



**CAERI**

# **EV Testing and Standardization in CAERI**

**Hao Zhang**

**China Automotive Engineering Research Institute**



- I. Institute Profile**
- II. EV Testing and Demonstration**
- III. EV standardization**



# I、Institute Profile

# History



- Established in 1965 by MOST, owned by the central government department
- After 46 years, CAERI has become one of the most important automotive institutes in China, which scope including
  - Vehicles and components development
  - Testing and research
  - Products inspection and certification
  - Engineering Consulting



# National Motor Vehicle Quality Supervision and Inspection Center



U.S.-CHINA CLEAN ENERGY RESEARCH CENTER  
中美清洁能源研究中心

One of the six main test centers in China



1. Changchun

2. Tianjin

3. Shanghai

4. Xiangfan

5&6. Chongqing



中国汽车工程研究院

CAERI China Automotive Engineering Research Institute

# National Motor Vehicle Quality Supervision and Inspection Center



U.S.-CHINA CLEAN  
ENERGY RESEARCH CENTER  
中美清洁能源研究中心

- Labs are granted by CNCA
- Test center for Products CCC-appointed by CNCA
- Test center for New products-appointed by MIIT
- Test center for Vehicles Emission-appointed by SEPA



# Facilities of Testing Center



中国汽车工程研究院—汽车技术研发与测试基地建设项目



序号	名称	面积	层数	用途
1	整车试验楼	10000	3	整车性能、耐久、碰撞试验
2	排放试验楼	5000	2	排放测试、尾气净化
3	零部件试验楼	8000	2	发动机、变速箱、底盘部件试验
4	安全试验楼	6000	2	碰撞、翻滚、制动试验
5	NVH试验楼	4000	2	噪声、振动、平顺性试验
6	EMC试验楼	3000	2	电磁兼容性试验
7	功率总成试验楼	5000	2	发动机、电机、电控系统试验
8	电池系统试验楼	3000	2	动力电池性能、安全试验
9	综合办公楼	2000	3	行政、研发、检测
10	食堂	1000	2	员工就餐
11	宿舍	15000	3	员工住宿
12	运动场	20000	1	员工体育锻炼
13	停车场	30000	1	车辆停放
14	绿化景观	50000	1	环境美化
15	道路试验场	100000	1	道路性能、耐久试验
16	风洞试验室	10000	2	空气动力学性能试验
17	材料试验室	2000	2	材料性能、疲劳试验
18	无损检测室	1000	2	无损检测、材料分析
19	计量室	500	2	计量校准、检测
20	实验室	3000	2	材料、化学、物理试验
21	图书馆	1000	2	文献查阅、学术交流
22	会议室	500	2	会议、培训
23	接待室	500	2	接待、洽谈
24	健身房	1000	2	员工健身
25	医务室	500	2	员工医疗
26	开水房	500	2	提供开水
27	洗衣房	500	2	员工洗衣
28	浴室	500	2	员工洗浴
29	卫生间	500	2	员工如厕
30	值班室	500	2	夜间值班
31	保安室	500	2	安全管理
32	配电室	500	2	电力供应
33	水泵房	500	2	供水系统
34	垃圾房	500	2	垃圾处理
35	化粪池	500	2	污水处理
36	化粪池	500	2	污水处理
37	化粪池	500	2	污水处理
38	化粪池	500	2	污水处理
39	化粪池	500	2	污水处理
40	化粪池	500	2	污水处理

CAERI 机械工业第三设计研究院



- Whole Vehicle
- Emission
- Components
- Safety
- NVH
- EMC
- Powertrain
- Battery System

