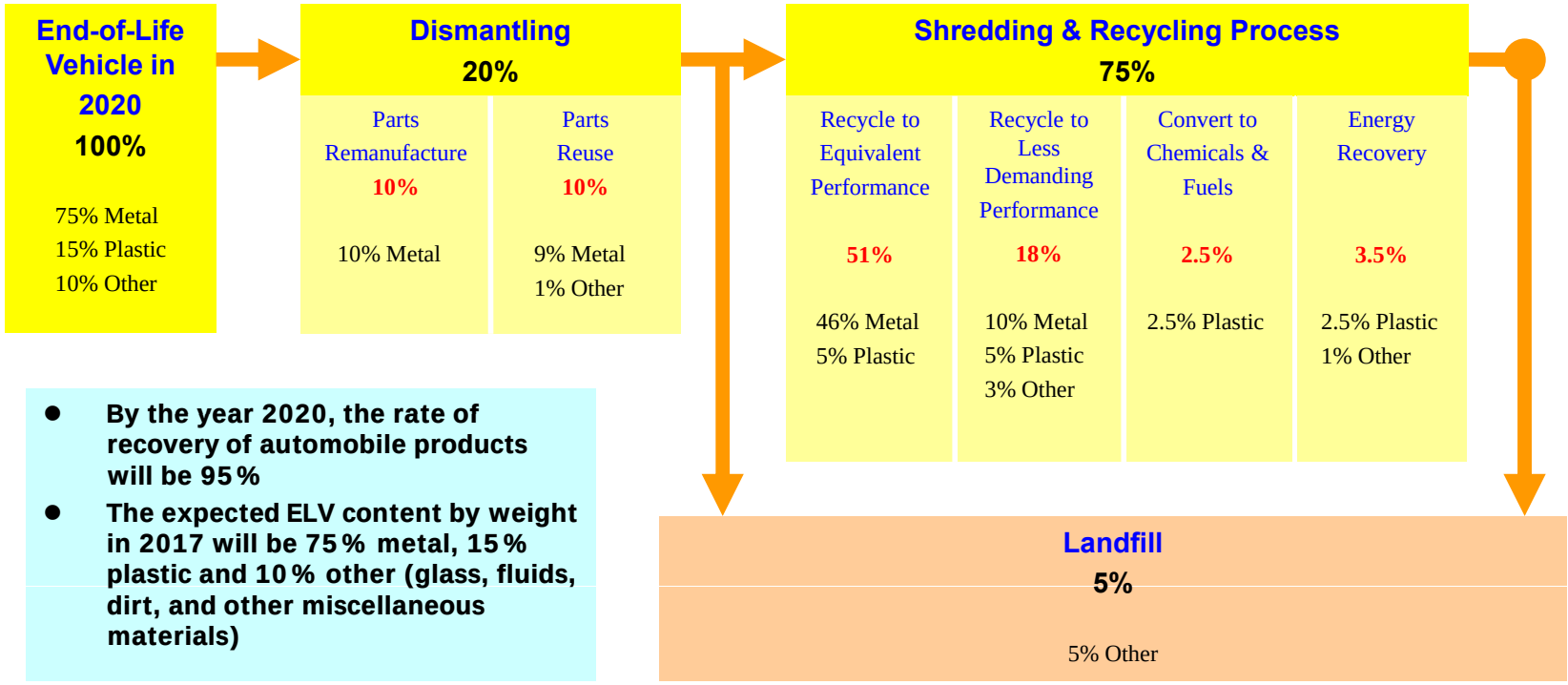
Ordinances & Implementing Rules:

