RAP Energy solutions for a changing world

China's Plans to Improve Air Quality

Wilson Center, China Environment Forum
Washington, DC

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Icebreaker

- All answers true or false:
  - One half of USA citizens live in areas that exceed one or more EPA air quality standards
  - Coal consumption in China will peak by 2020
  - Winter air pollution in Krakow is similar to that of many Chinese cities

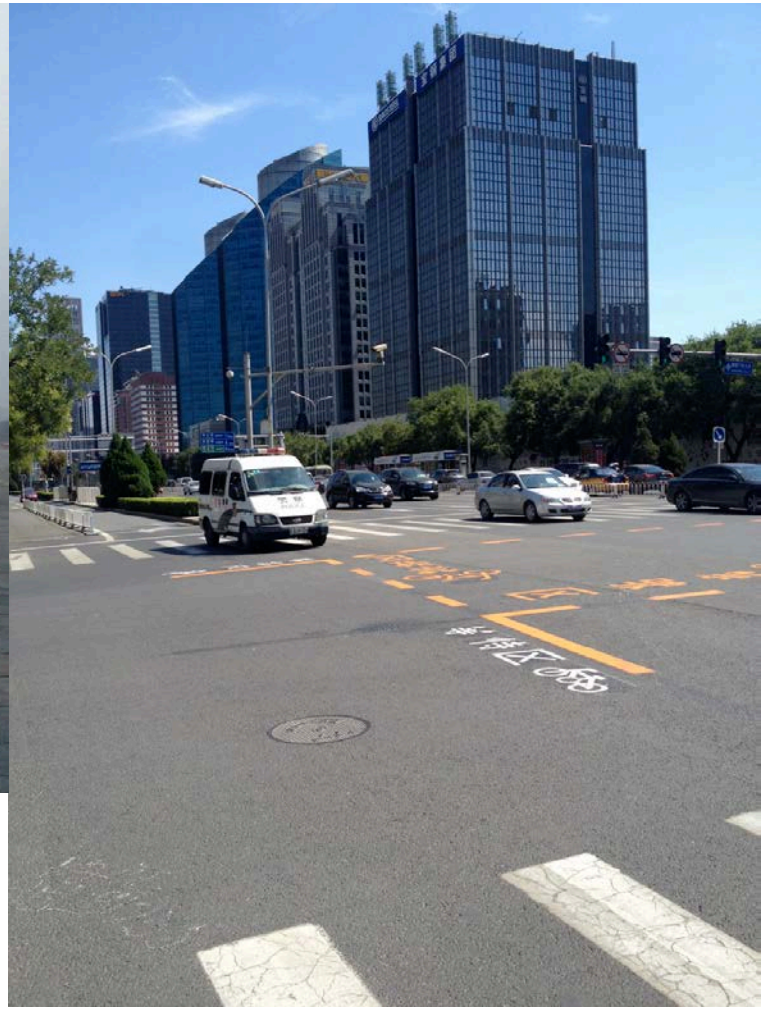
What Images Come to Mind When You Think of China and Air Quality?

This November 2011 day was rated "mildly polluted"

Clean Air is A Goal in China Too

A “Blue Sky Day”. Each of China’s major cities has a targeted number of such days they aim to reach each year

