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Sustainable Development and Air Quality: The Need to Replace Basic Technologies with Cleaner Alternatives

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The Need to Replace Basic Technologies with Cleaner Alternatives

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In the last five years, we have failed to make the fundamental technological changes that would be needed to meet the ambitious goals established in the Rio Declaration.[1] Still, we continue to stumble toward sustainability in many areas, as many indicators of air quality and emissions have continued to show improvement over the last five years.

This chapter begins by explaining sustainable development's meaning for air quality under Agenda 21[2] and the Rio Declaration. A second part assesses progress toward these commitments through a look at emission trends, recent regulatory developments, and movement toward sustainable technology during the last five years. A final part articulates recommendations for improving United States conformity to Agenda 21 and the Rio Declaration.

Sustainable Development's Link to Air Quality

The Rio Declaration states that "human beings . . . are entitled to a healthy and productive life in harmony with nature."[3] Since air pollution damages both human health and the environment, air quality implicates both environmental and health

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[1]Rio Declaration on Environment and Development, U.N. Conference on Environment and Development, U.N. Doc. A/CONF.151/5/Rev.1, 31 I.L.M. 874 (1992) [hereinafter Rio Declaration].

[2] U.N. Conference on Environment and Development, U.N. Conference on Environment and Development, Agenda 21, U.N. Doc. A/CONF.151.26 (1992).

[3]Rio Dec., *supra* note 1, prin. 1.

concerns.[4] To support this principal, Agenda 21 establishes an objective of eliminating "unacceptable or unreasonable" risks from air pollution "to the extent economically feasible."[5] The Rio Declaration suggests that we must eliminate unreasonable risks not only for this generation but for future generations as well.[6] In order to meet this objective the Rio Declaration states that countries “should reduce and eliminate unsustainable patterns of production and consumption."[7] The elimination of unsustainable production and consumption patterns requires use of integrated decision making[8] to ensure that air quality considerations are incorporated into the decision making process in production and consumption decisions, and that those decisions lead to achievement of air quality goals.

The overwhelming majority of the air pollution this part describes, in all of its myriad forms, comes from a single class of activities--burning fossil fuels. As a result, Agenda 21 aims to reduce "adverse effect on the atmosphere from the energy sector"

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[4]Agenda 21 seeks to avoid impairment of human health and "yet encourage development to proceed." Agenda 21, *supra* note 2 , ¶ 6.40.

[5]Id.

[6]Rio Declaration, *supra* note 1, prin. 3.

[7]Rio Declaration, *supra* note 1, prin. 8.

[8]Rio Declaration, s*upra* note 1, prin. 4.

through, among other things, the increased use of renewable energy and energy efficiency.[9]

The United States should not continue current pattern of fossil fuel consumption, since this pattern is not sustainable. We will run out of fossil fuels eventually. We face a choice. We can either continue to warm the atmosphere and inflict this generation and subsequent generation with serious health and environmental problems, facing up to the need for substitutes for fossil fuels only after scarcity makes fossil fuels uneconomic. Or we can act now, while we still have a chance to avert some of climate change's worst impacts upon future generations and ameliorate conventional air pollutants' impacts upon this generation. We may better serve our economic and environmental interests by vigorously moving away from fossil fuels now.

Progress Toward Sustainable Development over the Last Five Years

This part reviews progress in reducing air pollution, some recent regulatory developments, and movement toward more sustainable technology. In general, this assessment will show that the United States has made some progress, but it has often not achieved the goals that the Rio Declaration suggests. We have generally failed to substitute clean sustainable technologies for the basic dirty technologies in effect when the modern Clean Air Act was passed more than 30 years ago.

Pollution Trends

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[9]*See* Agenda 21, *supra* note 2, ¶ 9.9; 9.12; David M. Driesen, *Air Pollution, in* STUMBLING TOWARD SUSTAINABILITY 261, 811 n. 59 (John Dernbach ed. 2002) (parsing the relevant language in Agenda 21).

During the last five years emissions of most pollutants have decreased. Still, the United States has failed to meet the ambitious goals implicit in the Rio Declaration, namely the goals of granting all human beings a healthy and productive life and to avoid damage to the environment of other states.[10]

With respect to urban air pollution the United States has failed to meet Clean Air Act requirements governing the scope and timing of reductions. On the other hand, the United States has probably met its obligations respecting ozone depleting chemicals. The United States has, however, increased rather than decreased greenhouse gas emissions.