Automotive recycling policy	*Effectivity date*
Automobile industry development policy	21 May 2004
Automotive trade policy	10 August 2005
Automotive industry restructuring and revitalisation plan	14 January 2009
Technical policy for the recovery of automotive products	6 February 2006
Policies, certification rules and technical specifications of the green design of automotive products	*Standard number*
Recoverability of automotive products and management practices of disabled/restricted substances	Discussion paper
Implementation of mandatory rules for motor vehicles	CNCA-02C-023: 2008
Road vehicle recyclability calculation method	GB/T 19515-2004
Material identification and marking of automotive plastic, rubber and thermoplastic elastomer parts	QC/T 797-2008
Policies and technical specifications of recycling and dismantling of ELVs	*Effective date or standard number*
Management rules for ELV take-back	16 June 2001
Management regulations for the take-back and dismantling of ELVs	Requirement for comment
Interim measures for ELV scrapped subsidies	20 December 2002
Development of recycling scrapped automobiles dismantling companies to inform the pilot demonstration project	28 July 2009
Technical specifications for the ELV recycling and dismantling enterprise	GB 22128-2008
Environmental protection technical specifications for the disassembly of ELVs	HJ 348-2007
Implementing measures of auto replacement	1 June 2009–31 December 2010
Policies and technical specifications of automotive parts remanufacturing	*Effectivity date*
Administrative measures for pilot remanufacturing of automobile parts and assemblies	2 March 2008
Notice of deepening of remanufacturing pilot	6 September 2011
Notice of management and protection of enabling and strengthening the sign of automobile remanufacturing parts	February 20, 2010
Technology requirements for the remanufacturing of [illegible]	[illegible]
Remanufacturing standards of 11 automotive parts	Requirement for comment

J. Wang & M. Chen, Waste Management & Research 30(11), 1198–1207

Development goals for auto recycling industry in China ’2020

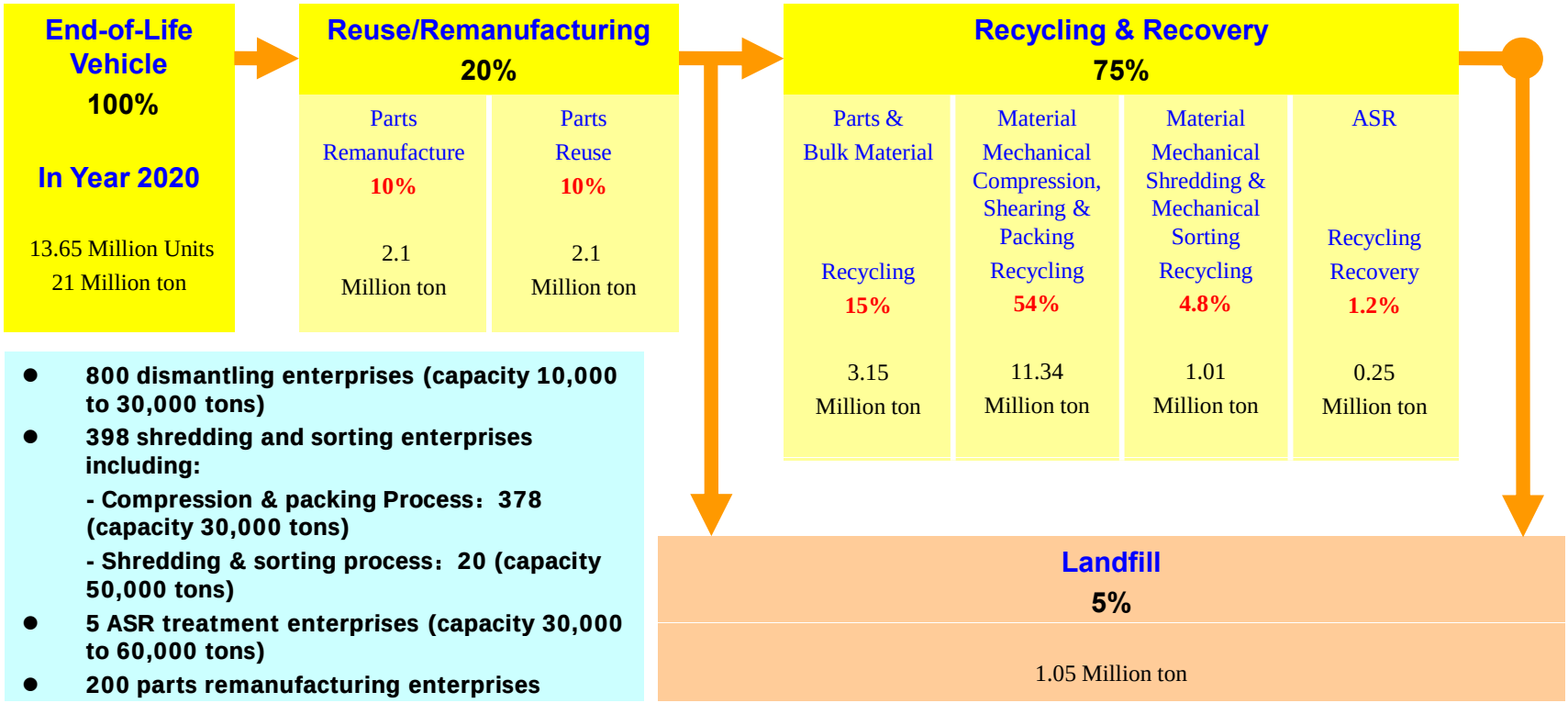
Development goal: to establish automobile product recycling industry system under extended producer responsibility regime, to make end-of-life vehicle's actual rate of recycling up to 95%, to achieve full life cycle management and control of legally banned and restricted substances, to disseminate used parts value-adding recycling technology in the industry, by 2020.