Smoggy Morning, Blue Sky Afternoon



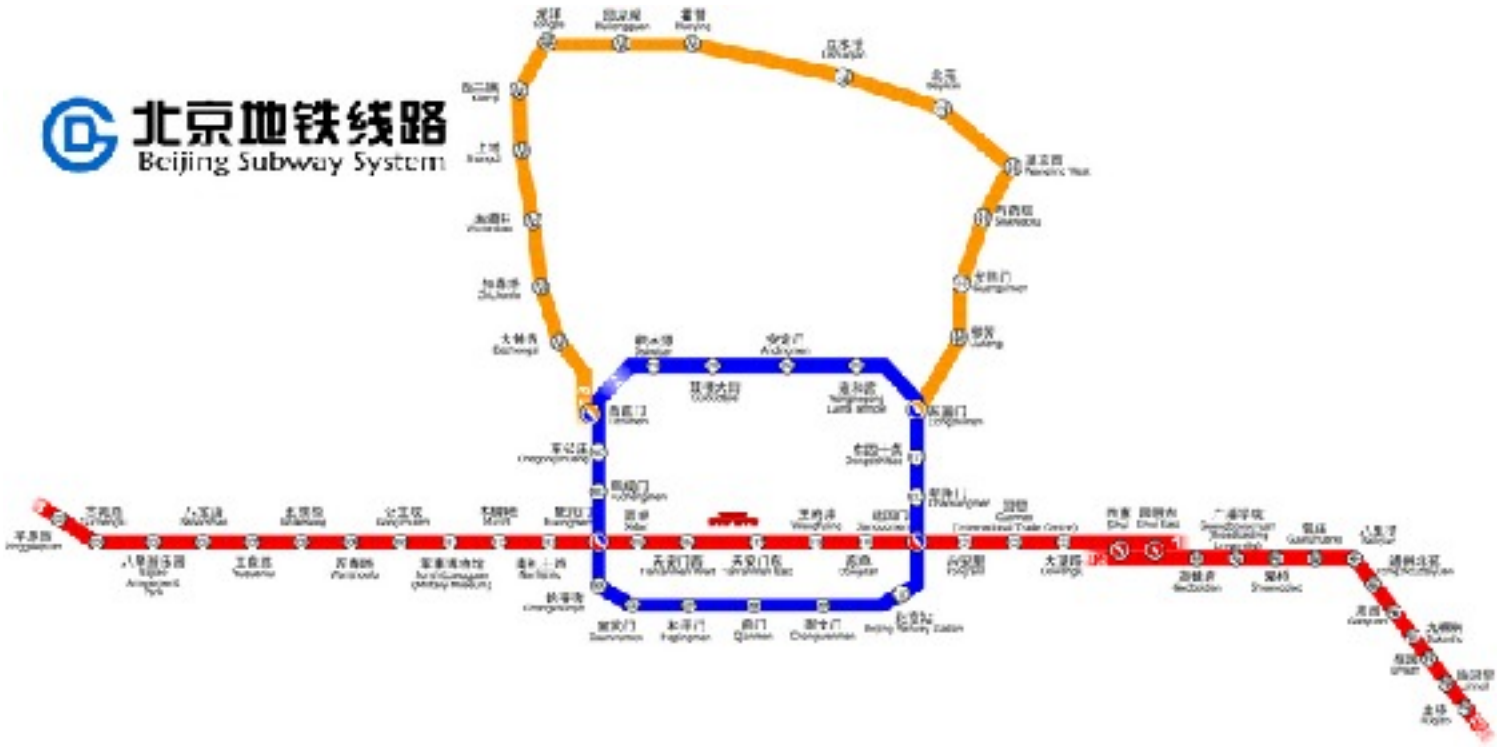
What Comes to Mind When You Think About China and Economic Development ?

This image is one that China wants to relegate to the dust bin. Hundreds of these plants have already been closed

