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Regional Air Quality Management in the Context of Climate Change: Perspectives from the US
气候变化下的区域空气质量管理：美国观点

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Chris James
金柯瑞

The Regulatory Assistance Project

China
European Union
United States

www.raponline.org

Presentation Outline
内容大纲

- 美国空气质量管理的经验概述
- 美国区域空气质量管理
- 气候友好型的空气质量管理
- 新型与创新的管理工具

- Overview of US Experience
- US Regional Air Quality Management
- Climate-Friendly Air Quality Management
- New and Innovative Instruments

Overview of US Experience in Air Quality Management
美国空气质量管理的经验概述

美国经验概述 US Overview

- 在美国控制污染最核心的元素是“州执行计划”（ SIP ）
  - 联邦与各州协调规划工具
  - 有两个最基本的组成部分： 1)清单 2)监测数据；
  - 使得主管部门能够有效的评估现行政策以及正在考量中的未来政策的有效性。
- 区域空气质量计划
- 气候友好型 空气质量管理
  - 大气质量监管部门与交通运输和能源部门联合工作；
  - 共同参与的流程可以考量在长期增长的过程中对于能源、经济与环境的影响；
  - 各部门应该共享数据以便于对各部门长期规划的编制提供支持；
  - 以旧金山大气质量规划为例。

- A “SIP” is a central element of US plans to control pollution
  - Federal-State planning tool
  - Two basic components: 1) inventory 2) monitoring data;
  - Enables agency to evaluate the effectiveness of current policies and future policies under consideration.
- Air Quality Planning also Regional
- Climate-Friendly Air Quality Management
  - Air quality officials work with transportation and energy officials;
  - Shared process that considers how long-term growth will affect energy resources, economy and environment;
  - Agencies should share data to help each other with their long-term plans;
  - Example of San Francisco plan .

US Regional Air Quality Management
美国区域空气质量管理

Regional Planning Organizations (RPOs) Established to Address Haze
区域规划组织 (RPOs)面对区域性烟雾

US RPOs: Typical Scope of Work
美国区域规划组织：工作范围

1. 数据采集与清单
2. 空气质量监测
3. 空气质量建模
4. 源解析
5. 制定规程
6. 许可证
7. 合规/实施
8. 监测与审核
9. 费用

1. Data Gathering, Inventory
2. Air Quality Monitoring
3. Air Quality Modeling
4. Source Apportionment
5. Regulatory Development
6. Permits
7. Compliance/ Enforcement
8. Monitoring and Verification
9. Fees

Northeast States for Coordinated Air Use Management (NESCAUM)
东北洲际联合空气使用管理机构（NESCAUM）

NESCAUM Successes
NESCAUM 成果

八十年代：

- 酸雨/酸沉降采样
- 降低涂料、涂层挥发性
- 降低商品汽油挥发性

九十年代：

- 采用加州车辆排放标准
- 搜集科学与法律证据起诉上风向州，以及提请 美国环保局（EPA） 减少传播空气污染量
- 柴油减排策略

1980s:

- Conducted acid rain/acid deposition sampling
- Reduced volatility of paints, coatings
- Reduced volatility of gasoline sold

1990s:

- Adopted California vehicle emissions standards
- Built the science and legal justification to sue upwind states and to petition EPA to reduce the quantity of transported air pollution
- Devised diesel emissions reduction strategies