- **By the year 2020, the rate of recovery of automobile products will be 95%**
- **The expected ELV content by weight in 2017 will be 75% metal, 15% plastic and 10% other (glass, fluids, dirt, and other miscellaneous materials)**

Forecast for the scale of auto recycling industry in China ’2020

Development scale: it is expected that by 2020, annual end-of-life vehicle processing capacity will be 13.65 million sets (about 21 million tons), enterprises above designated size in the industry will be more than 1,400, with total output value nearly 16 billion US$.



Status quo of the Chinese automotive product recycling system

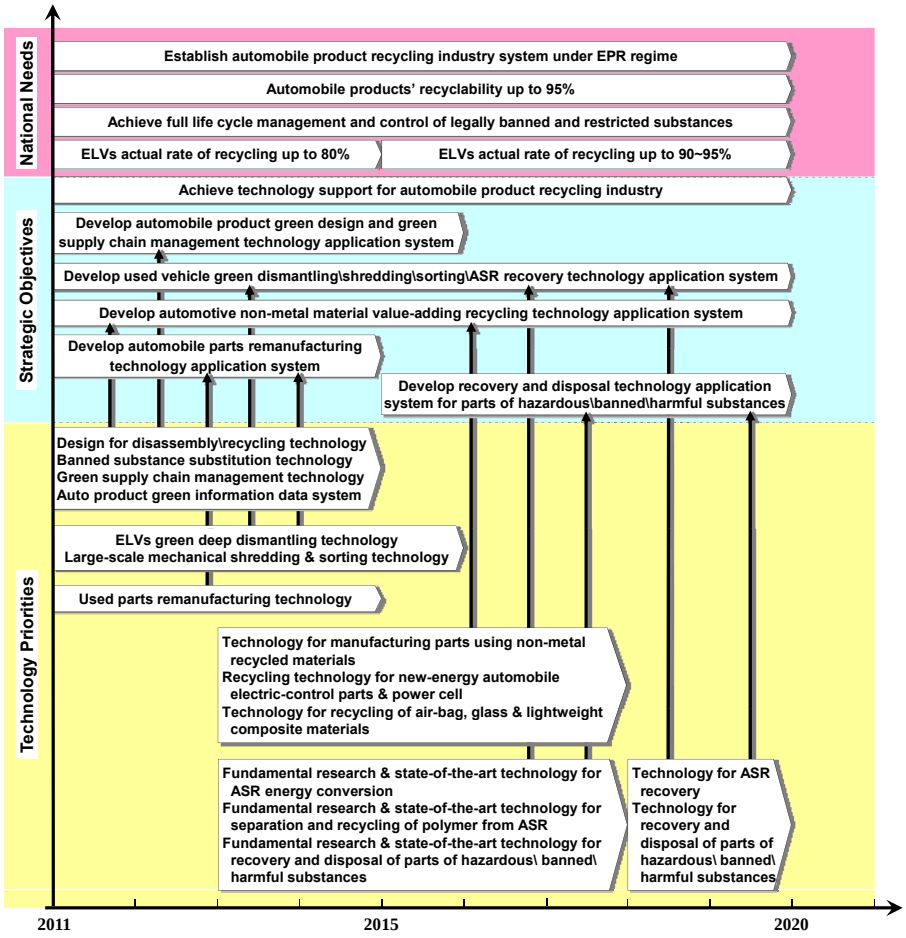
- By the end of 2010, China's vehicle population reached 90.86 million, up 19.3% year-on-year, deregistered 3.642 million, recycled 1.479 million ELVs
- In China, there are 520 enterprises for dismantling ELVs, with 2,175 take-back stations and more than 30,000 employees
- Manual dismantling operation mode guarantees a higher recycling rate
- The recycling technology level of ELVs is low, and the reuse and remanufacturing of used parts has not reached a considerable scale
- The extended responsibility of car manufacturers is unclear

