机动车排污监控中心
Vehicle Emission Control Center

2021

中国下阶段汽车排放标准思考
China’s Next phase of Automobile Emission Standards

机动车排污监控中心 | Vehicle Emission Control Centre

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第N 1 部分 | Section

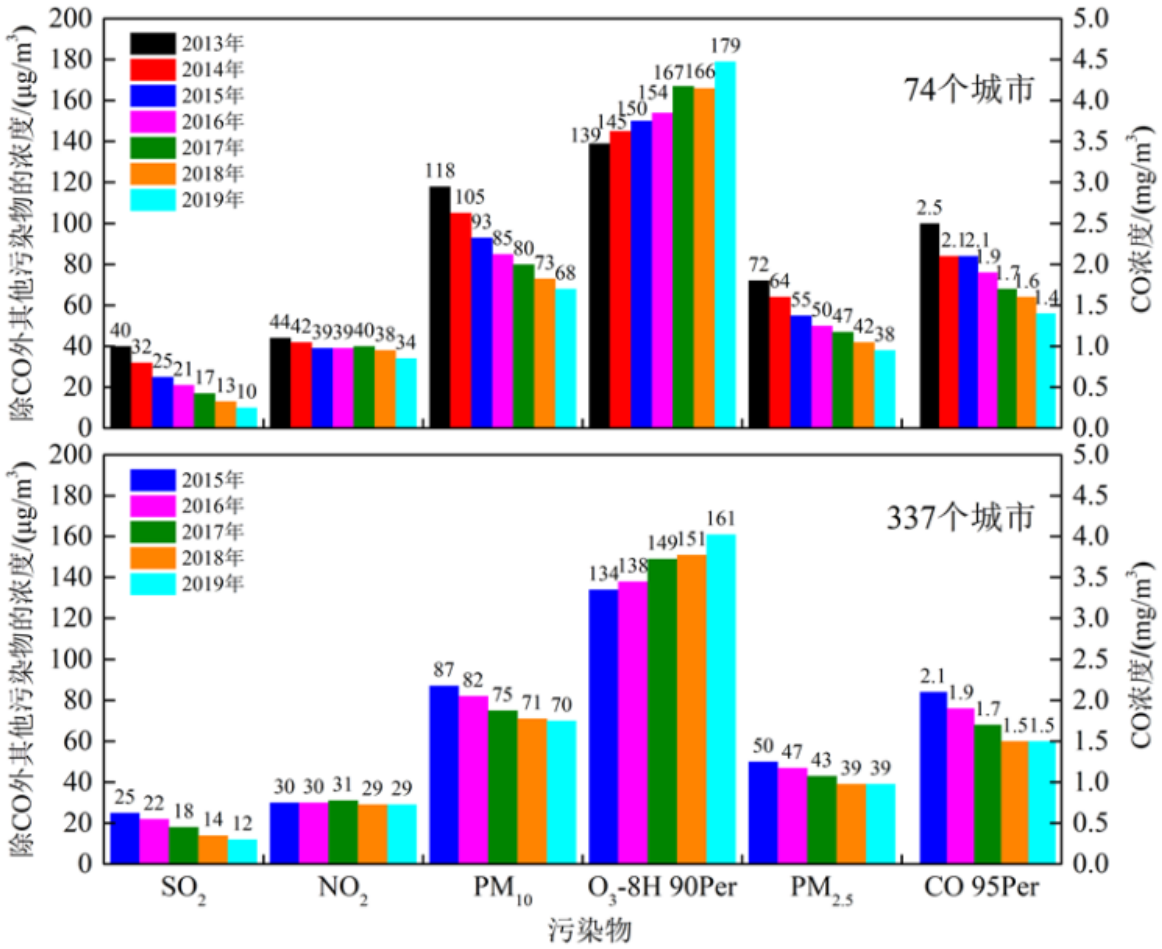
面临形势及背景

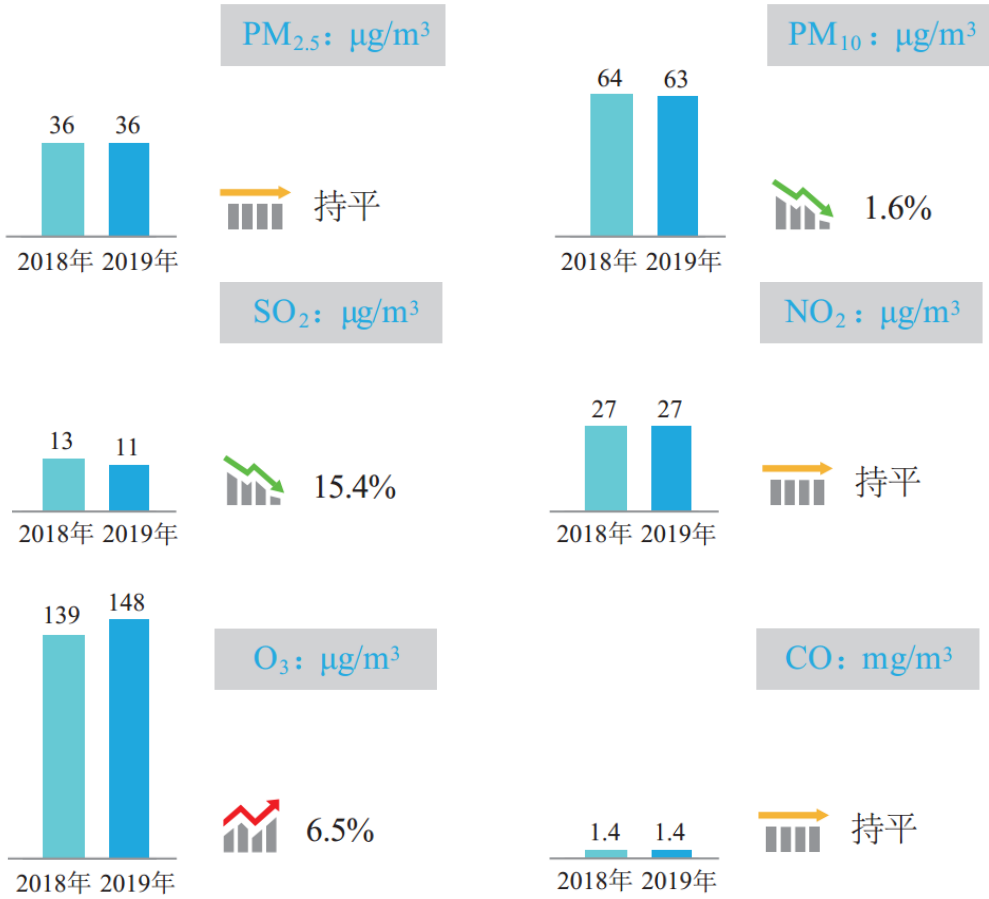
Looking at the current state and background

空气质量 现状
Status of Air Quality

- **“大气十条”作用下减排措施效果明显，空气质量明显改善，但形势依然严峻**

The effects of emission reduction measures under the “Ten Articles on Air Quality” are visible, and air quality has improved significantly, but the situation does not look ideal

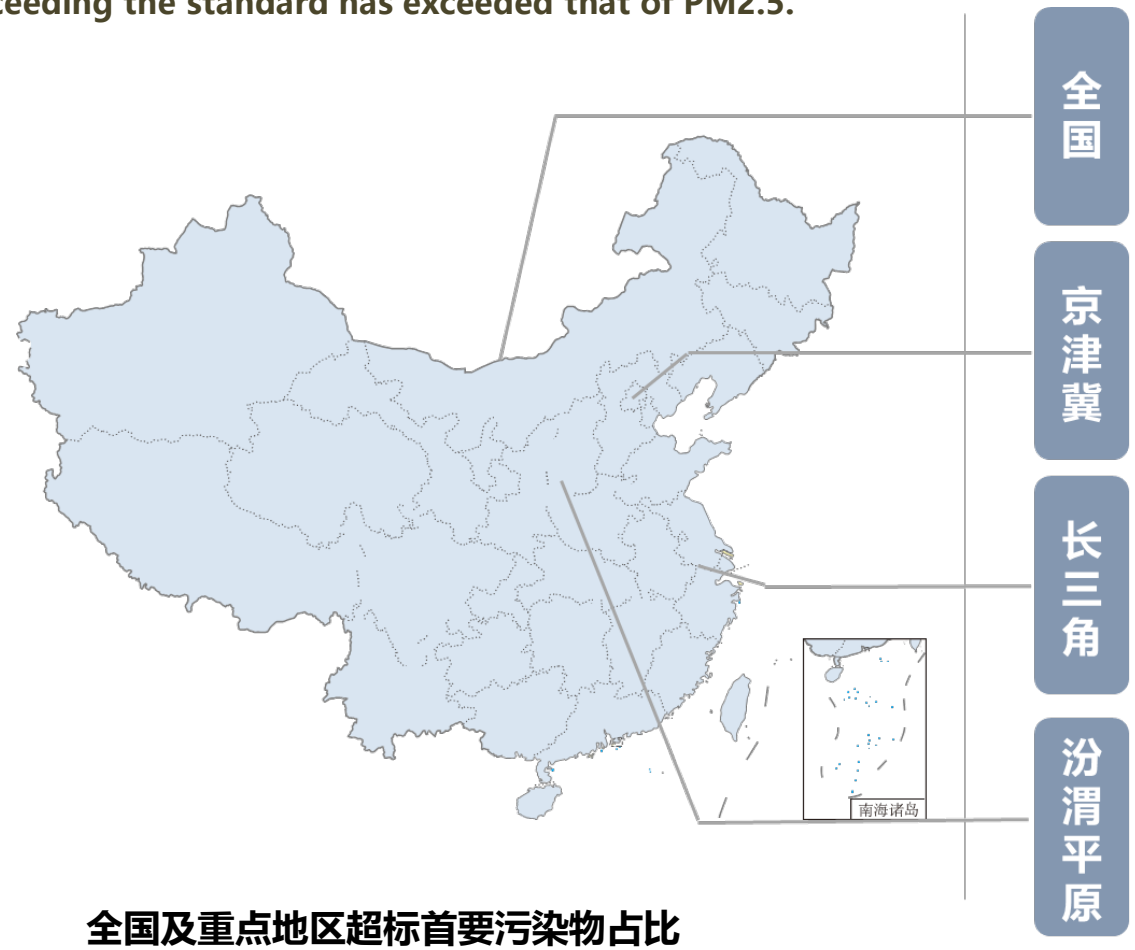


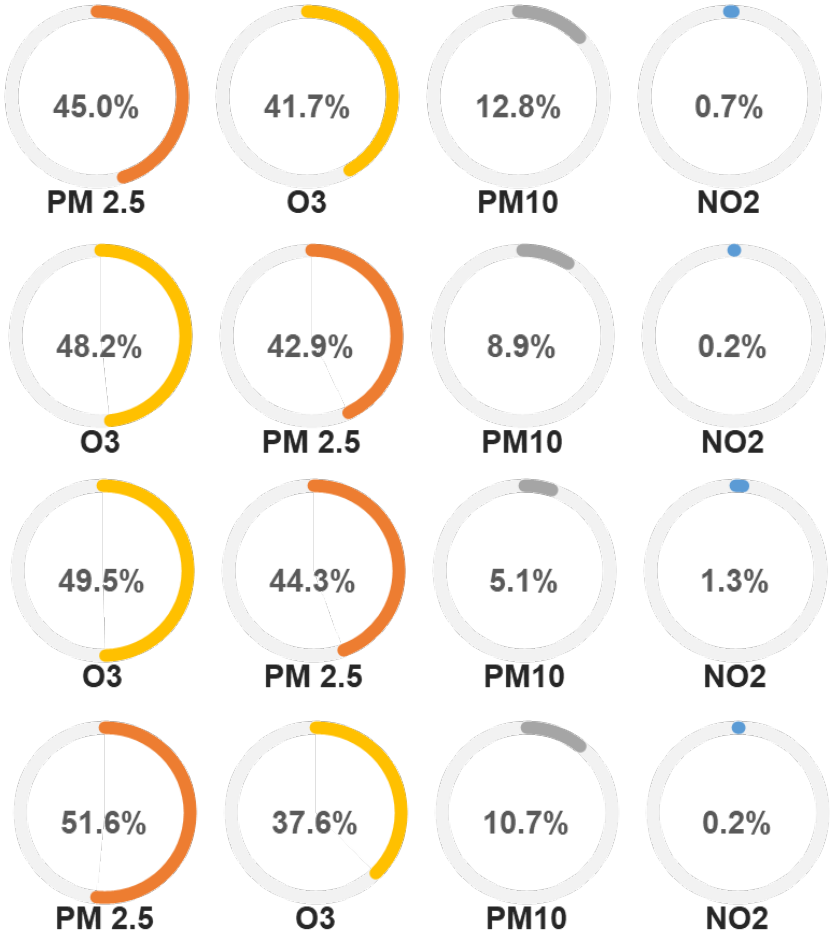


2019 年 337 个城市六项污染物浓度年际比较

空气质量 现状
Status of Air Quality

- **全国范围首要超标污染物仍为PM2.5为主，臭氧超标其次，在部分重点区域臭氧超标已超过PM2.5超标**
  PM2.5 remains the primary pollutant exceeding the standard nationwide, followed by ozone. In some key areas, the rate of ozone exceeding the standard has exceeded that of PM2.5.