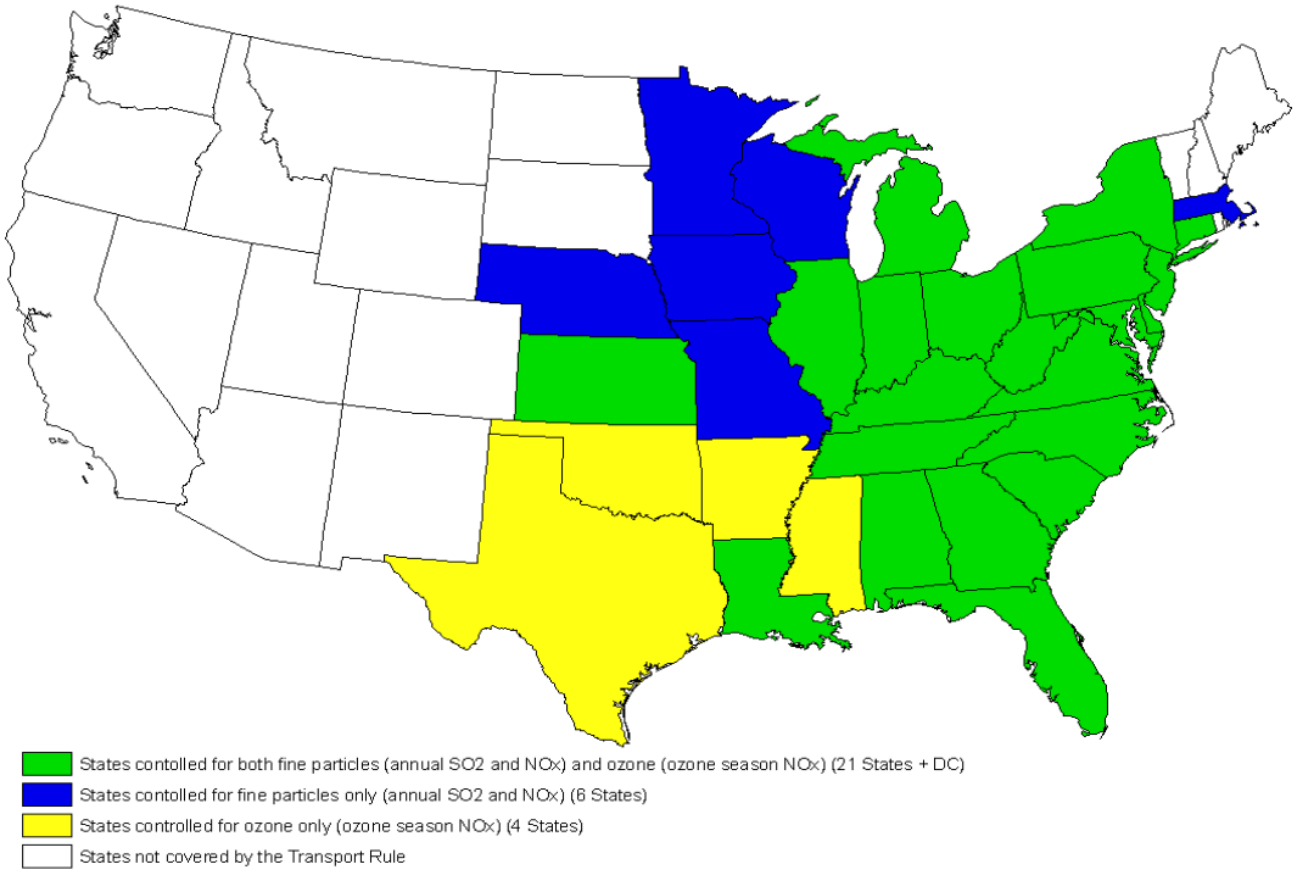
Regional Greenhouse Gas Initiative (RGGI)
区域性温室气体倡议 (RGGI)

RGGI: Key Points
区域性温室气体倡议 :要点

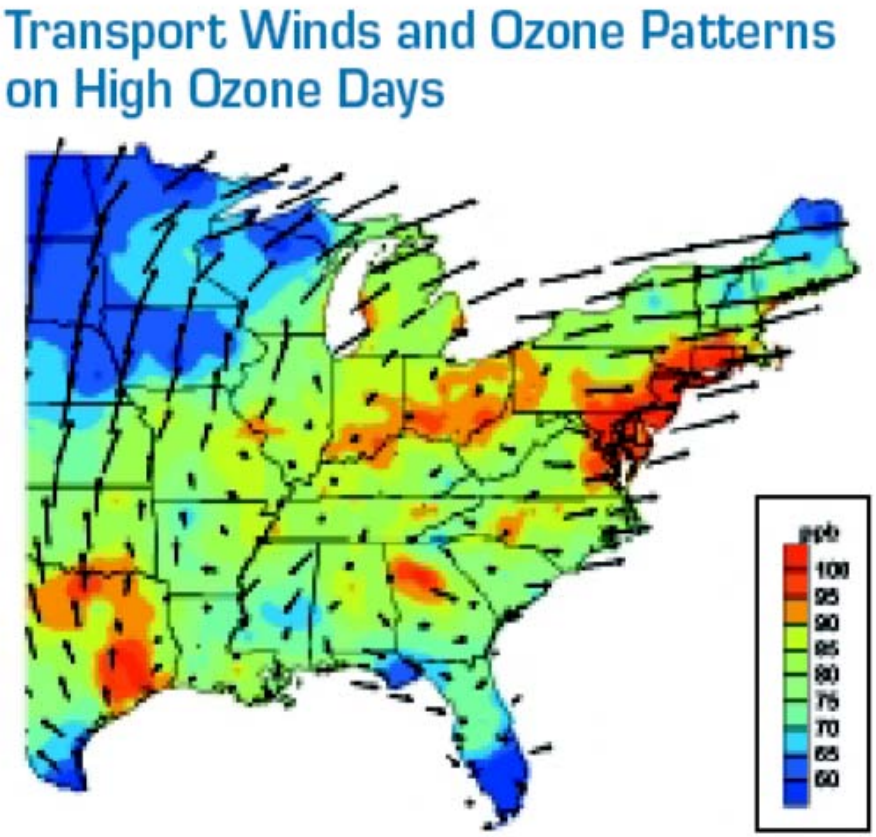
- 美国首个以基于市场的强制性 CO_2 减排计划
- 设定电力行业 CO_2 排放量上限；到 2018 年实现减排 10%
- “限额和投资”是个双管齐下的减排战略
  - 二氧化碳津贴被拍卖
  - 至3/11/11，区域拍卖产生了8.61亿美元
  - 拍卖收入投资于州上政府的可再生能源和能效方案