This Picture is Another View: Where China is Heading

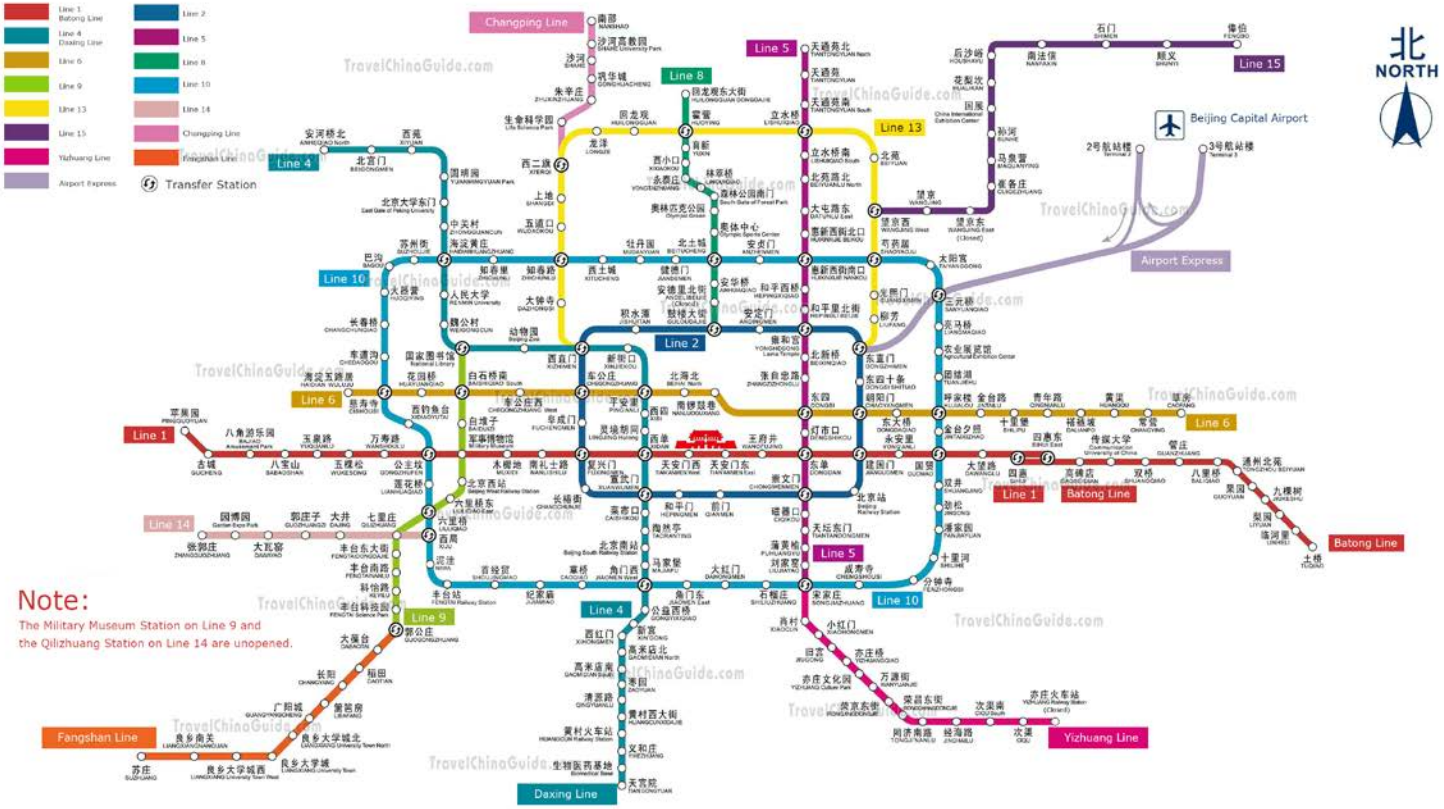
As Is This One

China Infrastructure Project Example
Beijing Subway Map 2007



Beijing Subway Map 2013

Beijing Subway Map (Click to Enlarge)



Overview

- Discussion of China's economic growth framed from environmental and especially air quality perspectives
- Comparison of China and United States economic development
- What indicators compelled each country to act to improve its environment?
- China and the United States actions to reduce air pollution and protect public health

Rate of Change in China: Environmental Affects and Opportunities

- Equivalent of two United States (600 million people) relocating from rural to urban areas
- Developing middle class: transition from heavy manufacturing to higher value products and service economy
- Annual growth in Gross Domestic Product (GDP) is 7-10%
- Annual electricity growth 10%
- Each ton of cement produced emits about one ton of CO2
- Each ton of coal combusted emits slightly more than one ton of CO2, along with many pounds of fine particles, sulfur dioxide. Coal combustion also results in mercury emissions.
- Electricity production requires water for cooling and power plant processes. Each kilowatt-hour of electricity produced uses 2.5 liters of water.