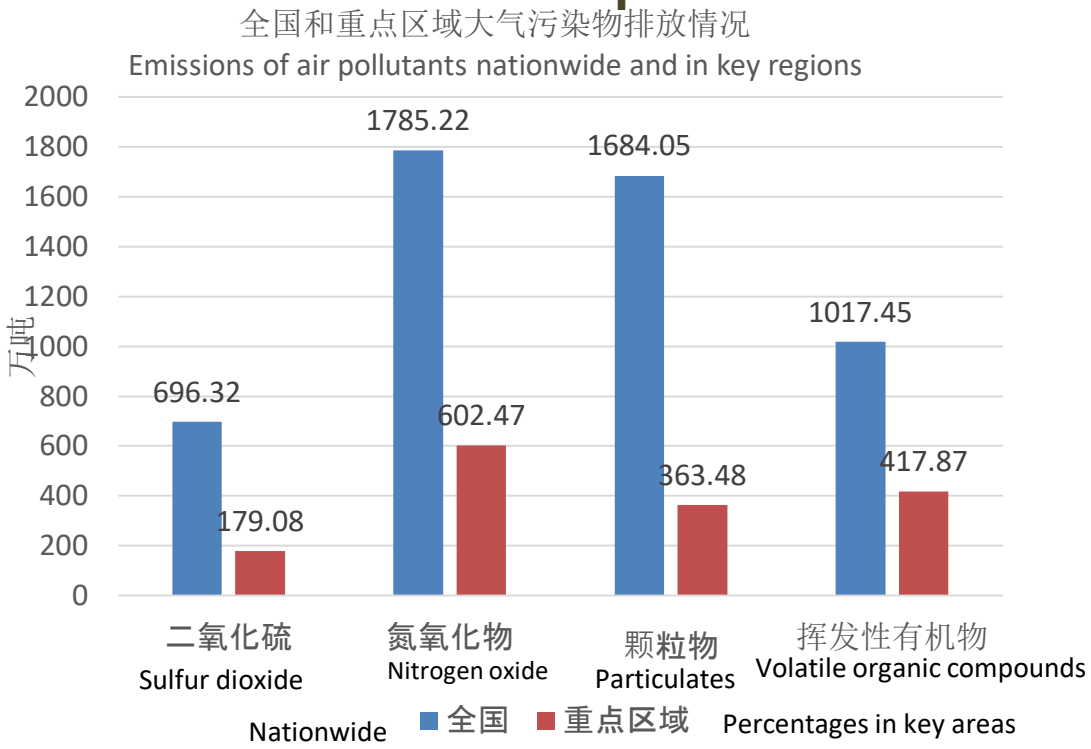


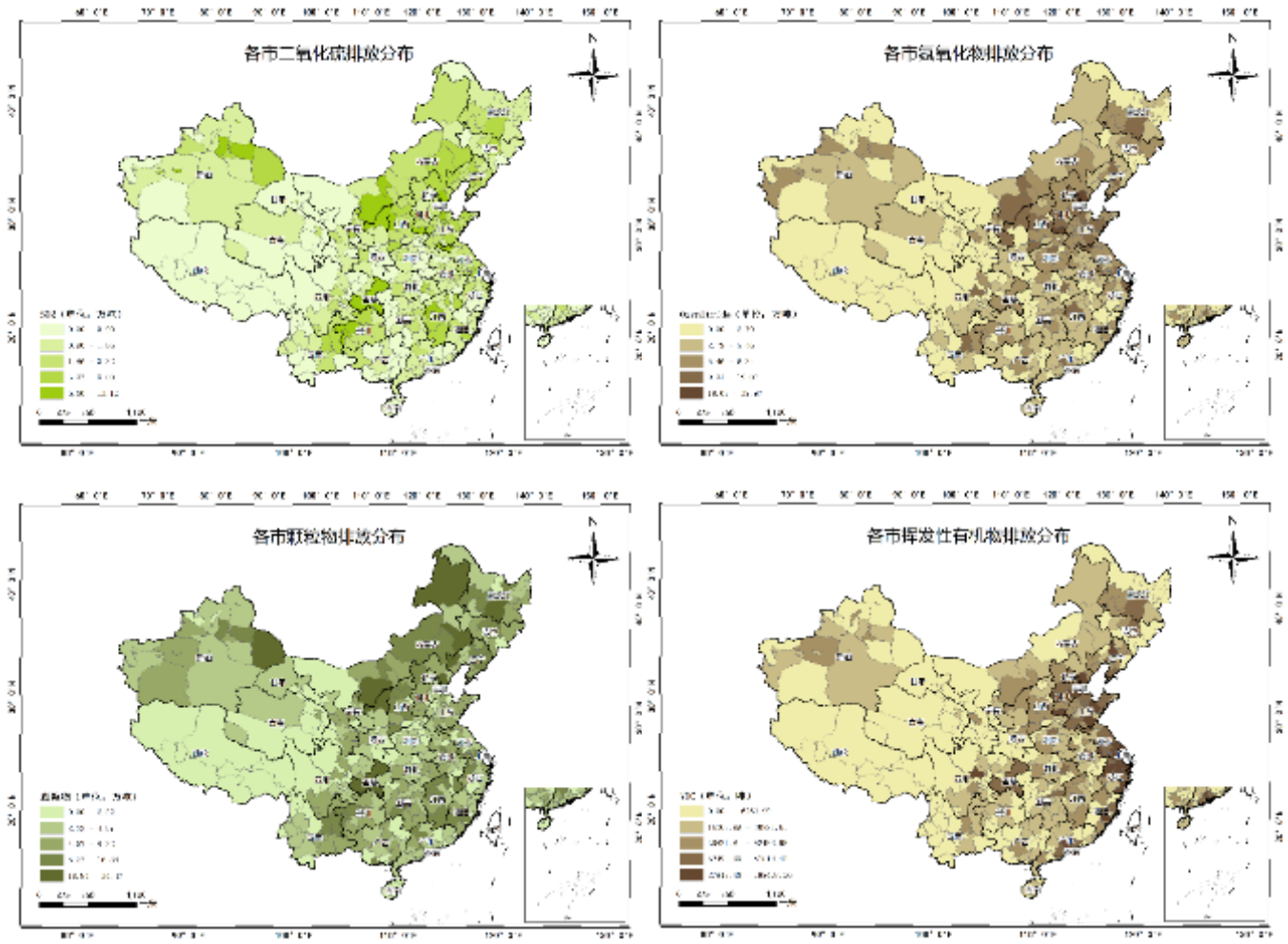
全国及重点地区超标首要污染物占比
Percentage of primary pollutants exceeding standard nationwide and in key regions

大气污染物排放情况
Air Pollutant Emissions

➢ 中国大气污染物排放现状（二次污染源普查公报）

Current status of air pollutant emissions in China



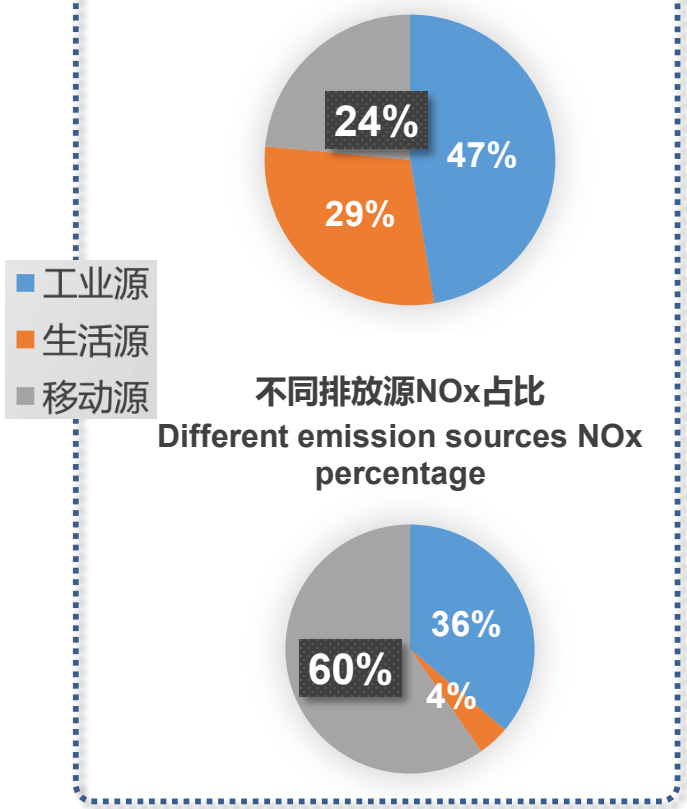


污染物 Pollutants	SO2	NOx	颗粒物 Particulates	VOCs
重点区域占比 Percentages in key areas	25.7%	33.7%	21.6%	41.1%

移动源污染排放情况
Pollution From Mobile Sources

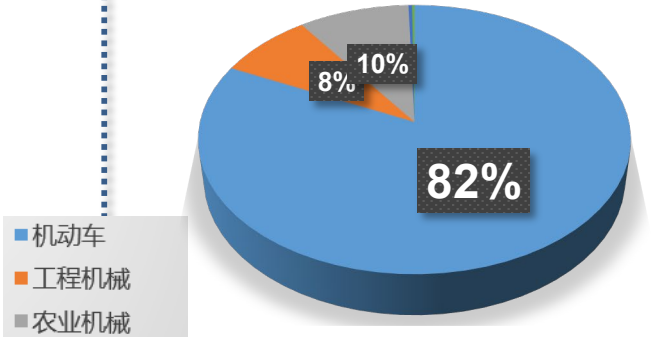
- **VOCs和NOx协同减排是治理颗粒物和臭氧的关键，未来移动源排放管控仍以VOCs和NOx为重点**
  The key to controlling particulate matter and ozone is the coordinated reduction of VOC and NOx emissions; future mobile source emission control will continue to focus on VOCs and NOx.

不同排放源VOCs占比
Different emission sourcesVOCs percentage

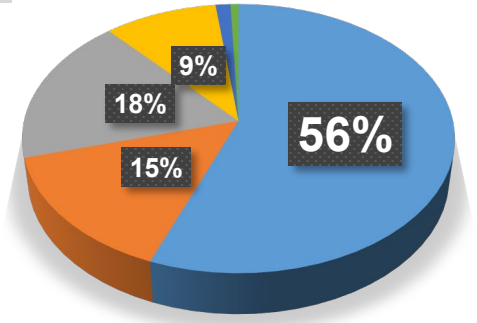


不同排放源NOx占比
Different emission sources NOx percentage

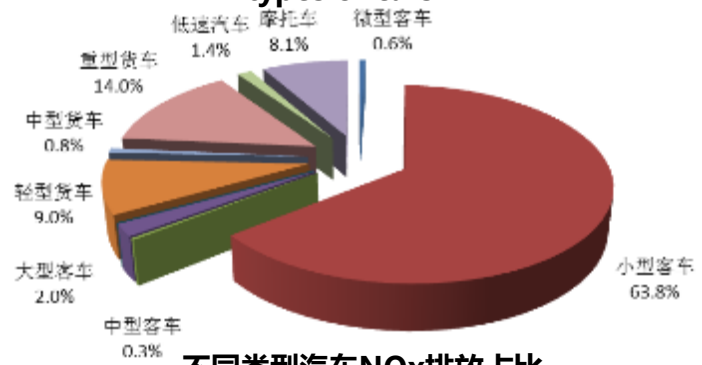
移动源VOCs占比
Movement source VOCs percentage



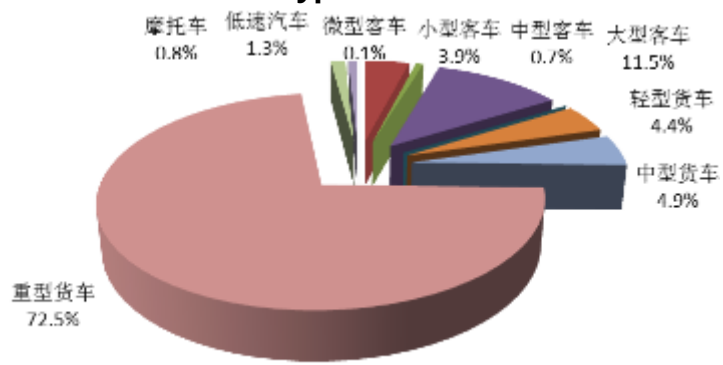
移动源NOx占比
Movement Source Nox percentage



不同类型汽车VOCs排放占比
Percentage of VOC emissions for different types of cars



不同类型汽车NOx排放占比
Percentage of Nox emissions for different types of cars

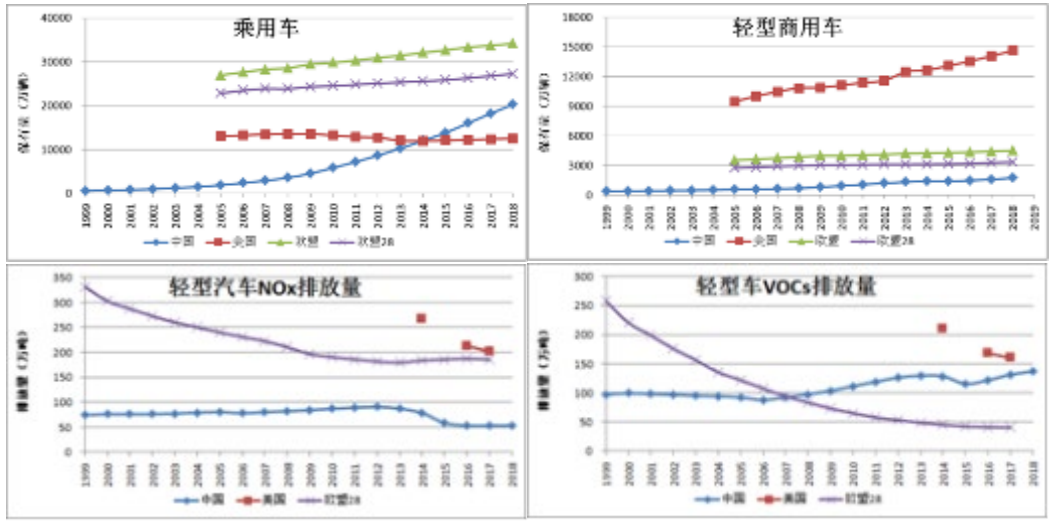


国外汽车排放对比情况
Comparison with foreign vehicle emissions

轻型车 Light vehicles

	1985	1990	1995	2000	2005	2010	2015	2020	2025
中国				国1	国2	国3	国4	国5	国6
美国	Tier0		Tier1	NLEV	Tier2			Tier3	
欧洲		欧1	欧2	欧3	欧4	欧5	欧6		
日本			标准	新短期标准	新长期标准	后新长期标准			

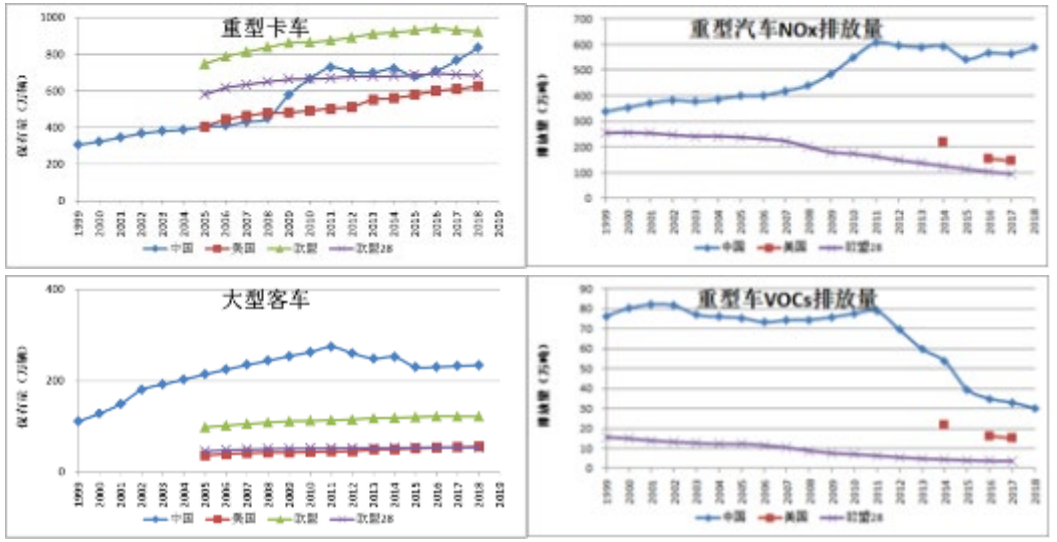
- 轻型车保有量略低于欧美水平（分别为美国和欧盟的80%和70%）；
  The number of light vehicles is slightly lower than EU and US levels (80% and 70%, respectively);
- NOx排放量为美国和欧盟各自排放的1/4;
  NOx emissions are 1/4 of the respective emissions of the United States and the European Union;
- HC排放量为美国的0.8倍及欧盟的3倍;
  HC emissions are 0.8 times that of the United States and 3 times that of the European Union;
- 轻型车排放控制已达到国际先进水平。
  Emission control of light vehicles has reached the international advanced level.



