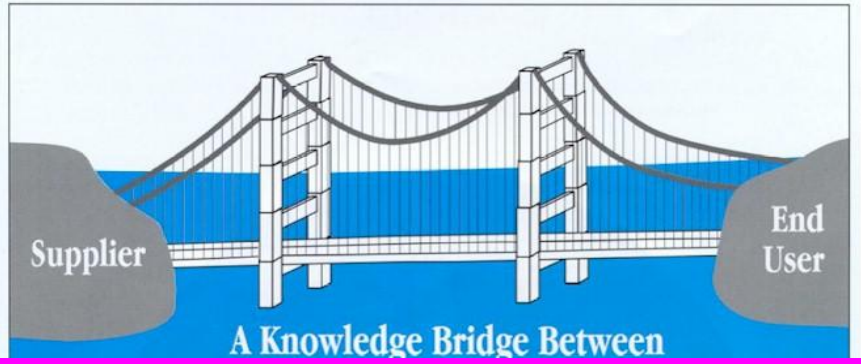
15th DeSOx Conference, Beijing China, April, 2011
第十五届二氧化硫、氮氧化物、汞、细颗粒物污染控制技术与管理国际交流会

The Latest Developments in Air Pollution Technology----Mercury Issues
大气污染控制技术最新进展----汞污染控制

Robert Mcilvaine & Gangjian Li（李钢建）
Mcilvaine Company USA & Shanghai Office
美国迈克文公司 & 上海办事处

April 27~28, 2011

McILVAINE



The Source of Environmental, Energy, Contamination Control, and Process Industry Information Since 1974

成立于1974年, 美国迈克文公司专注于环境、能源、污染控制和加工工业等行业信息服务

One of the Most Professional Worldwide Companies in Environmental Technologies and Market Information

全球最专业的环保技术与市场信息公司之一

Outline

- Background

  背景

- Air Toxic Rules in the U.S.

  美国有毒空气法案

- Overviews of the New Trends in Air Pollution Control

  大气污染控制技术的新走向

- Energy choices in China

  中国的能源选择

- Summary

  总结

1. Background

- **To make this sharing more efficient Mcilvaine has created a free website with the Global Knowledge Orchard.**

为促进知识更高效的分享，Mcilvaine公司创建“全球知识园地”的免费分享网站。

- **There are four major roots for each decison tree. They serve the four knowledge needs: Alerts, Answers, Analysis, Advancement.**

每一个决策树都有4个重要的分支组成。这4个部分构成知识的要求，分别是：通讯，答案，分析和提高。

- **In the Global Knowledge orchard the fruit from the oldest trees can be profitably harvested. Providing easy access to the worlds previously accumulated knowledge is the foundation of better decision making.**

在全球知识园地里，从最古老的知识树上可以收货有用的知识结果。做出更好的决策的根基是能够方便的获得以往全球积累的知识。

Background

- **Last year at this conference Mcilvaine presented a paper which can be reviewed at : www.mcilvainecompany.com 大气污染控制技术进展即时信息追踪系统**

  去年的这个会议（第14届，上海），Mcilvaine公司发表了一份报告。这份报告可以在 www.mcilvainecompany.com网站上的“大气污染控制技术进展即时信息追踪系统”连接中下载。

- **Rather than repeat some of this information, this paper will present only the changes and developments over the last year.**

  本报告不是单纯的重复去年的信息，而是给出大气污染控制技术领域的变化和进步。

Background – New Air Toxic Rules in the U.S.
美国有毒空气法案

- **The U.S. EPA has just proposed rules to limit power plant air toxics in the U.S. These rules are expected to reduce 91 percent of the mercury from being released as well as greatly reduce emissions of hydrogen chloride and toxic metals such as arsenic and chromium.**
- 美国环保署最近提出限制发电厂排放有毒空气的法案。这些法案有望减少91%的汞排放，而不是之前的汞稀释。同时，将要求大大减少氯化氢和诸如砷、铬等有毒金属物的排放。
- **The development of air toxic rules in the U.S. provides an important reference to China for the improvement of Air quality**
- 中国需要关注美国有毒空气法规的进展.

- **Chinese law makers will be interested in some of the background behind the ultimate decisions. For example the limit on HCl is based on the limitation of the monitors to accurately measure quantities below 2 ppm and not upon the health benefits alone.**
- 中国立法者会对最终决策后面的部分背景感兴趣。例如，限制氯化氢的排放。可以限制氯化氢监测器的准确度低于2ppm，而不是单纯考虑到氯化氢对于健康的影响。

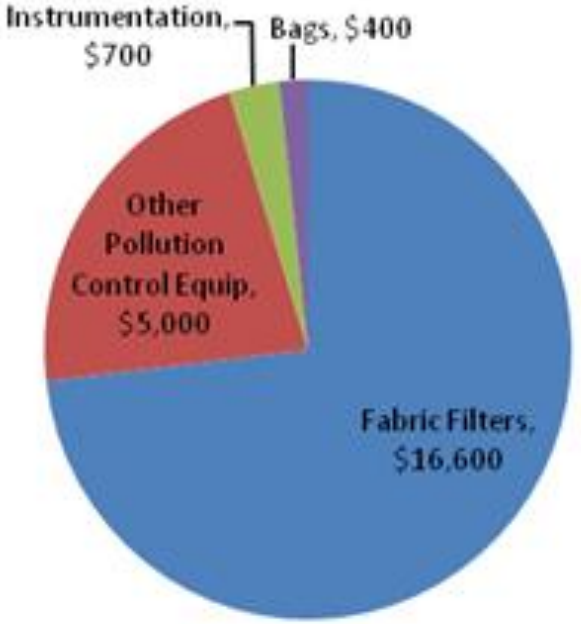
- **Most important is the decision to use total particulate as a surrogate for metal toxics such as cadmium and lead. China has few fabric filters on coal fired boilers. So if China followed the path of the U.S. there would need to be massive investment in fabric filters. Here is the likely outcome in the U.S.**
- 最重要的是决定使用总颗粒物的概念来包括诸如镉和铅等有毒金属。中国的燃煤锅炉很少使用纤维过滤器。所以，如果中国准随美国的道路，就需要在纤维袋式除尘器上做巨额的投资。这也是美国最有可能发生的事情。

