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The Chinese Standards Impacting Sustainability in the E-Mobility Value Chain

Flagship Case – Insights from China's approach to sustainability

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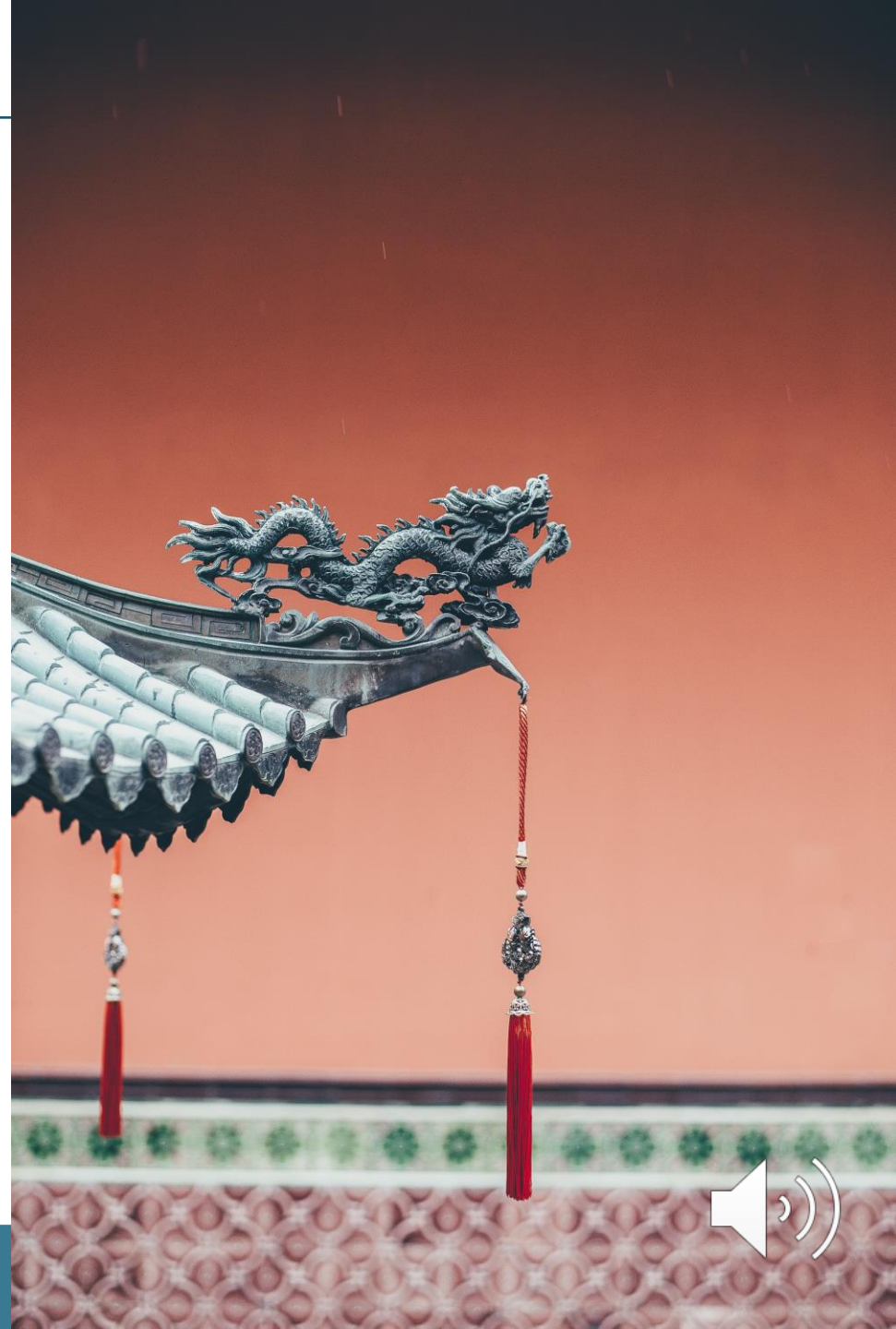
Case Study Learning Objectives

1. **Understanding** non-EU approaches to sustainability in global e-mobility value chains
2. **Recognizing** common denominators & areas for collaborative development
3. **Implementing** transferable aspects into EU based e-mobility value chains from the Chinese experience