# Facilities

## NVH Labs



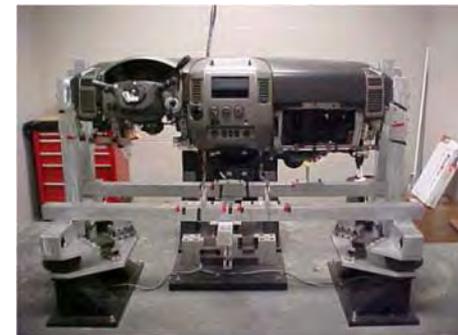
• 整车半消声室  
• (4驱、2电机、5.5吨)  
Vehicle semi-anechoic chamber  
4 WD , 2 motor , 5.5 tons



• 全消声发动机试验室  
Full anechoic engine test chamber



• 整车振动实验室  
Vehicle Vibration Lab



• 零部件异响室  
Parts abnormal sound room



• 部件振动疲劳  
Parts vibration fatigue



• 模态试验室  
Modal Lab



• 全消/混响室  
All consumers / reverberation chamber



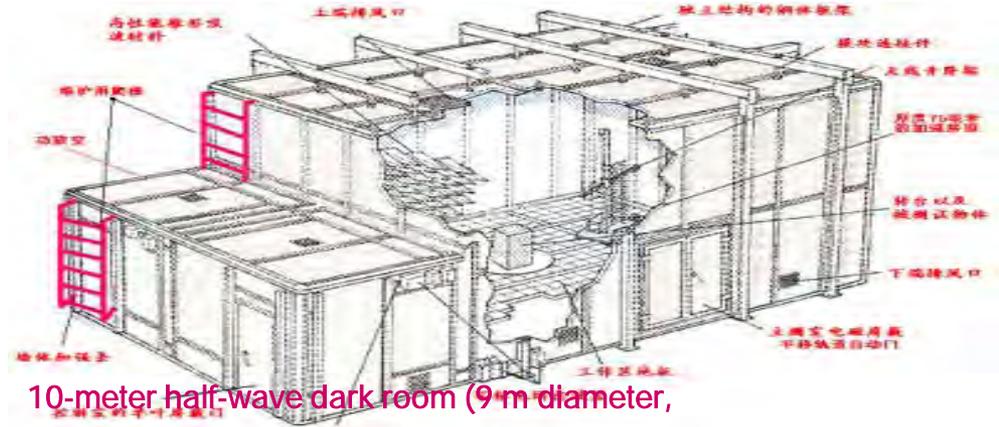
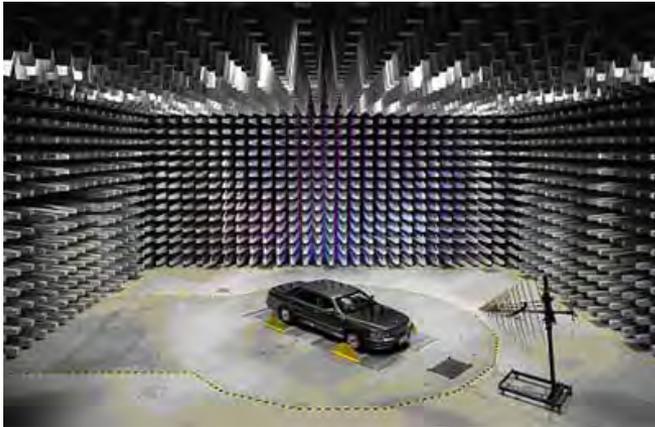
• 声品质分析室  
Sound Quality Analysis Laboratory