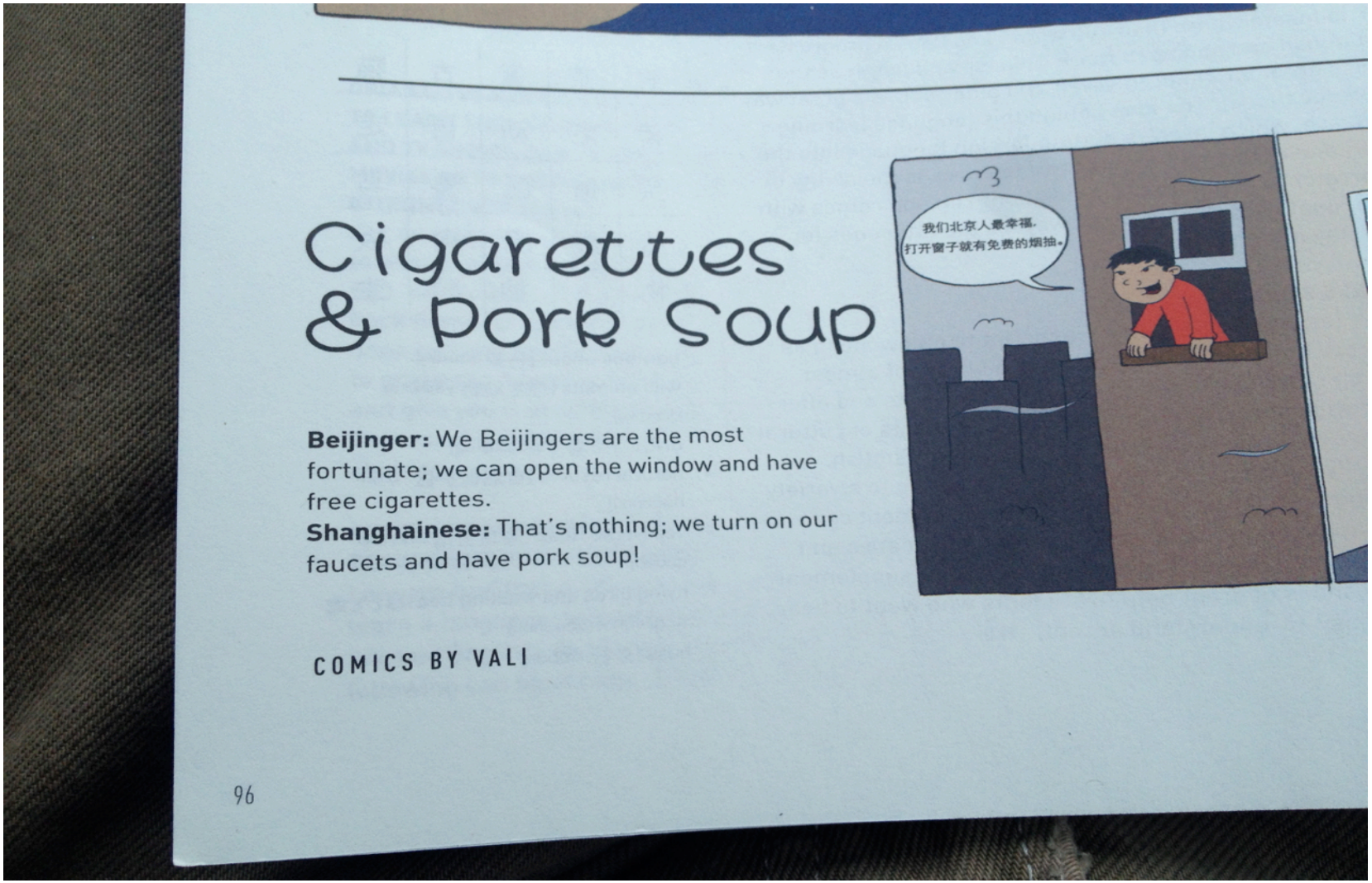
November 2011: PM2.5 Becomes Cause Celebre

- Beijing air quality in October and November consistently poor
- Over two week period:
  - China demands that US Embassy shut down their PM2.5 monitor
  - China asks US to permit China to monitor at location next to Embassy, or to have US and China co-locate monitors
  - China declares that its PM2.5 data are fine, that the US data are incorrect
  - China announces that PM2.5 pollution is a problem in Beijing, but says pollution is coming from other provinces
  - China announces that PM2.5 will be a major environmental focus during the 12th Five Year Plan. Announces plans to accelerate implementation of control measures, cleaner fuel standards, adoption of more protective PM2.5 standard, and adoption of new air quality index to supplement the existing index that is used to calculate “Blue Sky Days”