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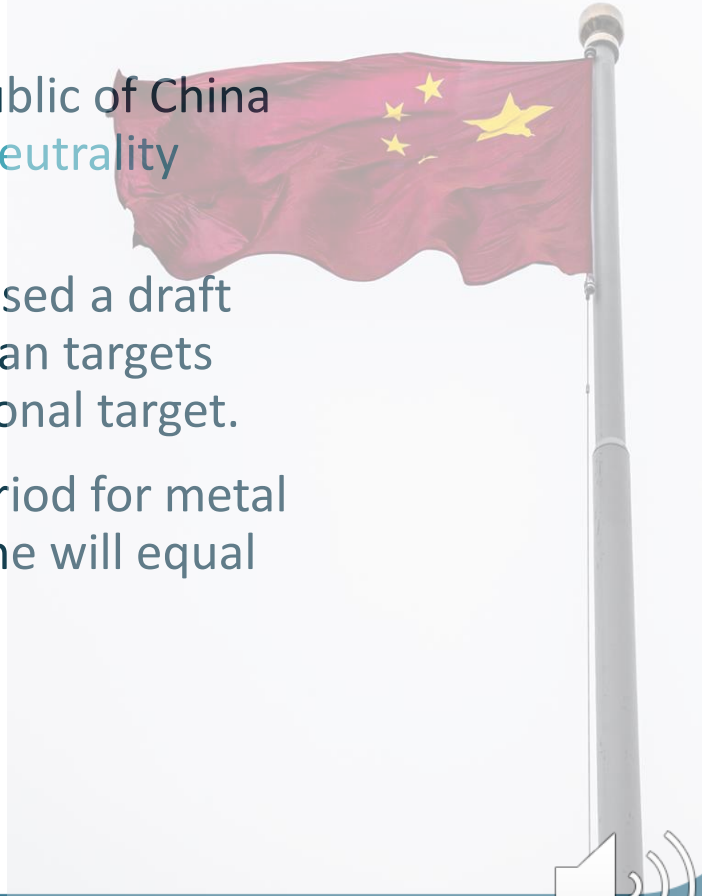
Case Context



- September 2020: President Xi Jinping announced that the People's Republic of China will "aim to have CO2 emissions peak before 2030 and achieve carbon neutrality before 2060".
- April 2021: China Nonferrous Metals Industry Association (CNMIA) released a draft carbon peaking implementation plan for the nonferrous industry. The plan targets 2025 for carbon peaking for the industry, five years earlier than the national target.
- Increased recycling & utilization of scrap metal, as China enters peak period for metal scrapping. CNMIA expects by 2025 the output from metal recycling alone will equal 20 million tons, including:
  - 4 million tons of recycled copper
  - 11.5 million tons of recycled aluminium

Case Context – China's Position in Electric Vehicle Batteries

- 2020: Chinese companies accounted for six of the top-ten electric vehicle battery makers globally.
- October 2020: China's State Council publishes new energy vehicle industry development plan (2021–2035):
  - 20% percent market share for new energy vehicles by 2025
  - electric vehicles to account for majority of new sales by 2035
- The 14th Five Year Plan lists new energy vehicles as one of the "strategic new industries".

