中国汽车产业碳减排路径及管理方式思考
Carbon Emission Reduction Path and Management Mode of Chinese Automobile Industry

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01  Carbon emission reduction of Chinese auto industry and its path

02  Thinking on the management mode of China's auto industry
1. China faces challenges in achieving its '30·60' decarbonization goal

- Time is tight: China is now the world's largest carbon emitter. The buffer time from carbon peak to carbon neutrality is only set to be 30 years, while the interval for developed countries is 40-70 years.
- The task is heavy: National carbon neutralization involves many fields and levels, and must be promoted in a coordinated manner between the upstream and downstream, while taking into account both economic development and people's livelihood.

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Data source: BP World Energy Statistical Yearbook
2. CO₂ reduction in the auto industry is important to the realization of '30·60' decarbonization goal

- In 2018, automobile transportation sector in China accounted for only about 8% of carbon emissions. Referring to countries that have achieved carbon peaks such as Europe and the United States, their automobile transportation carbon emissions accounted for 30%.
- In the long run, the number of cars is still increasing, and the proportion of its carbon emissions is expected to increase significantly, which will play an important role in the implementation of China's '30·60' decarbonization goal.
3. “双碳”目标下要求汽车产业全链条实现低碳转型

3. The whole chain is required to realize low-carbon transformation under the '30·60' decarbonization goal

- 汽车产业作为制造业中的集大成者，具有产业链条长、涉及领域广的特点，主要包含生产、使用、回收三大环节。
- The auto industry, as a comprehensive manufacturing industry, has the characteristics of a long industrial chain and a wide range of fields, mainly including production, use and recycling.

1. 汽车产品生产环节
   Production process
   - Fossil fuels, coal, oil and gas, etc. burned in the production process
   - Production
   - Electricity for production
   - Raw materials

2. 汽车产品使用环节
   Use process
   - Electric cars (NEVs)
   - ICEVs
   - Oil refining and refueling process
   - Electricity production and supply process
   - Grid transmission

3. 汽车产品回收环节
   Recycling process
   - Recycling
   - Recycle
### 4. The use process is the key to achieve '30·60' decarbonization goal in the auto industry

- The use process is the key to achieve '30·60' decarbonization goal in the auto industry.
- There are various statistical calibers of carbon emissions at the fleet level. According to the calculation of the whole industry chain, in 2019, the use process of fleet in China accounted for 75% of the total industrial carbon emissions, which is the key to achieve '30·60' decarbonization goal in the auto industry.

#### 车队层面碳排放国际上三种主要统计口径

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<th>口径一</th>
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<td>车辆运行使用</td>
<td>燃料周期</td>
<td>全产业链</td>
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<td>Car operation and use</td>
<td>Fuel cycle</td>
<td>whole industry chain</td>
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#### 2019年车队全产业链碳排放构成分析

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<th>车辆生产环节（当年度新生产汽车）</th>
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<td>Automobile production process</td>
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<table>
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<tr>
<th>车辆使用环节（当年度行业汽车保有量）</th>
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<tr>
<td>Automobile use process</td>
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#### 数据来源：中汽数据

The use of automobiles accounted for 75% in the field of automobile transportation.
5. Use process: promote the development of low-carbon products and accelerate electrification transformation

- It is estimated that by 2050, 920 million tons of carbon emission will be reduced by different measures, of which 66% will be contributed by the promotion of NEVs and the upgrading of energy-saving technologies.

- To reduce the carbon emission of automobile use process, the key is to improve the energy saving level of traditional vehicles and accelerate the electrification transformation.

Decomposition and calculation of emission reduction potential of automobile use

- Electric carbonization
- Electricity consumption decreasing
- NEV promotion
- Fuel consumption decreasing

Data source: China Automotive Data
6. 汽车产业落实“双碳”目标路径与阶段性管理重点识别

6. Path and phased management focus of the auto industry to the realization of '30·60' decarbonization goal

- 坚持系统推进汽车产业碳减排观念，处理好发展和减排、整体和局部、短期和长期的关系。
- Adhere to the systematic promotion of carbon emission reduction in the auto industry, and handle the relationship between development and emission reduction, overall and partial, short-term and long-term.
- 前中期需做好电动化替代、降低能耗水平，长期需关注低碳能源发展、绿色低碳交通转型。
- In the early and mid-term, electrification and fuel consumption reduction is necessary. In the long term, attention needs to be paid to the development of low-carbon energy and green and low-carbon transportation.