- **Many coal-fired power plants will switch from precipitators to fabric filters to decrease the amount of activated carbon needed for 90 percent mercury removal. They will also switch in order to meet the new particulate standard of 0.03 lbs/MMBtu total particulate. This standard has been set to insure capture of toxic metals. EPA says the rules will result in 166,000 MW of new fabric filters.**
- 许多 燃煤发电厂将会把除尘器改造为纤维袋式除尘器，这样可以减少脱除90％汞所需要的大量的活性炭。同时纤维袋式除尘器可以除去粒径为0.03lbs/MMBtu的新的细颗粒物。这个粒径的标准 的设置能够保证去除有毒金属颗粒物。美国环保署估计这个法案将会产生装机容量为166，000MW的纤维袋式除尘器市场。

- **An investment of $16.6 billion for new fabric filters will be required in the next four years. This will then impact the sales of replacement bags. The initial outlay will be over $400 million and replacement bag costs will be over $300 million/yr.**
- 未来四年，将会需要166亿美元投资于新型纤维袋式除尘器。这将影响滤袋更换的销售市场。新型纤维袋式除尘器初步的支出将超过4亿美元，滤袋更换的成本每年将会超过3亿美元。

Annual Consumables Costs for Power Plant Pollution Control Equipment to meet new EPA Rules, Million $

4-Year Investment in Power Plant Pollution Control Equipment to Meet New EPA Rules, Million $



2. Overview of the Trends in Air Pollution control
大气污染控制技术的新走向纵览

- **Carbon Capture and Sequestration**（二氧化碳捕集与封存）
  - **The conventional methods have been mentioned in last year.**
  - **Oxy-combustion rather than coal gasification may be the best approach to producing electricity and a concentrated CO2 stream to be sequestered.**

    相比于煤气化，富氧燃烧可能是更好的发电技术和富集二氧化碳气体用于封存的好办法。

  - **The U.S. DOE will fund this process at an Ameren plant in Illinois rather than the originally planned gasification and CO2 separation. Babcock & Wilcox will supply the oxycombustor.**

    美国能源部即将资助该技术，应用于美国伊利诺斯州的一个发电厂。之前，最初计划采用的技术是煤气化和二氧化碳气体封存。Babcock & Wilcox公司将会提供富氧燃烧装置。

Overview of the Trends in Air Pollution control

- **Another approach with U.S. DOE funding uses a turbine designed for the aerospace industry along with gasified coal and oxygen which promises CO2 sequestration and zero emissions. Clean Energy Systems is the system supplier.**

  受到美国能源部的资助的一个技术是采用航空工业使用的涡轮发电机，这个技术保证可以封存二氧化碳和承诺零排放。Clean Energy Systems公司是该系统的供应商。

Overview of the Trends in Air Pollution control

- **NOx Control Issues**（氮氧化物控制问题）
  - 氮氧化物控制最大的市场在中国
  - 催化剂是SCR脱硝技术的主体
    - 发展中国家如何获取更好的SCR催化剂
      - 与世界知名企业合作联合办厂；
  - SCR催化剂的可持续利用问题
    - **The cleaning , rejuvenation and regeneration of catalyst has become more important as power plants are faced with unexpectedly high costs for catalyst replacement . (see a discussion of the options under our Decisive Classification).**

由于发电厂正面临着更换催化剂的意外的高成本难题，催化剂的清洁、复活和再生变得越来越重要。（参考我们在“决策分级”中的讨论）。

Overview of the Trends in Air Pollution control

- SCR催化剂开发及应用必须关注的新问题
  - **High NOx reduction efficiency**
  - **Low Side-reaction productions**
    - **Minimizing the conversion rate of SO2 to SO3**
      最大限度减少SO3的生成
    - **Co-benefit for the oxidation of elemental mercury**
      增强其对烟气中零价汞同时氧化的协同效应
    - **Minimizing the conversion rate of N_2O（GHG）**
      尽可能的降低温室气体氧化亚氮的产生
    - **Developing the Low-temperature SCR catalysts**
      开发低温SCR催化剂，以满足80-200°C的低温烟气脱硝要求

Overview of the Trends in Air Pollution control

- **The safety issue on SCR Reducer (Ammonia)**
  作为脱硝还原剂的氨的安全问题
  - **Liquid Ammonia is cheaper both on its price and the operation cost，but the safety issue in its transportation and storage should be considered**

    液氨用作脱硝脱硝还原剂，无论其原料价格还是运行费用都相对较低，但其在运输及储存中的 安全问题必须关注
  - **Producing ammonia on-site from the hydrolysis of Urea is a favorable alternative.**

    利用尿素水解来现场产生氨气的方法是解决直接使用液氨安全问题的一个有效手段
    - **Many urea to ammonia systems have been installed in the U.S. There is now a system in China as well.**

      （ Wahlco has a urea to ammonia system for this purpose ）

Overview of the Trends in Air Pollution control

- **Mercury Issues**（汞排放问题）
  - **Based on the coming International Treaty on global mercury pollution control (expected in 2013), mercury abatement from coal-fired Power Plants is urgent both in The U.S and in China**

    随着全球汞污染控制的国际公约的即将形成，美国和中国在燃煤电厂进行汞排放控制显得尤为迫切
    - **On Mar. 16, 2011, US-EPA issued a new mercury control propsal, and about 91% of mercury revomal efficiency will be regulated for coal-fired power plant;**

      US-EPA于颁布了新的电站汞排放控制建议，并将于年底生效
    - In China， 16 power plants have been chosen for mercury emission monitor in 2011, and further full-scale demonstrations on emission control in China will be carried out by 2013.

      在中国环保部的努力下，中国已选取了16个典型燃煤电厂进行汞排放监测及控制技术示范，未来中国将在这一领域取得较大进展

Overview of the Trends in Air Pollution control

- Issues in Mercury control
  - Mercury measurements
    - More reliable measurements for the mercury determination in coal-fired flue gas are wanted, especially in China (with higher fly ash content in flue gas)
    - 电厂烟气汞的监测是一门技艺，它不仅要求具有质量可靠的仪器（专业认证）、规范的采样分析方法，而且操作人员的专业素质及测试经验也相当重要
      - The marketing for Hg-CEMs is increasing significantly, but developing more reliable in-line sampling method is still a big challenge for instrument producers, especially to meet the extreme demands in China (most with higher fly ash and moisture content without GGH downstream of FGD)
      - Hg-CEMs (连续在线监测仪器）将有较大的市场需求，但开发更为可靠的Hg-CEMs对现有的生产商来说仍有许多工作要做