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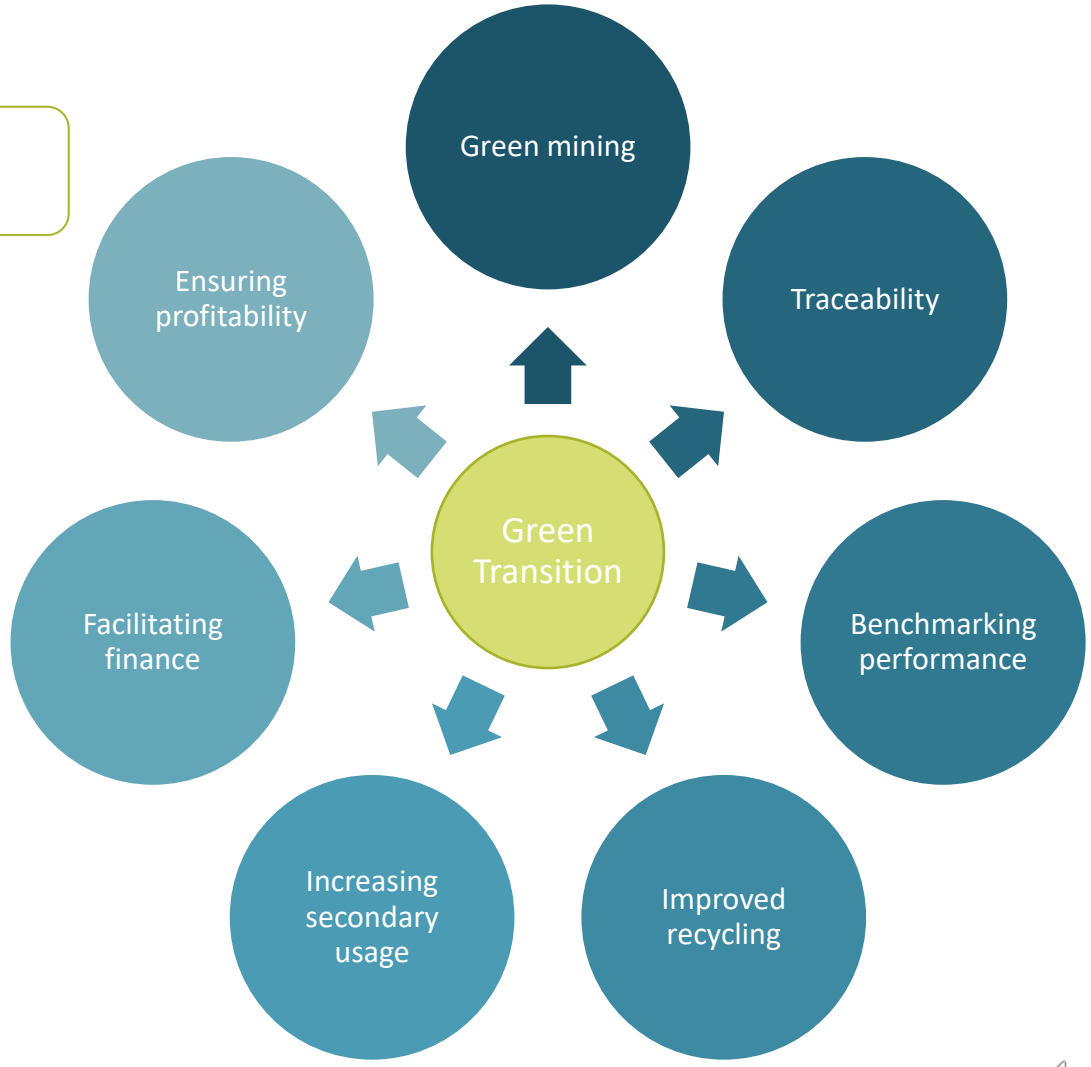
Multi-Pronged Approach to Sustainability

- 2010: The ‘Green Mine Construction Plan’
- 2018: Integrated Management Platform for the National Monitoring of New Energy Vehicles and Traceability of Power Battery Recycling
- 2021: Recycling & Re-use take centre stage:
  - Management Measures for the Gradual Utilisation of New Energy Vehicle Power Batteries
  - Directives to ensure standards & practices also ensure profitability
  - Regulations that benchmark recycling enterprises
  - Ensuring financial institutions can provide capital to implement at large scale