# Facilities

## EMC Labs



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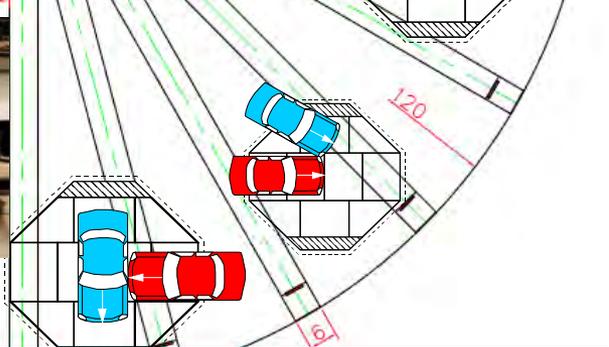
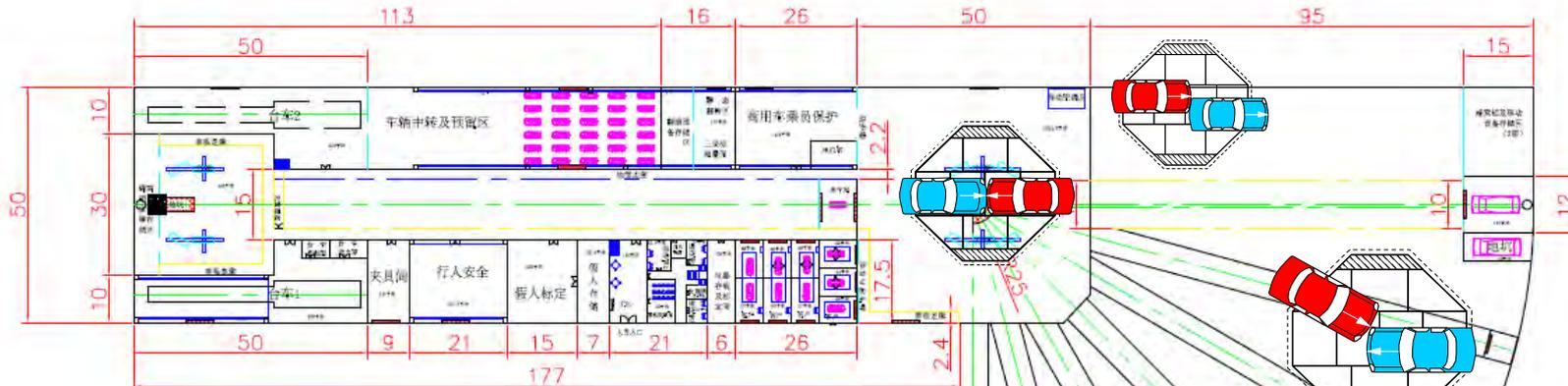


10-meter half-wave dark room (9m diameter, 20-ton turntable, 4 × 100kW dynamometer), three-meter modus and CISPR25 full-wave dark room

