重点区域大气污染防治“十二五”规划

China’s Twelfth Five Years Plan on Air Pollution Prevention and Control in Key Regions

2020/10/13, BEIJING

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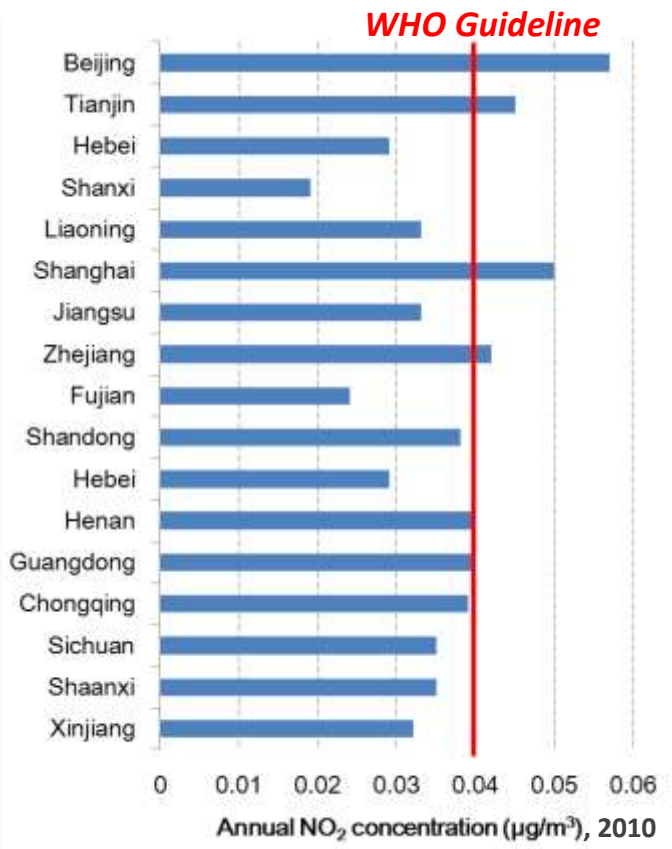
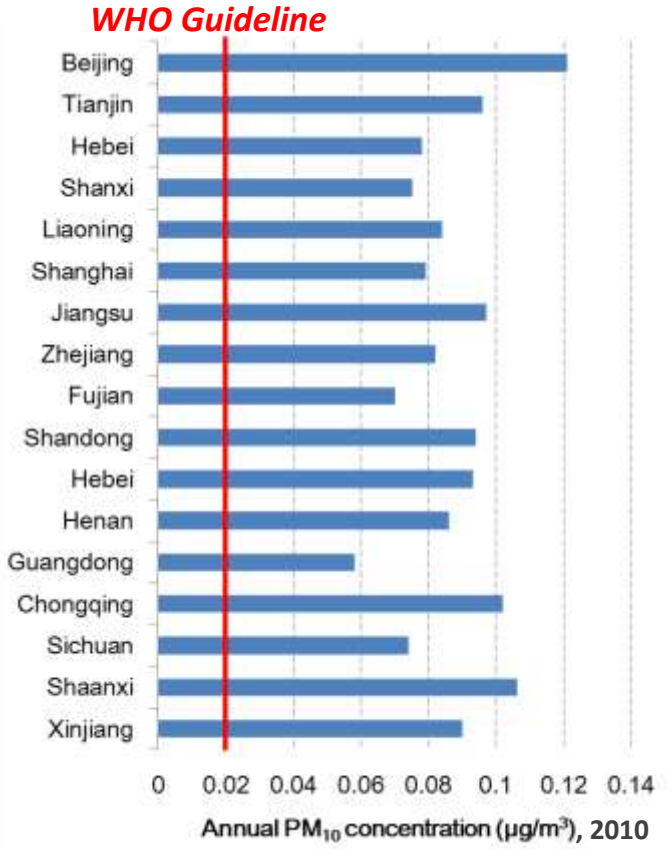
CAEP