Good Practice Aspects – Green Mine Construction

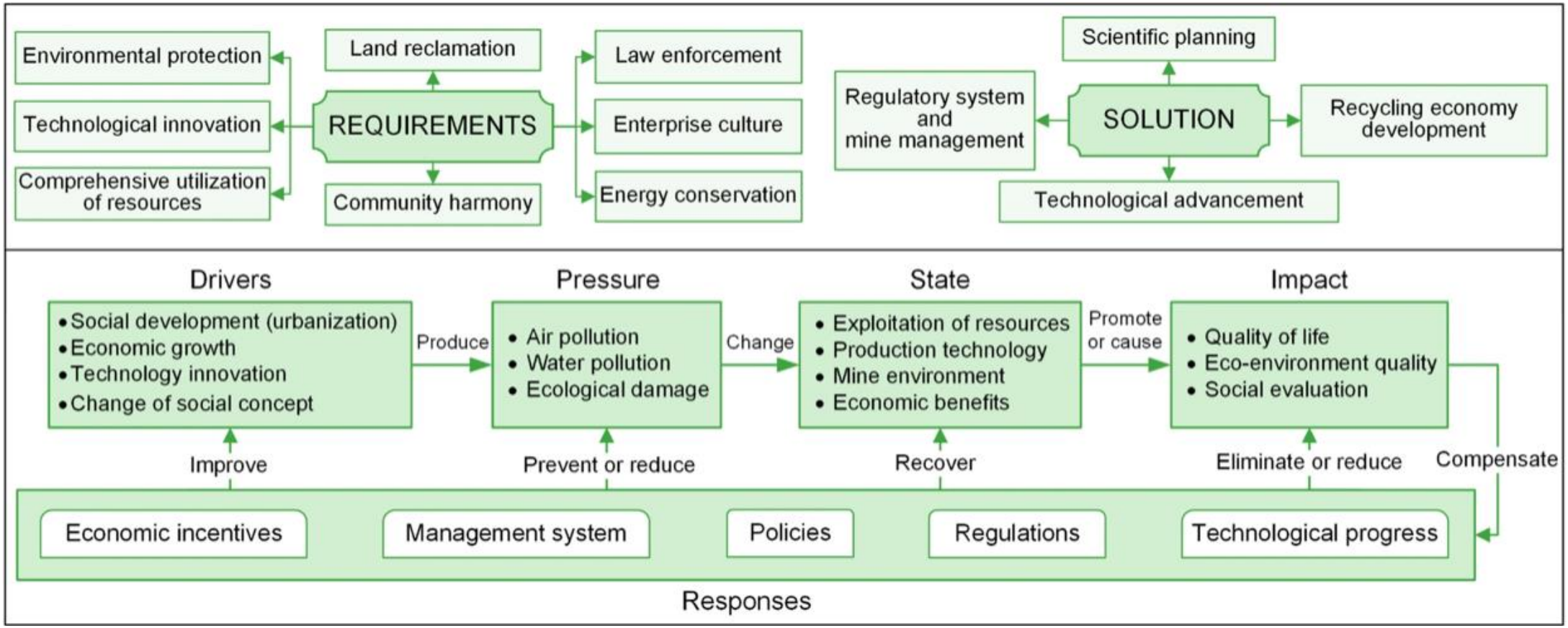
"*Green mining is an advanced mining mode that increases the efficiency of mining activities, decreases the environmental footprint, and allows valuable minerals to be extracted with minimal mining waste at all stages of operations*" – Chen, Jiskani, Jinliang & Yan (2020)

- Construction Specification of Green Mines:
  - Non-metallic minerals
  - Non-ferrous metals
  - Gold
  - Coal
  - Metallurgical Industry

Key aspects:

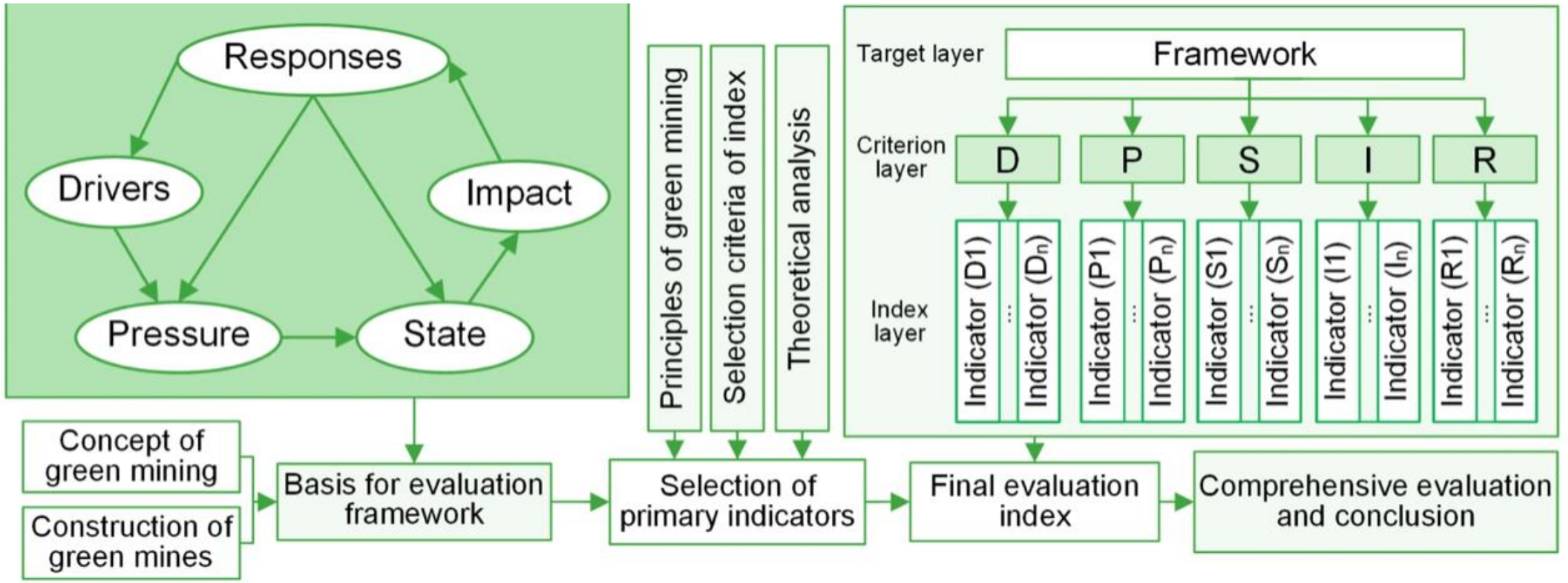
- Establish an environmental evaluation index system & technical standards
- Emphasis on technological innovation to optimize mining & smelting practices
- Focus on minimizing disturbance, and on restoration in equal measure