• 10米半波暗室 (9米直径、20吨转台、4×100kW测功机)、三米法及CISPR25全波暗室

# Facilities

## Safety Labs



实车碰撞 5t 120Km/h 25t 80km/h  
车车碰撞 5t 80Km/h 25t 50km/h

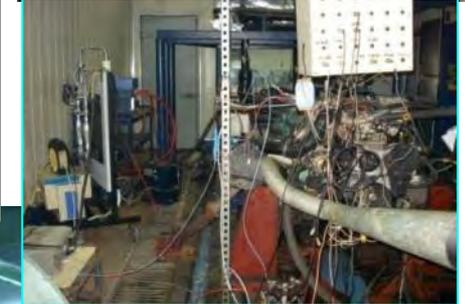


# Facilities

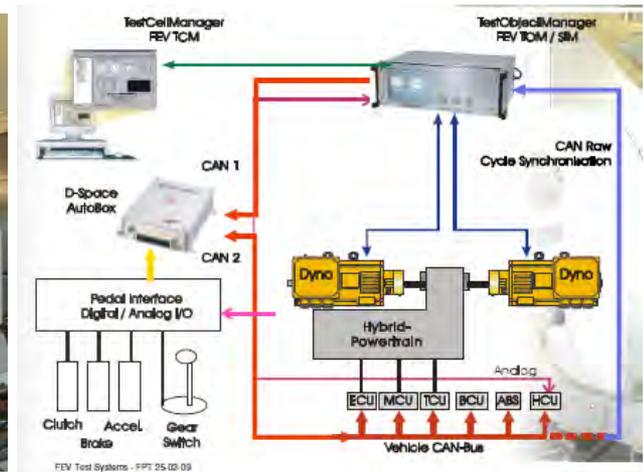
## Emission Labs



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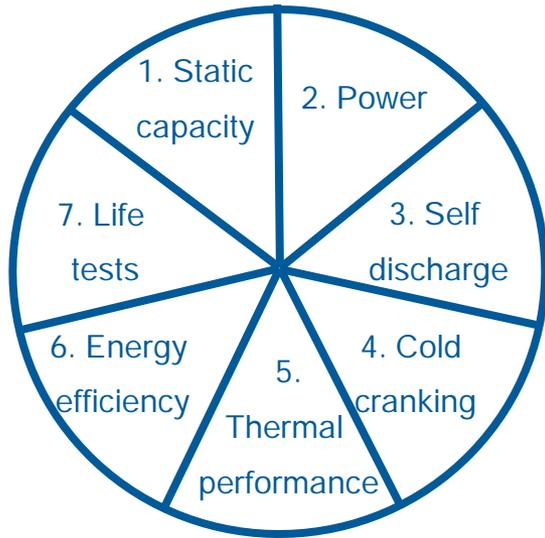


# Facilities - Component and Powertrain Labs

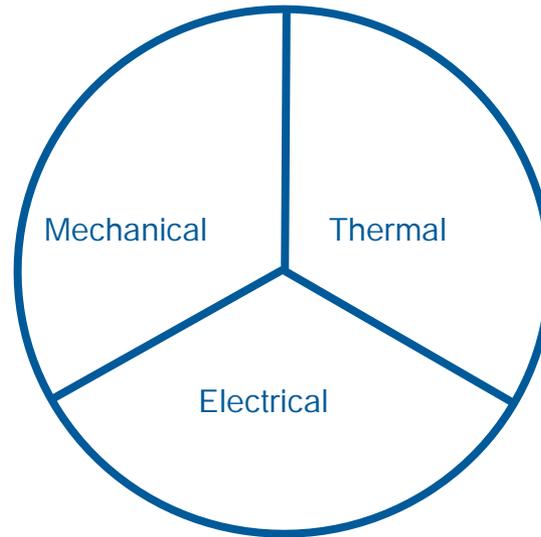


# Facilities

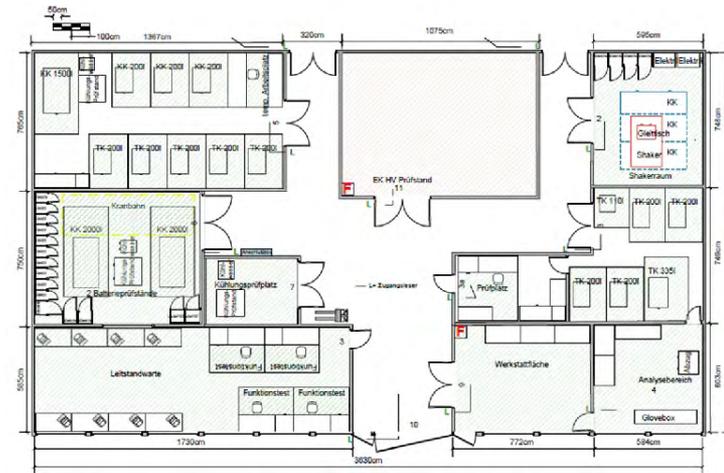
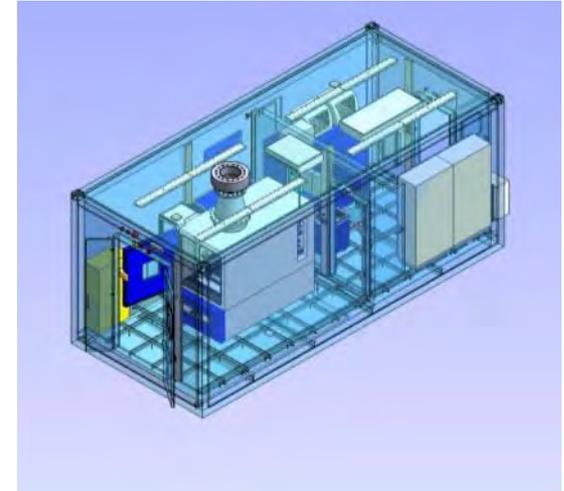
## New Battery Labs