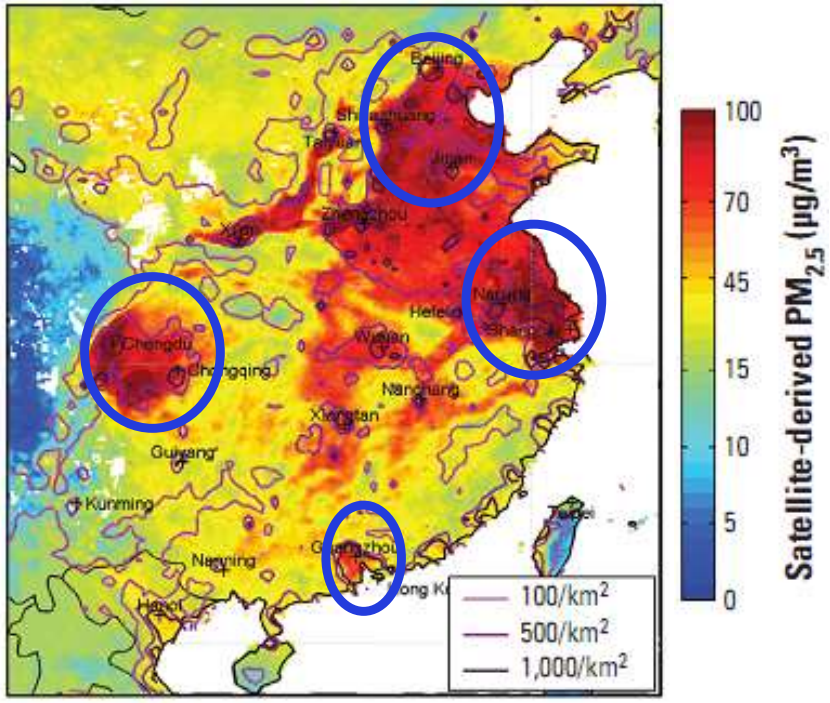
大气污染非常严重
China is suffering from heavy air pollution





- 颗粒物是中国最主要的大气污染物，2010年PM_{10}平均浓度达79μg/m^3，约为世界卫生组织指导值4倍
- PM_{10} concentration (79μg/m^3) is 4 times of WHO guideline value.

区域性大气污染形势严峻
Regional air pollution is a big challenge



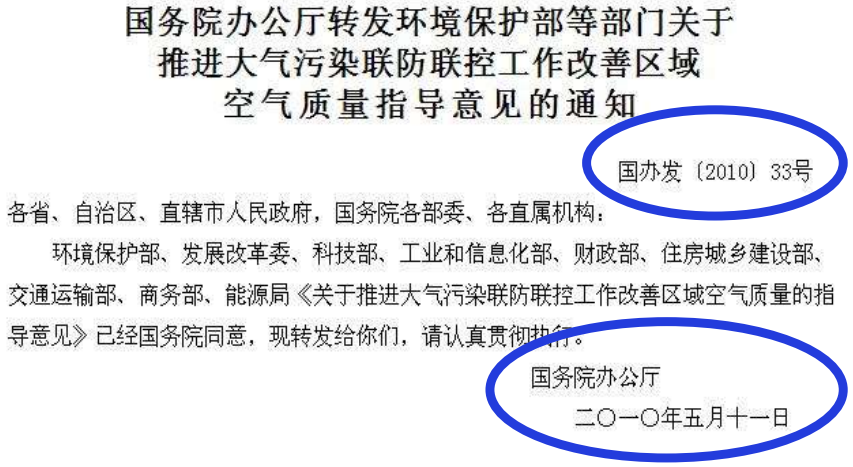
van Donkelaar et al., 2010

- **区域性复合型污染特征逐渐显现**
  - 区域$PM_{2.5}$浓度高达**50μg/m³**
  - 灰霾天数超过**100天**
  - O_3超标时间增多

- **Regional air pollution complex, characterized by photochemical smog and haze, is emerging**
  - High $PM_{2.5}$ concentration (**50μg/m³**)
  - **>100 days** of haze in key regions
  - Increasing O_3 exceedance

启动规划以改善区域空气质量
Plan launched to address air pollution issues

- 2010年5月,国务院办公厅转发了环境保护部等部门《关于推进大气污染联防联控工作改善区域空气质量指导意见的通知》
- “统一规划、统一监测、统一监管、统一评估、统一协调”



国务院办公厅转发环境保护部等部门关于推进大气污染联防联控工作改善区域空气质量指导意见的通知

国办发〔2010〕33号

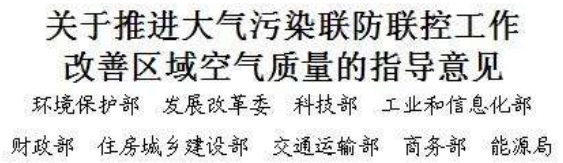
各省、自治区、直辖市人民政府，国务院各部委、各直属机构：

环境保护部、发展改革委、科技部、工业和信息化部、财政部、住房城乡建设部、交通运输部、商务部、能源局《关于推进大气污染联防联控工作改善区域空气质量的指导意见》已经国务院同意，现转发给你们，请认真贯彻执行。