A Framework for Green Mine Construction



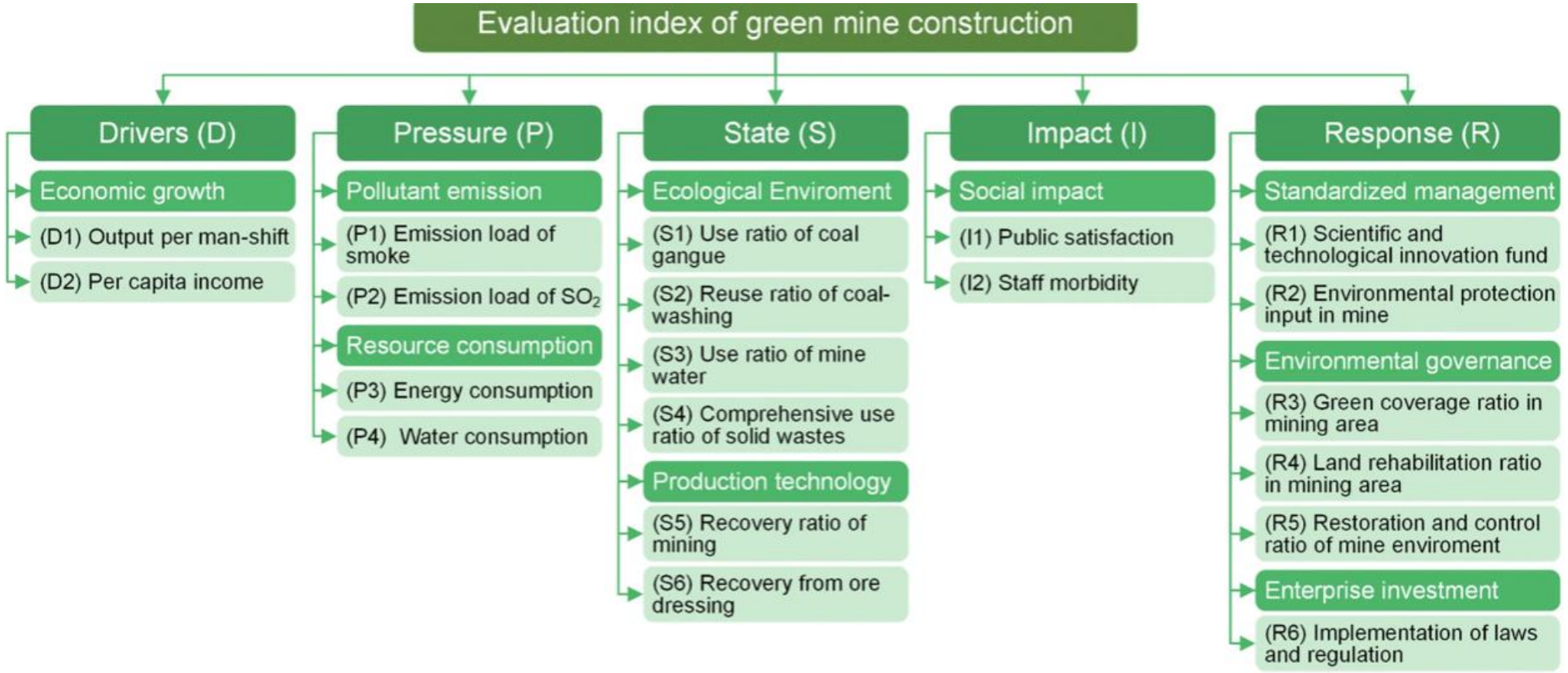
Source: Evaluation and future framework of green mine construction in China based on the DPSIR model