- First mandatory, market-based CO_2 emissions reduction program in U.S.
- Power sector CO_2 capped; 10% reduction by 2018
- Cap-and-Invest: a two-pronged reduction strategy
  - CO2 allowances are auctioned.
  - As of 3/11/11 , regional auctions generated USD $861 million.
  - Auction revenue is invested in state programs for renewable energy and energy efficiency.

EPA's Proposed Clean Air Transport Rule
美国环保局提出的清洁空气传输规则



Transport Rule to Address Upwind SO2, NOX
传输规则要减少在迎风州上SO2和NOX排放量



在臭氧高浓度天数时运输风和臭氧模式

Transport Rule: Key Points
传输规则：要点

- 下风口州请求环保署对上风口污染源制定更严格的规定
- 基于下风口州对空气质量的贡献，环保署应用模型来分配特定的洲际排放预算
- 规定只允许进行州内交易，这种限制将确保在需要的地方实现减排

- Downwind states petitioned EPA to put more stringent regulations on upwind pollution sources
- EPA used modeling to allocate state-specific emissions budgets, based on contribution to air quality in downwind states
- Rule allows only intrastate and limited interstate trading; restricted trading will ensure emission reductions happen where they are needed.

Climate-Friendly Air Quality Management
气候友好型 空气质量管理

Definition
定义

- 空气污染与温室气体（二氧化碳为主）同根同源，大都是来自化石能源的燃烧，因此一些空气污染防控措施如节能和利用可再生能源也能减少温室气体排放。
- 一些空气污染物如地面臭氧（光化学污染）和黑炭颗粒物，也有全球暖化的效果。

- Both air pollutants and GHGs mainly come from burning of fossil fuels, some key measures such as energy efficiency and renewable energy could reduce both emissions.
- Some air pollutants are also global warming agents, such as ozone and black carbon.