国务院办公厅

二〇一〇年五月十一日

- In May 2010, state council issued the instruction on regional air pollution control, drafted by MEP and other 8 ministries.
- “Unified” planning, monitoring, supervision, evaluation, and coordination is highlighted



关于推进大气污染联防联控工作改善区域空气质量的指导意见

环境保护部 发展改革委 科技部 工业和信息化部 财政部 住房城乡建设部 交通运输部 商务部 能源局

规划编制过程
Milestones

前期准备 Preparation

- 2010年5月，启动规划编制 **Kick-off**
- 2010年5-12月，规划编制指南，培训 **Training courses**
- 2011年2-3月，“三区”7省实地调研 **Field research**

编制规划文本 Compiling

- 2011年4-8月，与地方对接，编制规划初稿 **Drafting**
- 2011年9月2日，召开第一次部长专题会 **1st MEP thematic meeting**
- 2011年9月，修改，形成征求意见稿 **Finalizing the draft for comments**

修改完善 Modification

- 2011年9月27日，第一轮征求意见 **1st Comments collecting**
- 2011年10-12月，修改文本，审核整理重点工程项目 **Adapting, filtering major projects**
- 2011年12月31日， 第二次部长专题会 **2nd MEP thematic meeting**
- 2012年1月18日，第二轮征求意见 **2nd Comments collecting**

规划范围：三区十群
Areas of concern: 3 regions + 10 city cluster

- 3个重点区域和9个城市群共12个区域，涉及17个省（区、市）
- 总面积118万平方公里，占国土面积的12%
- 占全国42%的人口，67%的GDP和约一半的大气污染物排放

- 12 areas in 17 provinces
- 1.18 million km2, 12% of China's land area
- 42% Population, 67% GDP, and ~50% emissions of China

规划总体思路
Overview of the plan approach

- 以改善大气环境质量为核心
- 实施多污染物协同控制
- 注重空气质量模型运用
- 强化空气质量管理机制创新

- **Objective**: to improve air quality
- **Strategy**: joint control of multi-pollutants
- **Analysis tool**: air quality model (CMAQ)
- **Innovation**: adjusted air quality management system