Overview of the Trends in Air Pollution control

- **Mercury control Technologies（B-PAC)**
  - **Brominated carbon (B-PAC) has proved more efficient than expected when used in plants utilizing electrostatic precipitators.**
    发电厂采用静电除尘器时，溴化碳脱除汞已经被证明比预期的更有效。
  - **SO_3 has continued to be a problem. It interferes with mercury adsorption on the activated carbon. The addition of calcium or sodium sorbents in addition to the carbon is one solution to this problem.**
  - 三氧化硫的脱除是一个老问题。三氧化硫干扰活性炭对汞的吸附。在煤炭中添加钙或者纳的吸附剂是解决这个问题的一个办法。
  - **The deterioration of flyash by Carbon is still a barrier for the spread of B-PAC**
    溴化活性炭对飞灰品质的破坏作用仍然是值得关注的问题

Overview of the Trends in Air Pollution control

- **Mercury control Technologies（Co-benefit ways)**
  - **New methods for injecting halogens are proving cost effective in oxidizing mercury. This mercury can then be captured in either wet or dry scrubber systems at a rate as high as 95%.**

    已经证明，向烟气中注射卤素是氧化汞污染物的一种低成本高效益的方法。无论是在湿法还是干法的烟气洗涤系统中，这个办法都可以去除高达95%的汞。
  - **SCR catalysts can promote the oxidation of elemental mercury, but how to make good use of them is the unsolved problem both for SCR catalyst producers and the experts in optimizing SCR operating conditions or flue gas conditioning .**
  - **FGD can capture oxidized mercury effectively, but its potential pollution in FGD liquor, gypsum and FGD wastewater is still the issue to be considered.**

Overview of the Trends in Air Pollution control

- **Fine Particulate Issues**（细粒子问题问题）
  - **Progress has been made in the commercialization of a flexible ceramic bag with catalyst imbedded in the fiber.**
  - 一种在纤维上植入催化剂的可拆卸的陶瓷滤袋已经开始制作，有望成为一种新的选择。
  - **Membrane bags are proving more efficient than plain nonwovens. However bag leaks are a bigger concern than theoretical efficiency.**
  - 相比于普通的无纺布滤袋，覆膜滤袋的除尘效率已经证明更加有效。不过，相比于理论上的除尘效率，滤袋泄漏问题更受关注。

Overview of the Trends in Air Pollution control

- **Fine Particulate Issues**（细粒子问题问题）

- **There are some commercial installations of a wet electrostatic precipitator with a wetted fabric as the collection electrode. There are cost and operational advantages.**
- 湿式电除尘装置已经有商业应用，这种湿式电除尘器带有湿的纤维布和带水的收集电极。这种湿式电除尘装置具有成本和运营优势。

Overview of the Trends in Air Pollution control

- **SO2 Removal Issues**（脱硫问题）

- **Problems with mercury in the gypsum could lead to further use of the natural oxidation lime systems with conversion of the sludge to a fixed product for landfill or use.**
- 含有汞的石膏可能影响自然氧化石灰系统，该系统产生的污泥难以转化为固体物用于填埋或者做其它用途。

Overview of the Trends in Air Pollution control

- **SO2 Removal Issues**（脱硫问题）

- **There is now a commercial opportunity to use high purity gypsum to replace precipitated calcium carbonate for coating of magazine paper.**
- 现在有一个商业机会。利用高品位的脱硫石膏来代替碳酸钙沉淀物，用于制作杂志石膏用纸。
- 国家工信部【2011】73号文件（2011.02.21发布）《关于工业副产石膏综合利用的指导意见》，明确提出，到2015年，磷石膏的综合利用率由2009年的20%提高到40%，脱硫石膏综合利用率由2009年的56%提高到80%。

Overview of the Trends in Air Pollution control

- **SO2 Removal Issues**（脱硫问题）

- **There will be increasing opportunities to supply acid gas byproducts including ammonium sulfate, dilute sulfuric acid, and hydrochloric acid.**
- 烟气脱硫行业将会有越来越多的机会，提供包括硫酸铵，稀释硫酸，盐酸等酸性气体副产品。

Overview of the Trends in Air Pollution control

- **Monitoring and Measurement Issues**（监测问题）

- **There are still unresolved issues relative to mercury continuous emissions monitors (CEMS).**
- 有一个未解决的问题是连续排放汞的监测（CEMS）。
- **There is no clarity about the definition and measurement of total particulate. The challenge is to include compounds which are liquid at ambient temperature exiting the stack . Some methods are expensive. Others appear to be inaccurate.**
- 现在还没有能够明确定义和测定总颗粒污染物的方法。难题是常温下系统中的部分化合物是液体状态的。已经有的办法太昂贵，其它办法不够准确。

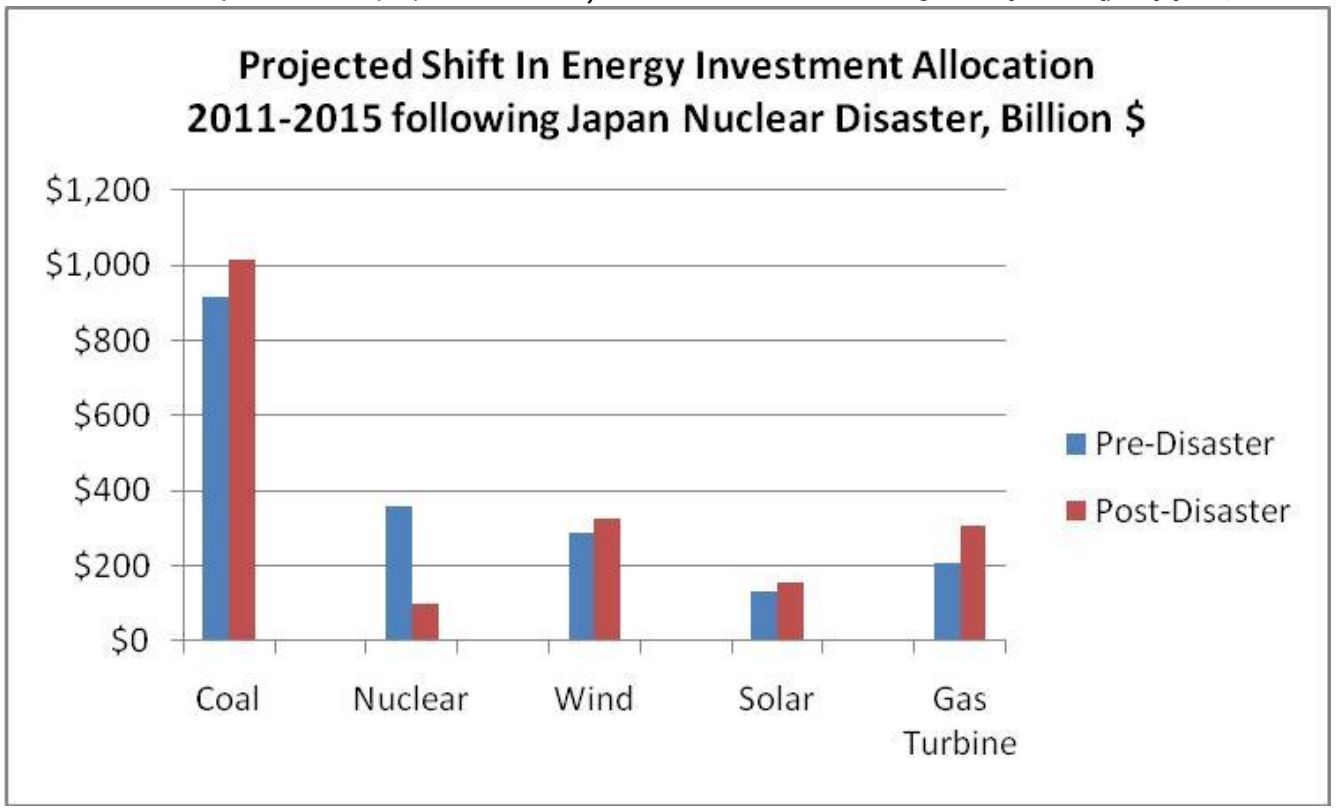
Overview of the Trends in Air Pollution control