重型车 Heavy vehicles

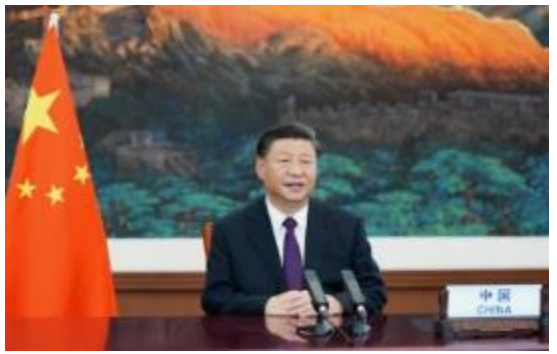
	1985	1990	1995	2000	2005	2010	2015	2020	2025
中国				国1	国2	国3	国4	国5	国6
美国			US1994	US1998	US2004	US2007	US2010		
欧洲		欧1	欧2	欧3	欧4	欧5	欧6		
日本			标准	新短期	新长期标准	后新长期标准			

- 重型车保有量高于欧美（分别为美国和欧盟的1.6和1.4倍）；
  The number of heavy vehicles is higher than in the EU and US (1.6x and 1.4x, respectively);
- 重型车NOx排放量分别为美国和欧盟的4倍和6倍;
  NOx emissions of heavy vehicles are 4 times and 6 times that of the United States and the European Union, respectively;
- HC排放量为美国和欧盟的2倍和9倍;
  HC emissions are 2 times that of the United States and 9 times that of the European Union;
- 重型车排放控制相对较为落后。
  Heavy-duty vehicle emission control is relatively backward.



大气污染物排放与温室气体协同减排需要
Necessity of Coordinated Emission Reduction of Air Pollutants & Greenhouse Gases

- 2014年我国交通运输温室气体排放量约为8.2亿吨二氧化碳当量，其中二氧化碳占99.0%，
  In 2014, China’s transportation greenhouse gas emissions were approximately 820 million tons of carbon dioxide equivalent, of which carbon dioxide accounted for 99.0%.
- 交通运输温室气体排放占全国温室气体排放总量的6.7%，交通运输领域中道路运输占比高达84.1%。
  Greenhouse gas emissions from transportation accounted for 6.7% of the country’s total greenhouse gas emissions with road transport accounting for 84.1% of the total.



- 在第七十五届联合国大会习总书记发言：
  At the 75th UN General Assembly, General Secretary Xi said:

二氧化碳排放力争于2030年前达到峰值；努力争取2060年前实现碳中和

We aim to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060

- 2020年中央经济工作会议：
  2020 Central Economic Work Conference:

“做好碳达峰、碳中和工作”列入2021年重点工作

“Doing a good job in carbon peaking and carbon neutrality” was included in key work for 2021

加快下阶段排放标准制定和实施，满足大气污染物排放与温室气体排放协同治理需要，推动清洁车队快速转型

Accelerate the formulation and implementation of emission standards in the next phase, meet the needs of coordinated governance of air pollutant emissions and greenhouse gas emissions, and promote the rapid transformation of clean fleets

第 N 2 部分 | Section

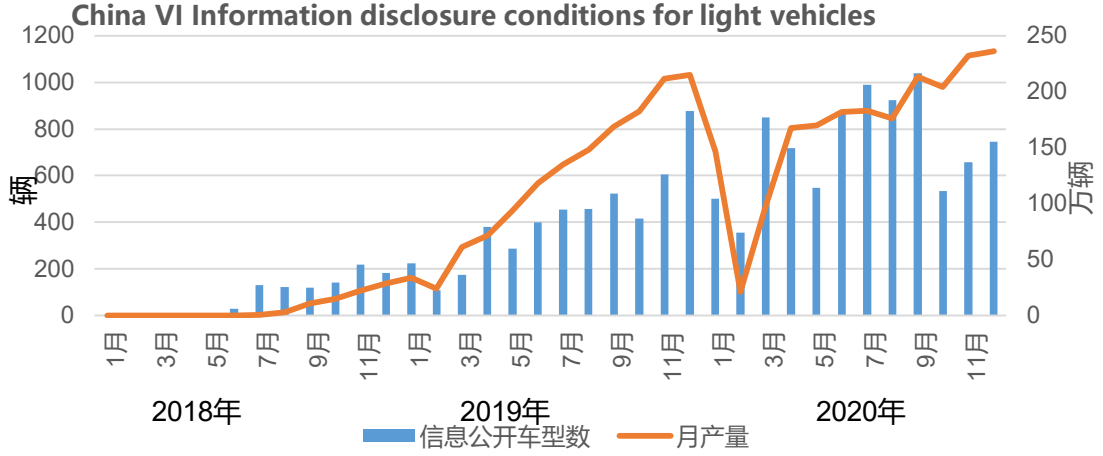
标准实施情况及目前监管存在问题

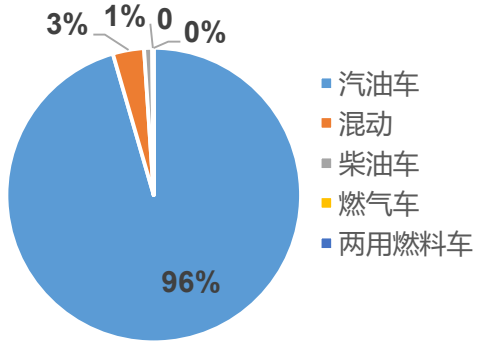
Implementation status of standards and current regulatory issues

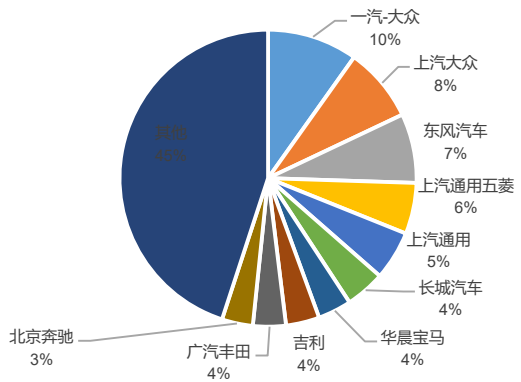
国六信息公开情况
China VI Information Disclosure Conditions

- **2019年7月1日起重点地区开始实施国六标准**
  China VI Standards will be implemented in key areas from 1 July 2019
- **截至2020年底，轻型车共计3573万辆、重型柴油车23万辆、重型燃气车17万辆完成了国六环保信息公开**
  By the end of 2020, a total of 35.73 million light-duty vehicles, 230,000 heavy-duty diesel vehicles, and 170,000 heavy-duty gas vehicles will have completed the China VI environmental protection information disclosure

轻型车国六信息公开情况

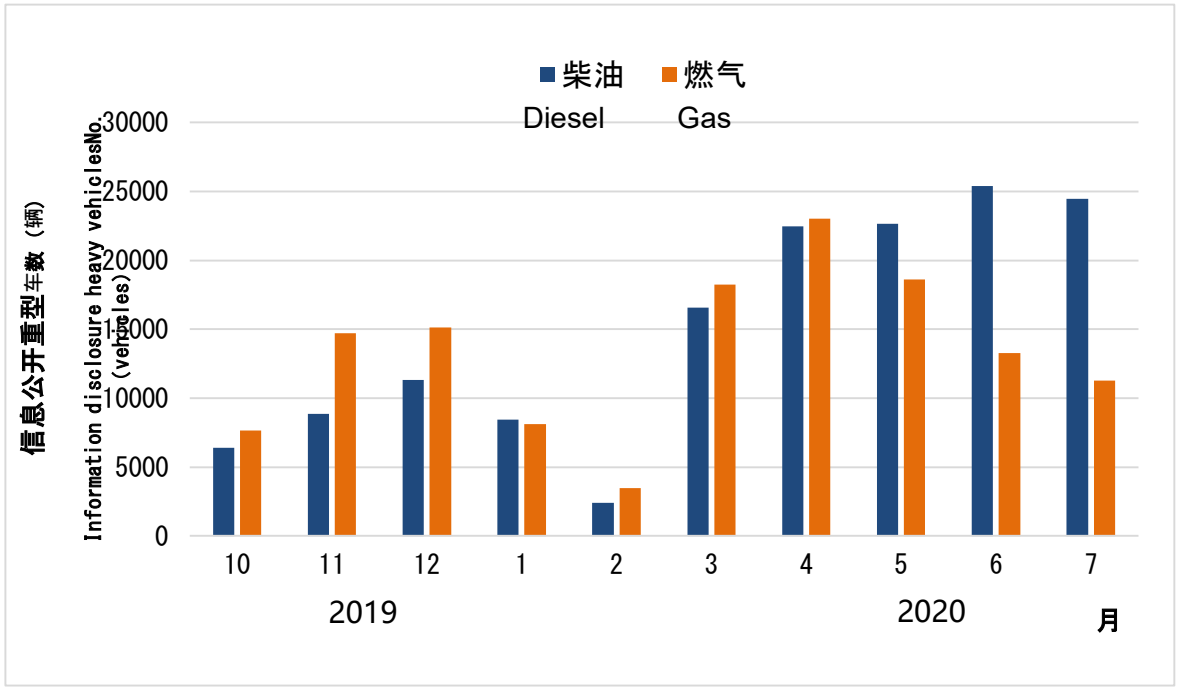






重型车国六信息公开情况

China VI information disclosure conditions for heavy vehicles



轻型车国六技术升级情况
Conditions of Light Vehicle China VI Technology Upgrade

- **轻型车国六应对升级主要内容**

Main contents of China VI light vehicle upgrade

1. 后处理系统升级 Post-processing system upgrade

- 提升三元催化器贵金属含量
  Increase precious metal content of 3-way catalytic converter
- 搭载GPF、二次空气喷射 Equipped with GPF, secondary air injection

2. 进一步改善原机排放和机内净化 Further improve original engile emission

- 发动机全工况标定
  Full working condition calibration of engine
- 提升燃油喷射和雾化能力
  Improved fuel injection and atomization capacity
- EGR

3. 强化蒸发排放控制能力 Strengthening of evaporative emission control capabilities

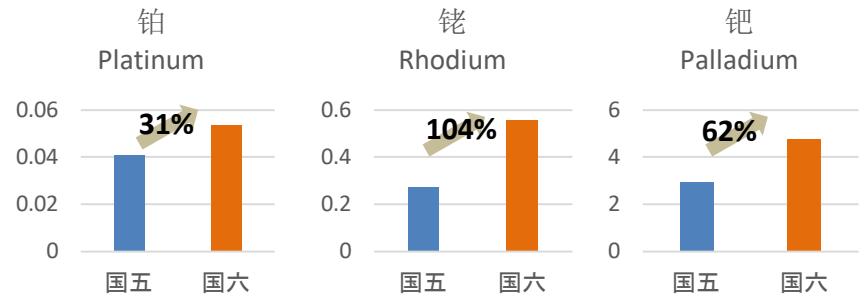
- 提升碳罐有效容积和工作能力
  improving effective volume and working capacity of the carbon canister
- 燃油系统改造，搭载ORVR系统 Fuel system modification, equipped with ORVR system

4. OBD技术升级 OBD technology upgrade

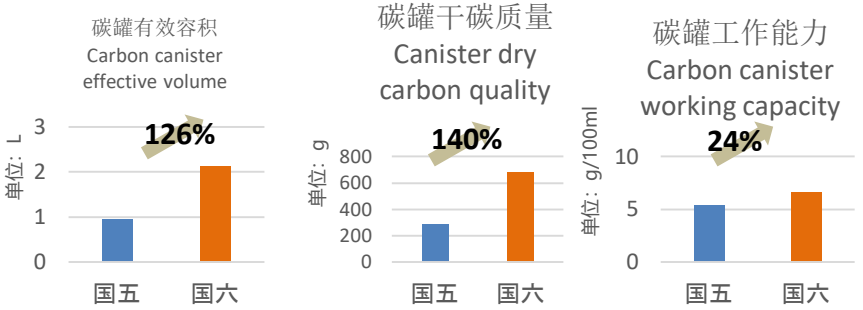
- 升级OBDⅡ监测内容
  Upgrade OBD II monitoring contents

轻型汽油车 Light gasoline car

催化剂贵金属含量 (单位：g) Catalyst precious metal content (Unit: g)



蒸发 Evaporation



GPF

重型车国六技术升级情况
Conditions of Heavy Vehicle China VI Technology Upgrade

- **重型车**

  Heavy vehicles

1. 后处理系统升级
Post-processing system upgrade

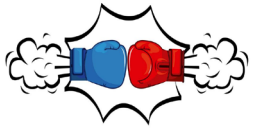
- EGR+DPF+SCR技术组合
  EGR+DPF+SCR technology combination
- 燃气车采用三元催化器
  Gas vehicles use three-way catalytic converters

2. 进一步改善原机排放和机内净化
Further improve original engine emissions and internal purification

- 发动机全工况标定
  Full working condition calibration of engine
- 提升燃油喷射和雾化能力
  Improve fuel injection and atomization capacity