规划目标：
General target of the plan

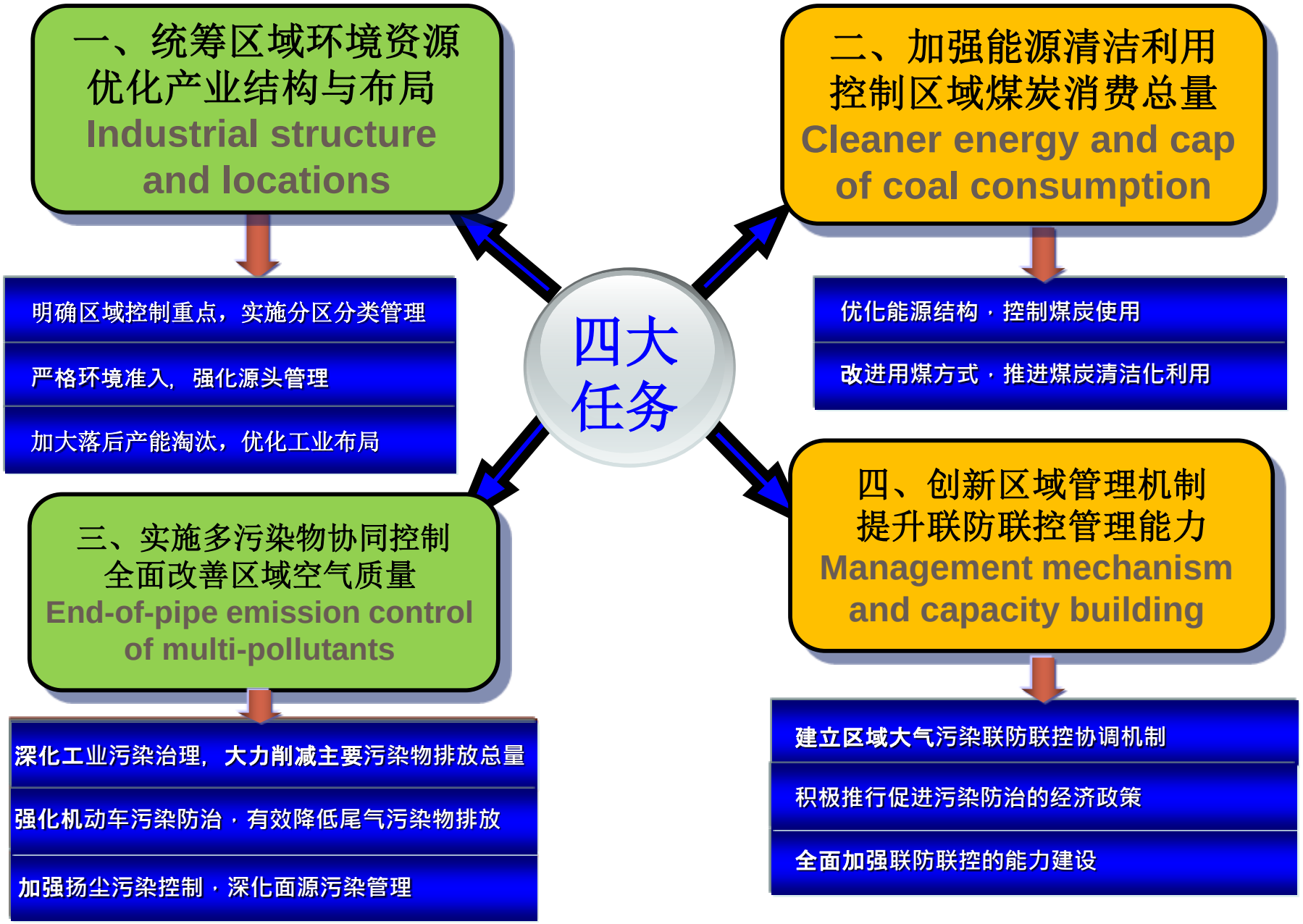
至2015年

- SO_2、NO_X、烟尘和工业粉尘排放量明显下降，挥发性有机物污染防治工作全面展开
- 环境空气质量显著改善，PM_{10}、SO_2、NO_2年均浓度分别下降10%、10%、8%
- 京津冀、长三角、珠三角区域$PM_{2.5}$年均浓度下降6%，O_3年超标天数下降10%
- 建立健全区域大气污染联防联控机制