Strategies for the development of auto recycling industry in China ’2020

- To improve the rate of recycling of China’s automobile product from the source control: in design & production phases
- To properly solve two key issues in take-back, dismantling and recycling phases: compliance with environmental protection standard and value-adding recycling of used automobile product
- To properly control convergence and cooperation between economic modulation mechanism and administrative control mechanism of extended producer responsibility system
- The Alliance of Auto Recovery Technology Innovation’s roles: work on R&D and industrialized demonstration of basic generic technology; dissemination over the entire industry

Consideration on China's automobile product sustainable recycling in 2020

Technology Roadmap for Automotive Products Recycling Industry in China



Development goals for auto recycling technology in China

- To master advanced applicable technologies meeting market demand and achieving value-adding recycling of automobile product, improve resource recycling level in automobile manufacture
- To explore new system on enterprises-led, industry-academia-research-application collaborative innovation
- To boost development of the generic fundamental technology and major state-of-the-art technology for China's green automobile manufacture

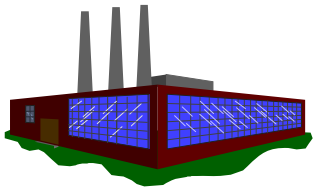
Main tasks

- To develop five major generic technology supporting systems
  - auto product green design and green supply chain management
  - used vehicle green dismantling, shredding, sorting, ASR recovery
  - parts remanufacturing technology application system
  - automotive non-metal material value-adding recycling
  - recovery and disposal for parts of hazardous, banned, harmful substances
- To make automobile product recyclability up to 95%, and realize full life cycle management and control of legally banned and restricted substance and substances of concern
- To realize the rate of recycling of 95%, achieving technology innovation in
  - green and high-efficient dismantling
  - used parts remanufacturing
  - automotive non-metal materials value-adding recycling
  - mechanical shredding and sorting
  - ASR recovery
  - auto electronics and power cell battery recycling
  - recovery and disposal of parts of banned and restricted substances

China's auto product recycling rate and banned material management system

- Chinese practice of EPR
- Approaches for the management of recycling rate and banned materials of automobile products
- Exemption list of banned materials
- Relevant standards and norms
  - *Reusable and Recyclable Calculation Method of Road Vehicles (GB/T 19515-2004)*
  - National standard: *Auto Banned Materials Requirements and Auto Industry Standard Detection Method of Lead, Cadmium Content, Detection Method of Hexavalent Chromium, Detection Method of Mercury (Hg), Detection Method of PBB and PBDE*, and other related detection methods
- Supporting systems
  - Recycling rate and banned materials authentication are included in the requirements of market access, incorporated into automobile product announcement management, imported automobile management, CCC (China Compulsory Certification) certification, and other market access management systems.
  - China's automobile materials data system (CAMDS) is established.