4. OBD技术升级
OBD technology upgrade

- 欧六OBD+远程在线监控
  Euro VI OBD + remote online monitoring

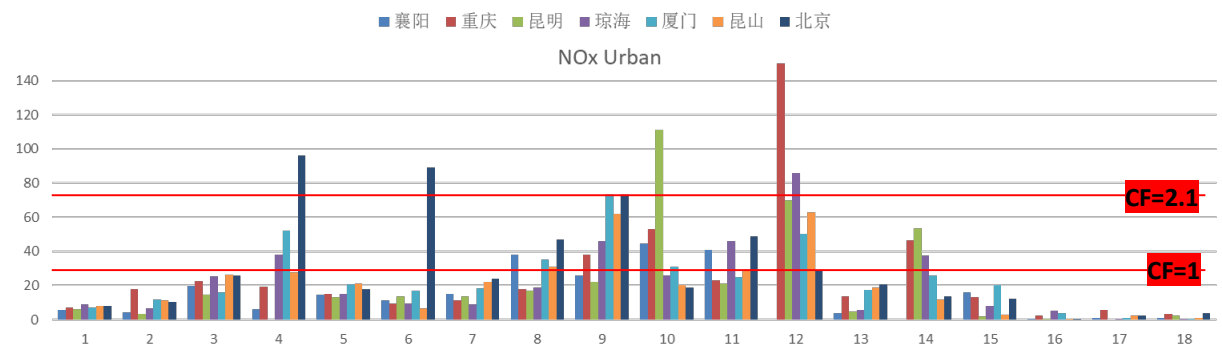


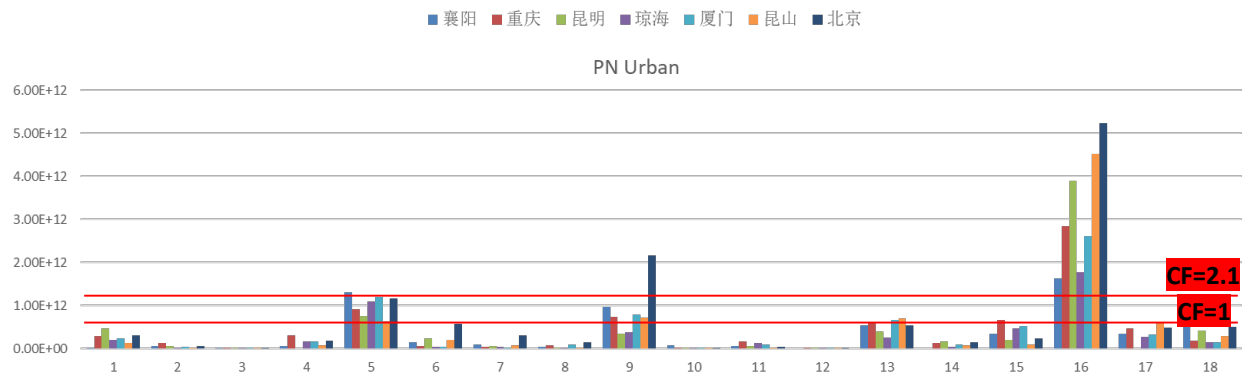
国五 China V	PK VS.	国六 China VI
柴油车 Diesel vehicle		*柴油车 Diesel vehicle*
92%: SCR **0.02%:** DPF+SCR		**100%**: DPF+SCR
燃气车 Gas vehicle		*燃气车 Gas vehicle*
基本: 稀燃+DOC **Base:** Lean burn + DOC		**全部**: 当量燃烧+三元催化器 Total: Equivalent combustion + 3-way catalytic converter

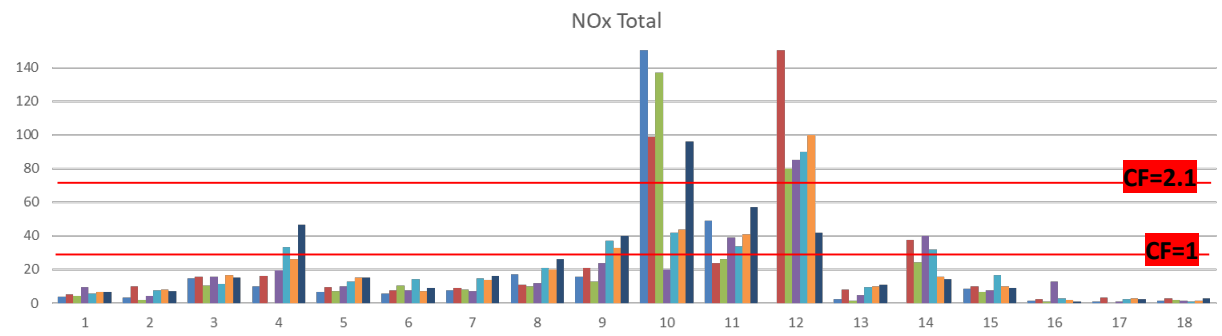
轻型车排放评估情况
Light vehicle emission assessment conditions

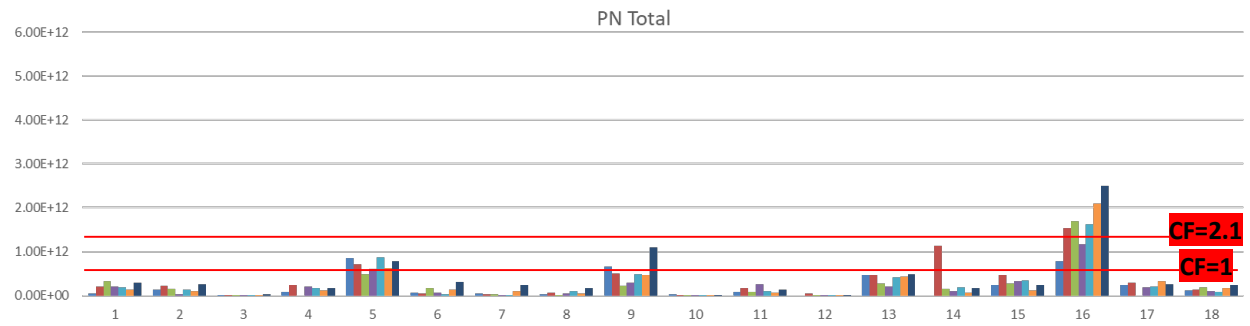
■ 轻型车RDE评估情况
Light vehicle RDE assessment conditions

- 市区NOx平均排放：23mg/km，总行程NOx平均排放：21mg/km　　(CF=1以下：80%，CF= 2.1以下：97%)
  Urban average NOx emission: 23mg/km, total travel NOx average emission: 21mg/km　　(CF=1 or less: 80%, CF= 2.1 or less: 97%)
- 市区PN平均排放：6.16E+11#/km，总行程PN平均排放：4.17E+11#/km　(CF=1以下：78%，　CF=2.1以下：91%)
  Urban PN average emission:6.16E+11#/km, total travel PN average emission:4.17E+11#/km　(CF=1 or less:78%, CF=2.1 or less:91%)









轻型车排放评估情况
Light vehicle emission assessment conditions

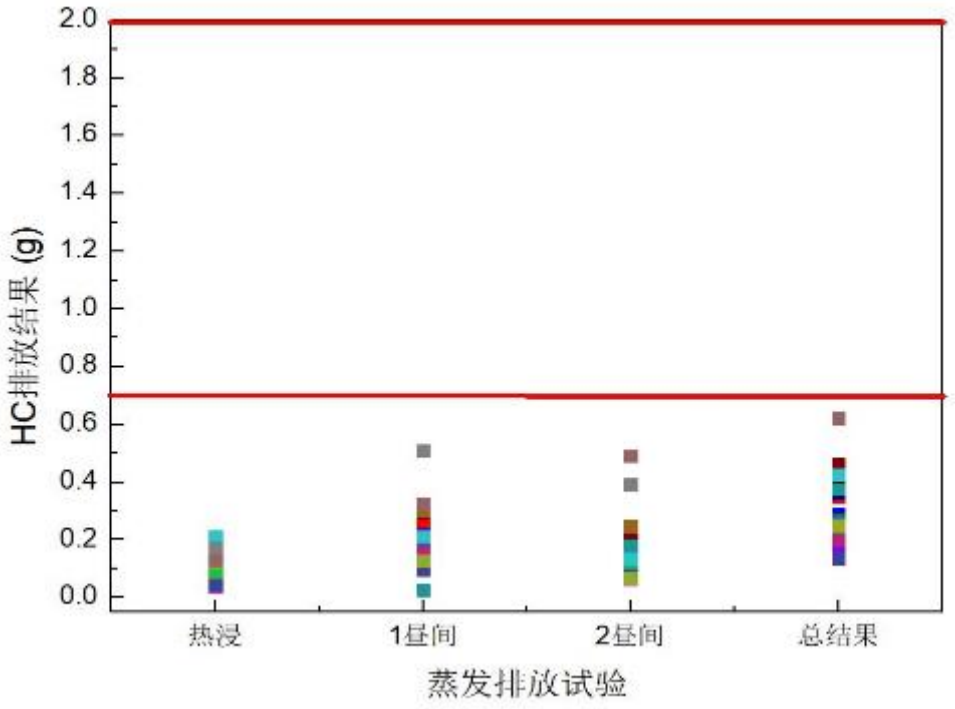
■ **轻型车蒸发排放评估情况**

Light vehicle evaporative emission assessment conditions

- **蒸发排放已实现两昼夜控制目标，蒸发排放基本在0.45g/test，相比国五下降80%左右，加油排放基本在0.015g/l。**
  Evaporative emissions have achieved the 2 full-day control target. The evaporative emission is basically 0.45g/test, which is approximately 80% lower than that of China V; the fueling emission is basically 0.015g/l.

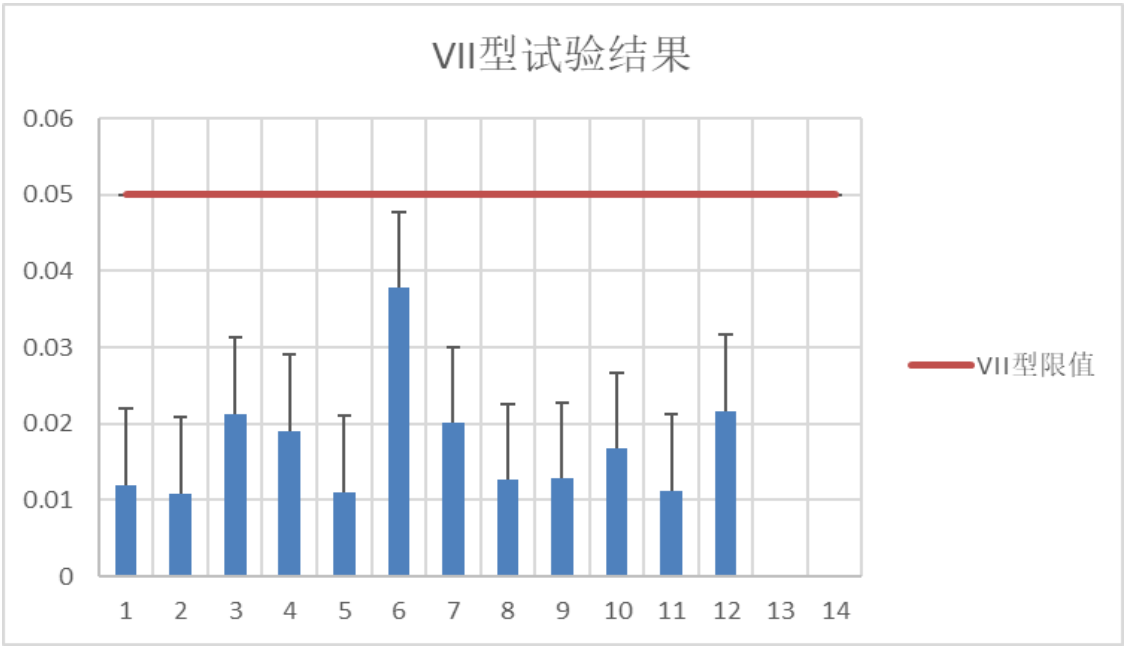
蒸发排放评估情况

Evaporative emission assessment conditions



加油排放评估情况

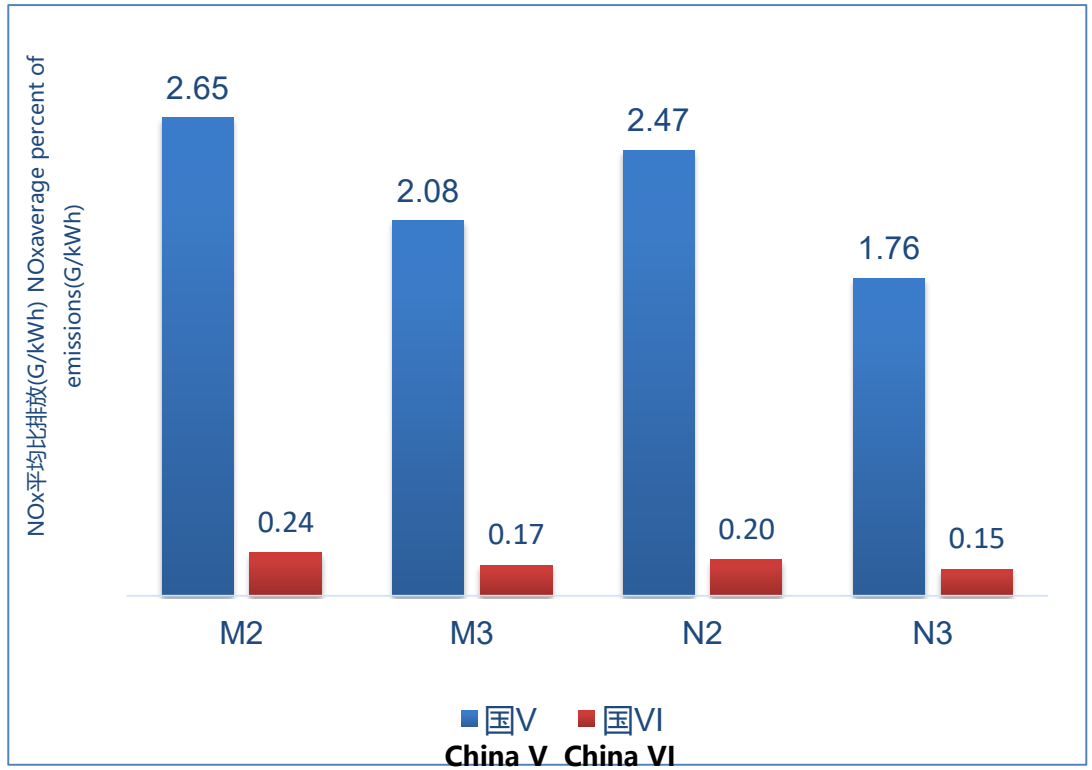
Fuel emission assessment conditions



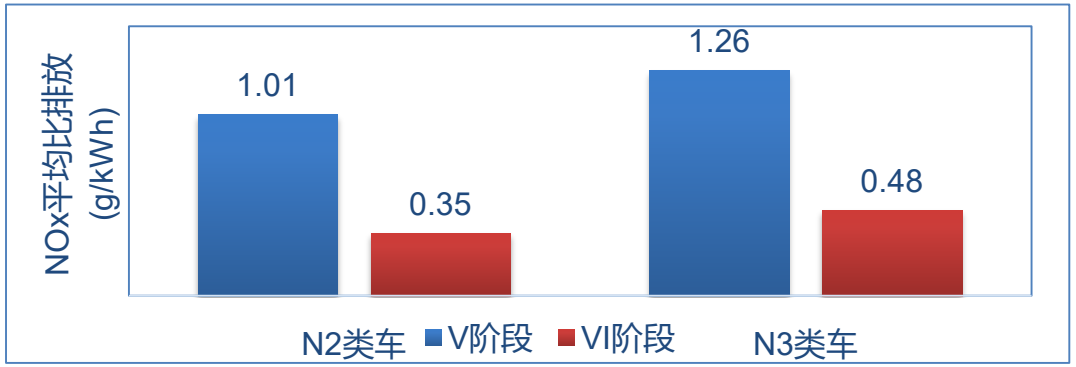
重型车排放评估情况
Heavy vehicle emission assessment conditions