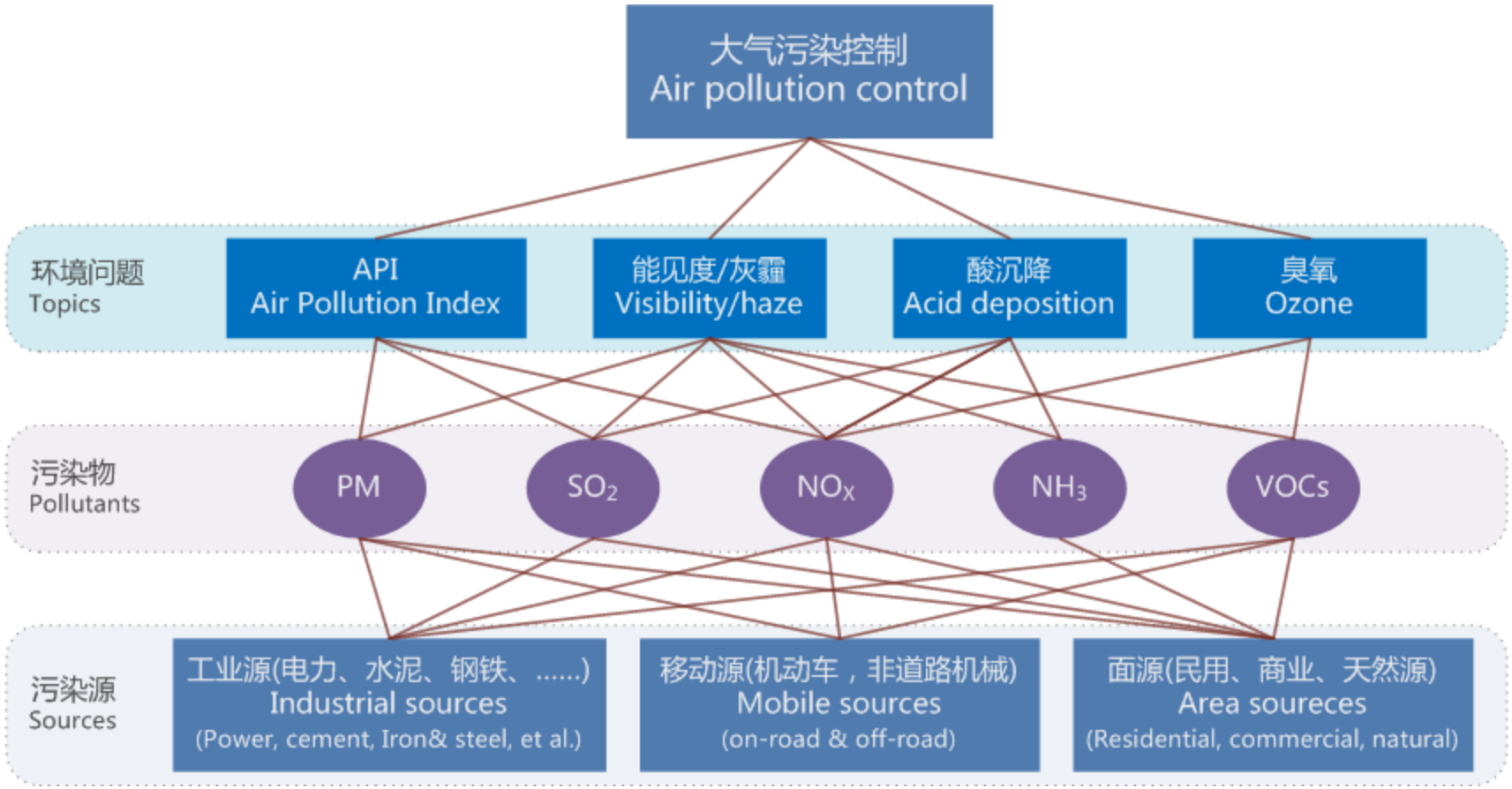
By 2015

- Significantly lower emissions of SO_2, NO_X and PM, and boost VOCs emissions control.
- Notably air quality improvement, annual average concentration of PM_{10}、SO_2、NO_2 declined by10%、10%、8%
- 6% decline of $PM_{2.5}$ Concentration, and 10% less days of O_3 nonattainment in Beijing-Tianjin-Hebei, YRD and PRD
- Mechanism for joint prevention and control of regional air pollution

规划重点任务 Important aspects included in the plan



强调多污染物、多污染源的共同控制
Multiple pollutants and emission sources of concern



SO_2排放控制
SO_2 emissions

- **深化电力行业SO_2治理**
  - 烟气脱硫效率达**90%**以上
- **全面实施烧结机烟气脱硫**
  - 烟气脱硫效率达**70%**以上
- **强化工业窑炉、工艺尾气烟气SO_2治理**
- **开展燃煤工业锅炉SO_2治理**
  - **20**蒸吨以上锅炉全部脱硫，效率达**70%**

- **Coal-fired power plants**
  - **Remove >90% of SO_2 emissions**
- **Sintering machines**
  - **Remove >70% of SO_2 emissions**
- **Industrial kilns and processes**
- **Industrial boilers**
  - **Remove >70% of SO_2 emissions from boilers ≥ 20 t/h**

固定源NO_X排放控制
NO_X emissions from stationary sources

- **大力推进电力行业NOx控制**
  - 20万千瓦以上机组烟气脱硫效率达**70%**以上
- **加强水泥行业NO_X治理**
  - 日产2000吨以上生产线：低氮燃烧
  - 日产4000吨以上生产线：低氮燃烧＋烟气脱硝
- **积极开展锅炉、烧结机等烟气脱硝示范工程**

- **Coal-fired power plants**
  - Remove **>70%** of NOx emissions from units ≥ 200MW
- **Cement kilns**
  - **LNB** for all kilns ≥ 2000t/d
  - **LNB + SCR/SNCR** for all kilns ≥ 4000 t/d
- **Industrial boilers and sintering machine**
  - Conduct pilot studies for NO_X emission control technologies

工业源颗粒物排放控制
PM emissions from industrial sources

- 重点控制部门
  - 燃煤电厂、水泥、钢铁
- 实施新的排放标准
  - 燃煤电厂：2011年发布
  - 钢铁：已征求意见
  - 水泥：准备修订
- 推动工程改造
  - 推广使用袋式除尘器
  - 加强无组织尘排放管理

- Key sectors
  - Coal-fired power plants, cement industry, iron & steel industry
- New emission standards
  - Power plants: issued in 2011
  - Iron & steel industry: waiting for approval
  - Cement industry: to be amended
- PM control technologies to be implemented
  - To promote fabric baghouse
  - To enhance management to reduce fugitive dust