主要贡献 时间
Time to take effect

-CO2减排潜力
Carbon reduction potential
-低碳汽车工业
Low-carbon automobile industry
-低碳能源
Low-carbon energy
-低碳汽车产品
Low-carbon automobile products
-低碳交通
Low-carbon transportation

前中期：电动化转型加快，2035年纯电车型成为主流；低碳汽车产品保有量有较大减排潜力。

低碳交通
Low-carbon transportation
-智慧交通
-共享出行
-公共交通

中后期：
-跟随经济发展阶段，先增后降
-报废回收
01 Carbon emission reduction of Chinese auto industry and its path

02 Thinking on the management mode of China's auto industry
1. 汽车产业碳减排政策工具的比较与分析

### 1. Comparison and analysis of policy instruments for carbon emission reduction in auto industry

- 综合对比汽车产业三种碳管理机制，评估认为均具有一定的适用场景，现阶段评估通过行政性管理政策实现强制性约束，对于促进汽车产业低碳发展效果更为直接和显著。
- Compared with the three carbon policy instruments of the auto industry, it can be seen that all of them have certain applicable scenarios. At the present stage, implementing mandatory restrictions through administration has more direct and significant effects on promoting the low-carbon development of the auto industry.

<table>
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<th>(1) 碳交易市场</th>
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<td><strong>碳排放总量</strong></td>
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<td>Control object</td>
<td>Total carbon emission</td>
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<td><strong>适用范围</strong></td>
<td><strong>适用于汽车生产环节</strong></td>
<td><strong>适用于汽车使用环节</strong></td>
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<tr>
<td>Scope of application</td>
<td>Production process</td>
<td>Use process</td>
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<tr>
<td><strong>减排效果</strong></td>
<td><strong>优，减排目标由政府通过发放配额制定</strong></td>
<td><strong>中，非约束性政策，减排主动权在于管控主体</strong></td>
</tr>
<tr>
<td>Carbon reduction effect</td>
<td>Good. Emission reduction targets are set by the government by issuing quotas.</td>
<td>Medium. It is a non-binding policy, and the initiative of emission reduction lies with the controlling body.</td>
</tr>
</tbody>
</table>

### 我国汽车产业实践现状

- **前期实施地方试点，2021年起建立全国碳市场（发电行业先行）**
  - Local pilot projects will be implemented in the early stage, and a national carbon market will be established from 2021, and power generation industry will take the lead.

- **目前我国尚无碳税政策立法计划，预计出台周期5-10年**
  - At present, there is no legislative plan for carbon tax policy in China, which is expected to take 5-10 years.

- **2005年起实施，显著提升节能水平，促进新能源车发展**
  - Since 2005, it has significantly improved the level of energy saving and promoted the development of new energy vehicles.
2. 汽车产业政策趋势：碳强度管理是前期政策重点

2. Auto industry policy trends: carbon intensity management is the focus of the early policy

- 汽车产业使用环节为碳减排管控重点，前期以基于汽车产品碳强度管控为主要政策导向，通过产品节能水平提升和电动化促进产业低碳发展。
- Focus on carbon emission reduction control in the use process of the auto industry. In the early stage, focusing on the control of product carbon intensity in the auto industry, the low-carbon development of the industry should be promoted through the improvement of energy-saving level and the electrification transformation.

“实施以碳强度控制为主、碳排放总量控制为辅的制度，支持有条件的地方和重点行业、重点企业率先达到碳排放峰值。” ——《“十四五”规划和2035年远景目标纲要》

“Implement a system that focuses on carbon intensity control, supplemented by total carbon emission control, and support places with the conditions to take the lead in reaching peak carbon emissions.” —— 14th Five-Year Plan and Long-Rang Objectives for 2035

汽车产业发展现状：
1. 我国汽车保有量处于增长阶段；
2. 随着社会经济发展，汽车出行需求还将持续增长；
3. 通过碳强度的控制能够更好地平衡经济社会发展和减排之间的关系。

汽车行业发展现状：
1. The stock of cars in China is in the growth stage.
2. With the social and economic development, the demand for cars will continue to grow.
3. Carbon intensity control can better balance the relationship between economic and social development and emission reduction.

财税和补贴政策

碳管理方式

限值标准和行政管理
Limit standards and administration

产品准入，双积分聚焦产品碳强度管理
Product access; The dual-credit policy focus on production carbon intensity management.

碳排放权交易市场
Carbon emission trading market

重点产业实施碳排放权交易，开展碳排放总量管理
Implement carbon emission trading in key industries and carry out total carbon emission management.

财税和补贴政策
Taxation and subsidy

通过碳税、补贴政策引导实现碳减排
Guide to achieve carbon emission reduction through carbon tax and subsidy.