Recoverability & banned substances type approval procedure



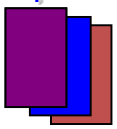
Car Makers

1

Applications for Preliminary assessment

Government or Approval Authority

Certificate of Compliance



2

Applications for Certification of Automotive products

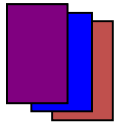
Type approval

3

For Announcement on vehicle manufactures and their products

Ministry of Industry and Information Industry

Type Approval Certificate

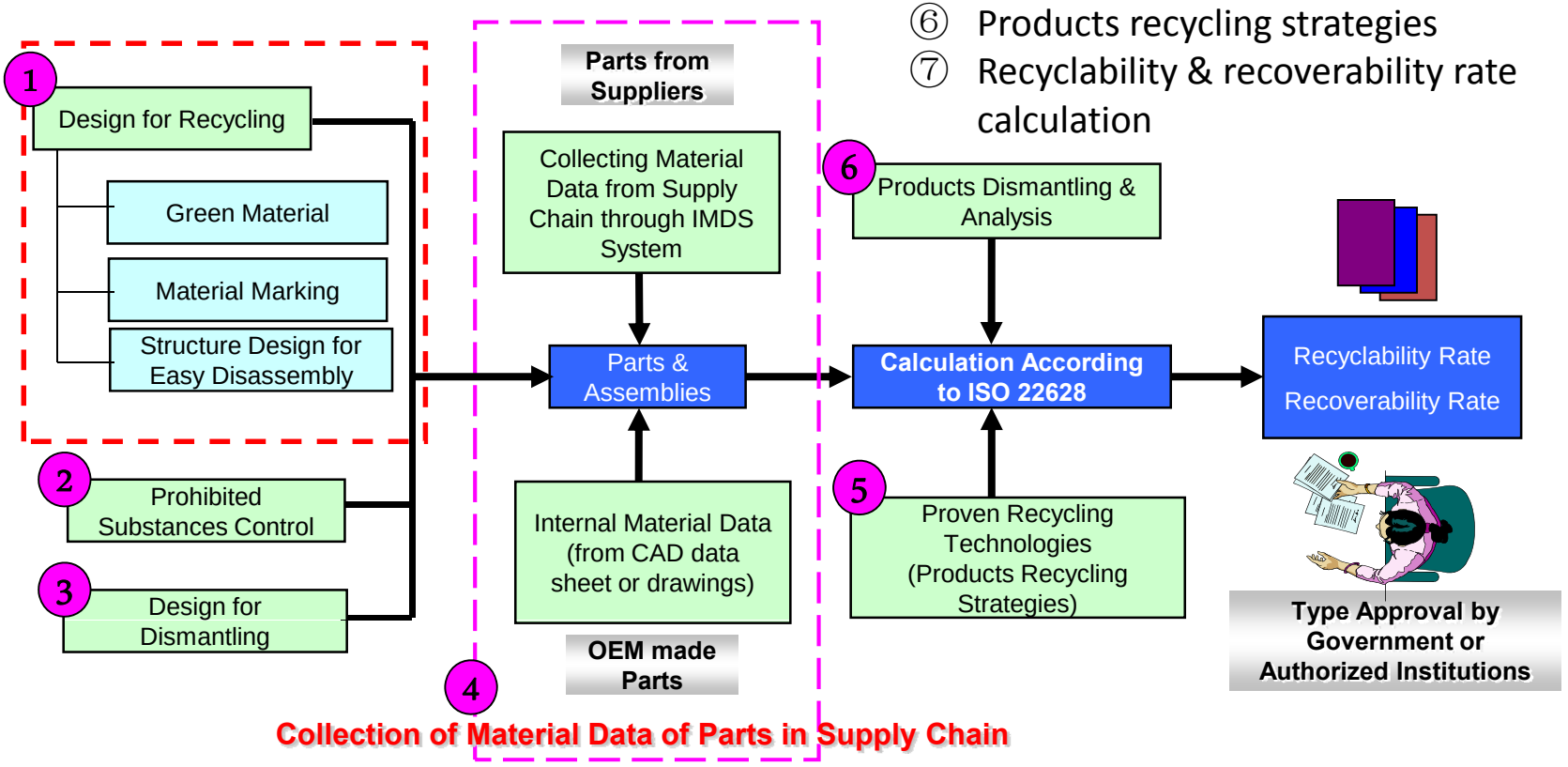


Approval Authority

Auto product green design and green supply chain management in OEM

- OEM implements auto product green design and green supply chain management system to meet regulation requirements