By the time of the 1990 Amendments to the Clean Air Act, almost every area in the country had met National Ambient Air Quality standards for lead, sulfur oxides, and nitrogen oxides. But the failure to achieve the standards for ozone, particulate, and carbon monoxide has left approximately 103 million people prey to unhealthy air quality as of 2006.[11]

In the last five years, efforts to address air pollution have continued to produce incremental progress, in spite of strong economic growth and growing population. Using the most recent five year period for which data exist (2002-2006), emissions of carbon monoxide declined by 10%, volatile organic compound (an ozone precursor) by 8%, nitrogen oxide by 14% and hazardous air pollutants for sources reporting to the toxic

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[10]Rio Decl., *supra* note 1, prin. 1, 2.

[11] http://www.epa.gov/air/airtrends/sixpoll.html (last visited on June 27, 2007).

release inventory by 8% (2001-2005)[12]. With respect to particulate matter, however, which is associated with tens of thousands of annual deaths, the progress has been barely detectable, with fine particulate (PM 2.5), likely the most serious health hazard, declining by less than 1% and coarse particulate (PM 10) declining by just 4%. Over the most recent five year period for which data is available (2002-2006) atmospheric concentrations of tropospheric ozone declined by 4.5%, carbon monoxide by 19%, fine particulate by 7%, coarse particulate by 11%, lead by 44%, sulfur dioxide by 13%, and nitrogen dioxide by 17%.[13] This suggests that air quality has improved during the last five years.

With respect to acid rain, the United States has made progress, but not fully protected the ecosystem. The United States has implemented a well designed emissions trading program to address this issue.[14] Power plant sulfur dioxide emissions fell an additional 6% from 2002 to 2006. But this program has not fully met the goals the Rio

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[12] Except for the hazardous air pollutant data, this data comes from an excel file obtained from EPA, containing the data reflected in various online graphs. The hazardous air pollution data was generated at http://www.epa.gov/triexplorer/chemical.htm. The information respecting hazardous air pollutants represents reporting by a small subset of toxic emitters (albeit ones with especially large emissions) using estimation methods of the operators' choosing. *See* EPA, TOXIC RELEASE INVENTORY 1999: EXECUTIVE SUMMARY, E-10-11 (2001)

[13] This is using data supplied by EPA focusing on the top 10 percentile of emissions, a frequently used metric for measuring air quality. The subsequent numbers in this paragraph use the same metric from the same source. The fine particulate numbers are based on 24 hour averages.

[14] *See* Byron Swift, *Command Without Control: Why Cap-and-Trade Should Replace Rate Standards for Regional Pollutants*, 31 ENVT'L L. REP. 10330 (Envt'l L. Inst.) (2001).

Declaration suggested for transboundary programs, since the acid rain program has not fully protected the ecosystem.[15]

The United States has generally made substantial progress toward sustainable development goals for stratospheric ozone depletion. It has ratified the Montreal Protocol and subsequent amendments and virtually ended production of CFCs, carbon tetrachloride, methyl chloroform, and halons.

During the last five years, however, EPA has delayed completion of the contemplated methyl bromide phaseout.[16] Even more significantly, greenhouse gas emissions have risen, which constitutes a major failure to move toward sustainable development.

Some Key Regulatory Developments

While some of the data on pollution trends may reflect regulatory developments in the last five years, most key regulatory measures taken recently will influence pollution trends and technological development in future years. In an effort to protect public health, EPA replaced its .12 parts per million (ppm) for ground level ozone with a

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[15] *See* GOVERNMENT ACCOUNTING OFFICE, ACID RAIN: EMISSIONS TRENDS AND EFFECTS IN THE EASTERN UNITED STATES (GAO/RCED-00-47) 18-20 (2000).

[16] *See* Natural Resources Defense Council v. EPA, 464 F.3d 1 (D.C. Cir. 2006) (allowing EPA to broaden exemptions for methyl bromide); 42 C.F.R. §§ 82.6, 82.7 (2001); 42 U.S.C. §§ 7671a(b), 7671d(b). *Cf.* Lee Anne Duval, *The Future of the Montreal Protocol: Money and Methyl Bromide*, 18 VA. ENVT'L L. J. 609 (1999) (arguing that developed countries have failed to meet a legal obligation to fund developing country phase out of methyl bromide).