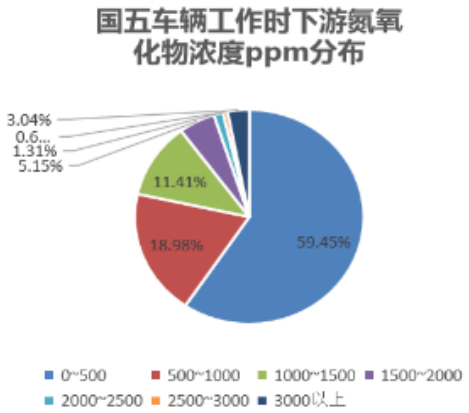
■ 重型车NOx排放评估情况
Heavy vehicle NOx emission assessment conditions

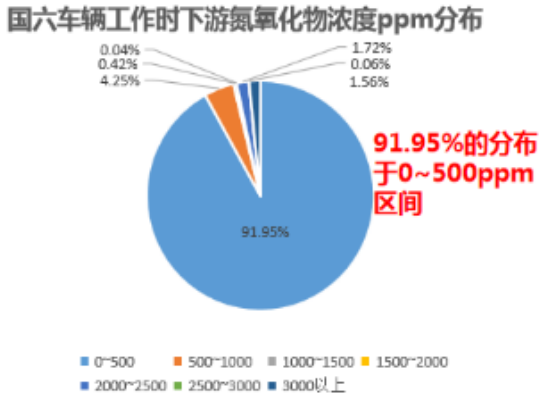
- **车载法型式检验**测试：国六NOx比排放较国五显著降低，**NOx降低幅度均超过90%**
  Vehicle-mounted method inspection test: NOx emission of China VI is significantly lower than that of China
- **远程监控**数据显示：国六车辆NOx比排放结果相比国五车辆显著降低；N2类车：**降低65%**；N3类车：**降低62%。**
  Remote monitoring data show that the NOx ratio of China VI vehicles is significantly lower than that of China V vehicles; N2 vehicles: **65% reduction**; N3 vehicles: **62% reduction**.



车载法对比结果
Comparative results for on-board methods







远程监控对比结果
Remote monitoring comparative results

目前监管存在的问题
Current Regulatory Issues

■ **轻型车**

Light vehicles

1. 应对汽车保有量增速，污染物管控力度仍持续加严

In response to the growth rate of car ownership, pollution control continues to be tightened

- **常规污染物：VOC、NOx、CO 等 （限值加严）**

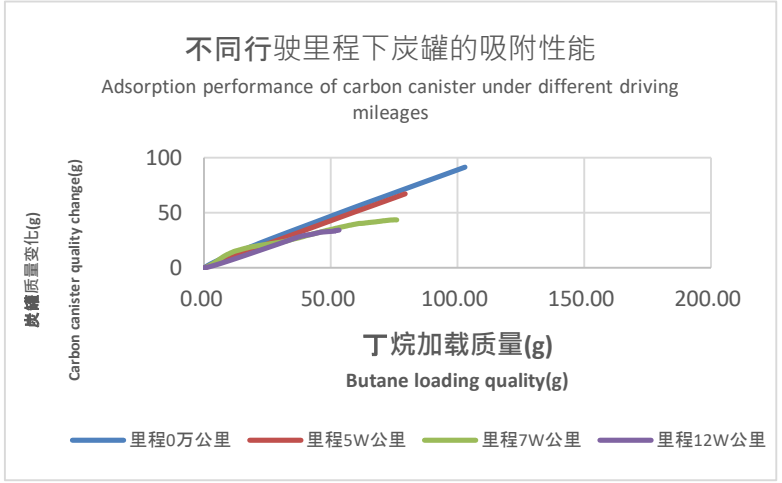
  Conventional pollutants: VOC, NOx, CO, etc. (limits tightened)

- **非常规污染物：NH3、多环芳烃、HCHO 等（限值引入）**

  Unconventional pollutants: NH3, polycyclic aromatic hydrocarbons, HCHO, etc. (limit introduction)

- **细颗粒物排放管控（10nm粒径、轮胎刹车细颗粒物排放）**

  Fine particle emission control (10nm particle size, fine particle emission from tire brakes)



道路耐久行驶过程中炭罐的老化分析

Analysis of aging of the charcoal canister during durable road driving

2. 汽油车蒸发排放已成为VOCs排放最主要来源，需持续强化管控力度

Evaporative emissions from gasoline vehicles have become the most important source of VOC emissions, and so it is necessary to continuously strengthen management and control efforts

- **在用汽油车蒸发排放控制装置失效问题严重，耐久性存在问题**

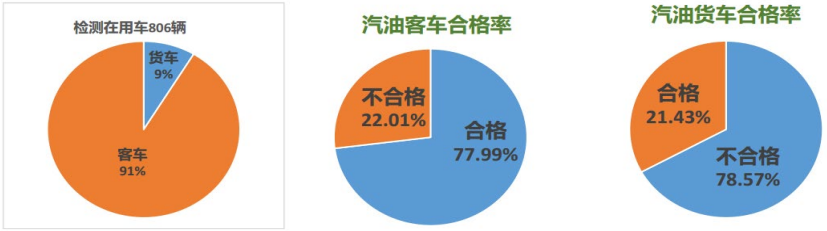
  Evaporative emission control devices of gasoline vehicles in use have serious failures and problems with durability

- **在用阶段蒸发排放监管能力薄弱，需从源头根本上解决问题**

  Weak monitoring capabilities for evaporative emissions during use phase; problem needs to be solved from source

1、共检验在用汽油车806辆；其中客车736辆，货车70辆；

2、合格率为73.08%；其中客车合格率为：77.99%，货车为：21.43% ；



在用车蒸发排放检测达标情况

In-use vehicle evaporative emission test compliance conditions

目前监管存在的问题
Current Regulatory Issues

- **轻型车**

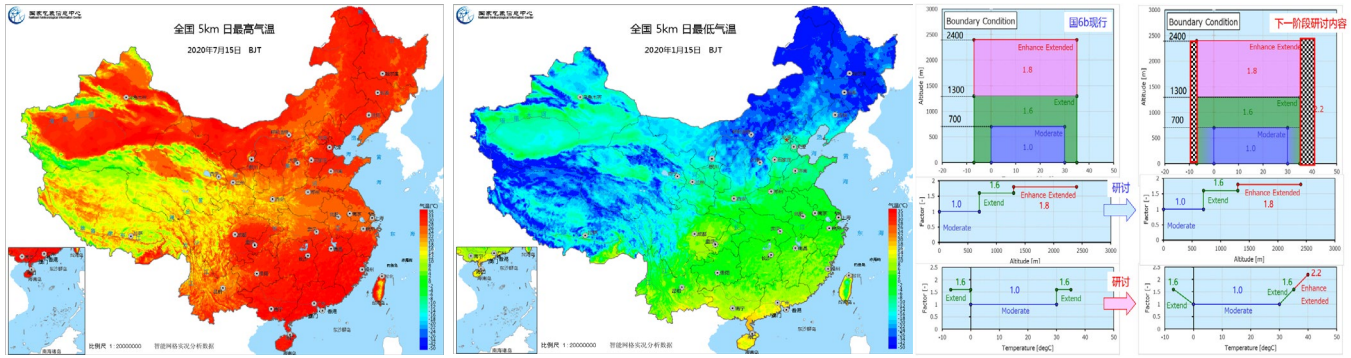
  Light vehicles

3. RDE测试问题
RDE testing problems

- **测试环境边界和修正不符合实际情况**
  Test environment boundaries and corrections do not meet the actual situation
  - **温度边界(-7~35℃) 无法覆盖**

    Temperature boundary (-7 – 35℃) cannot be covered
  - **排放修正问题（海拔修正必要性？阶梯性修正合理性）**

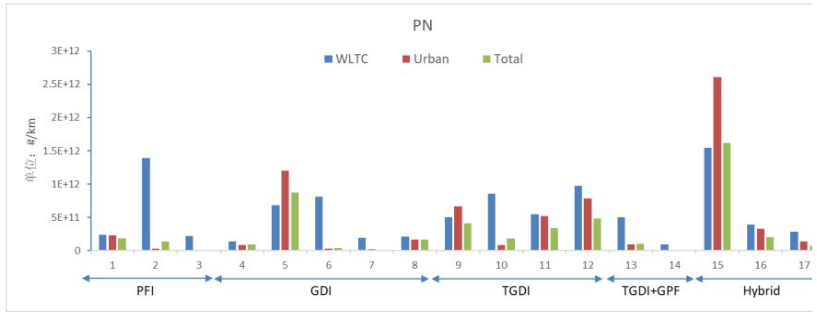
    Emission correction problem (need for altitude correction? rationality of stepwise revision)

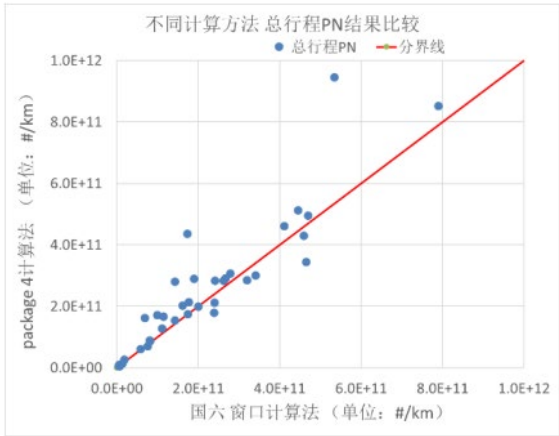


- **测试条件和数据处理方法受限无法反应真实排放水平**
  Limited test conditions and data processing methods cannot reflect the true emission level
  - **窗口法计算/ 冷启动数据剔除**

    Window method calculation / elimination of cold start data
  - **THC监管缺失，当前设备及法规限制下难以测量**

    Lack of THC monitoring and so difficult to measure with current equipment and regulations





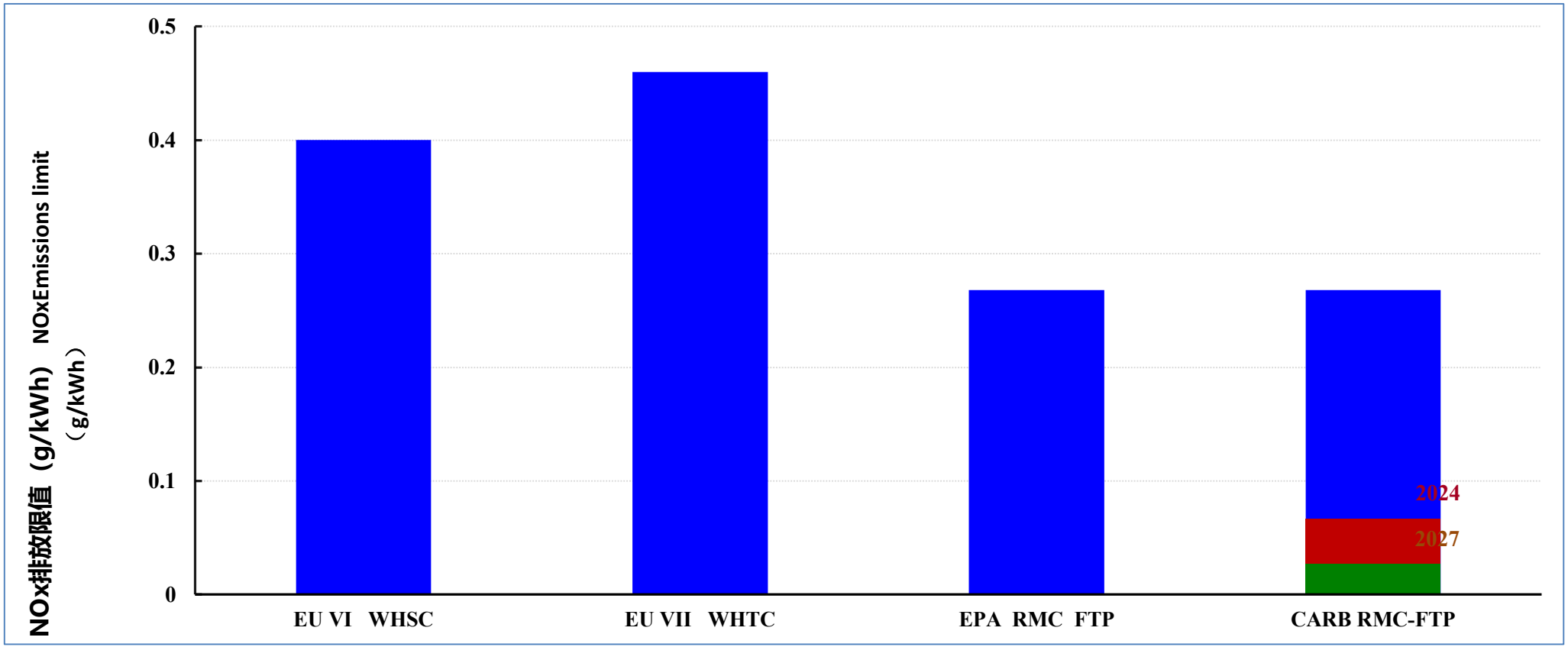
目前监管存在的问题
Current Regulatory Issues

- **重型车**

  Heavy vehicles

1. 重型车氮氧化物排放大，单车排放强度仍然需要进步降低

Heavy-duty vehicles emit high nitrogen oxides, and the emission intensity of single vehicles still needs to be improved and reduced



目前监管存在的问题
Current Regulatory Issues

- **重型车**

  Heavy vehicles

2. 重型车低速低负荷NOx排放占比高，当前没有低负荷测试要求和相关规定

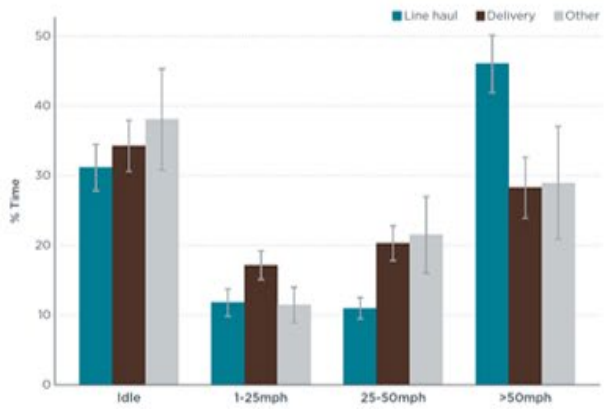
Low-speed and low-load NOx emissions of heavy-duty vehicles account for a high percentage, and there are currently no low-load test requirements and related regulations