Why Is Climate-Friendly AQM Important?
气候友好型 空气质量管理为什麼重要？

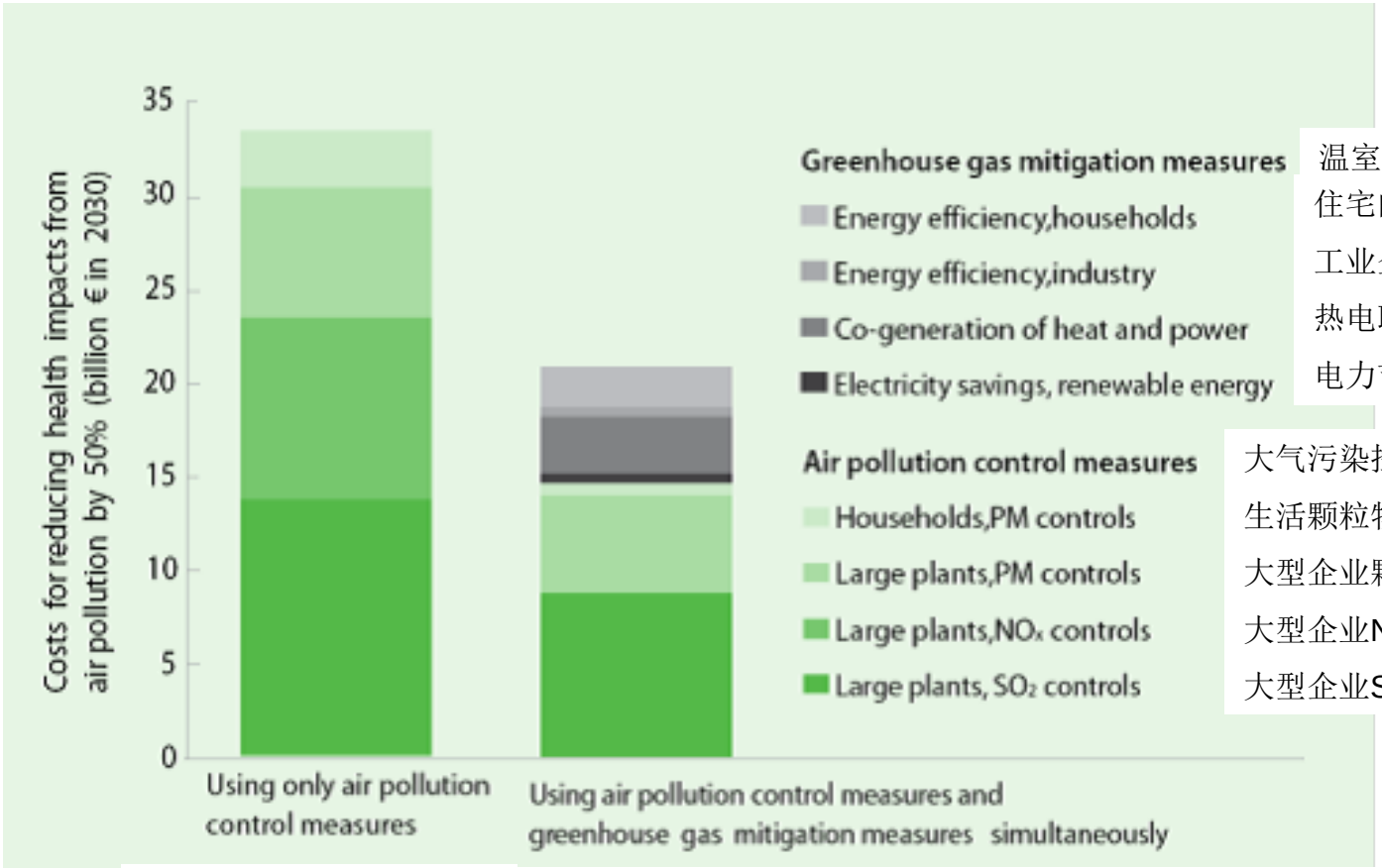
- 同时减少大气污染物排放以及温室气体排放将非常具有成本效益和时效性。
- 采用联合且优化的控制手段，可以仅需要50%的污染控制成本就实现大气污染控制，并同时实现8%的碳减排。
- 帮助实现国家总体的碳排放强度目标和能源强度目标。

- Reducing air pollutants and greenhouse gas emissions jointly is cost-effective and timely.
- Combined or optimized control approach = 50% of the cost of using pollution control measures only; with additional 8% reduction in CO_2 emissions.
- Achieves air quality, carbon intensity, and energy intensity goals simultaneously.

GAINS-Asia Modeling for China 2030
中国2030年的GAINS-Asia模型结果

将由大气污染所造成的卫生影响降低50%的成本

（单位：10亿欧元2030年）



温室气体减排措施
住宅的能效措施
工业企业的能效措施
热电联产
电力节约以及可再生能源使用

大气污染控制措施
生活颗粒物PM的控制措施
大型企业颗粒物PM的控制措施
大型企业NOX 的控制措施
大型企业SO2的控制措施

仅依靠
大气污染控制措施

同时应用大气污染控制措施
以及温室气体减排措施

Sample Co-Control Measures
气候友好的大气质量控制措施清单样本

- 能效(在电力，工业，建筑，运输)
- 例如：废热回收 （减少水泥厂为25-35%的电力需求）
- 可再生能源 （丹麦的热电联产设施用热水蓄热整合风能）
- 多联产和高级的工业化生态政策
- 燃料替换
- 城市的甲烷/生物气体的利用
- 煤炭清洗 （少污染， 火电厂少燃烧10-20% 煤燃料）
- 更加清洁高效的煤技术
- 合理的燃煤和其他化石燃料的消费总量控制
- 清洁车辆和燃料
- 城市规划以及公共交通系统, 快速公交

- End-use energy efficiency (in power, industry, building & transport sectors)
  - E.g., waste heat recovery (reducing power demand by 25-35% in a cement plant)
- Renewable Energy (Danish CHP facilities use hot water thermal storage to integrate wind)
- Poly-generation and advanced industrial ecology policies
- Fuel switching
- Urban methane/bio-gas utilization
- Coal washing (less pollution and 10-20% less coal burned by coal-fired plants)
- Cleaner, more efficient coal technologies
- Reasonable control of growth in fossil-fuel consumption
- Cleaner vehicles and fuels
- Urban planning public transport, BRT