- **Monitoring and Measurement Issues**（监测问题）

- **Using particulate matter as a surrogate for toxic metals is convenient but not necessarily representative.**
- 利用颗粒作为替代有毒金属物质是方便，但并不一定代表。

Energy choices in China
中国的能源选择

- **Due to the recent nuclear disaster in Japan, China and other countries are scaling back on their nuclear plans.**
- 由于近期日本发生的核灾难事件，中国和其它国家正在权衡各自的核电计划。



Energy choices in China
中国的能源选择

- **China needs to revise its choices for future power generation based on:**
- 基于以下几点，中国需要为未来发电做出修改性的选择：
- **1) The risks of nuclear energy as demonstrated by the disaster in Japan.**
- **2) The awareness that ultra super critical coal can be a bridge for the next 25-50 years and not a permanent solution.**
- **3) The benefits of innovative approaches to supplemental fuels and by products with coal as the main fuel.**
- **4) Clarity as to the real goals and aspirations of China.**

Energy choices in China
中国的能源选择

- **1) The risks of nuclear energy as demonstrated by the disaster in Japan.**
- 日本发生的核电灾难证明核电的高风险.

- **It is too early to tell what the eventual impact of the Japanese nuclear meltdown will have on nuclear plants. But it is clear that over the next 25 years nuclear will play a smaller role in the energy mix than was envisioned just a few months ago.**
- 现在评估日本核电灾难对于全球核电发展的最终影响还为时过早。但是很明显，对比与几个月前，未来25年内，核电在总体能源结构中的地位变小了。

Energy choices in China
中国的能源选择

- **2) The awareness that ultra super critical coal can be a bridge for the next 25-50 years and not a permanent solution.**
- 超超临界燃煤发电技术是未来20～25年发电的较好的选择，但不是永久的解决办法；

- **The economic life a coal fired plant is only 25 years. China can continue building new coal plants until 2025 and still rely on renewables for the time frame starting in 2050. The advanced ultra supercritical and the advanced carbon capture and sequestration technologies need time to become cost effective. China and the United States should both concentrate on replacing all sub critical coal fired boilers with new ultra supercritical boilers.**
- 燃煤发电厂的经济寿命只有25年。直到2025年，中国依然可以建造新的燃煤发电厂。从2050年，中国可以基本依靠可再生能源来发电。先进的超超临界燃煤发电技术、先进的碳捕集和封存技术需要时间来变得更具有经济效益。中国和美国都应该集中用超超临界燃煤锅炉来更换所有的亚临界燃煤锅炉。

Energy choices in China
中国的能源选择

- **3) The benefits of innovative approaches to supplemental fuels and by products with coal as the main fuel.**
- 采用创新的办法来补充能源，以及把煤作为主要能源来发展相关副能源产品；

- **Cellulosic ethanol is one example of the innovative matching of other production technologies with coal fired power generation. The coal plant furnishes waste steam and hydrochloric acid to the cellulosic ethanol plant. In return the plant receives the biomass waste which it burns along with coal. The Great Rivers Spiritwood Plant could be the first commercial marriage of these technologies.**
- 纤维素乙醇制造应用是一个例子，这种物质可以创造性的与燃煤发电的生产相匹配。燃煤发电厂产生的废蒸汽和盐酸可以组建纤维素乙醇生产厂。反过来，发电厂能够收到纤维素乙醇产生的生物质废料，可以和燃煤共燃发电。Great Rivers Spiritwood Plant是第一个采用这种方式商业运作的发电厂。

Energy choices in China
中国的能源选择

- **4) Clarity as to the real goals and aspirations of China.**
- 明确中国发电的真实目标和前景展望；
- **All harm and benefits can be reduced to a common metric called Quality Enhanced Life Days (QELD) Specific policies toward pollutant reduction, global warming and energy choices should be made with this common metric. Furthermore the significance of the tribal discount value (the lives of Chinese citizens are more important to China than the lives of Pacific Islanders) needs to be considered. The future value discount (saving lives today is worth more than lives saved 50 years from now) also needs to be included when making the choices** http://www.mcilvainecompany.com/SURS/subscriber/Default.htm
- Quality Enhanced Life Days (QELD)作为一个共同的度量可以权衡所有的好处和坏处。运用QELD，可以做出关于污染物减排、全球变暖和能源选择等方面的详细的政策。更重要的是要考虑到种群的折扣价值（对于中国而言，中国公民的生命远比太平洋岛民的生命更重要）。在做决策时，未来价值的折扣也需要考虑（今天生命的折扣远比50年后生命价值的折扣要重要）。参考：
  http://www.mcilvainecompany.com/SURS/subscriber/Default.htm