Green Mine Construction – Environmental Evaluation Index (*example*)



Source: *Evaluation and future framework of green mine construction in China based on the DPSIR model*

Green Mine Construction – Environmental Evaluation Index (*example*)



Source: *Evaluation and future framework of green mine construction in China based on the DPSIR model*

Green Mine Construction – Environmental Evaluation Index (*example*)

Influencing factor	Indicator	
Economic growth	D1	Output per man-shift ($t yr^{-1}$ $person^{-1}$)
	D2	Per capita income development of staff
Pollutant emission	P1	Emission load of smoke
Resourc		
Ecologi		
Produc		
Social i		
Enterprise investment	R1	Proportion of scientific and technological innovation fund in mine production value
	R2	Proportion of environmental protection input in mine production value
Environmental governance	R3	Green coverage ratio in mining area
	R4	Land rehabilitation ratio in mining area
	R5	Restoration and control ratio of mine environment
Standardized management	R6	Implementation of laws and regulations

Index		2012	2013	2014	2015
Environmental protection and land rehabilitation	Green coverage ratio	20	24	34	46
	Land rehabilitation ratio	26	31	46	48
	Restoration and control ratio of mine environment	31	42	48	79
Comprehensive utilization	Utilization ratio of solid wastes	48	61	71	91
	Reuse ratio of mine wastewater	78	82	83	91
	Recovery ratio of working face	92	93	95	97
	Rate of comprehensive utilization of mineral resources	34	46	51	58
Community harmony and enterprise culture	Injury ratio per million working hours	2.02	1.22	0.96	0.23
	Number of safety training per person per month*	1	2	3	4

Source: *Evaluation and future framework of green mine construction in China based on the DPSIR model*

Good Practice Aspects – Green Mine Construction

Challenges to address

- Traditional mining practices have been characterized by:
  - High resource consumption
  - High pollution
  - Low efficiency
  - Negative impact on quality of human life
- In 2019, 1200 mining companies were identified for Green Mining projects – around 2% of all mines in operation in China

Challenges to implementation

- Inadequate enforcement by local governments
- High costs of implementation for mining companies
- High risk of employing ‘new’ green technology innovations in mining

Good Practice Aspects – Electric Vehicle Battery – Second Use/Ladder Approach

- By 2025, the cumulative decommissioning of power batteries in China is expected to reach about 780,000 tons

- United States Advanced Battery Consortium (USABC – 1996) - battery pack should be replaced when it loses 20% of its original capacity.
- In the EU, when 30% of original capacity is lost

Second-life applications:

- electric bicycles
- small-scale energy storage units
- large-scale energy storage units for backup power supply
- portable charging devices

Chinese Approach: Move from a “production-sales-application-disassembly” to “production-sales-application-second use for energy storage -disassembly-resource recycle” model.

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Good Practice Aspects – Traceability Platform

- Clear requirement of data/information provision responsibi
- Utilizes blockchain technology

Information required includes:

1. Basic information & contact details for th company
2. Information on battery pack from manufacturer
3. Information from disassembler/recycler

Business entity	Upload information category	specific contents		Upload module
		Where to go for retired batteries	To company name	
			To the enterprise unified social credit code or D UNS code	
		Date of retirement		
Scrap car recycling and dismantling enterprises	Vehicle scrap information	V IN code		Recycling management module
		Battery pack coding		
		Battery type (NiMH / lithium iron phosphate / lithium manganate / lithium cobaltate / ternary / lithium titanate / other)		
		Scrap date		
		Battery shipment date		
		Where the battery pack goes	To company name	
			To the enterprise unified social credit code or D UNS code	
Tiered	Echelon	Ladder Battery (Pack / Module / Single)		

Business entity	Upload information category	specific contents	Upload module
		VIN code	Vehicle Management Module
		Battery Pack Code *	
		Vehicle Type	
		Vehicle name	
		Vehicle Brands	
		Vehicle model	
		icle manufacturing date	
		VIN code	
		Vehicle use	
		Sale date	
		sales regions	
		Number plate	
Personal		Name	

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Transferability of the Flagship Case

- The case only discusses the approach taken by the government – it has not evaluated the impact or issues in implementation.
- The case tends to focus on environmental aspects when considering sustainability and not wider social & community impacts.
- The multi-pronged approach initiated in the same time period, utilizing different tools to address the issue on multiple fronts.

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