怠速时间占比：30%~40%

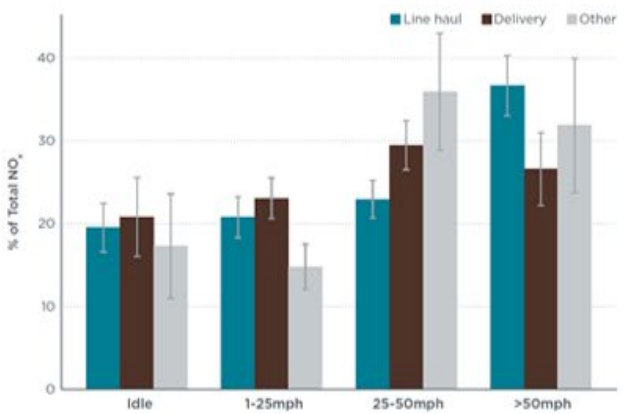
低速时间占比：12%~18%

怠速CO2占比~8%，但是NOx排放占比~18%

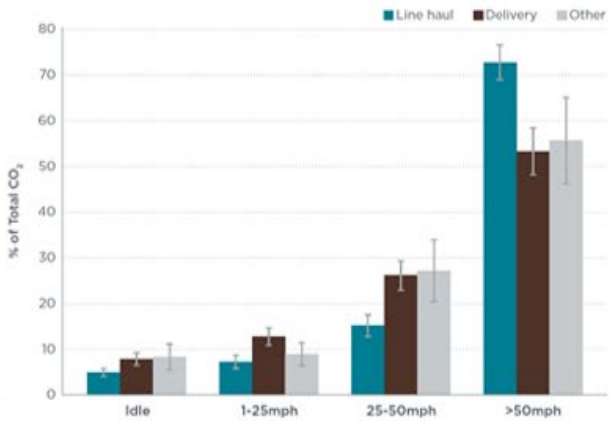
低速CO2占比~9%，但是NOx排放占比~19%



■ 各运行工况的时间占比



■ 各运行工况的NOx排放占比



■ 各运行工况的CO2排放占比

目前监管存在的问题
Current Regulatory Issues

■ 重型车存在问题

Issues with heavy vehicles

3. 车载诊断系统一致性验证不足，远程排放监控联网率低、数据质量问题突出

Insufficient verification of the consistency of on-board diagnostic systems, low networking rate for remote emissions monitoring, striking data quality problems

- 缺少整车验证， 普遍存在OBD功能以在整车上进行验证

  Lack of vehicle verification, OBD function is widespread and can verify the entire vehicle

- 信息公开数量40万辆，远程监控联网数量仅为1.5万辆，联网率不足4%，NOx数据无效率高

  There are information disclosures for 400,000 vehicles, but only 15,000 remote monitoring networks. The network rate is less than 4%, and NOx data is highly inefficient.

发动机：台架认证，WHTC

Engine: Bench certification, WHTC



整车：自查抽查、匹配车型

Entire vehicle: self-inspection/random inspection matched to model



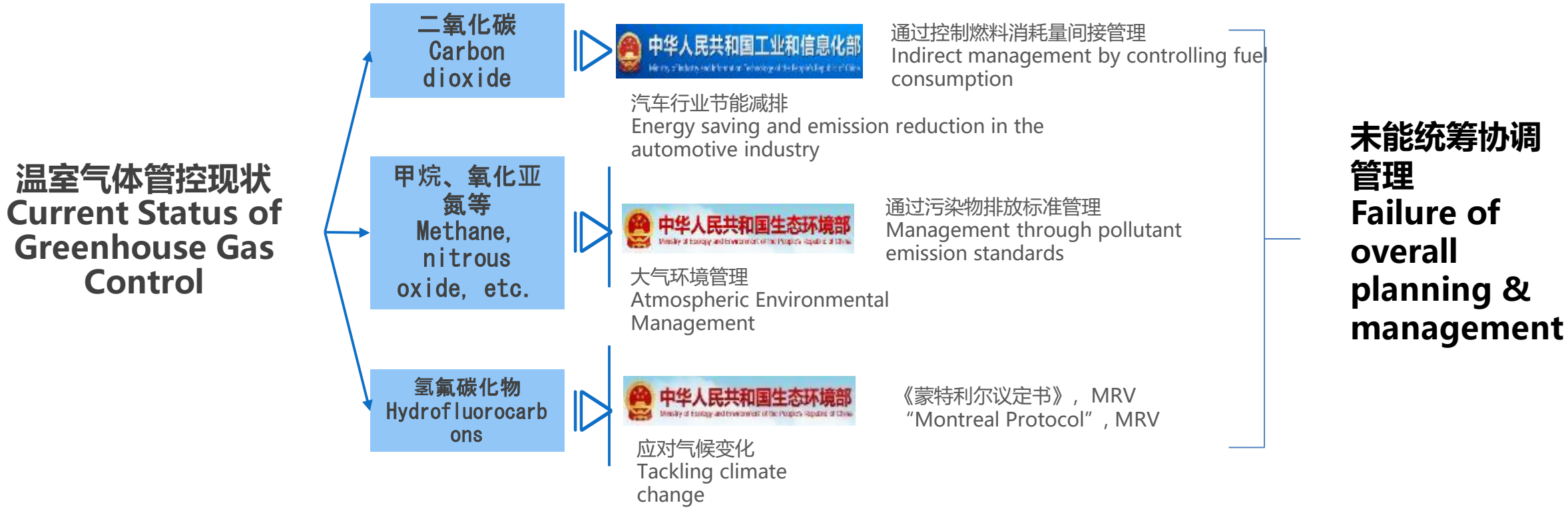
1	2	3	4
• 报警灯 Warning light • 诊断接口 Diagnostic • 通讯协议 Communication protocol	• 故障报警 Malfunction alarm • MIL点亮 MIL light • 永久故障码 Permanent malfunction code	• IUPR	• 反应剂余量 Reactant margin • 反应剂质量 reactant quality
标准化验证 Standardization Verification	监测功能验证 Monitoring function verification	在用监测性能验证 Performance	NOx控制系统验证 NOx control System verification

终端校时不准确 Terminal time is not accurate	**终端发送时间与实际时间偏差较大，影响对车辆在线情况判断 Terminal sending time deviates greatly from the actual time, which affects determination of vehicle online conditions**
转发时延不合格 Forwarding delay for "unqualified"	**50%以上的车辆转发时延超过10秒 More than 50% of vehicles have a forwarding delay of more than 10 seconds**
丢包率不达标 Packet loss rate does not meet standard	**数据转发丢包率普遍高于1% Data forwarding packet loss rate is generally higher than 1%**
数据质量较差 Poor data quality	**终端上报存在无效值、越界值、缺失值的情况较普遍 Terminals frequently report invalid values, out-of-bounds values, and missing values**
终端采集周期不稳定 Terminal collection cycle is unstable	**终端数据采集周期普遍高于1秒 Terminal data collection cycle is generally longer than 1 second**

目前监管存在的问题
Current Regulatory Issues

■ **温室气体管理**

Greenhouse gas control



应对气候变化和改善大气环境质量，需统筹汽车大气污染与温室气体排放控制

To cope with climate change and improve the quality of the air environment, it is necessary to coordinate the control of automobile air pollution and greenhouse gas emissions

第 N. 3 部分 | Section

对下阶段排放标准的思考
The next phase of emission standards

下阶段标准定位
Positioning Standards in the Next Phase

标准实施现状综合评估
Overall evaluation of the current status of standard implementation

相关行业发展趋势研判
Research of development trends in related industries

基于环境空气质量改善和碳达峰目标需求
Based on environmental air quality improvement and carbon peak target demand

研究减排新目标
Research on new targets for emission reduction

重点管控：VOC、Nox

Focal point control: VOC, NOx

碳达峰、碳中和目标：CO2

Carbon peak and carbon neutral target: CO2

探索监管新需求
Explore new regulatory requirements

传统车与新能源汽车监管模式

Monitoring model for traditional vehicles & new energy source vehicles

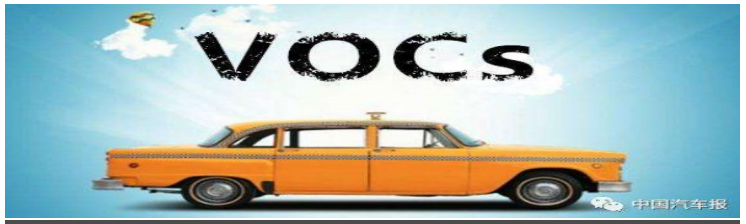
信息公开、企业质量保证与环保召回体系闭环衔接

Closed-loop connection of information disclosure, corporate quality assurance and environmental protection recall system

下阶段排放标准定位
Positioning Emission Standards in the Next Phase

(加严限值or监管力度)
(Increase limits or strengthen monitoring)

下阶段重点考虑方向
Key Considerations in Next Phase



1. VOCs&NOx协同减排
VOC & NOx coordinated emission reduction

- 严控汽油车燃油蒸发排放，实现零蒸发排放目标
  Strictly control the evaporative emissions of gasoline vehicles and achieve the goal of zero evaporative emissions
- 重型车超低氮氧化物排放
  Ultra-low nitrogen oxide emissions from heavy vehicles

2. 实际道路排放
Actual road emissions

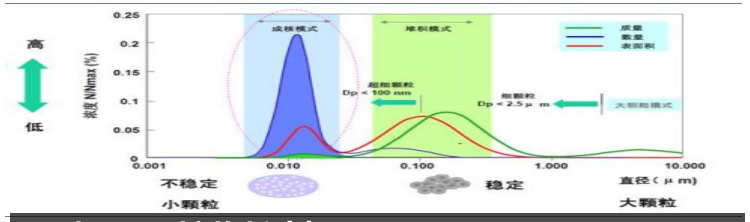
- 加强实际道路监管，进一步覆盖更广边界条件
  Strengthen actual road monitoring to further cover wider boundary conditions
- 体现冷启动排放重要性
  Reflect the importance of cold start emissions

3. 非常规污染物及替代燃料
Unconventional pollutants and alternative fuels

- 逐渐引入非常规污染物管控（氨排放、醛类）
  Gradually introduce control of unconventional pollutants (ammonia emissions, aldehydes)
- 多种替代燃料下的污染物排放
  Pollutant emissions under multiple alternative fuels

4. OBD&OBM

- OBD远程在线监控
  OBD remote online monitoring
- 污染物监测传感器技术
  Pollutant monitoring sensor technology



5. 加强颗粒物控制
Strengthen particulate control

- 23nm→10nm颗粒物检测技术及限值达标
  23nm→10nm Particle detection technology and limit compliance
- 轮胎磨损、刹车片磨损等颗粒物排放
  Emission of particulate matter such as tire wear and brake pad wear

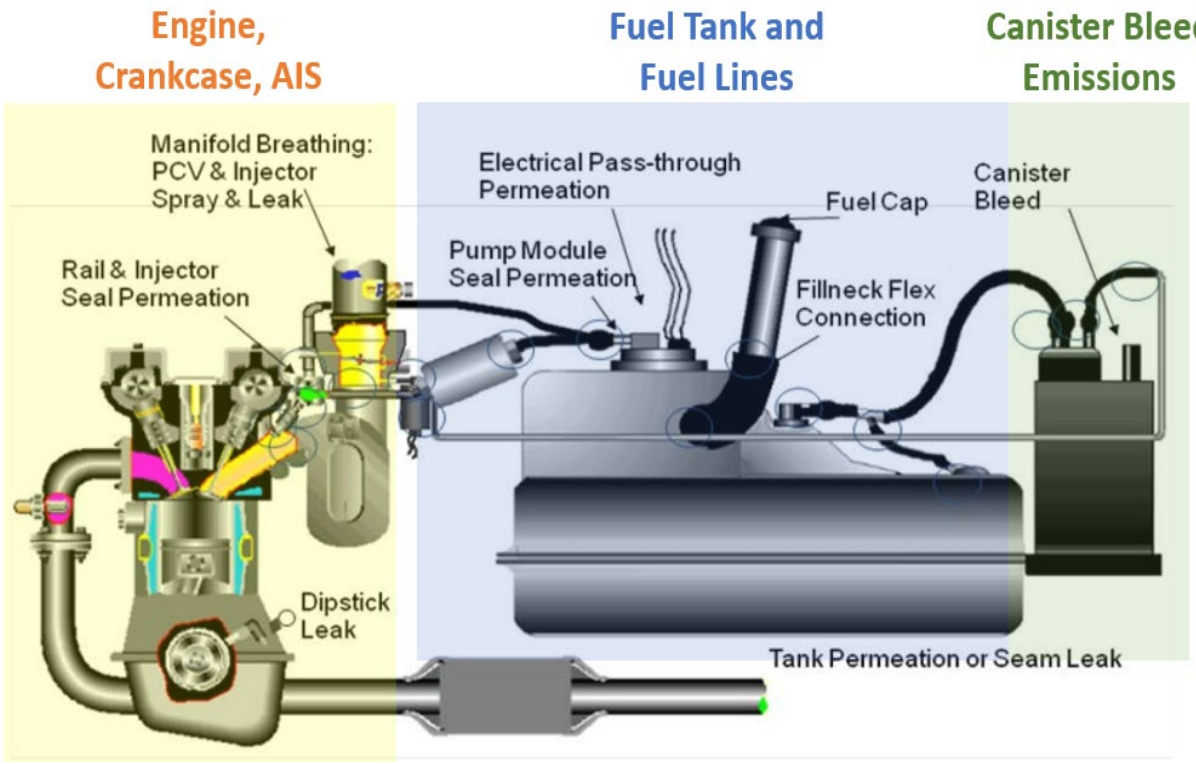
6. 温室气体排放协同管控
Coordinated control of greenhouse gas emissions

- 综合考虑国际公约碳排放达峰目标要求
  Comprehensive consideration of the international convention carbon emission peak target requirements
- 污染物排放与碳排放的协同管控
  Coordinated management and control of pollutant emissions and carbon emissions