① Design for recycling
② Design for dismantling
③ Prohibited substances control
④ Collection of material data of parts in supply chain
⑤ Products dismantling & analysis
⑥ Products recycling strategies
⑦ Recyclability & recoverability rate calculation



Pilot project of ELV dismantling & recycling

- 104 ELV recycling facilities technical upgrading from 2009, 2010
- Environmental protection measures of pilot enterprises of ELV green dismantling
- Dismantling technical measures of pilot enterprises
  - ELV entrance registration
  - Environment-friendly
  - Removal of reuse and remanufacturing parts
  - Dismantling of interior and exterior components, engine, and gearbox
  - Dismantling, cutting, and classification of ELV
  - Heat cleaning treatment of remanufacturing cores(excusive, in ECVD)
- Remanufacturing core processing and logistics pilot center of ELV used parts (innovation in business model in Shanghai ECVD)

Remanufacturing pilots of automotive parts

- 14+ pilot enterprises; remanufacturing capacity 250,000 units; more in approving
- Scope of automobile part products: engine, gearbox, generators, starter, and steering gear
- Three principles for remanufactured products
  - Remanufactured products shall not be used in new car production.
  - The technical performance, safety, and quality standards of remanufactured products shall comply with the relevant standard requirements of the original products.
  - A “Remanufactured” sign shall be indicated on an eye-catching spot outside remanufactured products and reserved permanently, and the packaging of remanufactured products should have a specific indication of “remanufactured products.”

Technical approaches of ELV recycling in China ’2020

for 6 to10-year used vehicles and for dismantling enterprises with capacity of 10,000 tons or so per year

environment-friendly pre-treating → parts dismantling deeply → mechanical compression, shearing, packing → electric furnace remelting





for 10-year and older used vehicles and for dismantling enterprises with capacity 20,000 to 30,000 tons per year

environment-friendly pre-treating → parts dismantling → mechanical shredding → mechanical sorting → ASR recycling





Technology innovation developed by AARTI (1)

- Study on environment-friendly pretreatment and depth dismantling equipment of used passenger cars
  - Integrated collection equipment of waste oil, waste liquid, fuel, and refrigerating fluid
  - Multi-modal detonating technology of airbags
  - ELV depth dismantling technology
  - Identification technology of parts made from banned materials
- Study of recycling technology and equipment with high added value for used automotive control electronic components
- Study of key recycling technologies and equipment with high added value for typical interior and exterior parts
  - Study of key technologies to efficiently remove the polymer coating of external parts
  - Study of efficient separation technology for interior part materials with lamellar compound structure

Technology innovation developed by AARTI (2)

- Study of flexible automatic transfer, convey, depth dismantling system for used passenger vehicles
  - Establish the efficient depth dismantling production line for used passenger vehicles with the annual dismantling capacity of 100,000 unit
- Study of large-scale efficient shredding & sorting system for used passenger vehicles
  - Establish the efficient shredding & sorting production line for used passenger vehicles with the annual handling capacity of 50,000 tons
- Study of automobile shredder residues (ASR) pyrolysis & gasification mechanism and its recovery
- Contribution of material cascade utilization to sustainable resource management (a Deutsch-Sino collaboration)

Conclusive Remarks

- Improving resource utilization efficiency is one of the major means for low-carbon development of automotive industry
- Economic value in the reutilization of used automotive materials and parts determines the future of the automobile recycling industry
- Consumer concept and attention serves as an important driving force for the automobile recycling industry to maximize economic and environmental benefits
- Promote the producer's extended responsibility regime in the Chinese automobile product recycling industry system, thereby creating opportunities for the development of the automobile product recycling industry in China in the future

谢　谢！

Thank you for your attention!

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