US – CHINA

Electric Vehicle and Battery Technology WORKSHOP

美国-中国电动汽车和电池技术研讨会

August 30, 2010 – September 1, 2010
2010年8月30号 - 9月1号

Sponsored by (主办):
U.S. Department of Energy
美国能源部

China Ministry of Science and Technology
中国科技部

Hosted by (承办):
Argonne National Laboratory
阿岗国家实验室

Argonne Guest House
阿岗招待所

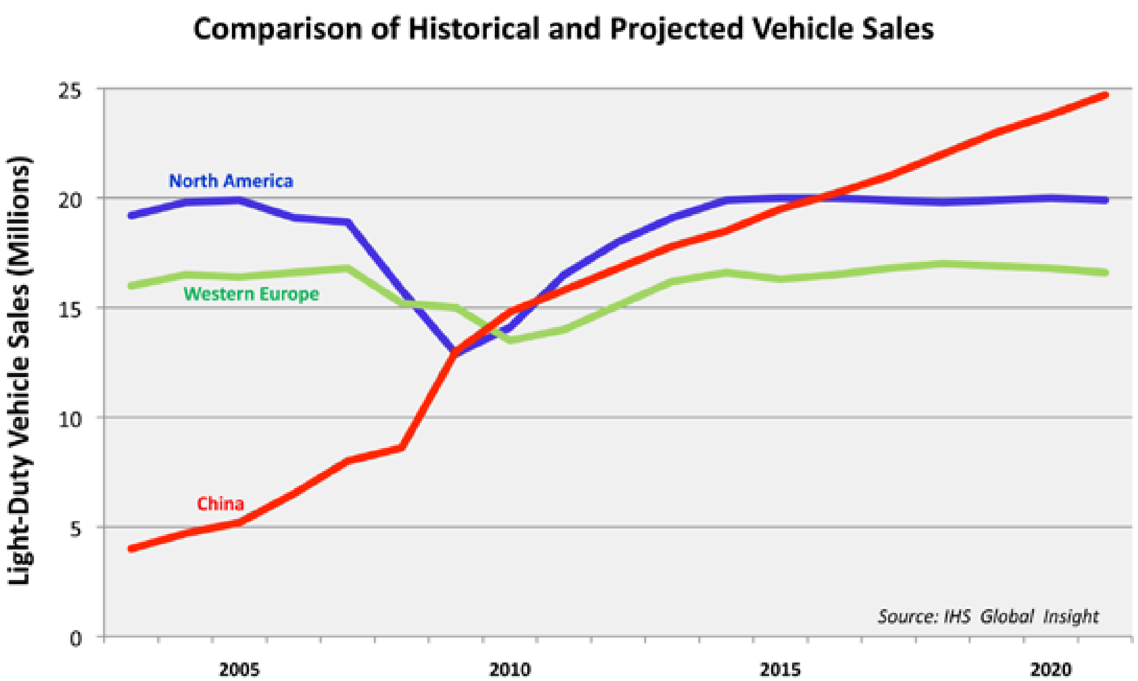
Aerial view of Argonne
阿岗俯视图

US–China Electric Vehicle and Battery Technology Workshop
Conference Center Entrance

美国-中国电动汽车和电池技术研讨会会议中心入场处

Theory and Computing Science – Building 240
理论和计算科学楼(240号楼)

China's Spectacular Growth in Automobile Sales
中国汽车销售的惊人增长



Spectacular growth in auto sales in China has propelled it into first place in the global market. To a large extent, this was made possible by a collapse in US auto sales in 2009. As the global economy recovers from the current recession, North America should regain the lead in auto sales, but only temporarily. China should become the biggest market for automobiles, for good, by 2015.

– *IHS Global Insight*

Survey Question

➤ **By 2020, electric-drive vehicles (HEVs, PHEVs, and BEVs) will be what percent of new light-duty vehicle SALES?**
到2020 年， 电动汽车 (HEVs, PHEVs, and BEVs) 占市场轻型车销售的百分比是多少?

China: _____ <5% _____ 5 – 10% _____ 10 – 20% _____ >20% 根据中方预计数据 as forecast by the Chinese

US: _____ <5% _____ 5 – 10% _____ 10 – 20% _____ >20% as forecast by the Americans

FACT SHEET: U.S.-China Electric Vehicles Initiative

November 17, 2009

Today, President Barack Obama and President Hu Jintao announced the launch of a U.S.-China Electric Vehicles Initiative. The two leaders emphasized their countries' strong shared interest in accelerating the deployment of electric vehicles in order to reduce oil dependence, cut greenhouse gas emissions and promote economic growth. Activities under the initiative will include:

- Joint standards development. The two countries will explore development of joint product and testing standards for electric vehicles. This will include common design standards for plugs to be used in electric vehicles, as well as common test protocols for batteries and other devices. Each country currently has extensive literature and data on its own standards. Making this information mutually available and working towards common standards can help facilitate rapid deployment of electric vehicles in both countries.
- Joint demonstrations. The Initiative will link more than a dozen cities with electric vehicle demonstration programs in both countries. Paired cities will collect and share data on charging patterns, driving experiences, grid integration, consumer preferences and other topics. The demonstrations will help facilitate large-scale introduction of this technology.
- Joint technical roadmap. A U.S.-China task force will create a multi-year roadmap to identify R&D needs as well as issues related to the manufacture, introduction and use of electric vehicles. The roadmap will be made widely available to assist not just U.S. and Chinese developers, but also the global automotive industry. It will be updated regularly to reflect advances in technology and the evolution of the marketplace.
- Public awareness and engagement. The United States and China will develop and disseminate materials to improve public understanding of electric vehicle technologies. Building on the success of the first-even U.S.-China Electric Vehicles Forum in September 2009, the United States and China will sponsor the event annually, alternating between the two countries. The Forum will bring together key stakeholders in both countries to share information on best practices and identify new areas for collaboration.

