

U.S. Politics and Laws as Drivers for Air Quality Management (AQM)

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Main Points

- **Basic human needs must be met before citizens care about air pollution**
- **People respond first to what they can see and smell**
- **Basing emission reduction strategies on healthful ambient concentrations (NAAQS) has driven pollution control technology**
- **Single pollutant control strategies have been effective for most directly-emitted pollutants**
- **Multi-pollutant control strategies are needed for pollutants that form after emission (ozone, sulfate, nitrate, organic carbon)**
- **The piecemeal development and lack of accountability of the U.S. AQM system has resulted in inefficiencies, excessive litigation, implementation delays, and retention of older assessment technologies**

Citizens were upset with poor visibility in major cities



9:20am in downtown Pittsburgh, 1946



Afternoon in Los Angeles, early 1960s

Citizens were also concerned about poor visibility in treasured national parks

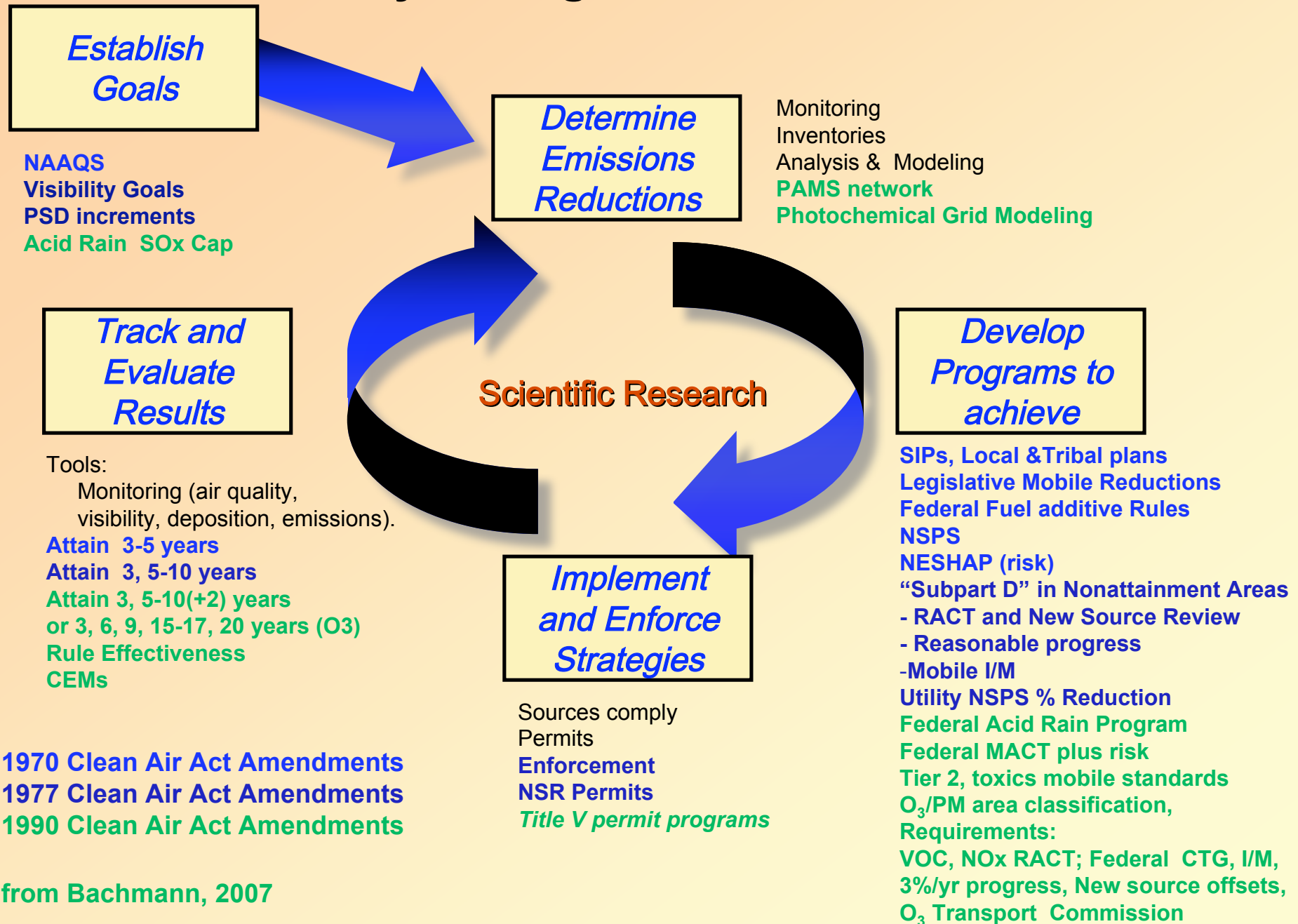


Grand Canyon, 6/21/1985, 9 AM



Four Corners coal-fired power station, east of Grand Canyon, 1970s

U.S. Air Quality Management is an Iterative Process

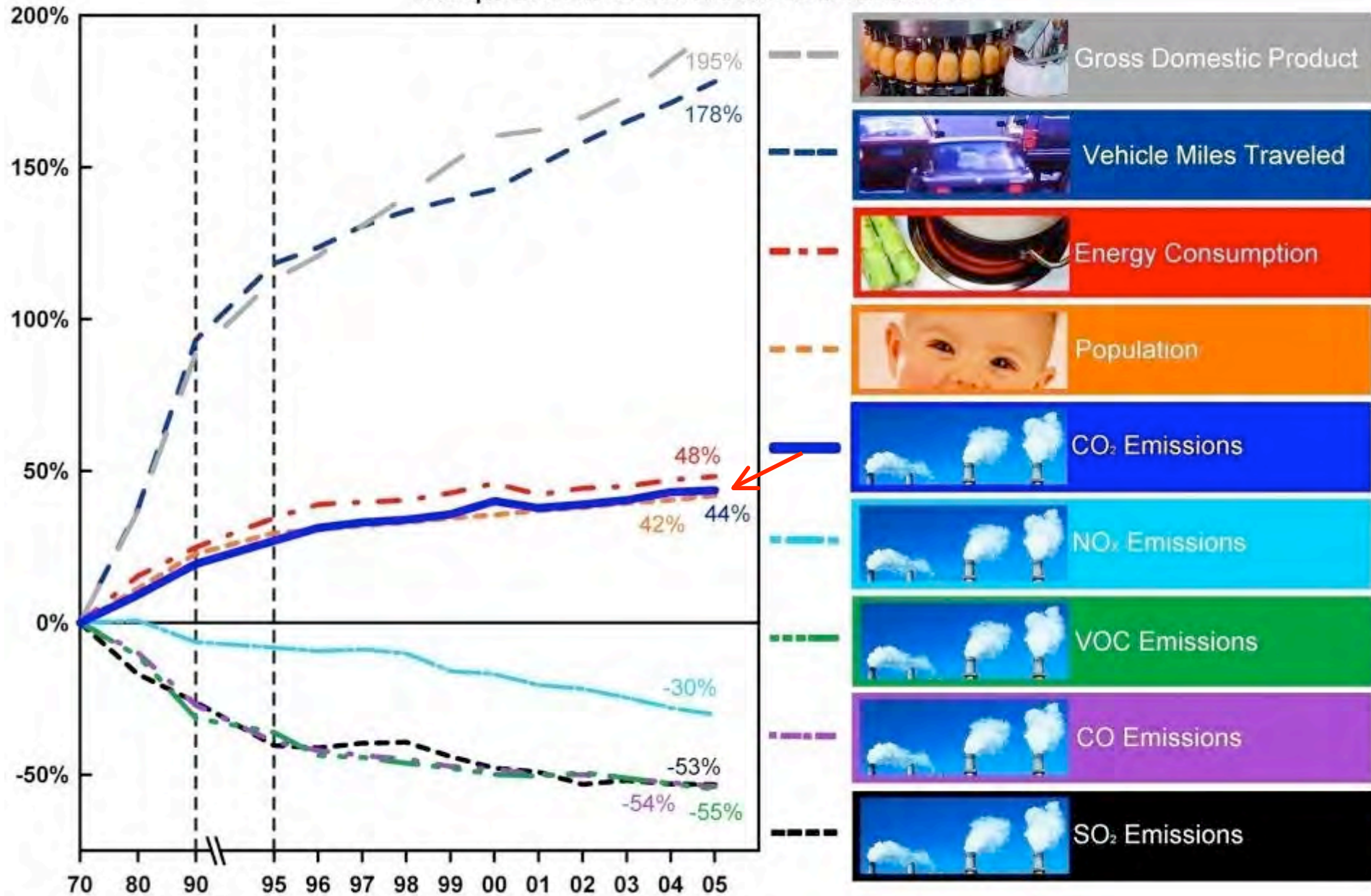


Multiple Emission Reduction Laws and Regulations have Been Promulgated for U.S. AQM

- **Ambient air quality standards (NAAQS)**
- **Emissions caps and trading**
- **Demonstrated reasonable progress**
- **Emission fees and fines**
- **Emission limits (NSPS, Tiers 1,2,3,4,5)**
- **Effluent treatment requirements (RACT, BACT, MACT, LAER)**
- **Retrofit Requirements (NSR, BACT)**
- **Product design specifications**
- **Forced shutdowns**
- **Fuel specifications**
- **Inspection and Maintenance programs**
- **Energy efficiency requirements**