Performance tests



Safety tests



## II、EV Test and demonstration

1. Test and inspection
2. Benchmarking and evaluation
3. Ten cities 1000 EVs

# Test and Inspection



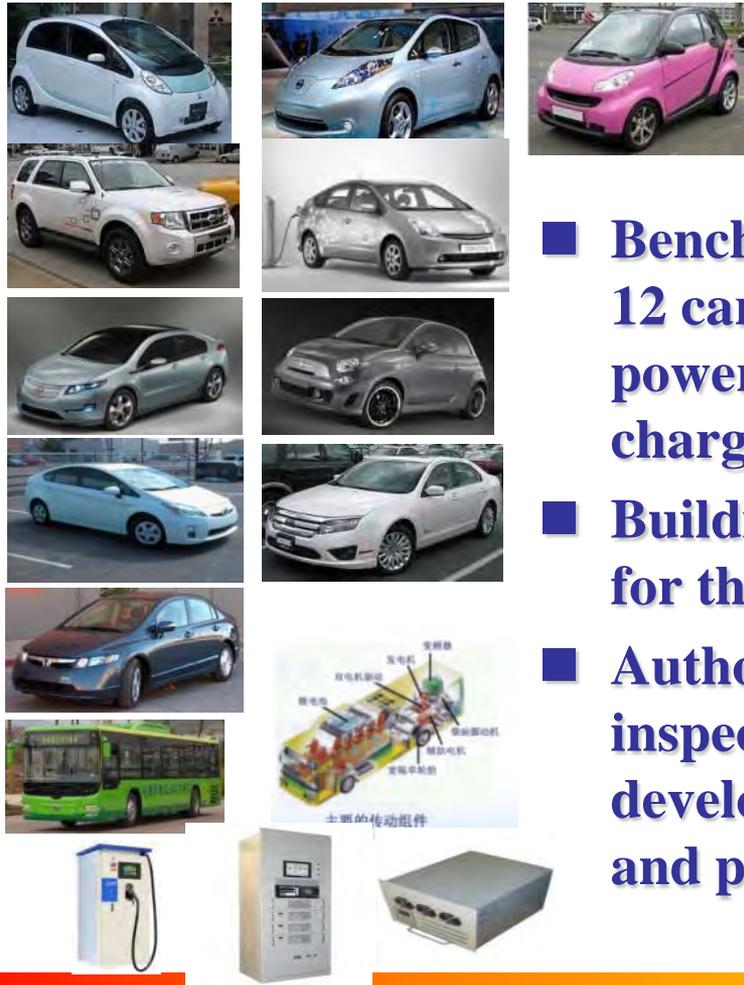
- Test center finished lots of tests for the OEMs' new products certification
  - fifteen hybrids
  - Thirty-three EVs
  - Twenty E-motors, some with transmission together
  - Several types of batteries

# Benchmarking and evaluation



U.S.-CHINA CLEAN ENERGY RESEARCH CENTER  
中美清洁能源研究中心

- ▶ BEV
- ▶ Plug-in
- ▶ REEV
- ▶ Full Hybrid
- ▶ Mild Hybrid
- ▶ Power train of HDV
- ▶ Chargers



- Benchmarking more than 12 cars and two powertrain of bus, five chargers
- Building up the database for the industry
- Authorized by MOST, inspect and supervise the development of vehicles and parts in 863 program

# Benchmarking and evaluation



1. Evaluation of basic technical parameter
2. Designing and layout
3. Performance
4. Comparison between EVs
5. Energy-efficiency technologies
6. Structure and Crash Safety
7. Analyze working pattern of system