情况说明书：美国-中国电动汽车合作草案

2009年11月17日

今天，奥巴马总统和胡锦涛主席宣布了美中电动汽车合作草案。 两位国家领导人强调了彼此在加速电动汽车发展以减少对石油的依赖，减少温室气体排放，和刺激经济发展等方面的共同兴趣。草案所包括内容如下：

- 联合的标准制定。两个国家将共同发展电动汽车的通用产品和测试标准。这将包括可充电式电动汽车插头的通用设计标准，以及电池和其他相关设备的通用测试程序。每个国家目前都有很多关于自己标准的文档和数据。互相共享这些信息，并且建立统一标准将极大地加速电动汽车在两个国家的发展。

- 联合的展示。草案将两个国家的十多个城市的电动汽车展示项目联系起来。配对的城市将收集并共享关于充电规律，驾驶经验，电网整合，消费者偏好等方面的数据。联合展示将有效促进电动汽车的大规模市场引进”。

- 联合的技术发展规划。美中将联合制定关于未来几年电动汽车研究、制造、市场引入和使用的发展规划。 这个发展规划将被允许广泛使用，不仅中美两国，全球的汽车产业都可以从中受益。发展规划还将定期更新以反映市场动向和技术革新。

- 公众意识和参与。 美国和中国将共同宣传相关信息以促进公众的对电动汽车技术的认识。基于2009年9月第一届美中电动汽车论坛的成功举行，美中两国将每年轮流举办该研讨会。研讨会将聚集两个国家的主要相关人员来分享最佳的实践信息和确定新的合作领域。

US – China Electric Vehicle and Battery Technology Workshop

Argonne National Laboratory
Theory and Computing Science Building

August 30 – September 1, 2010

Sunday
August 29
19:00~21:00
Reception at Guest House

Plenary Session
Overview, Objectives, Guidance

Monday (am)
August 30
Auditorium

- 8:00 Continental Breakfast
- 9:00~9:30 Welcome
- 9:30~10:15 Technology Policy
- 10:15~11:00 Vehicle Technology
- 11:00~11:45 Battery Technology
- 11:45 Lunch

Invited talk & Discussions

Roundtable Sessions
Develop Common Understanding of Key Issues, through technical presentations and discussions

Monday (pm), August 30
13:30 ~ 17:00 (15:30 Break)

Battery Technology Roadmapping

Key Issues
- Battery materials and chemistries
- Techniques to understand failure
- Characterizing materials and electrodes
- Modeling battery life prediction

Battery Test Procedures

Key Issues
- Battery performance/durability testing
- Battery abuse testing

Vehicle Demonstrations and Infrastructure

Key Issues
- Vehicle test procedures and protocols
- Charging systems and infrastructure
- Vehicle-grid interface
- Vehicle and charger standards
- Vehicle-Grid communication
- US & China demonstration programs
- Public awareness and engagement

18:00
Dinner at Guest House

Roundtable Sessions
Continue to Develop Consensus … Opportunities and Recommendations

Prepare summary presentations

Tuesday, August 31

8:00 Continental Breakfast
10:30 Break
12:00 Lunch

9:00~12:00 13:30~15:00
Battery Technology Roadmapping
Opportunities for Cooperation

Battery Test Procedures
Opportunities for Cooperation
9:00~12:00 13:30~15:00

Vehicle Demonstrations / Infrastructure
Opportunities for Cooperation
9:00~12:00 13:30~15:00

18:15~21:30
Dinner begins at 18:45
Banquet
Museum of Science and Industry

Closing Session
Summary Presentations, Next Steps

Wednesday, Sept. 1
Auditorium
(joint session)
9:00~12:00

- 8:00 Continental Breakfast
- Battery Technology Opportunities
- Battery Testing Opportunities
- 10:30 Break
- Vehicle Technology Opportunities
- 12:30 Lunch at Guest House
- 14:00 ~16:30 ANL Facility Tours

美国-中国 电动汽车和电池技术研讨会

阿岗国家实验室
理论和计算科学大楼

星期日
8月29号
19:00~21:00
招待会
阿岗招待所

开幕
主题介绍

星期一(上午)
8月30号
礼堂

- 8:00 早餐
- 9:00~9:30 欢迎
- 9:30~10:15 技术政策
- 10:15~11:00 车辆技术
- 11:00~11:45 电池技术
- 11:45 午餐

特邀报告 及 讨论

圆桌会议
通过技术报告和讨论对主要议题达成共识

星期一(下午), 8月30号
13:30 ~ 17:00 (15:30 休息)

电池技术发展规划
主要议题
- 电池材料
- 故障诊断技术
- 材料和电极的特性
- 电池寿命预测模型

电池测试程序
主要议题
- 电池性能/耐久性测试
- 电池滥用测试

车辆展示和基础设施
主要议题
- 车辆测试方法和规则
- 充电系统和设施
- 车辆-电网接口
- 车辆及充电器标准
- 车辆-电网 通信
- 美国-中国展示项目
- 公众意识及参与

18:00
晚餐
阿岗招待所

圆桌会议
继续发展共识...
机遇和建议
准备总结报告

星期二, 8月31号

- 8:00 早餐
- 10:30 休息
- 12:00 午餐
- 9:00~12:00 13:30~15:00 电池技术发展规划 合作机会
- 9:00~12:00 13:30~15:00 电池测试程序 合作机会
- 9:00~12:00 13:30~15:00 车辆展示 / 基础设施 合作机会

18:15~21:30
（晚餐于18:45开始）
宴会
芝加哥科学工业博物馆

闭幕
总结发言, 下一步

星期三, 9月1号
礼堂
(联合会议)
9:00~12:00

- 8:00 早餐
- 电池技术发展机遇
- 电池测试技术发展机遇
- 10:30 休息
- 车辆技术发展机遇
- 12:30 午餐 阿岗招待所
- 14:00 ~16:30 阿岗研究设施参观

2010年8月30号到9月1号

Bus Schedule

A bus will circulate between the Argonne Guest House and the Building 240 Conference during the listed hours.

- **Monday, August 30**
  7:45 to 9 a.m.
  5 to 5:45 p.m.

- **Tuesday, August 31**
  7:45 to 9 a.m.
  3 to 3:45 p.m.

- **Wednesday, September 1**
  7:45 to 9 a.m.
  End of meeting for 45 minutes

SPECIAL EVENTS

- **Tuesday, August 31**
  A bus will leave the Guest House at 4:30 p.m. take conference attendees to a special banquet at the Museum of Science and Industry. The bus will leave the museum at 9:30 and return to the Guest House.

- **Wednesday, September 1**
  Buses will leave the Guest House at 2 p.m. for tours of Argonne's transportation research facilities. The bus will return to the Guest House at 4:30 p.m.