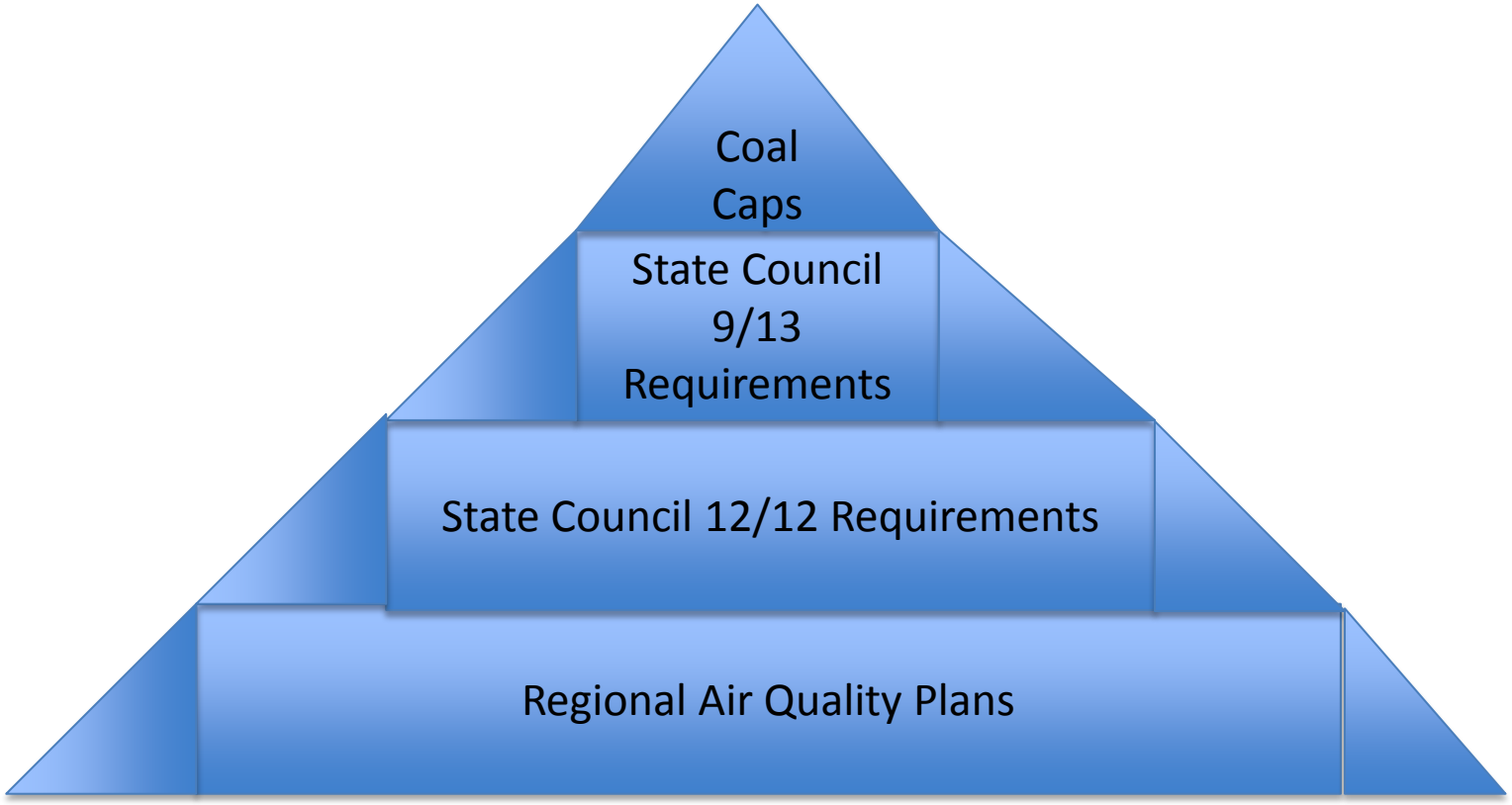
Increased Public Pressure

"Thousands of people besieged a government office in a southern Chinese town Tuesday and blocked a highway to demand a halt to a planned coal-fired power plant because of concerns about pollution, protesters said."