锅炉颗粒物排放控制
PM emissions from boilers

- **提高煤炭使用效率**
  - 推动集中供热
  - 淘汰小型燃煤锅炉
- **改善燃煤质量**
  - 加强洗煤和配煤
- **推进锅炉烟尘治理**
  - 推动使用天然气
  - 进行高效除尘改造

- **To increase energy efficiency**
  - Promotion of central heating
  - Replacement of small boilers by larger one
- **To improve coal quality**
  - Development of coal washing and coal blending system
- **To reduce PM emissions from the stacks**
  - Promotion of natural gas
  - Implementation of control technologies with higher PM removal efficiency

VOCs排放控制：工业过程
VOCs emissions: industrial processes

重点控制部门

- 石油化工
- 有机化工
- 医药化工
- 塑料制品生产

处理工艺

- 泄漏检测与修复技术
- 原料、产品密闭储存
- 工艺气体回收利用
- 废气末端处理（焚烧或吸收）

Key sectors

- Petrochemical industry
- Organic chemical industry
- Pharmaceutical industry
- Plastic products industry

Major technologies

- Leakage Detection And Repair (LDAR)
- Sealed storage of raw material and products
- Recycle of process gas
- Incineration/absorption of exhaust gas

VOCs排放控制：其他
VOCs emissions: other sources

- **表面涂装和溶剂使用的部门**
  - 推广水性涂料和油墨
  - 密闭作业
  - 建立废气收集和净化系统
- **加油站、储油库和油罐车**
  - 全部进行油气回收治理改造

- **Painting and using of solvent**
  - Replacement of oil-based paints and solvents by water-based ones
  - Enclosed operation chamber
  - A system to collect and incineration/absorb waste gas
- **Gas stations, oil storage tanks and tankers**
  - **All** facilities with hermetical oil gas recovery system before 2014

移动源污染防治：机动车
Mobile sources emissions: on-road vehicles

口新车

- 加快颁布实施国家第Ⅴ阶段机动车排放标准
- 完善型式核准制度

口在用车

- 环保标志发放率在2015年达到85%以上
- 完善检验与维修制度
- 加速淘汰黄标车

□ New vehicles

- Phase in Stage Ⅴ Emission Standards
- Improve the type approval regulation

□ In-use vehicles

- Above 85% vehicles receive environmental protection label by 2015
- Improve I/M program
- Accelerate the scrappage of yellow-sticker vehicles

移动源污染防治：油品和非道路移动源
Oil and off-road vehicles

□ 推动油品低硫化

- 车用汽油：2013年达50ppm
- 车用柴油：2014年达50ppm
- 普通柴油：2013年7月前达350ppm以下

□ 非道路移动源污染防治

- 实施国家第Ⅲ阶段非道路移动机械排放标准
- 实施国家第Ⅰ阶段船用发动机排放标准
- “绿色港口”建设和码头移动源污染防治工程

□ Oil desulfurization

- Gasoline: 50ppm by 2013
- Diesel for motor vehicles: 50ppm by 2014
- Diesel for other use: <350ppm by Jul, 2013

□ Off-road emissions control

- Stage III emissions standards for off-road machineries
- Stage I emissions standards for vessel engines
- “Green Harbor” projects

扬尘和面源污染防治
Fugitive dust and other area sources

- **施工扬尘**
  - 加强工地管理
- **道路扬尘**
  - 加强道路清扫
- **堆场扬尘**
  - 建设密闭料场
  - 覆盖或喷洒稳定剂
- **秸秆焚烧**
  - 推进秸秆资源化利用