巴士运行时间

在以下时间，巴士会在阿岗招待所和240号楼会议室之间运行。

- **星期一，8月30号**
  7:45到9:00 **(上午)**
  5:00到5:45 **(下午)**

- **星期二，8月31月**
  7:45到9:00 (上午)
  3:00到3:45 (下午)

- **星期三，9月1号**
  7:45到9:00 (上午)
  会议结束后45分钟内

特别项目

- **星期二，8月31月**
  星期二，8月31号- 巴士将于下午4点30分从阿岗招待所出发，带全体与会者去芝加哥科学工业博物馆参加宴会。巴士将于晚上9点30分离开博物馆返回阿岗招待所。

- **星期三，9月1号**
  星期三，9月1号- 巴士将于下午2点从阿岗招待所出发，带全体与会者参观阿岗的交通研究设备资源。巴士将于下午4点半返回阿岗招待所。

Plenary Session 开幕

August 30, 2010 (morning) | Building 240 | Room 1416

2010年8月30号（上午） | 240号楼 | 1416会议室

1. **Welcome and Orientation | 9:00 – 9:30** 欢迎和介绍
    - a. Mark Peters, Deputy Laboratory Director – Welcome to Argonne

      Mark Peters, 阿岗国家实验室副主任 – 欢迎来到阿岗
    - b. Larry Johnson, TTRDC Director – Orientation, Logistics, Workshop Format

      Larry Johnson, 交通技术研发中心主任 – 会议介绍，安排和研讨会形式

2. **Technology Policy | 9:30 – 10:15** 技术政策
    - a. U.S. David Sandalow, USDOE Assistant Secretary for Policy and International Affairs

      美国 David Sandalow, 美国能源部政策和国际事务助理副部长
    - b. China DU Zhanyuan, Vice Minister, Ministry of Science and Technology

      中国 杜占元，中国科技部副部长

3. **Vehicle Technology and Demonstrations | 10:15 – 11:00** 车辆技术和展示
    - a. U.S. Henry Kelly, USDOE EERE Principal Deputy Assistant Secretary

      美国 Henry Kelly, 美国能源部能源效率和可再生能源副助理副部长
    - b. China ZHANG Zhihong, Deputy Director General, Department of New and High Technology, MOST

      中国 ZHANG Zhihong, 张志宏，中国科技部高新技术司副司长

4. **Battery Technology | 11:00 – 11:45** 电池技术
    - a. U.S. Dave Howell, USDOE Vehicle Technologies Program, Team Lead Hybrid Electric Systems

      美国 Dave Howell, 美国能源部车辆技术办公室， 混合动力电子系统领导
    - b. China WU Feng, Beijing Institute of Technology, Chief Scientist of the National 973 Battery Project

      中国 吴锋，北京理工大学，国家973电池项目首席科学家

Notes 备注

Roundtable 1: Battery Technology Roadmapping
圆桌会议 1: 电池技术 发展规划

CO-LEADERS:
会议主席

UNITED STATES
美国

Dave Howell
U.S. Department of Energy

Dave Howell, 美国能源部

CHINA
中国

WU Feng
Beijing Institute of Technology

吴锋，中国 北京理工大学

Presentations:
报告

US Advanced characterization techniques to understand failure (Frank McLarnon/LBNL)
美方 先进的诊断技术： 对于材料失效机制的研究 (Frank McLarnon/伯克利国家实验室)

US In situ techniques to characterize materials and electrodes (YANG Xiao-Qing/BNL)
美方 原位诊断技术： 对于电极材料的研究 （杨晓青/布鲁克海文国家实验室)

US Developing modeling capability to predict life of batteries (Jeff Christopherson/INL)
美方 开发预测电池寿命的模拟能力 (Jeff Christopherson/爱德荷国家实验室)

China Studies of Interfacial Processes of Lithium-Ion Batteries by using In Situ MFTIRS and EQCM (Shigang Sun/ Xiameng University)
中方 MFIRS 与EQCM对锂离子电池界面过程的研究 （孙世刚/厦门大学）

China New Battery Materials (Xueping Gao/ Nankai Unviersity)
中方 新型电池材料（高学平/南开大学）

Notes 备注

Roundtable 1: Battery Technology Roadmapping

Issues to be addressed

Battery materials and chemistries: Discuss the different battery chemistries that are suitable for HEV, PHEV and EVs. Provide supporting data and discuss the potential problems in relation to cost, safety, calendar life and performance.

Advanced characterization techniques to understand failure: Discuss the different characterization tools using under the ABRT and BAAT. Presenter will collect data from all DOE labs and will explain how the techniques works and what kind of result to expect using examples.

In situ techniques to characterize materials and electrodes: Discuss synchrotron based in situ and ex situ soft x-ray absorption spectroscopy (XAS) techniques which allows for the distinguish ion of the structural differences between surface and bulk of electrodes using both electron yield (EY) and fluorescence yield (FY) detectors simultaneously.

Developing modeling capability to predict life of batteries: Discuss Technology Life Verification Testing (TLVT) model that can help predict battery life capability with high statistical confidence and minimal testing. Both a battery life model and error model are needed for accurate life prediction. The life model should adequately cover the anticipated range of stress factors, and the error model must account for both manufacturing variability and measurement error. Based on these models, an estimate of life can be determined through Monte Carlo simulations and verified with actual test data. A user-friendly software tool was developed for the analysis and simulation of battery test data using statistically robust methods based on a default model. A description of the TLVT methodology and the available software tool will be presented.

Roundtable 1: Battery Technology Roadmapping
圆桌会议 1: 电池技术 发展规划
需要讨论的议题

电池材料及其匹配组合：讨论应用于混合动力汽车(HEV)，可充电式混合动力汽车(PHEV) 及电动汽车(EV)的不同的电池材料选配。 提供相应的数据支持并讨论与成本，安全，寿命及性能相关的问题。

先进的诊断技术-探索失效机制：讨论在美国能源部“ABRT”及“BATT”研究项目中使用的先进诊断手段，用例证说明这些手段的工作原理及预期结果。

电池材料及电极的原位诊断技术：讨论基于同步辐射光源的原位及非原位X光衍射/吸收， 软X光吸收光谱技术（同时使用光电子及荧光X光子探头）使我们可以对电极表面与内部的结构变化加以区分。

开发预测电池寿命的模拟能力：讨论“预测电池寿命的模型和测试” (TLVT)。这个模型会有助于实现用最少的测试数据来有效的预测电池寿命。我们需要两个模型以便准确预测电池寿命：电池寿命模型和误差模型。电池寿命模型应准确考虑可预计的破坏性因素，而误差模型应考虑生产误差及测试误差。基于这两个模型，电池预期寿命可用蒙地卡罗(Monte Carlo)模拟法算出并由实验数据证实。我们在此基础上开发了易于使用的软件程序。“TLVT”及相关的模型，数据分析和软件程序会在讨论中详细说明。