# Benchmarking and evaluation



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中美清洁能源研究中心

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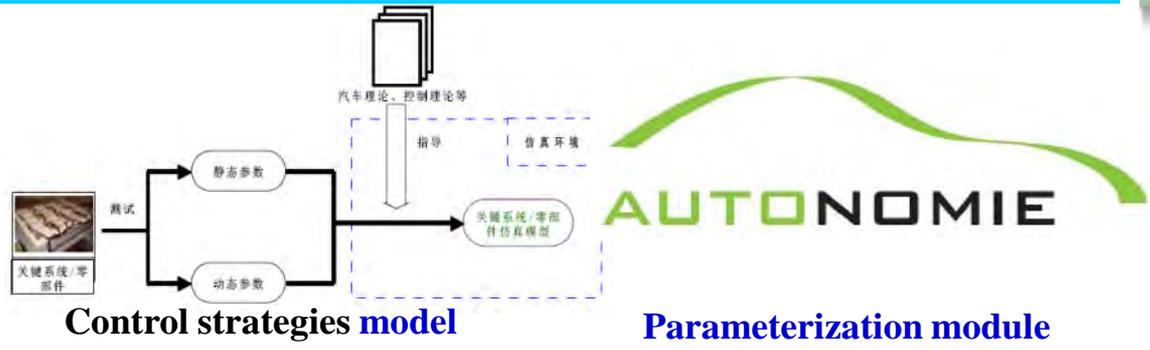
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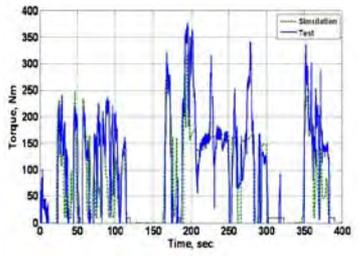
# Benchmarking and evaluation



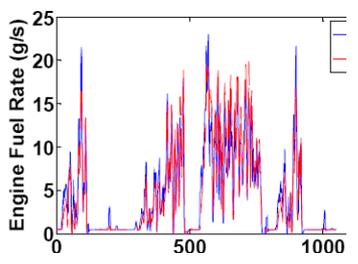
Based on software simulation , bench test and road test, research the control strategies and validate the results



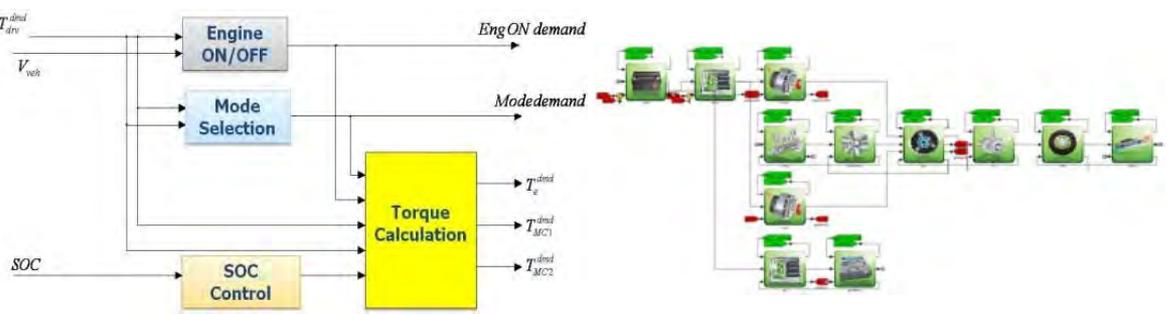
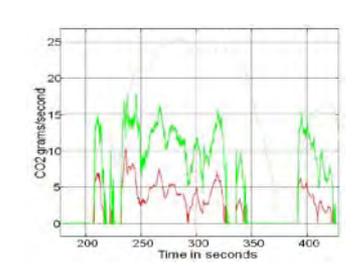
Vehicle performance