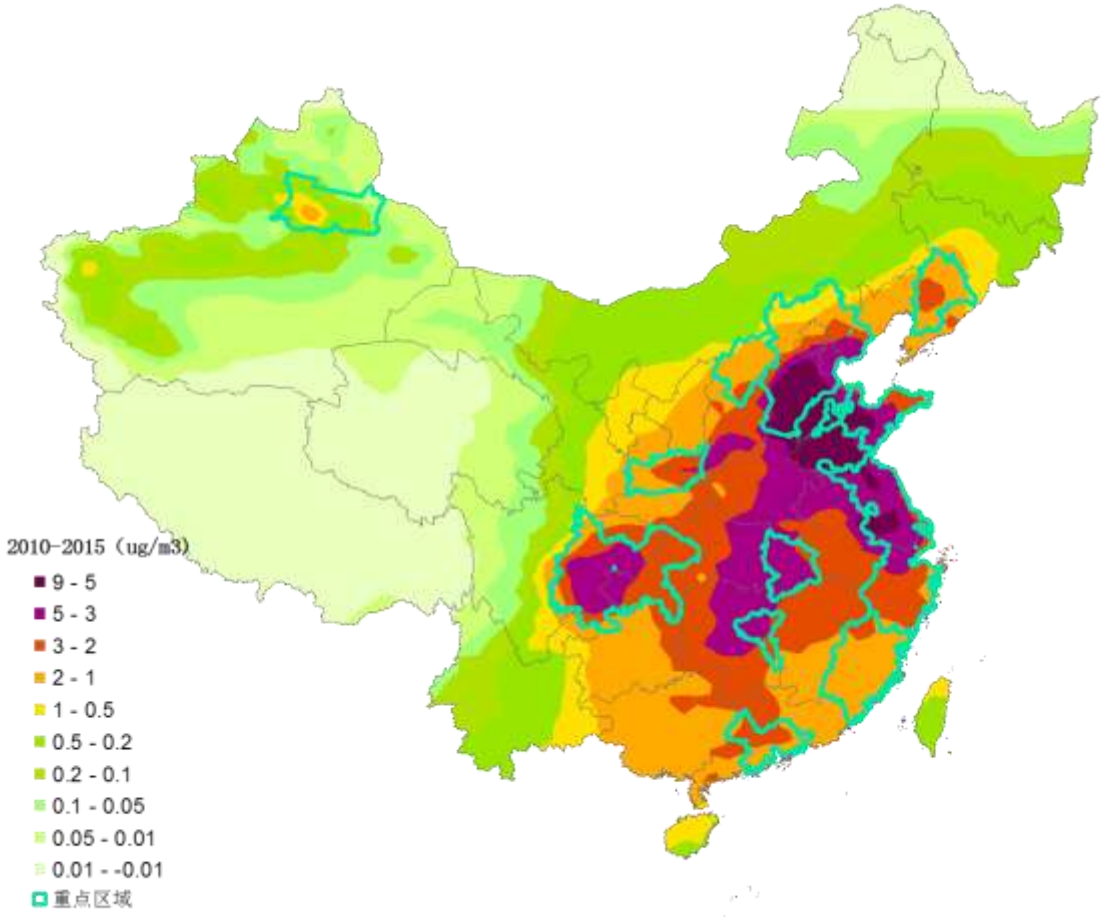
- **Dust from construction field**
  - Promotion of good practice of construction field management
- **Dust from paved roads**
  - Intensify road cleaning
- **Dust from stock piles**
  - Construction of storage hoppers
  - Cover or stabilize
- **Biomass open burning**
  - Promotion of technologies to convert biomass into manure and energy

污染治理工程（部分）
Part of proposed projects

- **工业部门除尘设施改造**
  - 1.7亿千瓦火电机组
  - 600条水泥生产线
  - 500台烧结机
  - 7000台燃煤工业锅炉
- **工业部门VOCs污染治理**
  - 十大行业，共3000个治理项目
- **淘汰黄标车**
  - 400万辆黄标车
- **……**

- **Retrofitting PM control equipment**
  - 170GW power units
  - 600 cement kilns
  - 500 sintering machines
  - 7000 industrial boilers
- **Industrial VOCs emission control**
  - 3000 projects in 10 industrial sectors
- **Phasing out of yellow-sticker vehicles**
  - 4 million vehicles
- **……**

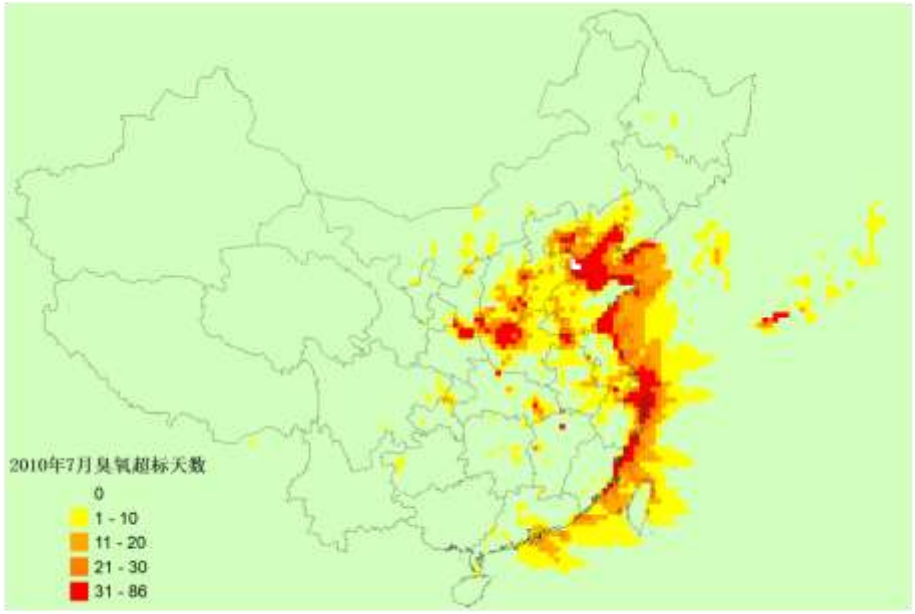
空气质量改善: $PM_{2.5}$年均浓度
AQ improvement: Annual $PM_{2.5}$ concentration