When Jokes Are Made About Pollution



Building Blocks of China's Air Quality Program



Key Regions Described in State Council's Regional Air Quality Guidance

1. Central Liaoning [Province] (Shenyang etc.)
2. Shandong Peninsula (Qingdao etc.)
3. Greater Wuhan
4. Changsha, Zhuzhou and Xiangtan region
5. Chengdu and Chongqing region
6. Areas around Taiwan Strait (Xiamen etc.)

7. Shanxi [Province] (Taiyuan etc.)
8. Shaanxi [Province] (Xi'an etc.)
9. Xinjiang [Province] (Ürümqi etc.)
10. Gansu [Province] (Lanzhou)

= Economic Zones

= City Clusters

China's Regional Air Quality Plans

- 2010: State Council Guidance issued
- Pollution levels 2.9-3.6 times China's air standards
- Applied to 10 key cities, 3 key regions
  - Population: 500 million
  - GDP: >40% of national total
  - GDP growth: 7%+/year
- Multi-pollutant plans
- Coal free zones established, mainly in urban core
- 2011-12: Widespread PM2.5 episodes: additional and more aggressive actions required
- 2012: National People's Congress law adopted
- All 113 key cities must complete by 12/31/2015
- Mandatory reduction targets by 2015: PM10: 10%, PM2.5: 5%, SO2:10%, NOx:7%.
- Coal free zones: expanded to more cities, and larger areas in initial group of cities
- Coal caps: Beijing, Tianjin, Nanjing, Guangzhou. More areas to be added in 2013-14
  - Beijing: coal consumption must be cut 35% by 2015; 60% by 2020.

China Coal Free Zones

- First included in "Blue Sky Plans" circa 2009
  - Central business districts
  - Closure/relocation of coal burning plants
  - Conversion to natural gas for heating, taxi cab fleets
- 2012: part of MEP plans to improve national air quality
- 47 key cities
  - Coal free zones must be 80% or greater of urban area
- Emissions must be offset by 2:1
- $55.6 billion to be spent by 2015

Benefits from Regional Air Quality Plans

- Emissions: by 2015:
  - NOx reduced by 3.59 million tons
  - SO2 by 2.28 million tons
  - PM by 1.48 million tons
- Economic benefits to society by 2015:
  - $317 billion
- Energy:
  - Thermal upgrades for residential buildings and small industrial/commercial sector
- Clean Fuels:
  - Connect additional residential buildings to district heating
  - Convert district heating from coal to gas

Chinese Economic Incentives

- Bonuses and promotions of government officials based on their abilities to meet targets in Five Year Plans
  - Failure to meet goals: no new projects approved, official(s) may be relocated
- Pay for energy audits for small industrial boilers
- Differential pricing: power companies that install air pollution controls are paid slightly higher rate and are dispatched sooner

December 2012 State Council Actions

- Coal free zones established in 47 of 113 key cities (more to come)
- Emission reduction targets for next five years for all major pollutants
- Local economic development funds linked to city's efforts to reduce pollution
- Senior officials job performance reviewed based on achieving air quality goals
- State Council issuance means actions are binding across all major Chinese departments: environment, housing, finance, transport, planning

September 2013 State Council Actions

- Very unusual for announced plan not to coincide with normal five year planning cycle
- Driven by January 2013 “smogacolypse”
- Requires Beijing, Shanghai and Guangdong area to reduce fine particles 25, 20 and 15%, respectively by 2017
- Changes energy structure to cap and reduce coal consumption
- “Name and shame”: top and bottom performing cities will be published annually

Results of China Efforts to Reduce Air Pollution

- Government will spend about $315 billion in next five year to reduce air pollution
- Steel production in one province (Hebei) is being cut by 60 million tons per year
- Coal consumption is forecast to peak by 2020
- Additional measures expected to be included in next Five Year Plan, starting in 2016

Discussion Questions

- Role of the public to engage, encourage and advocate for change
  - What can Chinese citizens do to help achieve the air quality and energy goals?
- What will China look like in 2030?
- What can the United States and Europe learn from China? And vice versa

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

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