Air Toxic Rules in the U.S.
美国有毒空气法案

- **China needs to watch the development of air toxic rules in the U.S.**
- 中国需要关注美国有毒空气法规的进展.
- **The U.S. EPA has just proposed rules to limit power plant air toxics in the U.S. These rules are expected to reduce 91 percent of the mercury from being released as well as greatly reduce emissions of hydrogen chloride and toxic metals such as arsenic and chromium.**
- 美国环保署最近提出限制发电厂排放有毒空气的法案。这些法案有望减少91%的汞排放，而不是之前的汞稀释。同时，将要求大大减少氯化氢和诸如砷、铬等有毒金属物的排放。

Air Toxic Rules in the U.S.
美国有毒空气法案

- **Chinese law makers will be interested in some of the background behind the ultimate decisions. For example the limit on HCl is based on the limitation of the monitors to accurately measure quantities below 2 ppm and not upon the health benefits alone.**
- 中国立法者会对最终决策后面的部分背景感兴趣。例如，限制氯化氢的排放。可以限制氯化氢监测器的准确度低于2ppm，而不是单纯考虑到氯化氢对于健康的影响。

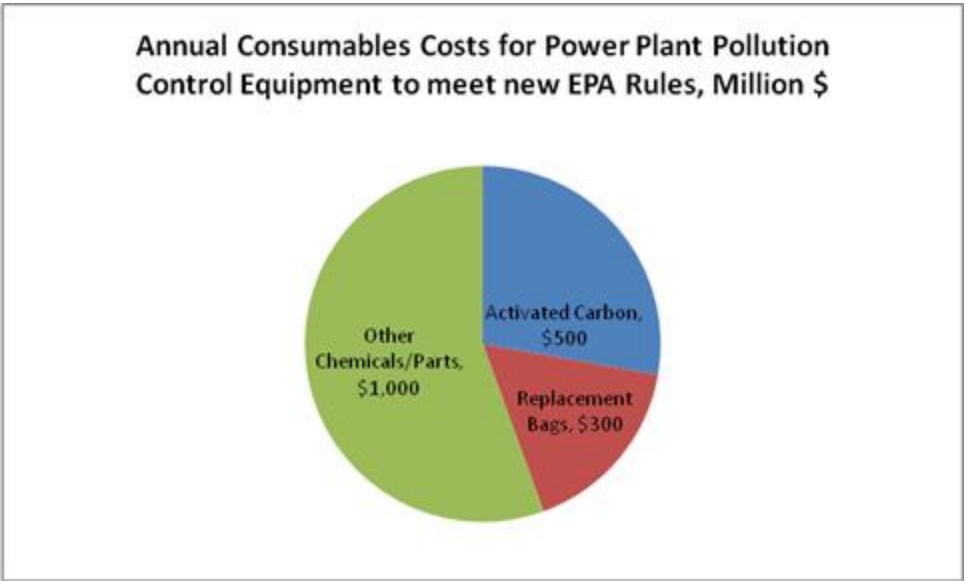
- **Most important is the decision to use total particulate as a surrogate for metal toxics such as cadmium and lead. China has few fabric filters on coal fired boilers. So if China followed the path of the U.S. there would need to be massive investment in fabric filters. Here is the likely outcome in the U.S.**
- 最重要的是决定使用总颗粒物的概念来包括诸如镉和铅等有毒金属。中国的燃煤锅炉很少使用纤维过滤器。所以，如果中国准随美国的道路， 那就需要在纤维袋式除尘器上做巨额的投资。这也是美国最有可能发生的事情。

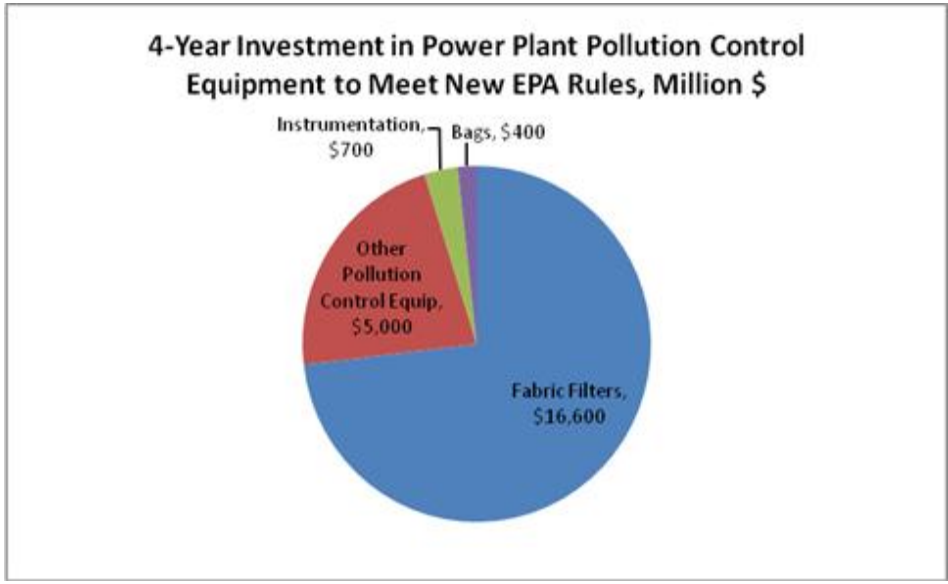
Air Toxic Rules in the U.S.
美国有毒空气法案

- **Many coal-fired power plants will switch from precipitators to fabric filters to decrease the amount of activated carbon needed for 90 percent mercury removal. They will also switch in order to meet the new particulate standard of 0.03 lbs/MMBtu total particulate. This standard has been set to insure capture of toxic metals. EPA says the rules will result in 166,000 MW of new fabric filters.**
- 许多 燃煤发电厂将会把除尘器改造为纤维袋式除尘器，这样可以减少脱除90%汞所需要的大量的活性炭。同时纤维袋式除尘器可以除去粒径为0.03lbs/MMBtu的新的细颗粒物。这个粒径的标准 的设置能够保证去除有毒金属颗粒物。美国环保署估计这个法案将会产生装机容量为166，000MW的纤维袋式除尘器市场。

- **An investment of $16.6 billion for new fabric filters will be required in the next four years. This will then impact the sales of replacement bags. The initial outlay will be over $400 million and replacement bag costs will be over $300 million/yr.**
- 未来四年，将会需要166亿美元投资于新型纤维袋式除尘器。这将影响滤袋更换的销售市场。新型纤维袋式除尘器初步的支出将超过4亿美元，滤袋更换的成本每年将会超过3亿美元。