汽车行业前期以产品碳强度管控为主，通过产品节能水平提升和电动化替代推动产业低碳发展

In the early stage, focusing on the control of product carbon intensity in the auto industry, the low-carbon development of the industry should be promoted through the improvement of energy-saving level and the electrification transformation.
### 3. 碳强度管理中产品能耗管理与产品生命周期碳管理的关系

3. Relationship between energy consumption and life cycle analysis in product carbon intensity management

- 以汽车产品能耗管理为主要政策导向，单车生命周期碳排放作为政策导向和技术路线评估工具。
- Energy consumption management of automotive products is the main policy orientation, and carbon emission per vehicle is the technology route evaluation tool.

**汽车产品能耗管理**：单车能耗限值；
**Automotive product energy consumption management**: Energy consumption limit per vehicle;

**车队平均油耗/碳排放管理**
Fleet average fuel consumption/carbon emission management

**单车生命周期碳排放管理（LCA）**：参照欧盟机制，管控范围包括原材料获取、制造、使用、报废环节
**Life cycle analysis of vehicle carbon management (LCA)**: According to the EU mechanism, the scope of control includes raw material acquisition, manufacturing, use and recycle, etc.

- 单车LCA的评价能够全面评估产品的环保水平，是政策导向评估的重要工具。
- LCA of vehicle carbon management can comprehensively evaluate the environmental protection level of the product.
- LCA of carbon management requires assessing the relationship between the potential/benefits and the costs of emission reduction.

- 汽车使用环节碳排放占比高、潜力大，是管控重点，汽车产品能耗管理是整车生命周期碳管理的基础和前提。
- The carbon emissions from automobile use account for a high proportion, which is the focus of management. Energy consumption management of automobile products is the basis and premise of life cycle analysis of vehicle carbon management.

- 单车LCA的评估能够全面评估产品的环保水平，是政策导向评估的重要工具。
- Life cycle carbon management requires assessing the relationship between the potential/benefits and the costs of emission reduction.

- 从国际已有经验来看，对零部件碳足迹管理快于对整车全生命周期管理的评估。
- Referring to the international experience, the carbon footprint management of parts is faster than the evaluation of the whole vehicle life cycle management.

Automotive product energy consumption management is the basis of LCA of vehicle carbon management, the relationship between them is not substitution. Referring to the international experience, the carbon footprint management of parts is faster than the evaluation of the whole vehicle life cycle management.
4. Connection between the dual-credit policy and carbon market has been evaluated in the early stage

- Lack of precedent for automobile products to be included in the carbon market: Europe, the United States and other countries did not include the carbon emissions of automobile products.

- Standards and regulations for strength management is the international mainstream: Europe, America and Japan have adopted the way of carbon strength management.

-制度保障缺失：碳条例尚未出台，相关规章制度和法律监管体系有待完善。
- 碳市场建设不成熟：全国碳市场刚启动，仍处于初级阶段。

-国际上尚未有汽车产品纳入碳市场的先例：欧洲、美国、澳大利亚等国家碳市场起步早，发展较为成熟，但都没有纳入汽车产品端的碳排放。
- 出台标准法规进行强度管理是国际主流做法：国际上欧美日等国家都采用强度管理的方式，促进汽车产品的节能减排。

- Lack of institutional guarantee: Carbon regulations have not been issued, and relevant regulations and legal supervision system need to be improved.
- Immature carbon market construction: The national carbon market has just been launched and is still in its early stages.
4. 前期已开展双积分与碳市场衔接的研究评估
4. Connection between the dual-credit policy and carbon market has been evaluated in the early stage

双积分政策与碳交易市场衔接主要障碍
Obstacles in the connection between double points policy and carbon trading market

1. 交易标的不同：双积分-碳强度（g/100km），
   碳市场-碳排放量(吨)；
2. 交易价格差异：2019年积分交易均价1204元/分，
   碳价约20元/吨；
3. 交易规模差异：2019年NEV积分交易量为400万分左右，
   碳市场交易量3.95亿吨。

1. Differences in trading objects: double points - carbon intensity (g/100km), carbon market - carbon emissions (ton);

2. Differences in transaction price: in 2019, the average transaction price of credits is 1204 yuan/point, and the carbon price is about 20 yuan/ton;

3. Differences in transaction scale: In 2019, NEV credit trading volume was about 4 million, and carbon market trading volume was 395 million tons.

其他可能的衔接方案研究
Other possible linking schemes

进一步细化研究，探索基于新能源汽车使用环节碳减排奖励的一种碳交易机制。

- Further refine the research, and explore a carbon trading mechanism based on carbon emission reduction incentives for the use of new energy vehicles.