Roundtable 1: Battery Technology Roadmapping
圆桌会议 1: 电池技术 发展规划

Desired Workshop Outcomes
研讨会期待就以下几点达到共识

- Agree on which battery chemistry is suitable for PHEV and EVs
  对于最适用于PHEV和EV的电池材料组合达成共识
- Identify the most promising and effective diagnostic tool that can be used to understand battery failure
  确定理解电池失效机制最有效的诊断技术
- Identify areas of collaboration in the diagnostic field including exchange of scientist and materials
  确定诊断研究领域的合作渠道，包括人员及材料的交流
- Identify areas of collaboration in situ techniques using advanced user facility in the US and China
  确定在原位诊断研究领域的合作方式，共享美中两国的先进设施
- Identify areas of collaboration on developing robust modeling capability to predict battery life
  确定在利用模拟计算预测电池寿命领域的合作机会。

Roundtable 2: Battery Test Procedures
圆桌会议2：电池测试程序

CO-LEADERS: 会议主席	UNITED STATES 美国	CHINA 中国
	Jeff Chamberlain Argonne National Laboratory	**QIU Xinping** Tsinghua University
	Jeff Chamberlain, 阿岗国家实验室	邱新平，清华大学

Presentations:
报告

US　U.S. Battery Performance and Durability Testing (Ira Bloom/ANL)
美方　美国电池性能及耐久性能测试（Ira Bloom/阿岗国家实验室）

US　U.S. Battery Abuse and Safety Testing (Peter Roth/SNL)
美方　美国电池极限条件和安全性能测试（Peter Roth/桑迪亚国家实验室）

China　Test of Lithium-ion Batteries for Self Heating and Lifetime evaluation (HE Xiangming/Tsinghua University)
中方　电池检测与模型（何向明/清华大学）

China　Testing standards and new methods for batteries (SHAN Zhongqiang/Tianjin University)
中方　动力电池检测标准与新方法（单忠强/天津大学）

Notes 备注

Roundtable 2: Battery Test Procedures

Issues to be addressed

US Battery Performance and Durability Testing: Discuss testing methods and the meaning of the results. In the US, battery performance and life testing is application-based. Here, challenging performance and durability targets and goals are developed by the United States Advanced Battery Consortium for applications, such as pure electric, hybrid-electric and plug-in hybrid-electric vehicles. The test procedures are derived from the goals. The test, itself, consists, of characterizing the battery, aging it, and characterizing it again to gauge change. The tests last long enough to produce a reasonable amount of data without, necessarily, exhausting the battery. During the test, the data are routinely analyzed for quality and are used to develop degradation models for life predication. In certain cases, the tested batteries are subjected to post-test analyses to correlate the performance change with physical/chemical changes within the battery.

Questions to be discussed at the roundtable

1. What approach to testing is used in China and in the US (general philosophy)?

2. What testing procedures are used in China and in the US? Are they standards or standard practices? May we obtain a copy of them? How do they compare to those used in the US and in the US?

3. Do China and the US perform data analysis and modeling using test data? Do China and the US have any validated models that are used for life estimation or other generic degradation models used? What approach is used for accelerated testing and life prediction?

4. Do China and the US perform data quality analyses? Uncertainty analyses?

5. Do China and US validate the testing procedures against real-world results? How do the test results compare to vehicle results?

6. Do China and US perform post-test analyses on batteries? Techniques used?

圆桌会议2：电池测试程序

需要讨论的议题

美国电池性能及耐久性测试：讨论测试方法和数据含义。在美国，电池性能和寿命测试是以应用为前提的。美国先进电池联盟面向应用为目的，制定了非常有挑战性的电池性能与耐久度的近期和远期目标，而这些应用包括电动汽车，混合动力汽车以及可充电式混合动力汽车。测试的程序则来源于目的。测试本身包括表征电池，老化测试，然后再次表征来测量电池的变化。这些测试可以持续很长时间，从而产生足够的数据而不必耗尽电池性能。测试时，得到的数据会定期的进行分析以监测电池的品质并用来构建退化模型，从而可以预测电池寿命。在某些特定测试中，被检测电池需要进行测试之前的分析，已用来校正电池系统内的物理化学变化所引起的性能改变。

圆桌会议讨论的问题

1。 中国与美国所采用的（一般意义上的）电池测试方法都有哪些?

2。 中国与美国所采用的电池测试程序都有哪些？这些程序是标准程序或者标准惯例吗？我们可以要求一份这些程序吗？与在美国应用的程序相比，他们有哪些相同或不同?

3。 中国与美国是否采用这些数据进行数据与建模分析吗？中国和美国是否建立了有效的数据模型用来评估电池寿命或者其他常见的电池老化？什么样的方法可以用来加速电池检测与寿命预测?

4。 中国与美国是否进行数据质量分析或者不确定性份析?

5。 中国和美国是否验证测试程序的真实性？与汽车测试结果相比有何不同?

6。 中国和美国是否对电池进行检测后分析？使用何种技术?

Roundtable 2: Battery Test Procedures

Issues to be addressed

US Battery Abuse and Safety Testing: Discuss testing methods and the meaning of the results. The growing market for electric vehicles (EVs) and plug-in hybrid vehicles (PHEVs) is driven by performance, vehicle range (higher energy, higher capacity), and battery pack life (cycle life). The near-term generations of these battery packs will be lithium-ion cell chemistries ranging from 5 to 50 kWh and the inherent safety issues and potential failure modes of these EV and PHEV batteries are of increasing concern. Unlike aqueous-based NiMH or NiCd batteries, most conventional lithium-ion cells contain organic solvent-based electrolyte that is highly flammable and use cathode materials that can undergo exothermic, autocatalytic thermal runaway. The failure of these cells can be catastrophic and are well documented in the consumer electronics industry. The Battery Abuse Testing Laboratory at Sandia National Laboratories is focused on determining failure mechanisms of lithium-ion cells, developing and evaluating abuse tolerant materials for cells, batteries and packs, and thermal characterization of lithium-ion cell materials.

Questions to be discussed at the roundtable

1. What safety testing standards or protocols are in place for the lithium-ion battery market in China and the US (vehicle or consumer electronics applications – what testing is required, who monitors and ensures testing, etc.)?

