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Chapter 2

New Directions: Sustainability in strategic air quality planning

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Sustainability is often defined as meeting the needs of the present without compromising the ability of future generations to meet their needs. Rather than a shortsighted approach to distribution of capital and opportunity, sustainability emphasizes equity over much longer, intergenerational time scales. While still a relatively new paradigm, support for the concepts inherent to sustainability is spreading. Current policies for meeting and maintaining ambient air quality standards, however, often fail to recognize these precepts. In the US, the Clean Air Act and its amendments have traditionally provided a planning window on the order of only five to ten years, with a maximum of 20. As will be discussed here, the relatively near-team provisions of these policies compound ignorance of the effects of current actions on future opportunities, which could, in turn, preclude a region from ever attaining clean air under current or future standards.

Consider two hypothetical and competing opportunities for improving air quality: A and B. Further assume that the choice between the two is discrete – one may choose only one of the options. If implemented, the effectiveness of each opportunity is illustrated in Fig. 1. Opportunity A rapidly attains the current air quality standard and is able to maintain it in perpetuity. Opportunity B is also able to meet the current standard, but at a much later date, and only after an initial increase in air pollution. Unlike opportunity A however, B continues to decrease air pollution beyond the current standard. If decision-makers are forced to attain the current air quality standard in five or ten years, then clearly A will be selected. Only it meets the goal of attainment. The selection of A however, also presumes that current air quality standards will not change. This presumption fails the test of sustainability. Just as the current generation is debating air quality standards, it is reasonable to expect that future generations will also revise the standards to reflect their contemporary values. The choice

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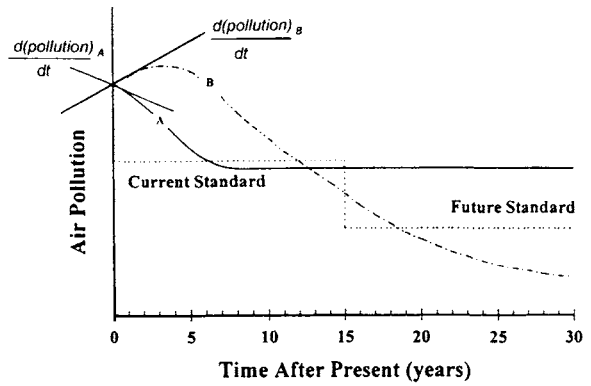

Figure 1.

to pursue A, however, precludes future generations from reasonably attaining a more strict air quality standard. On the other hand, B preserves the opportunity to lower the standard in the future, and even if this is not desired, it provides other opportunities by providing more pollution allowances under the cap.

Short planning horizons demand decisions be made at the margin. That is, the first derivaties d(pollution)/dt at time $t = current$ are used to determine the most appropriate action. The option that is selected for implementation is the one that provides the greatest immediate decrease in pollution (or more likely, greatest pollution decrease per unit cost). The effect of the action on longer-term future opportunities is discounted since the future is over the planning horizon. Sustainability on the other hand, demands a more holistic approach and, rather than discount the future consequences, it discounts those options that fail to preserve future opportunity.

Atlanta, Georgia is a large urban center located in the southeastern United States. The US EPA designated Atlanta nonattainment for ground-level ozone in 1978. Since then, the state of Georgia has prepared and implemented five separate plans to improve air quality (1979, 1985, 1987, 1994, and 1998). None of these have extended beyond a five-year planning horizon, and none have resulted in attainment. The Atlanta region's primary sources of anthropogenic ozone precursors are the transportation sector and coal-fixed electric power production. Regional transportation plans however, because they necessitate huge investments in capital, are prescribed 20 years in advance. They also persist for multiple generations once they are built. The fundamental elements of Atlanta's current urban expressway were designed in 1946 and building was completed in 1970. Electric power plants are designed, constructed, and operated across similar scales. Of the larger coal burning facilities near Atlanta, the newest plant began commercial operations in 1976. It is this long-in-the-

making and persistent urban paradigm that created Atlanta's nonattainment problem. A strategy that employs innovative technology and clever policy may make attainment possible in Atlanta while preserving the paradigm, but this has not yet been realized (in Atlanta, the last two air quality plans could not envision a scenario in which attainment is even possible). Further, the short-sighted policies that guide actions may be reinforcing the nonattainment paradigm rather than shifting it to one in which attainment is more readily achieved. When Georgia's regulators require a power plant near Atlanta to invest in expensive technologies (e.g. NO_x RACT in 1994) to reduce marginally its emissions of ozone precursors (plan A in the discussion above), they also extend the commercial service life of this facility. The operator must continue to run the facility and earn a return on investment at least until the newly acquired capital costs (needed to implement the control technologies) are fully amortized. If however, future generations wish to shut down the power plant (plan B) for air quality or other reasons, the opportunity to do this is lost or at least delayed. Just as creating new power plants takes time and significantly alters the paradigm, shutting one down must take considerable time as well. New capacity or effective conservation matters must be in place before operations can be terminated. Because the benefits of these measures may not be realized before the deadlines that existing air quality policies mandate for clean air however, they are not explored in the air quality planning process.

The argument presented here is in no way intended to discredit the seeking of near-team solutions to air quality problems. Current generations are just as entitled to clean air as future generations. Furthermore, many solutions may in fact provide benefits now and into the future. The challenge is to consider the effect of near-team actions on future opportunities. To do this, policies must provide incentives for planners and decision-makers to seek longer planning horizons. This in turn will expand the set of opportunities available to improve air quality. The Clean Air Act and its amendments have improved air quality largely through a mandated series of actions planned and implemented over five to ten year periods. Now after nearly three decades of concerted, yet fragmented effort, and marginal effectiveness, one can only speculate if better performance might have been achieved if only long-term opportunities would have been more thoughtfully considered. Finally, while the argument presented here is strictly concerned with air quality, the reasoning is universal. Sustainability is relevant in the context of any system – climate, water resources, the economy, etc. – and while a truly holistic perspective may be difficult to attain, it is no less necessary if intergenerational progress is expected.