Air Toxic Rules in the U.S.
美国有毒空气法案





Four Lane Knowledge Bridge
四车道的知识桥梁

- **The Mcilvaine Company has built a four lane knowledge bridge that most effectively links the supplier and the power plant operator. This bridge insures the effective delivery of the fruit from the Global Knowledge Orchard.**
- **There are four lanes: Bike, truck, auto and express. There are high powered vehicles and there is optimum traffic control.**
- Mcilvaine公司已经建立了一个四车道的知识桥梁，它可以最高效率的连接设备供应商和发电厂经营者。这些桥梁可以确保从“全球知识园地”的知识果实的高效率的传递。
- 这四车道分别是：自行车、卡车、汽车和快递。这些车道上有高速的交通工具，也具备最佳的交通管理。

Four Lane Knowledge Bridge
四车道的知识桥梁

- **The four lane bridge：**
- **The Bike Lane provides the networking, project databases, and customer directories**
- 自行车车道提供网络服务、工程数据库和客户目录；

- **The truck lane includes articles in various magazines and in Mcilvaine Newsletters**
- 卡车车道包括各种期刊的技术文章和Mcilvaine通讯

- **The auto lane includes InterWEBviews™ and webinars in Chinese and in English**
- 汽车车道包括中英文的在线会议记录和在线网络研讨会；

- **The express lane includes instantly accessible data in the Mcilvaine free Global Knowledge Orchard, as well as on Google and supplier websites**
- 快递车道包括Mcilvaine免费的“全球知识园地”的即时数据网络，还有谷歌知识和全球供应商目录；

Four Lane Knowledge Bridge
四车道的知识桥梁

- **Vehicles in the bike lane 行驶在自行车车道**

- **Vehicles in the bike lane include a networking system in the Free Global Knowledge Orchard. Power plant operators can identify experts who will answer their questions.**
- 通过自行车车道包括获取免费的“全球知识园地”的网络系统的服务。发电厂经营者能够确认能够回答他们问题的专家。

- **Networking of experts around the world will help Chinese Decision Makers.**
- 世界各地的专家网络将帮助中国决策者。

Four Lane Knowledge Bridge
四车道的知识桥梁

- **Vehicles in the bike lane 行驶在自行车车道**
- **Data Search by Person数据搜索人**

  Top of Form
- **Data Search on: Wilber, Karl**
-
- **Bottom of Form**
- **Attendee:** EPRI CEMS, June 8-10, 2011 / Attendees
- **Attendee:** Tekran Attendees at IEEE Cement Conference, St. Louis, MO, May 22-26, 2011.
- **Attendee:** Tekran Exhibitor Personnel, International Conference on Mercury as Global Pollutant, July 24-29, 2011
- **Biography:** Wilber, Karl - Tekran Instruments - Biography as of February 11
- **Presentation:** Portland Cement MACT Regulations Frequently-Asked Questions (FAQs) - Cement MACT Webinar February 9, 2011
- **Speaker:** Air Quality VIII, October 24-27, 2011/ Speakers
- **Webinar Recording:** Cement MACT Webinar - February 9, 2011
- **YouTube:** Portland Cement MACT Regulations Frequently-Asked Questions (FAQs) - Cement MACT Webinar February 9, 2011 YouTube
-
- **Conference networking is another vehicle in the bike lane**
- **全球行业会议目录也在自行车车道中。**

Four Lane Knowledge Bridge
四车道的知识桥梁

- **Vehicles in the bike lane 行驶在自行车车道**
- **Conference networking is another vehicle in the bike lane**
- **全球行业会议目录也在自行车车道中。**
- **Here are 8 exhibits in just 13 days of which 6 are valuable for those interested in air pollution control.**
- **这里有13天内的8个展会，其中的6个展会或者会议是对空气污染控制展有兴趣的人是很有价值的。**
- 5/10/2011 Electric Power 2011
- 5/9/2011 IEEE Cement Conference 2011
- 5/9/2011 World of Coal Ash Conference 2011
- 5/5/2011 Aerosol Technology for Cleanrooms
- 5/5/2011 IFAT CHINA + EPTEE + CWS 2011
- 5/2/2011 ESTECH 2011
- 5/2/2011 Offshore Technology Conference 2011
- 4/27/2011 15th Int'l Conference for SO2, NOx, HG, PM2.5

Four Lane Knowledge Bridge
四车道的知识桥梁

- Vehicles in the bike lane 行驶在自行车车道

- For the supplier the bike lane contains Chinese Utility Plans and the Chinese E Alert along with other directories and tools to help the salesmen identify projects and contacts.
- 对于供应商而言，自行车车道包含“中国公用事业工程展望”和“中国电子通讯”。配合其它目录和工具，设备销售商可以确定对应的工程项目和联系方式。

CHINESE E-ALERT
Energy Progress in China

COAL

- Peabody to Develop Clean Coal Power Plants and Surface Mines with Huaneng and Yankuang Groups
- Fuel Tech awarded ASCR, ULTRA Orders
- 2×350 MW Units at Huaneng Shandong Huangtai Power Plant in Commercial Operation
- 300 MW Unit at Datang Inter Shanxi Linfen Thermal Power Plant in Commercial Operation
- 2×660 MW Units at Guodian Guangxi Jiujiang Power Plant Approved
- 600 MW Unit in Phase III at Huaneng Yueyang Power Plant in Commercial Operation
- 2×300 MW Units in Phase III at Guodian Yangzonghai Power Plant Approved
- 330 MW Unit in Phase I at Guodian Jilin Jiangnan Power Plant in Commercial Operation
- 350 MW Unit at Hueneng Huhehot Thermal Power Plant in Commercial Operation
- 2×330 MW Units in Expansion Project at Guodian Gansu Lanzhou Thermal Power Plant in Commercial Operation
- 300 MW Unit at Huadian Mudanjiang No. 2 Power Plant in Commercial Operation
- 330 MW Unit in Phase I at Guodian Xinjiang Hongyanchi Power Plant in Commercial Operation
- 330 MW Unit at Guodian Henan Zhumadian Power Plant in Commercial Operation

FGD

- FGD Technical Renovation Project on No.7 Unit at Huadian Heilongjiang Mudanjiang No. 2 Power Plant Passed Environmental Protection Examination