.08 ppm standard (averaged over an 8 hour period) in 1997, and took some initial steps toward implementing them during the last five years.[17] Scientists have called for additional tightening of this standard because data indicates that the current standards do not adequately protect public health, but EPA has so far not acted on this call. EPA also revised its standards for fine particulate in 2006. Because of the long time required for states to develop rules limiting the emissions of the pollution sources creating violations of these ambient air quality standards, these revisions will influence future air quality.[18]

EPA had an opportunity to address mercury, a bioaccumulative pollutant having transboundary impacts, through a rule addressing power plant mercury emissions. Because this rule delays mercury reductions and demands less reduction than many states thought technologically feasible, mercury reductions will most likely stem from individual state decisions to adopt more stringent standards.[19]

The Clean Air Act's new source review program offers perhaps the major forum for the type of integrated decision-making called for in the Rio Declaration. Generally, the Clean Air Act uses pollution control requirements to ameliorate the effects of technological decisions made privately, often with no consideration of sustainable development. But the new source review program demands integration of environmental decisions with technological choices when a major stationary source is created or

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[17] National Ambient Air Quality Standards for Ozone, 62 Fed. Reg. 38,835 (July 18, 1997) (codified at 40 C.F.R. §§ 50.9, 50.10). These standards were upheld in Whitman v. American Trucking Ass'n, 531 U.S. 457 (2001).

[18] *See* South Coast Air Quality Management District v. EPA, 472 F.3d 882 (D.C. Cir. 2006); Air Quality Designations and Classifications for the 8-Hour Ozone National Ambient Air Quality Standards; Early Action Compact Areas with Deferred Effective Dates, 69 Fed. Reg. 23858 (Apr. 30, 2004) (to be codified at 40 C.F.R. pt. 81).

[19] *See* E. Donald Elliott et al., *Recent Clean Air Act Developments–2006*, 37 ENVT'L L. REP. (Envt'l L. Inst.) 10274, 10279 (April, 2007).

modified. Generally, it requires incorporation of state-of-the-art pollution control in such major changes.

During the last five years, EPA has sought to exempt existing sources from new source review, by manipulating the definition of *modification.* While this effort has met a mixed reception in court,[20] EPA has probably succeeded in creating a disparity between treatment of existing sources, which will largely be exempt from this integrated planning requirement, and treatment of new greenfield sources, which remain subject to strict new source review. This disparity, while ostensibly intended to advance movement to more sustainable technology, may retard its development.[21]

On the positive side, EPA produced an ambitious rule limiting non-road vehicle emissions that should begin to protect public health this year. EPA has also produced a rule generally instituting a cap and trade program to further reduce nitrogen oxide and sulfur dioxide emissions in 28 Eastern States and the District of Columbia, which should provide modest and late emissions reductions going forward.[22]

Movement Toward Sustainable Technology

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[20] *See* New York v. EPA, 413 F.3d 3 (D.C. Cir. 2005) (upholding some revisions of the definition of an "emission" increase causing a modification, while striking down others); New York v. EPA, 443 F.3d 880 (D.C. Cir. 2006) (rejecting an EPA effort to broaden the exemption from NSR for routine maintenance). *Cf.* Environmental Defense v. Duke Energy Corp., 127 S. Ct. 1473 (2007) (upholding EPA decision to apply prevention of significant deterioration requirements to sources that increase their tons of emissions per year, but not their hourly emissions rate).

[21] *See* DRIESEN, THE ECONOMIC DYNAMICS OF ENVIRONMENTAL LAW 187-92 (2003). *See generally* Richard L. Revesz & Jonathan Nash, *Grandfathering and Environmental Regulation: The Law and Economics of New Source Review*, 102 NW. L. REV. ___(forthcoming 2007). The author represented several United States Senators in an amicus brief challenging one of the relevant rules, but this article's statements about new source review reflect the authors' views, not necessarily those of his former clients.

[22] Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule), 70 Fed. Reg. 25162 (May 12, 2005) (to be codified at 40 C.F.R. pts. 51, 72-74, 77, 78 & 96).

The United States has moved to more sustainable patterns of production for refrigeration, solvents, and other applications that prior to the Earth Summit depended heavily upon ozone depleting substances.[23] In these areas, the United States has unleashed substantial technological change, including some very simple changes, such as substituting soap and water for CFCs, and some more complicated ones, eliminating CFCs, but substituting substances with less severe, but still real, environmental downsides.[24]

Little change has occurred in the power sector. The United States continues to rely predominantly upon coal-fired power production, a very dirty energy source contributing to acid rain, climate change, and urban air pollution, just as it did prior to the Earth Summit.[25] Renewable technologies, such as wind power, fuel cells, and solar power, produce power with no direct air pollution at all, but have not led to a decline in coal-fired generation.[26] Similarly, we remain dependent upon the internal combustion engine, which burns petroleum, thereby contributing significantly to urban air pollution

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[23]*See* OZONE DEPLETION IN THE UNITED STATES: ELEMENTS OF SUCCESS (Elizabeth Cook, ed. 1996).