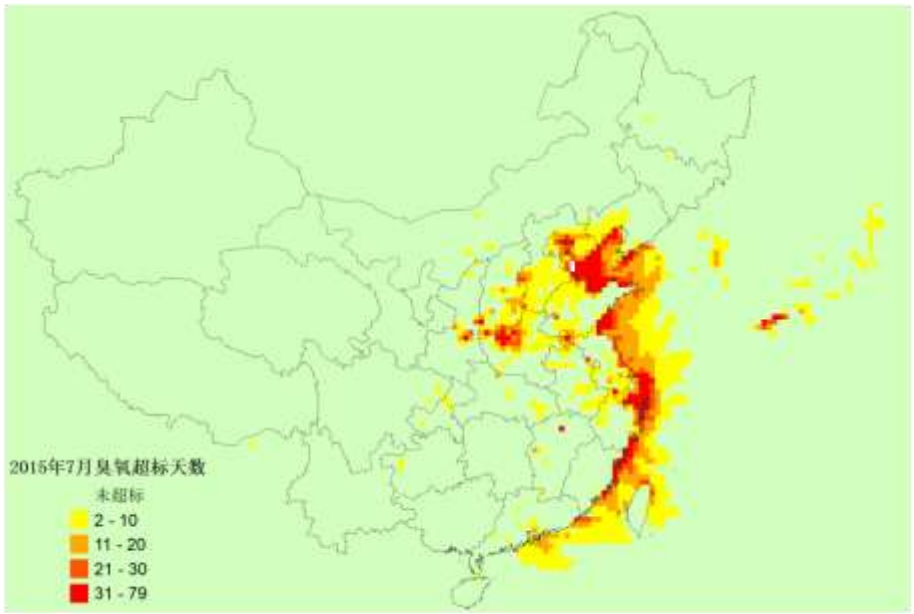
- 规划区域范围内$PM_{2.5}$年均浓度平均下降约4μg/m³
- Average annual $PM_{2.5}$ concentration in the 12 regions could decline by ~4μg/m³

- 中国东部其他地区的$PM_{2.5}$浓度也将有一定程度下降
- The measures would lower $PM_{2.5}$ pollution over other areas in eastern China as well

空气质量改善: O3超标情况
AQ improvement: O3 exceedance



Hours of O_3 exceedance, 2010



Hours of O_3 exceedance, 2015

- **大部分地区O_3超标小时数有所降低，少数城市可能略有升高**
- Hours of O_3 exceedance could decline in most area, despite a little increase in some individual cities

- **由于VOCs的排放信息较少，此分析结果存在一定的不确定性**
- Uncertainty due to lack of accurate VOCs emissions information

成本和效益
Costs and benefits

- 8类重点工程项目，投资需求3450亿元
- 新增SO2、NOX、PM、VOCs年减排能力分别为185万吨、370万吨、150万吨和160万吨
- 环境空气质量改善所减少的社会经济损失约20000亿元

- 8 categories of major projects, total investment accounts for 345 billion RMB
- Capable of mitigate 1.85 MT of SO2, 3.7 MT of NOX, 1.5 MT of PM and 1.6 MT of VOCs annually
- 2 trillion RMB lost will be reduced after the plan is implemented

进一步的工作
Future efforts

- 增强污染物排放信息的统计能力
  - VOCs，非道路移动源，扬尘……
- 进一步研究VOCs控制技术和政策
- 增强环境监测和污染物排放在线监测能力建设

- More accurate emissions information
  - VOCs, off-road mobile sources, fugitive dust, …
- Measures to control VOCs emissions
- Air quality monitor and CEMS

谢谢！
Thank you！

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