2. What research is being done and implemented to mitigate or address the safety hazards associated with lithium-ion chemistries in China and US?

3. Are there currently any standards or certifications for HEV, EV or PHEV lithium-ion batteries in China and the US? If not, are their plans to certify vehicle batteries?

4. What is being done to address issues related to lithium-ion battery field failures (new materials, manufacturing quality assurance, etc.)?

Roundtable 2: Battery Test Procedures

圆桌会议2：电池测试程序

需要讨论的议题

美国电池极限条件和安全测试：讨论测试方法和数据含义。电动车和可充电式混合动力汽车的市场增长取决于以它们的性能，车辆行驶距离(更高能量，更高容量），以及电池组寿命（循环寿命）。新一代电池组将以锂离子电池为基础，从5到50千瓦时。 但是电动车和可充电式混合动力汽车车用锂离子电池固有的安全问题和潜在的故障模式引起日益关注。不像水基的镍氢或镍镉电池，传统的锂离子电池使用含有高度易燃的有机溶剂电解质和可放热，自催化热失控的正极材料。这些电池的故障可能是灾难性的，这些在消费电子行业都有记录。美国桑迪亚国家实验室的电池极限测试实验室重点是确定锂离子电池失效机理，开发和评估更安全的电池电池组材料，以及对这些材料的热表征。

圆桌会议讨论的问题

1。在锂离子电池市场， 中国和美国有何安全测试标准或测试原型（车辆或消费电器应用 - 需要何种测试，负责监察及确保测试机制等）？

2。中国和美国在做何种研究减轻或解决锂离子电池的安全隐患?

3。在中国和美国，目前是否有任何混合动力汽车，电动车或插入式混合动力汽车锂离子电池标准或认证?如果没有，是否有计划认证汽车用电池?

4。正在采取什么措施以解决与锂离子电池故障相关的问题（新材料，生产质量保证等）？

Roundtable 2: Battery Test Procedures
圆桌会议2：电池测试程序

Desired Workshop Outcomes
研讨会期待就以下几点达到共识

- Compare and contrast battery testing methods for both performance/durability and abuse/safety.
  比较和对比电池性能/耐久性和极限/安全性能的测试方法。

- Identify areas for collaboration which may lead to a better understanding of the assumptions in the methods used; to a better understanding of the results that are produced; and to, possibly, a common, international testing framework.
  确定合作领域，增进更好地了解预定的测试方法，测试结果，以及，如果可能的话，一个共同的国际测试框架。

Notes 备注

Roundtable 3: Vehicle Demonstrations and Infrastructure
车辆展示和基础设施

CO-LEADERS: 会议主席	UNITED STATES 美国	CHINA 中国
	Keith Hardy (ANL)	WANG Hewu 王贺武 (Tsinghua University 清华大学)
	Steve Goguen (DOE)	

Presentations:
报告

US Opportunities for Standardization/Harmonization in the VehicleGrid System (Keith Hardy, ANL)
车辆-电网系统标准协调的发展机遇 (Keith Hardy)

US Standards Update/Global Approaches to Vehicle-Grid Connectivity (Gery Kissel, GM)
标准更新/车辆-电网连接的通用方法 (Gery Kissel)

US Implementation in Electric Vehicle Supply Equipment (Ted Bohn, ANL)
电动汽车供应设备的安装启用 (Ted Bohn)

US Learning Demonstrations – Vehicles on the Road (Lee Slezak, DOE)
从车展中学习-现有车辆 (Lee Slezak)

US Data Collection for the Vehicle Demonstration Programs (Jim Francfort, INL)
车辆展示项目的数据收集 (Jim Francfort)

China Current Situation and Development of Electric Vehicle Standards in China (ZHOU Rong, CATARC)
中国电动汽车标准的现状和发展 (周荣, 中国汽车技术研究中心)

China Drive and Control Technology of Electric Vehicles (WANG Lifang, Tsinghua University)
王丽芳，电动汽车的驱动和控制技术 (清华大学)

China The Impact of Electric Cars on the Grid (LAI Xiaokang, CATARC)
来小康，电动汽车对电网的影响 (中国电力科学研究院超导电力研究所)

Roundtable 3: Vehicle Demonstrations and Infrastructure
车辆展示和基础设施

Issues to be addressed
需要讨论的议题

The following INFRASTRUCTURE questions will be discussed at the roundtable:
本节讨论以下关于基础设施的问题:

- What are the key drivers/issues in setting vehicle-grid connectivity standards from the perspectives of the OEM, Supplier, Utility and Consumer?
  从制造商，供应商，电力系统和消费者的角度看建立车辆-电网连接标准的主要问题。
- What are the advantages and disadvantages of standardization/harmonization between Asia, Europe and the US?
  亚洲，欧洲和美国实现标准协调的利弊。
- Is global standardization/harmonization necessary or desirable?
  全球标准协调是否必要和值得期待。
- Should governments be involved in the standardization process?
  政府是否应该参与到标准化的过程中。
- What should governments do to support the process? Can the standardization process be accelerated by government involvement?
  政府应该怎样支持这个标准化进程。政府的参与是否能加速这个标准化的过程。
- Are there specific technological developments that would support global standardization (or make more desirable/palatable)?
  是否有具体的技术发展措施能促进全球标准化进程（或者是使其更加有吸引力）。
- How will we share information with each other?
  我们如何共享信息。

Roundtable 3: Vehicle Demonstrations and Infrastructure
车辆展示和基础设施

Issues to be addressed
需要讨论的议题

The following VEHICLE questions will be discussed at the roundtable:
本节讨论以下关于车辆的问题:

- How many vehicles are anticipated to participate in the demonstration?
  参加展示的车辆数目
- Where will they be operated?
  展示场地
- What is the altitude at the demonstration sites?
  展示场地的海拔
- What are the high and low temperatures at the demonstration sites?
  展示场地的最高温度和最低温度
- What are the anticipated driving cycle profiles of the vehicles?
  预计车辆行使工况
- What are the make and model of the vehicles?
  参展车型和制造商
- What type of electric drive train are the vehicles equipped with? (HEV/PHEV/BEV)
  参展车辆的动力传动系统类型（混合电动汽车/可充电式混合电动汽车/电池车）
- What is the performance specification of the battery/drive train?
  电池/传动系统性能参数
- What options are the vehicles equipped with?
  参展车辆的可选择装备
- Will the vehicles be operated by individuals or will they be fleet vehicles?
  参展车辆是按个体运行还是按车队运行
- How will the vehicles be recharged? (type 1, 2, or 3)
  参展车辆如何充电 （类型1，2或者3）
- Will the vehicles be equipped with data loggers?
  参展车辆是否安装数据采集器