Four Lane Knowledge Bridge
四车道的知识桥梁

- **Vehicles in the Truck Lane 行驶在卡车车道**

- **The vehicles in the truck lane include articles in Chinese and other magazines as well as articles in Mcilvaine Newsletters.**
- 通过卡车车道可以获取中文的期刊技术文章和其它期刊论文，也包括“Mcilvaine通讯”。

FGD and DeNOx NEWSLETTER March 2011, No. 395

For a printer friendly copy of this newsletter Click Here

FGD

NO_x

MERCURY

Four Lane Knowledge Bridge
四车道的知识桥梁

- **Vehicles in the Auto Lane 行驶在汽车车道**

- **The vehicles in the auto lane include InterWEBviews™, shared webinars, and custom webinars in Chinese and English.**
- 通过汽车车道可以获取中英文的在线会议记录、共享的在线网络研讨会和客户定制研讨会。

- **Here are xxx InterWEBviews in chinese**
- **下面是一个中文的在线会议记录**

- **INTERWEBVIEW A**
- **INTERWEBVIEW B**
- **INTERWEBVIEW C**

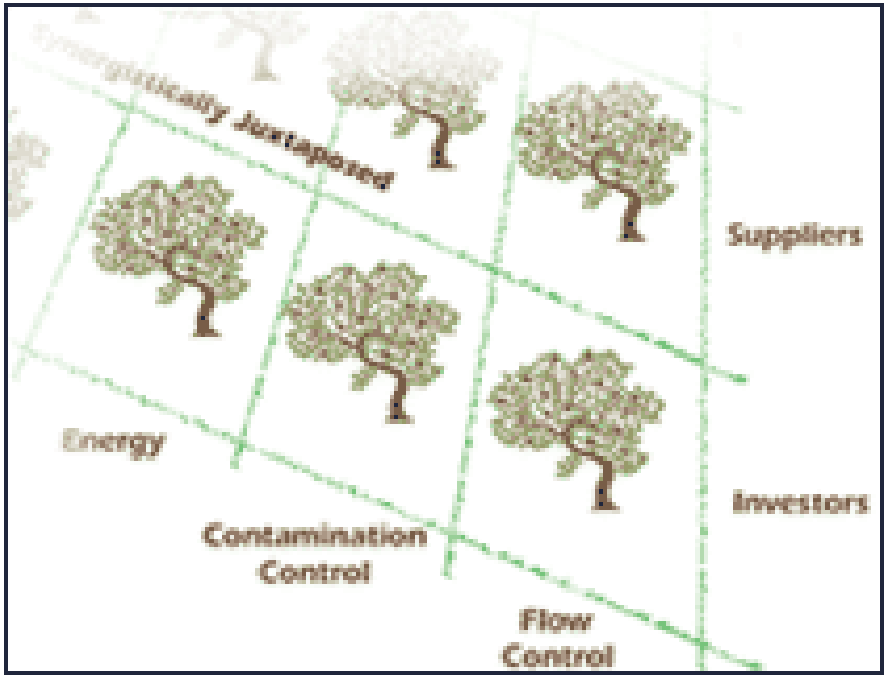
- **Here are some in English**
- **Free Sponsored Webinars**
- **Albemarle - Cement MACT**
- **Aquatech**
- **GE - Mercury Capture**
- **Honeywell**
- **INVISTA**
- **Midwesco - Bagfilter Performance Analyzer**
- **Neundorfer**
- **Pavilion**
- **Sick Maihak - Cement MACT**
- **Tekran Instruments - Cement MACT**

Four Lane Knowledge Bridge
四车道的知识桥梁

- **Vehicles in the Express Lane 行驶在快递车道**

- **Vehicles in the express lane include the free Global Knowledge Orchard website with instant comprehensive searches as well as google and information posted on supplier websites.**
- 通过快递车道可以获取免费的“全球知识园地”网络，包括类似于谷歌的即时的综合的搜索快，还有设备供应商发布网络上的信息。

Four Lane Knowledge Bridge
四车道的知识桥梁



- **Global Knowledge Orchard**
- Free News and InterWEBviews ™

Four Lane Knowledge Bridge
四车道的知识桥梁

- **Traffic Control on the 4 lane bridge 四车道交通管理**

- **Traffic control for the power plant operator includes Power Plant Decisions. For the suppliers it includes FGD, Fabric Filter and other strategic reports It also includes Decisive Classification.**
- 对于发电厂经营者来说，交通控制包括“发电厂决策系统”。对于设备供应商来说，交通控制包括“烟气脱硫系统”、“纤维袋式除尘器系统”和其它展露报告。
- 这些交通控制还包括“决策分级系统”。

Four Lane Knowledge Bridge
四车道的知识桥梁

- Decisive Classification in Chinese and English will aid in better selections
- 中英文的“决策分级系统”有助于作出更好的选择

- Dentrification is the wrong word for DeNOx. One type of DeNOx is selective catalytic reduction (SCR). One component of SCR is the catalyst. One aspect of catalyst decision making is maintenance. A group of experts has agreed on the following classifications in Chinese and English
- 脱硝是氮氧化物脱除的错误的说法。一类是氮氧化物脱除技术是有选择性的脱硝催化还原（SCR）。SCR技术的一个重要组成是催化剂。催化剂决策的一个层面是催化剂的维护。众多专家都赞同下面的中英文分级方法。

Top of Form

Descriptor:

Bottom of Form

Major Class

t

Descriptor

Chinese Descriptor

Reference

Definition

Product

Catalyst Maintenance

Top of Form

Other Children of:

Bottom of Form

Major Class

Parent

Descriptor

Acronym

Synonym

Chinese Descriptor

Reference

Definition

Product

Four Lane Knowledge Bridge
四车道的知识桥梁

- It is important that every product and every application which will be subject to decision making is decisively classified. Mcilvaine invites the participation of various Chinese organizations to make this a universal tool.
- 重要的是，从属于决策的每一个产品和每一种应用都必须进行分级。Mcilvaine公司邀请中国的各种组织参与进来，是“决策分级系统”成为一个通用的工具。
-
- 网络连接：
- http://www.mcilvainecompany.com/Decision_Tree/subscriber/Tree/DecisiveClass.htm