重点研究内容
Focal Point Research Content

■ 汽油车净零蒸发排放
Net zero evaporative emissions from gasoline vehicles

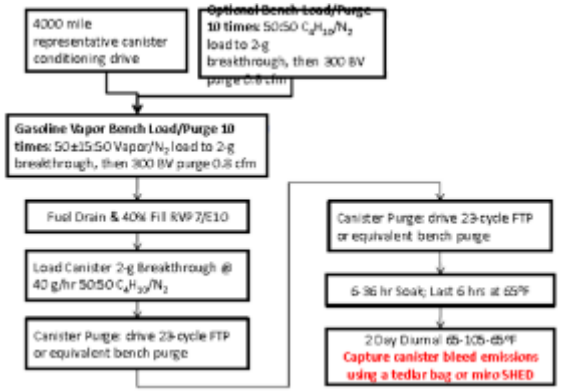
- **进一步加严轻型车VOCs管控，研究燃油系统实现净零蒸发排放技术路线**
  Further tightening the control of light vehicle VOCs and study technical route of fuel system to achieve net zero evaporative emissions

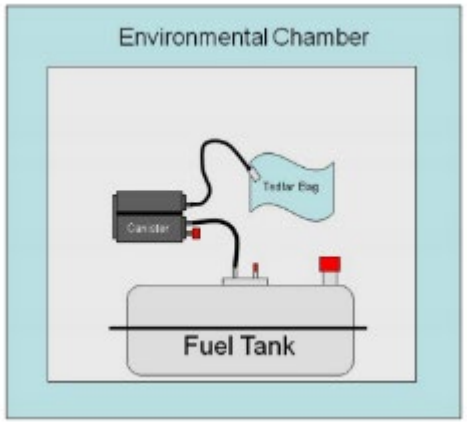


超低整车蒸发限值
Ultra-low vehicle evaporation limit

BETP→零
zero

逸出排放测试程序（Bleed Emission Test Procedure BETP）





重点研究内容
Focal Point Research Content

■ 零蒸发排放可行性测试研究试验计划
Research test plan for zero evaporative emission feasibility

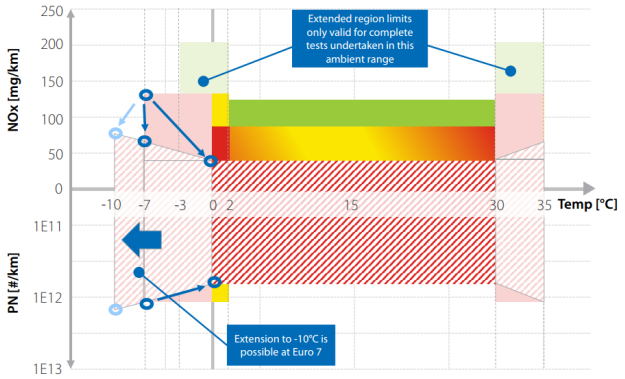
测试 Test	测试条件 Test conditions	脱附使用的运转循环 Operating cycle for desorption	测功机室温度 Dynamometer room temperature(°C)	测试燃油 Test fuel	燃油RVP Fuel RVP (kPa)	密闭室热建立 Heat build-up in sealed room (°C)	认证测试限值 Certification test limit (g/test)
A	Tier 3 BETP 基线 **Baseline**	FTP-75 (31.2 min)	23	Tier 3 E10	60 - 63.4	22.2 - 35.6	0.020
B	Tier 3 2-days diurnal 基线 **Baseline**	FTP-75 (31.2 min)	23	Tier 3 E10	60 - 63.4	22.2 - 35.6	0.300
C	中国 BETP Chinese BETP	WLTP (L+M+H+EH/30 min)	23	国六E0 China VI E0	56 - 60	20 - 35	演示 ≤ 0.020 Demo ≤ 0.020
D	中国 2-days diurnal China 2-days	WLTP; (L+M+H+H + 8 min idle/40.2 min)	38	国六E0 China VI E0	56 - 60	20 - 35	演示 ≤ 0.350 Demo ≤ 0.350
E	中国BETP 使用38°C的WLTP脱附 Chinese BETP Using 38°C WLTP desorption	WLTP; (L+M+H+H + 8 min idle/40.2 min)	38	国六E0 China VI E0	56 - 60	20 - 35	非认证测试； 演示 ≤ 0.020 Non-certified test Demo ≤ 0.020

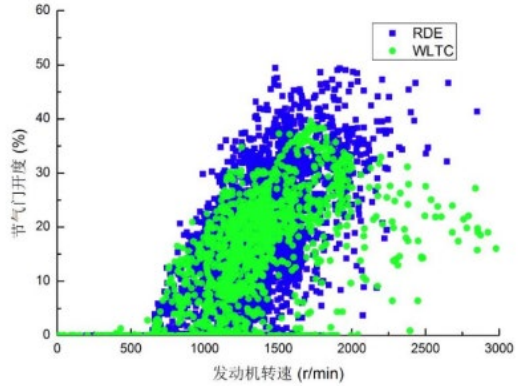
重点研究内容
Focal Point Research Content

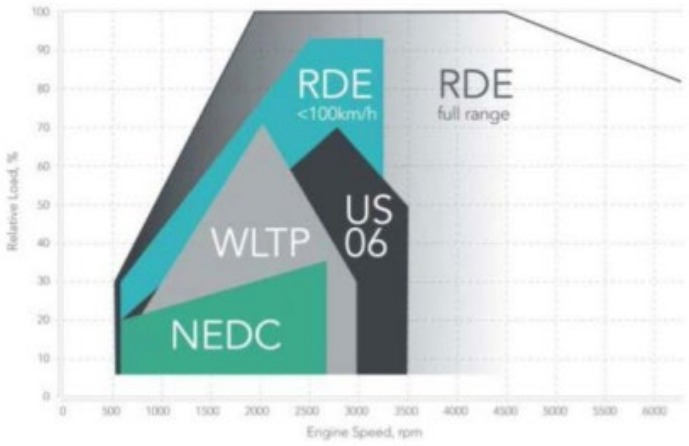
■ RDE 实际道路排放监管
RDE actual road emission monitoring

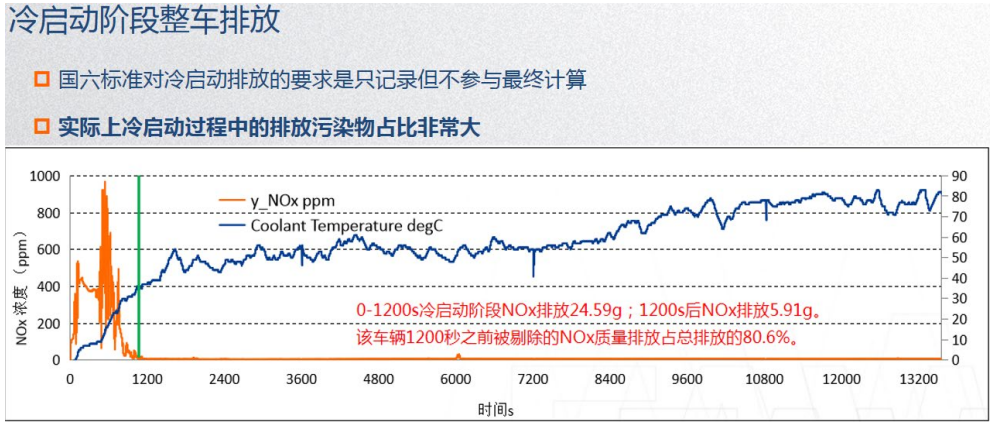
- **进一步放宽实际道路排放测试边界条件，逐步转变**
  Further relax boundary conditions of actual road emissions testing, and gradually implement changes

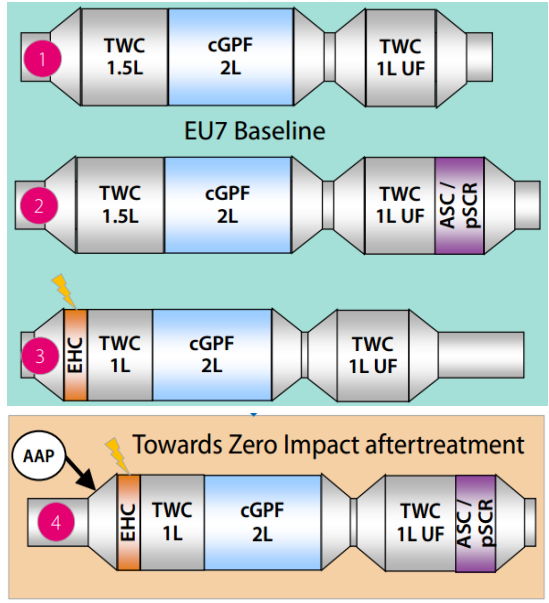
  - **环境边界（温度、海拔）**
    Environmental boundaries (temperature, altitude)
  - **驾驶行为（行程动力学）**
    Driving behavior (stroke dynamics)
  - **冷启动**
    Cold Start
  - **油品**
    Oil products











重点研究内容
Focal Point Research Content

■ RDE行程动力学评估研究进展
Research progress for RDE stroke dynamics evaluation

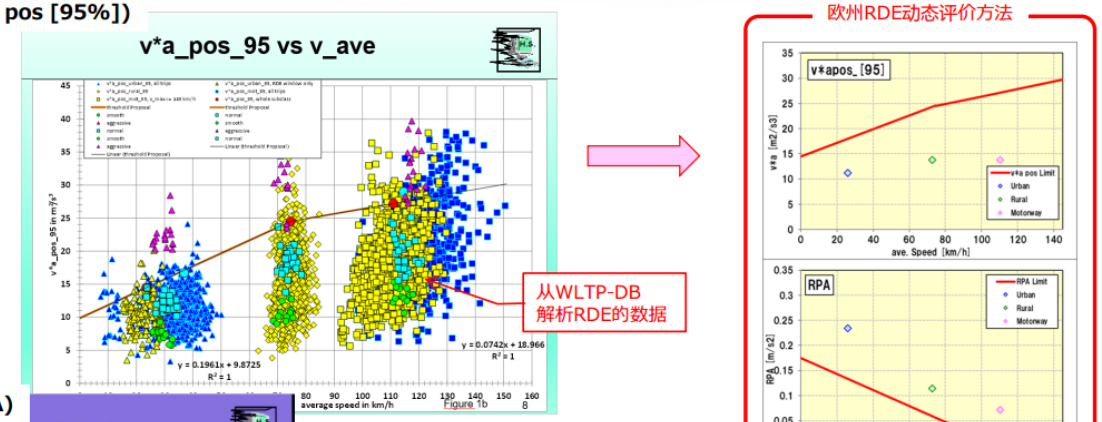
- 制定中国工况时采用的数据和2017~2018年实际不同城市RDE试验行驶数据进行统计分析

  Statistical analysis of data used when formulating the Chinese operating conditions and actual RDE test driving data in different cities from 2017 to 2018

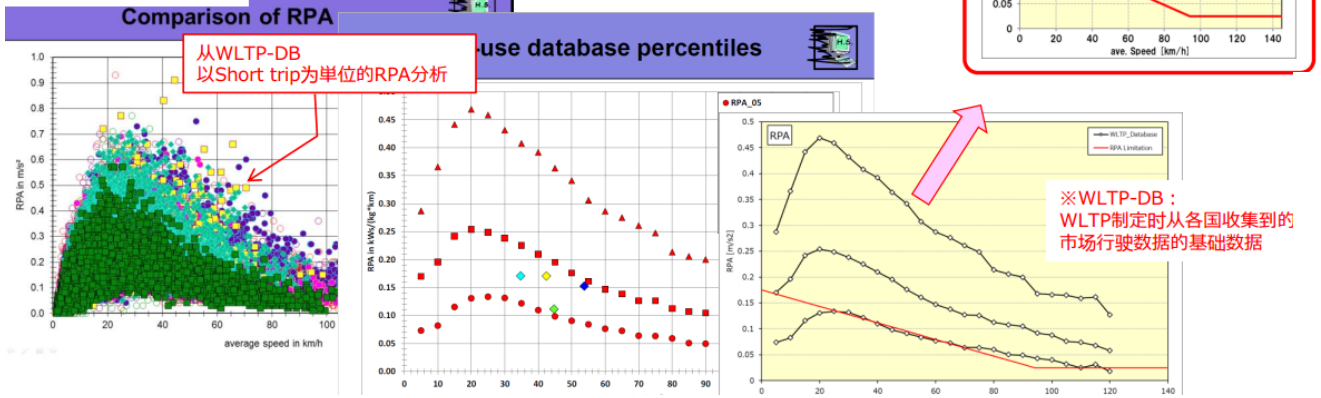
- 目前基于WLTC工况制定V*a_pos[95%]限值已足够宽松（EU > VECC RDE > JPN_WLTP > China On Road）

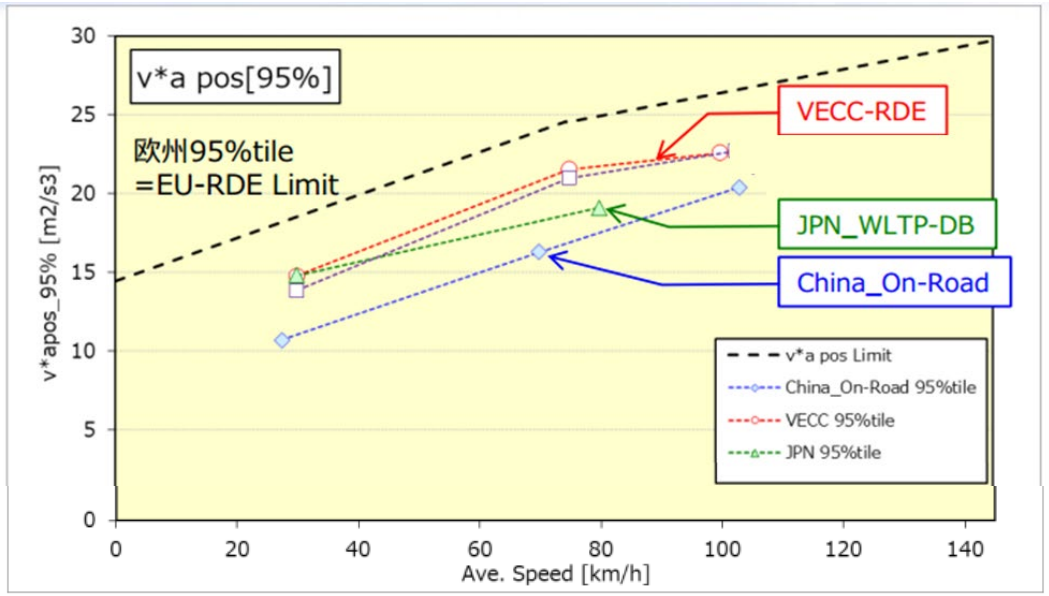
  The current V*a_pos[95%] limit based on WLTC working conditions is sufficiently relaxed (EU > VECC RDE > JPN_WLTP > China On Road)

- ■上限基准设定 (v*a pos [95%])



■下线基准设定 (RPA)





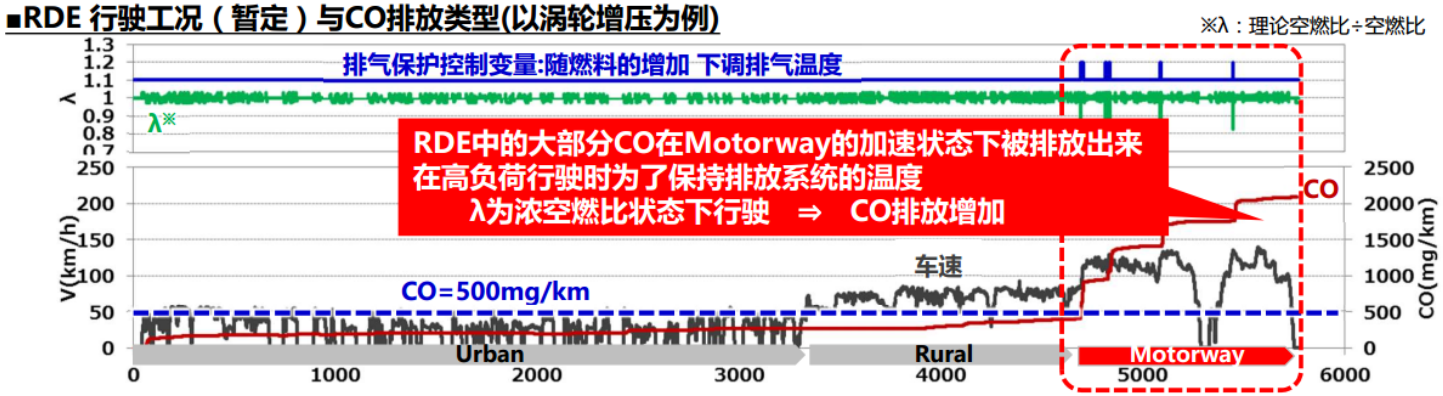
重点研究内容
Focal Point Research Content

- **高速和超高速阶段混合气加浓导致CO急剧增加，而根据台架工况表明，HC与CO有很强的相关性**

  The high-speed and ultra-high-speed stage of mixed gas enrichment leads to a sharp increase in CO.