- If data loggers are used what data will they collect?
  如果使用数据采集器，以下哪些数据需要采集
  - Date 日期
  - Time 时间
  - Key on 接电
  - Key off 断电
  - Odometer 里程表
  - Pedal position 踏板位置
  - Identification of vehicle 车辆识别
  - Start of charge 充电开始
  - End of charge 充电结束
  - Energy of charge 充电量
  - Charge profile 充电工况
  - GPS locator 定位器
  - Fuel used and type of fuel 燃料使用量和燃料类别
  - Ambient temperature 环境温度
  - Vehicle utility load (heat, air conditioning, wind shield wipers, etc) 车载电荷（加热，空调，雨刷等）
- How will we share information with each other?
  我们如何共享信息。

Roundtable 3: Vehicle Demonstrations and Infrastructure
车辆展示和基础设施

Desired Workshop Outcomes
希望得到的圆桌会议成果

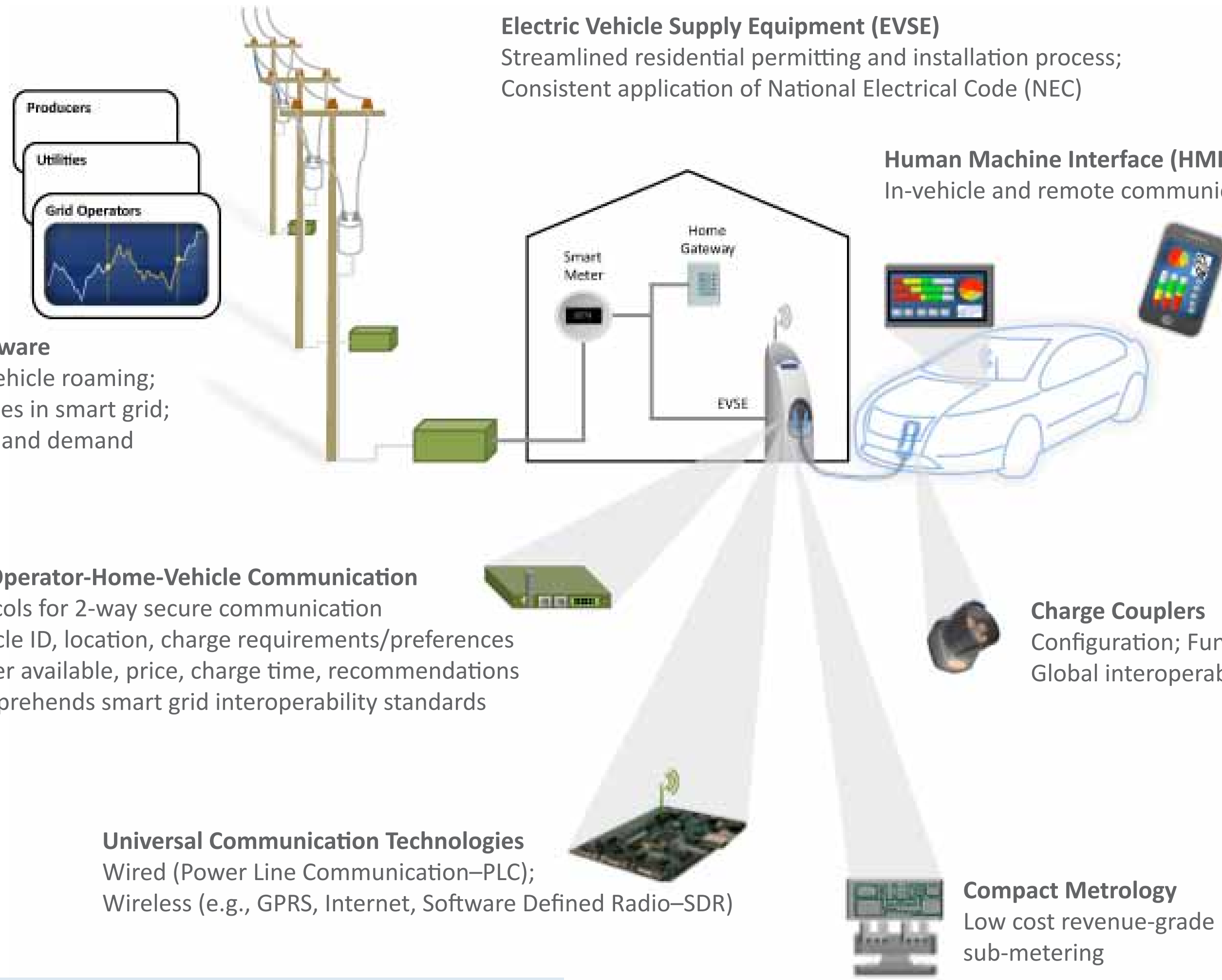
- Government perspective(s) on global standardization/harmonization
  关于全球标准协调的政府观点
- Government involvement in the standardization process
  标准化进程中的政府参与
- Potential for government cooperation
  未来政府合作的可能性。
- Next steps
  下一步

Transportation Electrification Demonstration Activities

Geographical Distribution

Large-Scale Demonstration: "20 Cities – 1000 Vehicles"

Opportunities for Standardization/Harmonization in the Plug-in Vehicle-Grid System



Electric Vehicle Supply Equipment (EVSE)
Streamlined residential permitting and installation process;
Consistent application of National Electrical Code (NEC)

Human Machine Interface (HMI)
In-vehicle and remote communication; behavioral feedback

Back Office Software
Comprehends vehicle roaming;
Integrates vehicles in smart grid;
Balances supply and demand

Grid Operator-Home-Vehicle Communication
Protocols for 2-way secure communication
- Vehicle ID, location, charge requirements/preferences
- Power available, price, charge time, recommendations
- Comprehends smart grid interoperability standards

Charge Couplers
Configuration; Functionality;
Global interoperability

Universal Communication Technologies
Wired (Power Line Communication–PLC);
Wireless (e.g., GPRS, Internet, Software Defined Radio–SDR)

Compact Metrology
Low cost revenue-grade
sub-metering

Test Procedures and Protocols
- Battery safety and condition (figure of merit and remaining life)
- Electric drive system power ratings (analogous to IC engines)
- EVSE functional compatibility