Four Lane Knowledge Bridge
四车道的知识桥梁

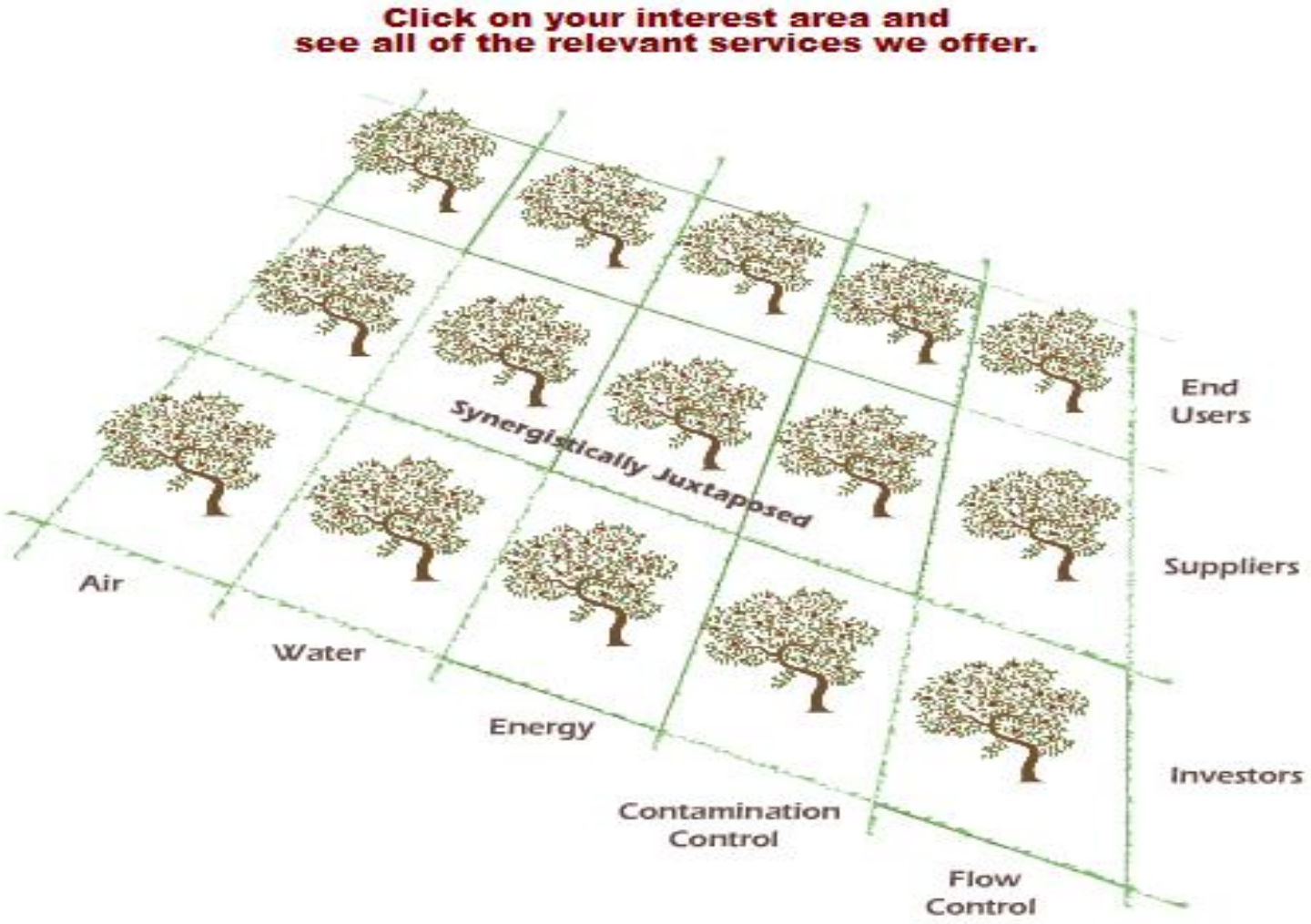
- Numerical and dual language identification of Chinese and international companies is desirable
- 中文和跨国公司的数字和双语识别是迫切的
-
- Because of the confusion in translating back and forth between Chinese and English. It is desirable to identify every company with a corporate number and display the relationship between a subsidiary and parent
- 由于中英文之间来回翻译引起的混乱，所以每一家公司的数目和不同母子公司之间的隶属关系的识别是很迫切的。

Four Lane Knowledge Bridge
四车道的知识桥梁

- Company name
- English Name | Parent corporate | # | Chinese name
-

Tianjin TEDA Filters Co., Ltd.		731	天津泰达洁净材料有限公司
Tianshan Precision Filter Material Co., Ltd.		819	
Tiantai Industrial Cloth Factory Zhejiang	Tiantai South-West Filter-Cloth Factory	890	浙江省天台县工业用布厂
Tiantai South-West Filter-Cloth Factory		890	浙江省天台县工业用布厂
Titan Manufacturing, Inc.		1734	
Tomoe Valve Co., Ltd.		1432	上海巴蝶阀门有限公

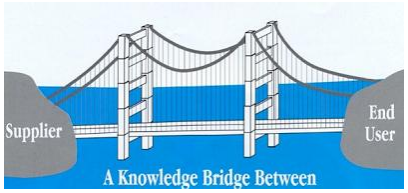
Air Decision Trees Overview



Summary
总结

- China already has the second biggest economy in the world. More people speak Mandarin than any other language. China is investing more in air pollution control equipment than any other country except the United States. The 4 lane bridge connecting suppliers and end users needs to be traveled by China as well as all the other countries of the world. Each country can learn from the others. China is host to a number of innovative air pollution projects. Information about their success needs to be communicated to the rest of the world. This interchange of information can take place with the traffic control provided by Decisive Classification and the swift vehicles designed for this bridge.
- 中国已经是全球第二大经济体。相比较与其它语言，更多的人说普通话。除了美国以外，相比于其它任何国家，中国正投资更多的钱在空气污染控制设备。四车道的桥梁可以在设备供应商和最终用户需要之间有效连接，这在中国和世界其它国家一样有效。每个国家都可以借鉴别国。中国是许多创新的空气污染控制工程的东道国。这些工程的成功经验信息需要传递给全世界。通过“决策分级系统”和知识桥梁的车道切换的交通控制，这些信息的交换是可以做到的。

联系我们



- The McIlvaine Company

191 Waukegan Road, Suite 208

Northfield, IL 60093, USA

Phone: 847-784-0012

Fax: 847-784-0061

Website: www.mcilvainecompany.com

- The McIlvaine Company Shanghai Office

闵行区中春路998号，上海，中国

E-mail: shmcilv@126.com　　ligangjian2007@126.com

电话：86-21-64978916

传真：86-21-64978916

Website: www.mcilvainecompany.com

谢 谢！

www.mcilvainecompany.com