New & Innovative Instruments
新型&创新的管理工具

Require Advanced Planning by Enterprises
要求企业提前制定计划

- 针对多种污染物开发建立长期的控制战略
  - 应该修改目前的标准，在未来增加新的标准。。
- 针对长期的发展，当地污染排放标准能够明确提出逐渐严格的标准，这样企业可以更好地进行投资决策。

- Develop long-term multi-pollutant control strategies
  - existing standards will be revised, and new standards will be added in the future。
- Local emission standards can specify increasingly stringent standards for long-run development, so enterprises can make better judgment in their investment decisions。

Emissions Offsets & Environmental Impact Assessment (EIA)
排放抵销和环境影响评价 (EIA)

- 针对新建项目环境绩效的改进，环境影响评价（EIA）可以成为一个非常有力的工具。
- 污染物排放总量控制制度引发了新的政策，这要求企业通过购买污染信用额度来抵消其SO2与COD的排放。可以考虑将 NO_X 也纳入这个体系进行管理。
  - 在十二五规划中设立的NO_X总量控制要求

- EIA is a powerful tool for improving the performance of new construction.
- Total emission control approach has triggered policy by which a new facility must offset its SO_2 and COD emissions by purchasing pollution offset credits. NO_X could be treated similarly.
  - Total emissions control of NO_X in the 12th FYP

Offset Future Industrial Energy Use
抵销未来的工业用能

环境影响评价的方法可以应用于能源消耗。

- 可以要求新建工厂的项目建议书中包含通过采用先进的技术或者节能措施，如热电联产，废热回收，或者通过第三方购买节能额度等方式，抵消一部分未来的能源消耗。
- 或者,节能额度可以被设计成为能够抵减多种污染物的一种额度。

The EIA approach could be applied to energy consumption.

- New plant proposals can be required to offset a portion of electricity consumption through the application of advanced techniques of industrial efficiency, like cogeneration or waste heat recovery, or through the purchase of energy efficiency savings from a third party energy service company.
- Alternatively, energy efficiency savings could be designed to qualify as a multi-pollutant offset credit.

Financial Incentives and Penalties
财务激励和处罚措施

- 价格措施可以有效的将环境成本内部化并且鼓励表现好的行动：
  - 燃煤锅炉的经验（重庆）：污染持续监控系统（CEMS），加上每日处罚。排污的费用会引导企业家决定将燃料更换为天然气；
  - 基于此经验，可以提出的措施包括（下一张PPT）

- Pricing practices can help internalize environmental externalities and reward good behavior:
  - Chinese experience with coal-fired boilers (Chongqing): CEMS, plus daily penalties, pollution fees led to enterprises' decisions to switch fuels to natural gas;
  - Ideas to build upon this experience are (next slide):

Suggested Financial Incentives to Consider
建议的财务激励措施（1）

1. 实施差别电价：加强实施，并且加大电价的差异，尤其针对污染行业低效的生产活动.
2. 节能调度: 可以鼓励更节能的，以及更清洁的，对于污染控制做的好的企业（超过标准的要求），以及IGCC（IGCC同样需要补贴）。

1. Differential electricity pricing: enhance implementation, and apply increased differential rates for inefficient and polluting industrial operations.
2. Environmental / efficiency dispatch: can reward more efficient generation units, and those which better implement pollution control measures (beyond standard requirements), and potentially IGCC (IGCC needs subsidy as well).

Suggested Financial Incentives to Consider
建议的财务激励措施（2）

3. 金融机构在进行贷款决定时需要考虑绿色信用：建立一个评估企业环境绩效的体系，并且将这些信息提供给商业银行作为贷款决策的参照信息。

3. Green credit for loan decisions at financial institutions: create an evaluation system to grade enterprises, to provide commercial banks for reference when making loan decisions.

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

Chris James
cjames@raponline.org
617-861-7684 (Pacific time)

Global
US
China
EU

The Regulatory Assistance Project
50 State Street, Suite 3
Montpelier, Vermont 05602
phone: 802-223-8199
fax: 802-223-8172
www.raponline.org

关于美国电力监管援助组织（RAP）

美国电力监管援助组织（RAP）是一个全球性的、非营利性专家咨询机构，主要关注并进行电力与天然气行业长期经济和环境的可持续性研究。RAP在监管体系和市场政策领域有着资深的专业经验，主要包括：

- 推进经济效率
- 保护环境
- 保证系统可靠性
- 为所有消费团体公平地分配系统利益

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Chris James
cjames@raponline.org
617-861-7684 (Pacific time)