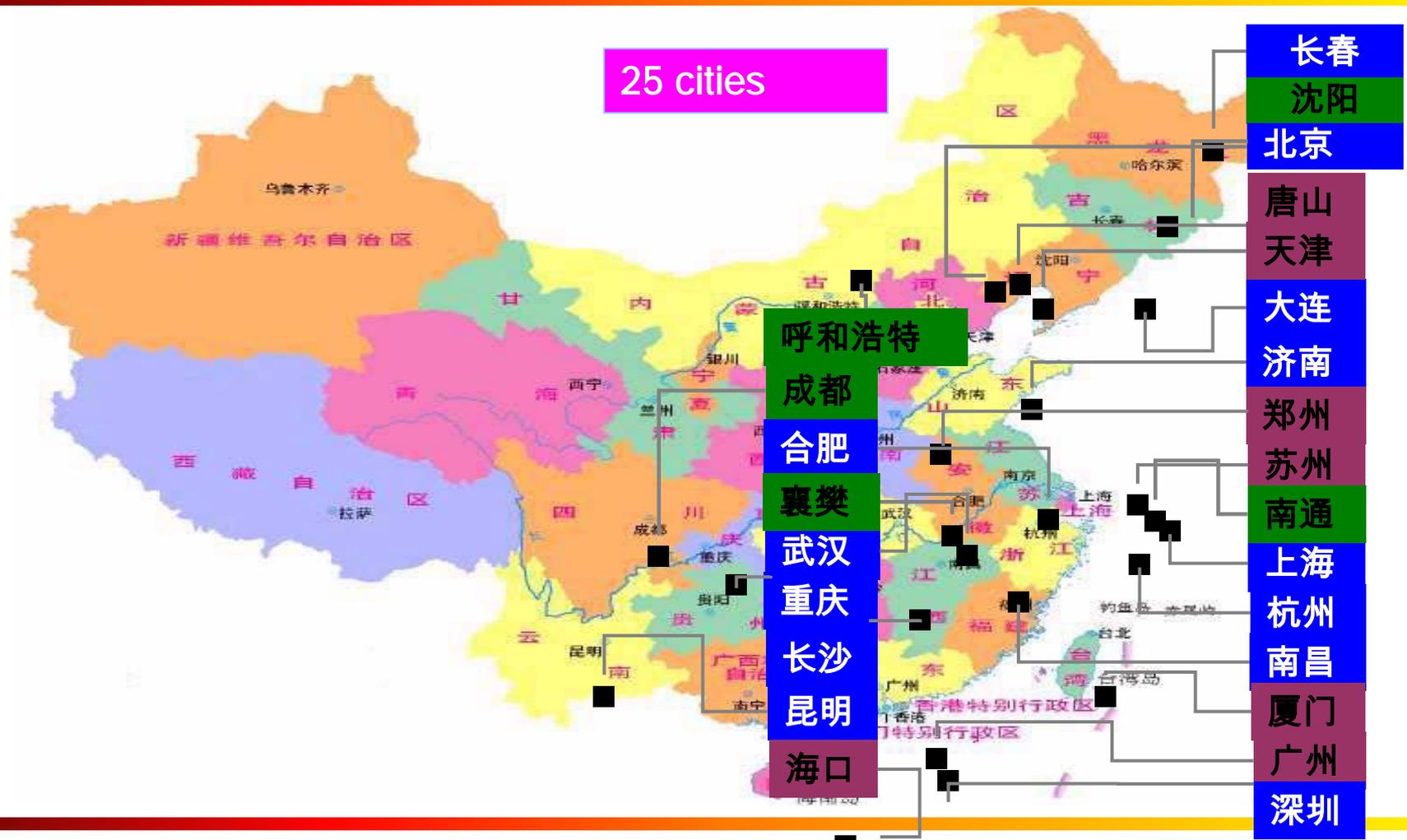
Fuel Economy



Emissions



# Ten cities 1000 EVs



# Ten cities 1000 EVs



City	HEV	BEV/Plug-in	Total
广州	1800	800	2600
海口	300	750	1050
苏州	900	100	1000
唐山	/	2000	2000
厦门	607	403	1010
郑州	600	1400	2000
天津	1205	295	1500
沈阳	1000	100	1100
成都	330	700	1030
南通	670	430	1100
襄樊	100	970	1070
呼和浩特	570	30	600
Total	8082	7978	16060