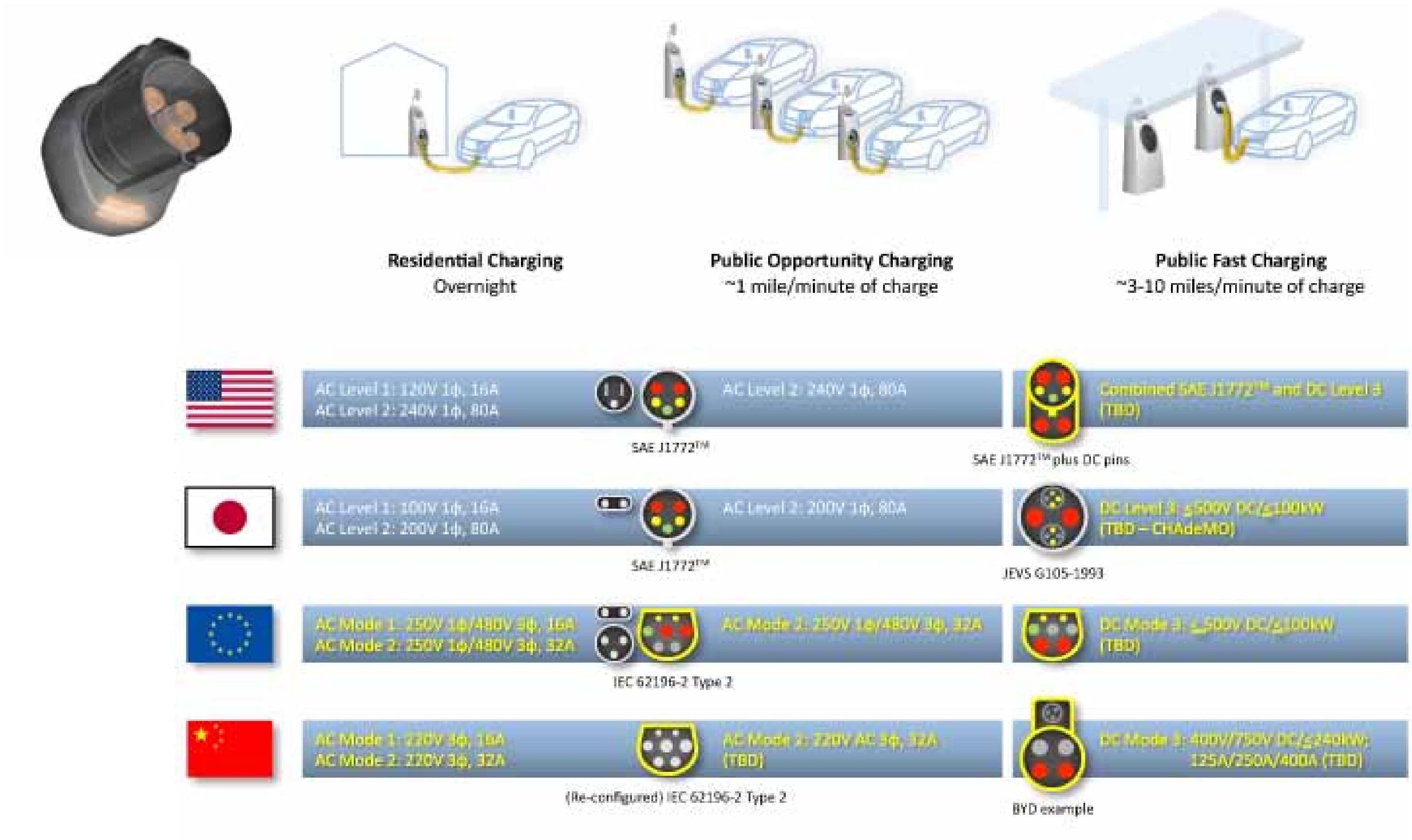
Plug-In Vehicle and Infrastructure Workshop
DOE Headquarters, Washington, DC July 22, 2010

Contacts: khardy@anl.gov, tbohn@anl.gov

Argonne NATIONAL LABORATORY
U.S. DEPARTMENT OF ENERGY

Plugging in Internationally

Standard/proposed charge couplers



SAE J1772™ charging configurations and max ratings (Kissel, June 2010)

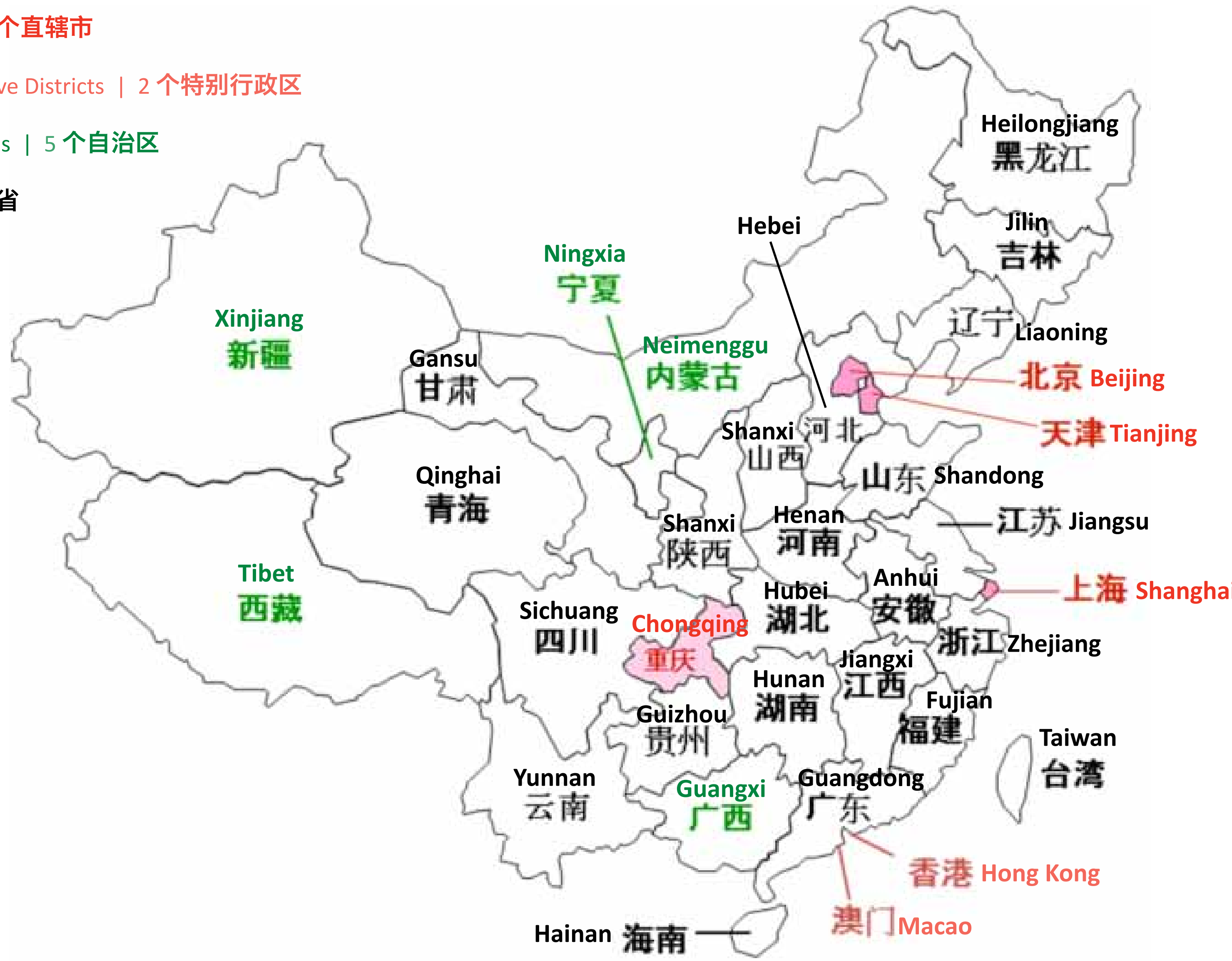
AC L1: 120V AC 1Φ, 12-16A/1.44-1.92kW
AC L2: 240V AC 1Φ, 80A/19.2kW