[24]*See* id. at 14-15, 23-26, 58-60, 90-94, 98-104, 109. For example, some companies have substituted HCFCs for CFCs. HCFCs deplete the ozone layer, albeit less severely than CFCs. While some of the substitutes for CFC-based solvents are benign, many are toxic.

[25]EGrid2006V2.1 Year 2004 Summary Tables (April, 2007), available at http://www.epa.gov/cleanenergy/egrid/index.htm. (showing coal as providing more than 50% of electricity generation).

[26]*See* http://www.powerscorecard.org/technologies.cfm.

and climate change. During the last five years, however, we have seen some changes developing with respect to vehicle technology. California's LEVII program took effect during this period, thereby tightening and expanding the scope of the standards that led to the introduction of hybrid vehicles.[27] This program demands significant emission reductions that effectively force significant technological change. Furthermore, California recently enacted standards requiring a 33% cut in carbon dioxide emissions from new passenger vehicles and a 25% reduction from new light duty trucks by 2030[28], which should significantly improve vehicle efficiency.[29]

Recommendations for the Next Decade

We must move away from our dependence upon fossil fuels, especially fossil fuels that produce such large contributions to acid rain, global warming, and urban air pollution. The need for this only becomes apparent when we consider a broad range of environmental factors with an eye toward the long-term economic and environmental good.

Move Toward Phasing out Fossil Fuels

We must begin the process of phasing out the non-renewable fossil fuels that lie at the heart of so many serious environmental problems. We have begun to take steps that might lessen our dependence on oil through the introduction of hybrid and alternative fuel vehicles. A movement toward phasing out oil would not only catalyze the

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[27] *See* CAL. CODE REGS. tit. 13 § 1960.1(g) (1998).

[28] *See* CALIFORNIA AIR RESOURCES BOARD, INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING, PUBLIC HEARING TO CONSIDER ADOPTION OF REGULATIONS TO CONTROL GREENHOUSE GAS EMISSIONS FROM MOTOR VEHICLES vi (2004).

[29] ID. at xi (stating that many measures that manufacturers will employ to meet the California standards will make the vehicles more efficient).

development of lower or zero emission vehicles, it would lessen dangers from oil drilling, oil spills, petroleum refinery emissions, and leaking underground storage tanks (over time), while improving national security by lessening our dependence on Middle East oil. A good first step would be to cap the amount of oil that can be produced or imported at or near current levels.

Phasing down coal-fired power would not only have an enormous impact on global warming and conventional air pollution, it would also limit the enormous damage that coal mining does to land and water. A phase-out of coal would produce enormous health and environmental benefits.[30] While we may be able to more cost effectively address global warming through carbon capture and storage,[31] this approach would not prove as effective as a phaseout, since carbon capture likely would leave some residual emissions. These emissions would be added to the cumulative atmospheric concentrations and remain in the atmosphere trapping heat for hundreds if not thousands of years.[32] Also, carbon sequestration does nothing to address problems like mountain-top removal and the degradation of water in coal mining country.[33] Furthermore, carbon

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[30] *See* Environmental Law Institute (ELI), Cleaner Power: The Benefits and Costs of Moving from Coal Generation to Modern Power Technologies 16 (2001) (projecting enormous benefits from just a 50% reduction in coal).

[31] *See generally* KEN BERLIN & ROBERT M. SUSSMAN, GLOBAL WARMING AND THE FUTURE OF COAL: THE PATH TO CARBON CAPTURE AND STORAGE (2007), available at http://www.americanprogress.org.

[32] *See Greenhouse Gas in* WIKIPEDIA.

[33] *See* Ohio Valley Environmental Coalition v. United States Army Corps of Engineers, 479 F.Supp.2d 607, 614-15, 629-642 (S.D.W.Va. 2007) (describing mountaintop removal and reviewing its impacts).

sequestration poses some risks to groundwater.[34] If this approach is used, we should still be working on developing the alternatives that can make modernization of basic energy infrastructure politically feasible in the future.