# Ten cities 1000 EVs



## Tasks and requirements:

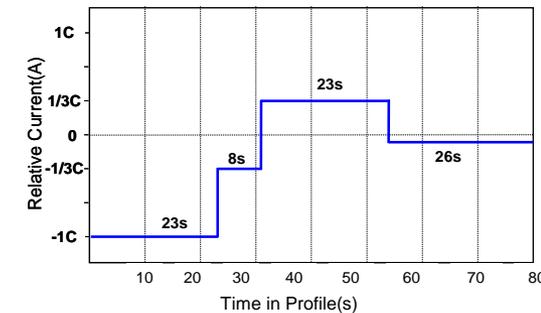
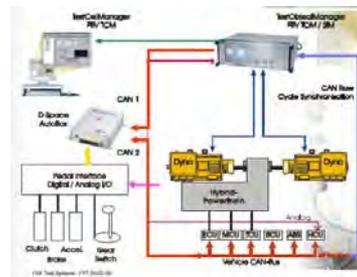
- (1) Standards of data format, collection interface, data storage
- (2) standards of remote monitor, data transfer format, transfer methods, transfer safety, vehicles calibration, diagnose, fault-tolerant based on 3G technology
- (3) Structure of the information service platform

# III、EV Standardization

# Codes and Standards Research



- Supported by MOST, researching the testing and inspection methods of for REEV, powertrain, battery etc.
- Providing more the ten test procedures and eight suggestions to the industry and national standards



# Codes and Standards Research



## ■ Achievements of this project

1. Extended-Range Electric Vehicle Energy Consumption , range and Emissions Test Technologies
2. Methods of EMC characteristics measurement
3. Methods of Noise characteristics measurement
4. Methods of Crash measurement
5. Test and Evaluation of battery system cycle and calendar lives
6. Test and Evaluation of power train
7. Test and Evaluation of Extended-Range system
8. Test and Evaluation of on-board chargers

# Codes and Standards Research



- Provide suggestions for industry and national standards
  1. **GB/T 18387-2008 Limits and test method of magnetic and electric field strength from electric vehicles, broadband,9kHz to 30MHz**
  2. **GB 18655-2002 Limits and methods of measurement of radio disturbance characteristics for the protection of receivers used on board**
  3. **GB/T 18384.1-2001 Electric vehicles – Safety specifications**
  4. **GB/T 24549-2009 Fuel cell electric vehicles - Safety specifications**
  5. **GB/T 19751-2005 Hybrid electric vehicles - Safety specifications**
  6. **GB/ T Electrically propelled road vehicles — Test specification for traction battery systems**
  7. **GB / T Electrically propelled road vehicles — General Technical Requirements for traction battery systems**
  8. **GB/ T Recommended Practice for Electric Vehicle Battery Systems Crash Integrity Testing**

# Role in SEVIA



## 中央企业电动车产业联盟 State-owned Enterprise Electric Vehicle Industry Alliance

■ Supported by SASAC, 20 companies organized the EV industry alliance in China

■ In SEVIA, CAERI acts as the secretary unit for building up the standards and code of the alliance inside, promotes those to be the standards of the national

■ CAERI also responses to build up the independent test center for the members of SEVIA



# Summarize



## ■ Three main types of CAERI activities

- Benchmarking of advanced EV technologies
- Attending the 10 cities 1000 Vehicles information collection
- Providing the data to support the codes and standards making

## ■ We would like to cooperate with National labs and their industry partners

- Exchange complementary expertise
- Share information and data
- Share the facilities



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Thanks for your time!



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