U.S. AQM has been Successful for Individual Pollutants

Comparison of Growth Areas and Emissions



Future Challenges for U.S. Air Quality Management

- **Simplify overlapping rules and regulations**
- **Regulate pollutant combinations rather than individual pollutants**
- **Re-design source characterization and ambient networks for data uses beyond compliance and phase-in new measurement technologies**
- **Expand spatial domains for AQM beyond local, state, and national boundaries**

Source Material

- **Simplify overlapping rules and regulations**
- **Regulate pollutant combinations rather than individual pollutants**
- **Re-design source characterization and ambient networks for data uses beyond compliance and phase-in new measurement technologies**
- **Expand spatial domains for AQM beyond local, state, and national boundaries**

Source Material

- Bachmann, J.D. (2007). Will the circle be unbroken: A history of the US national ambient air quality standards-2007 Critical Review. *J. Air Waste Manage. Assoc.*, 57(6):652-697.
- Chow, J. C. 2001 Critical review discussion - Diesel engines: Environmental impact and control. *J. Air Waste Manage. Assoc.* 2001, 51(9), 1258-1270.
- Chow, J. C.; Bachmann, J. D.; Wierman, S. S. G.; Mathai, C. V.; Malm, W. C.; White, W. H.; Mueller, P. K.; Kumar, N. K.; Watson, J. G. 2002 Critical review discussion - Visibility: Science and regulation. *J. Air Waste Manage. Assoc.* 2002, 52(9), 973-999.
- Chow, J. C.; Watson, J. G.; Shah, J. J.; Kiang, C. S.; Loh, C.; Lev-On, M.; Lents, J. M.; Molina, M. J.; Molina, L. T. 2004 Critical review discussion: Megacities and atmospheric pollution. *J. Air Waste Manage. Assoc.* 2004, 54(10), 1226-1235.
- Chow, J. C.; Watson, J. G.; Feldman, H. J.; Nolan, J.; Wallerstein, B. R.; Bachmann, J. D. 2007 Critical review discussion - Will the circle be unbroken: A history of the U.S. National Ambient Air Quality Standards. *J. Air Waste Manage. Assoc.* 2007, 57(10), 1151-1163.
- Chow, J. C. 2007 Critical review introduction - Will the circle be unbroken: A history of the U.S. National Ambient Air Quality Standards. *J. Air Waste Manage. Assoc.* 2007, 57(6), 650-651.
- Civic Exchange Air Pollution - Air quality management issues in the Hong Kong and the Pearl River Delta Region. prepared by Civic Exchange, Hong Kong, 2004.
- Hedley, A. J.; Mcghee, S. M.; Barron, B.; Chau, P.; Chau, J.; Thach, T. Q.; Wong, T. W.; Loh, C.; Wong, C. M. Air pollution: Costs and paths to a solution in Hong Kong - Understanding the connections among visibility, air pollution, and health costs in pursuit of accountability, environmental justice, and health protection. *Journal of Toxicology and Environmental Health-Part A-Current Issues* 2008, 71(9-10), 544-554.
- Hopkinson, L.; Stern, R. One country, two systems, one smog cross-boundary air pollution policy challenges for Kong Kong and Guangdong. *China Environment Series* 2003, (6), 19-36.
- Lee, S. C.; Watson, J. G.; Chow, J. C.; Ho, K. F.; Wangberg, I.; Lau, A. K. H.; Guo, H.; Liu, S. Feasibility of establishing air monitoring supersites in Hong Kong. prepared by Hong Kong Polytechnic University and the Desert Research Institute, Hong Kong, SAR, China, 2008. <http://www.cse.polyu.edu.hk/~HKsupersite/>
- Lloyd, A. C.; Cackette, T. A. Critical review - Diesel engines: Environmental impact and control. *J. Air Waste Manage. Assoc.* 2001, 51(6), 809-847.
- Molina, M. J.; Molina, L. T. Critical review: Megacities and atmospheric pollution. *J. Air Waste Manage. Assoc.* 2004, 54(6), 644-680.
- Ng, K. L.; Obbard, J. P. Strategic environmental assessment in Hong Kong. *Environ. Int.* 2005, 31(4), 483-492.
- NRC (National Research Council) *Air Quality Management in the United States*. The National Academies Press: Washington, DC, 2004;
- NRC (National Research Council) *New Source Review for Stationary Sources of Air Pollution*. The National Academies Press: Washington, DC, 2006;
- NRC (National Research Council) *Energy Futures and Urban Air Pollution Challenges for China and the United States*. National Academies Press: Washington, DC, 2008;
- Watson, J. G. Visibility: Science and regulation. *J. Air Waste Manage. Assoc.* 2002, 52(6), 628-713.