A phase-out would catalyze enormous innovation in the production of substitutes. While predicting the complete nature and extent of this innovation is difficult, experience with previous phaseouts suggests grounds for optimism. For example, Britain replaced 40% of its coal-fired generation with natural gas plants in the 1990s and experienced a 30% decline in electricity prices in real terms.[35]

If steps toward phasing out fossil fuel raised cost significantly, the price increase would probably stimulate much-needed investment in energy efficiency, which would bring down the cost. Governments should, however, support movement toward a phaseout with programs to support energy efficiency[36] and, if the need arises, with subsidies for low-income citizens to cope with short-term energy price increases.

From a long-term perspective, massive investment in end-of-the-pipe controls to handle fuels that will run out anyway constitutes a waste. In the long run we will be better off economically and environmentally if we become an economic leader in technologies and fuels that can make it possible to live with little or no fossil fuels. Fossil fuel prices will inevitably rise in the future as they become scarce. By contrast, renewable energy sources rely on fuel sources that will not run out and, in some cases,

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[34] *See* Jeff Goodell, *The Dirty Rock: Can Coal Clean up its Act?*, 284 THE NATION 30, 32 (May 7, 2007) (discussing how carbon dioxide can dissolve minerals and thereby contaminate drinking water).
[35] *See* ELI, *supra* note 30, at 10.
[36] *See* John C. Dernbach et al., *Stabilizing and then Reducing U.S. Energy Consumption: Legal and Policy Tools for Efficiency and Conservation*, 37 ENVT'L L. REP. (Envt'l L. Inst.) 10003 (2007).

are free. The world is moving toward cleaner energy and countries that remain saddled with antiquated infrastructure are unlikely to prosper in the long run.

Redesigning the Regulatory System to Encourage Advanced Technology

With or without a phaseout, government must create an economic dynamic encouraging innovative technologies to meet environmental needs. We should experiment with new economic incentive mechanisms, such as an "environmental competition" statute.[37] An environmental competition statute would authorize polluters who clean up to collect the costs of that clean-up, plus a pre-set premium, from competitors with higher pollution levels. This would stimulate a race to improve environmental quality. It circumvents a key problem with environmental regulation, the tendency of government to set overly modest pollution reduction goals because the government does not have full knowledge of all of the reduction possibilities.[38] This approach would make the achievements of those with the most technological capability the measuring rod for compliance.

Such an approach emulates the market dynamic that rewards innovation in free markets. In highly competitive markets, innovators can take market share from their competitors, thereby increasing their revenues while decreasing those of their competitors. An Environmental Competition Statute allows improvements in environmental quality to generate rewards at the expense of unsuccessful environmental competitors. This creates a free market dynamic that relies on greed (the hope of gain) and fear (of loss) to motivate environmental cleanup.

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[37] *See* DRIESEN, *supra* note 21, at 151-61.
[38] *See* ID. at 104-05 (explaining why government has trouble writing sufficiently ambitious regulations).

Such an approach would need enforceable anti-collusion rules, lest potential competitors for environmental quality conspire not to compete.[39] And it would require a dispute settlement mechanism, so that low polluting firms could quickly and reliably collect from more polluting competitors even if a dispute arose about who has the lowest emission levels.[40]

Enforcing the Clean Air Act and Improving Monitoring

All economic incentive programs, including taxes, emissions trading, and environmental competition statutes, require good monitoring to be effective.[41] EPA should require use of the best available monitoring absent a showing that such monitoring is prohibitively expensive. In most cases, we know too little about emissions to regulate effectively, especially if we make wider use of economic incentives.

EPA must enforce state compliance with the Clean Air Act. It has usually failed to do this,[42] so Congress should examine alternative means of securing state compliance and adopt its own standards for more nationally significant pollution sources, such as electric utilities.

Conclusion

The United States made incremental progress. But it has fallen far short of the more ambitious goals underlying the Rio Declaration. Meeting these goals requires a

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[39] *See* ID. at 154.
[40] *See* ID. at 156.
[41] *Cf.* Environmental Integrity Project v. EPA, 425 F.3d 992 (D.C. Cir. 2005).

[42] *See e.g.* Natural Resources Defense Council v. EPA, 22 F.3d 1125 (D.C. Cir. 1994); Natural Resources Defense Council v. EPA, 475 F.2d 968 (D.C. Cir. 1973); Sierra Club v. EPA, 719 F.2d 436, 469 (D.C. Cir. 1983)

substantial movement toward more sustainable technology. The United States should move toward phasing out the dirtiest fossil fuels. We must create an economic dynamic favoring much greater use of sustainable technology.