AC L2: 240V AC 1Φ, 80A/19.2kW
DC L1: 200-450V DC, 80A/19.2kW
DC L2: 200-450V DC, 200A/90kW

AC L3: 240V AC 1Φ , 400A (TBD 1Φ or 3Φ?)
DC L3: (TBD) 200-600V DC, ≤400A/≤240kW

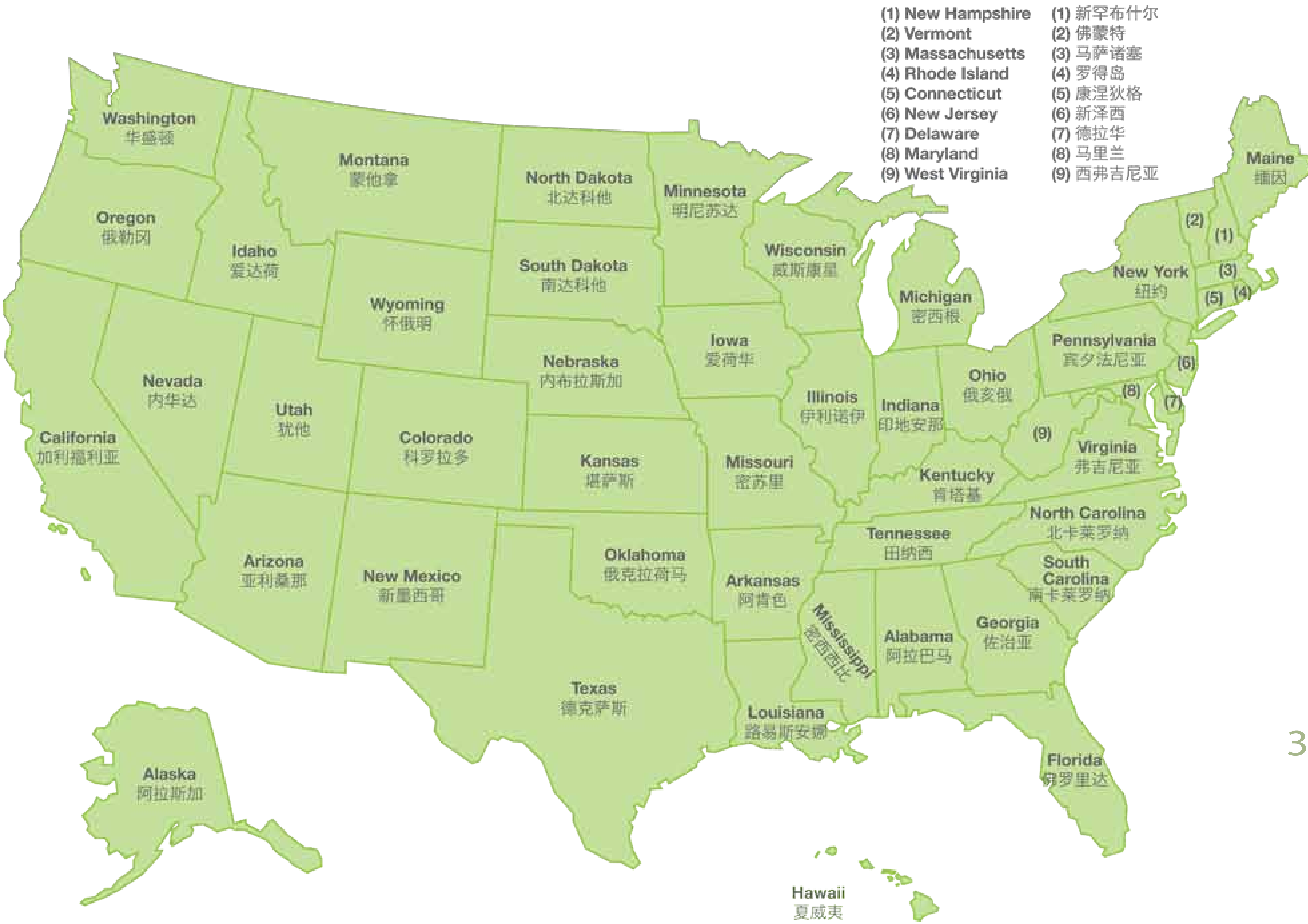
People's Republic of China
中华人民共和国

- 4 Municipalities | 4 个直辖市
- 2 Special Administrative Districts | 2 个特别行政区
- 5 Autonomous Regions | 5 个自治区
- 23 Provinces | 23 个省



The 50 States in the USA

The "Lower 48" plus Alaska and Hawaii



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