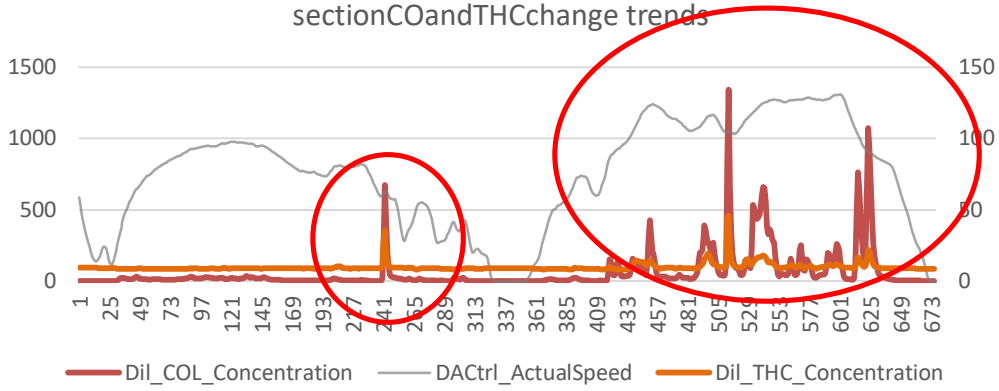
  According to bench conditions, HC and CO have a strong correlation

■RDE 行驶工况（暂定）与CO排放类型(以涡轮增压为例)

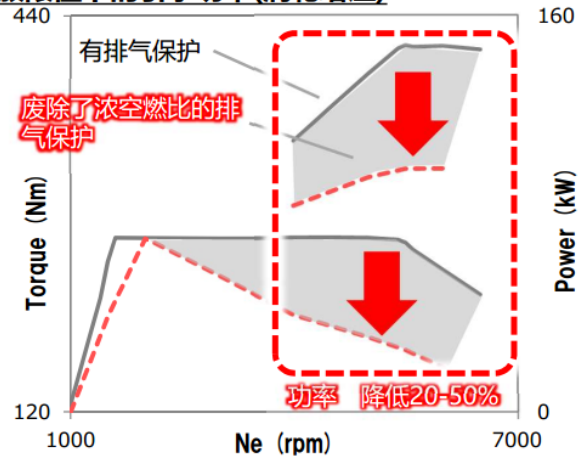


WLTC高速和超高速段CO和THC变化趋势

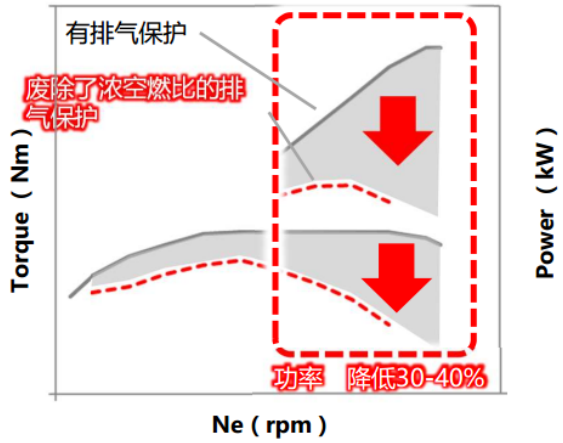
WLTC High speed and ultra high speed sectionCOandTHCchange trends



■CO排放限值下的引擎功率(涡轮增压)



■CO排放限值下的引擎功率(自然吸气)



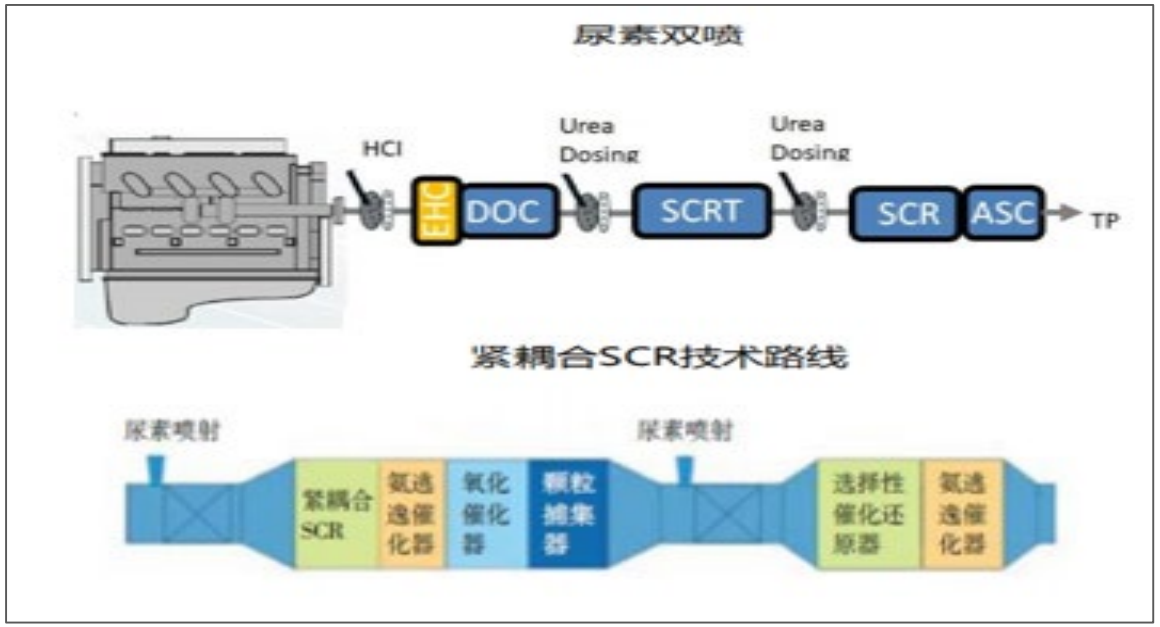
为满足NOx和VOC协同控制目标，现阶段在无法测量轻型车RDE THC测试要求的情况下，可通过CO排放来间接评价实际道路THC排放状况。

In order to meet the NOx and VOC coordinated control goals, at this stage, when the RDE THC test requirements for light vehicles cannot be measured, CO emissions can be used to indirectly evaluate the actual road THC emissions.

重点研究内容
Focal Point Research Content

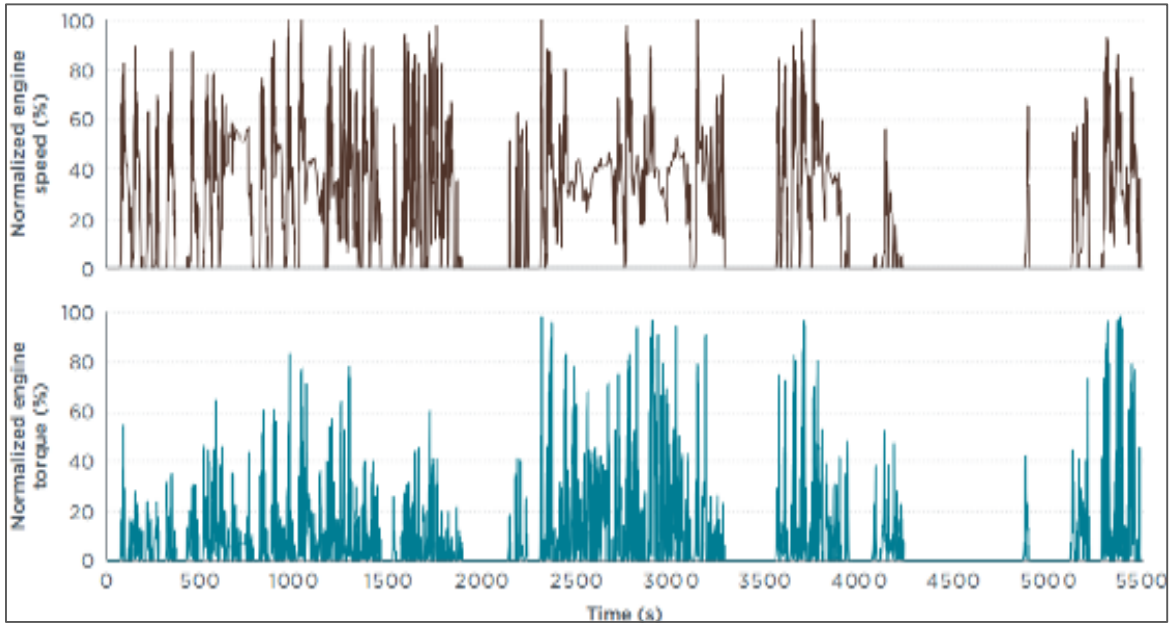
■ **重型车超低NOx排放+低负荷测试循环**
Heavy vehicle ultra-low NOx emission + low load test cycle

1、NOx超低排放
Ultra-low NOx emissions



NOx 超低排放控制技术
NOx ultra-low emission control technology

2、低负荷排放测试
Low load emission test



Low-load 工况
Low-load working conditions

重点研究内容
Focal Point Research Content

■ **充分利用传感器技术发展，优化车载诊断和联网，推动的完善汽车排放实时监管技术手段**
Make full use of the development of sensor technology, optimize on-board diagnosis and networking, and promote perfect real-time monitoring of vehicle emissions.

车载终端数据采集技术 On-board terminal data collection technology	互联网数据传输技术 Internet data transmission technology	数据安全传输和加密技术 Technology for secure transmission & encryption of data	数字签名和防篡改技术 Digital signature and anti-tampering

1.实时监控
. Real-time monitoring

- 车辆在线状态；
  Vehicle online status;
- 车辆故障情况；
  Vehicle malfunction conditions
- 异地运行情况；
  Remote operating conditions
- 各排放水平车辆运行情况。
  Vehicle operating condition at various emission levels.

2.运行轨迹
Operation tracing

- 单车整段、分段历史轨迹回放，回放时可以显示各传感器主要上报数据
- Playback of the entire and segmented historical trajectory of a bicycle, with main data reported by each sensor being displayed during playback

3.排放轨迹
Emissions tracing

- 按照运行轨迹，展现排放带状分布情况，目前暂时按照杭州经验，设定不同浓度区间的展现形式。
  The emission belt distribution is displayed based on the operating trajectory. Currently based on the Hangzhou experience, the display form is set at different concentrations.

4.故障报警
Malfunction alarm

- 根据故障码信息，展现车辆故障报警时间、地点、报警内容。
  Based on the malfunction code information, the time, location and content of the vehicle malfunction alarm is displayed.

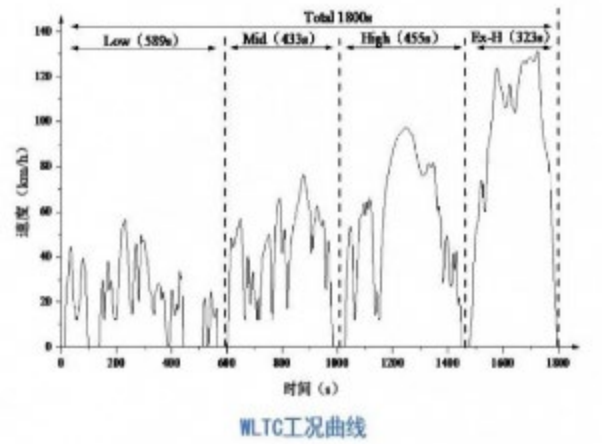
5.运行指标
Operating indicators

- 尿素耗/油耗：观测尿素消耗合理性；
  Urea consumption/fuel consumption, monitors the rationality of urea consumption;
- SCR上下游浓度比：判断SCR状态；
  SCR upstream and downstream concentration ratio, determines SCR status;
- NOX排放量：每分钟计算汇总的NOx排放量；
  NOX emissions, calculates and summarizes NOx emissions per minute;
- NOX排放因子：每分钟计算NOX排放量与行驶里程的比值。
  NOX emission factor, calculates ratio of NOX emission to mileage.

重点研究内容
Focal Point Research Content

■ 大气污染物排放与温室气体协同管理 Coordinated management of air pollutant emissions & greenhouse gases

统一测试方法及流程
Unified testing methods and procedures



WLTC工况曲线

统一开展信息公开
Unified information disclosure

统一开展环保监管
Unified environment monitoring

以机动车环保达标监管体系为基础，统一开展大气污染物和温室气体排放测试、信息公开和环保监管，在测试方法流程、数据报送、生产一致性、在用符合性监管方面加强与能耗管理协调。

On the basis of the motor vehicle environmental protection compliance monitoring system, we will carry out air pollutant and greenhouse gas emission testing, information disclosure and environmental protection monitoring, and strengthen coordination with energy consumption management in terms of test method procedures, data submission, production consistency, and in-use compliance monitoring.

汇报完毕，谢谢！
Thank you for your attention!