CHAPTER 1

INTRODUCTION

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INTRODUCTION

The 2007 Air Quality Management Plan (AQMP or Plan) is designed to meet the challenge of achieving clean air in southern California. The Plan proposes strategies and programs aimed at both a healthy environment and economy. The costs of implementing the Plan and the associated benefits of achieving clean air standards are the subject of this report. The purpose of this assessment is to define and present the potential socioeconomic impacts related to the 2007 AQMP.

2007 AQMP

The 2007 AQMP is a comprehensive Plan designed to achieve the federal $PM_{2.5}$ standard by 2015 and the eight-hour ozone standard by 2024 for the South Coast Air Basin (Basin) and those portions of the Salton Sea Air Basin that are under the District's jurisdiction (namely the Coachella Valley). This revision began with the remaining control strategies in the 2003 State Implementation Plan (SIP), then expanded to include new strategies from the draft plan. These new control strategies continue to focus on reducing emissions from NOx and VOC—ozone and $PM_{2.5}$ precursors—as well as SOx and directly emitted $PM_{2.5}$.[1]

The 2007 AQMP combines a traditional command-and-control approach facilitated by market incentive programs and advanced technology to be implemented by 2024. Short- and mid-term control strategies are proposed and will be implemented by the District, local and regional governments, CARB, and EPA. These strategies are based on commercially available technologies such as add-on control devices, alternative fuels, fleet modernization, and repowering and retrofit of engines. The Plan also proposes several long-term measures with additional NOx and VOC reductions to be implemented beginning in 2020 to meet the federal 8-hour ozone standard by 2024. Long-term measures for the 2007 AQMP focus primarily on mobile source reductions and are based on the development of new technologies and strategies, and improvement of existing technologies which cannot be specifically defined at this time (i.e., black box). The long-term strategies include accelerated retirement of on-road vehicles and off-road engines, and the use of low VOC compounds in consumer products. Many of the long-term strategies would require funding to be feasible.

As with the 2003 AQMP, the District has proposed to expand its control program to mobile sources by proposing additional short-term mobile source control strategies to supplement CARB's Mobile Source Control Strategy and long-term mobile source control measures. Some of these proposed mobile source measures would require public funding assistance to achieve NOx reductions through accelerated fleet turnover or the use of the cleanest off-road engine standards after 2010.

The implementation of short- and long-term measures will produce both direct and secondary positive and adverse impacts on the community and economy of the 19 sub-county

[1] The majority of $PM_{2.5}$ emissions in the Basin are secondarily formed.

regions. Direct impacts include costs such as expenditures on pollution control equipment, transportation infrastructure, and reformulated products. Direct impacts also include benefits such as decreased medical costs due to better air quality and increased crop yields. Secondary impacts are the spillover impacts of direct costs and benefits as a result of interactions between industries and consumers in the 19 sub-county regions.

LEGAL REQUIREMENTS

As part of the 1989 AQMP approval, the District Governing Board passed a resolution that called for District staff to prepare an economic analysis of emission reduction rules proposed for adoption or amendment. Elements to be included in the analysis include identification of affected industries, cost effectiveness of control, and public health benefits.

In addition, Health and Safety Code Section 40440.8, which took effect on January 1, 1991, requires a socioeconomic analysis of each District rule that has significant emission reduction potential. In addition to the elements required under the District's resolution, Section 40440.8 requires the District to estimate employment impacts and to perform socioeconomic analyses of the project alternatives developed pursuant to the California Environmental Quality Act (CEQA).

Health and Safety Code Section 40728.5 requires that the Governing Board actively consider any socioeconomic impacts in its rule adoption proceedings. Health and Safety Code Section 39616 requires the District to ensure that any market incentive strategies it adopts result in lower or equivalent overall costs and job impacts, (i.e., no significant shift from high-paying to low-paying jobs), when compared with command-and-control regulations. Health and Safety Code Section 40920.6, which became effective on January 1, 1996, requires that incremental cost effectiveness (difference in costs divided by difference in emission reductions) be performed whenever more than one control option is feasible to meet control requirements.

None of these requirements apply to the preparation of the AQMP. However, the District has elected to perform a socioeconomic analysis of the Plan in order to further inform public discussions and the decision making process of the Plan.

Current Socioeconomic Analysis Program

District staff continually seeks to improve its analysis of socioeconomic impacts by expanding its methods and tools. Over the years, the District's socioeconomic analyses have diversified and evolved as shown in Figure 1-1. The District relies on both quantitative and qualitative analyses, describes impacts in absolute and relative terms, and has continually refined its analysis to a more detailed level. In addition, the District is beginning to use facility-based and sub-industry data to better identify the underlying socioeconomic characteristics of various sizes of affected industries. Such analysis becomes an important analytic tool in situations where proposed regulations disproportionately impact small or minority owned businesses.

The Massachusetts Institute of Technology (MIT) conducted an audit of the District's socioeconomic impact analysis program (Polenske et al., 1992). This audit found that the District surpassed most other agencies in analytical methods. The audit did, however, recommend that the District use alternative approaches and work with the regulated community

and socioeconomic experts to refine its socioeconomic assessments. The Scientific, Technical and Modeling Peer Review Advisory Group (STMPRAG), the Ethnic Community Advisory Group (ECAG), and the Local Government and Small Business Advisory Group (LGSBAAG) have been involved in providing input and refinements to the socioeconomic assessments. STMPRAG is composed of leading experts in the socioeconomic and air quality modeling fields, representatives from the regulated community, and participants from public interest groups. ECAG consists of representatives from community groups, small businesses, and grass roots organizations who work extensively with their communities. LGSBAAG is made up of representatives from local governments and small businesses.

In 1998, the District co-funded a visibility study with the most recent property sales data and Census data for the four county area (Beron et al., 2001). Results indicated that a strong relationship existed between the marginal willingness to pay for improved visibility (price of visibility) and educational level and household net income.

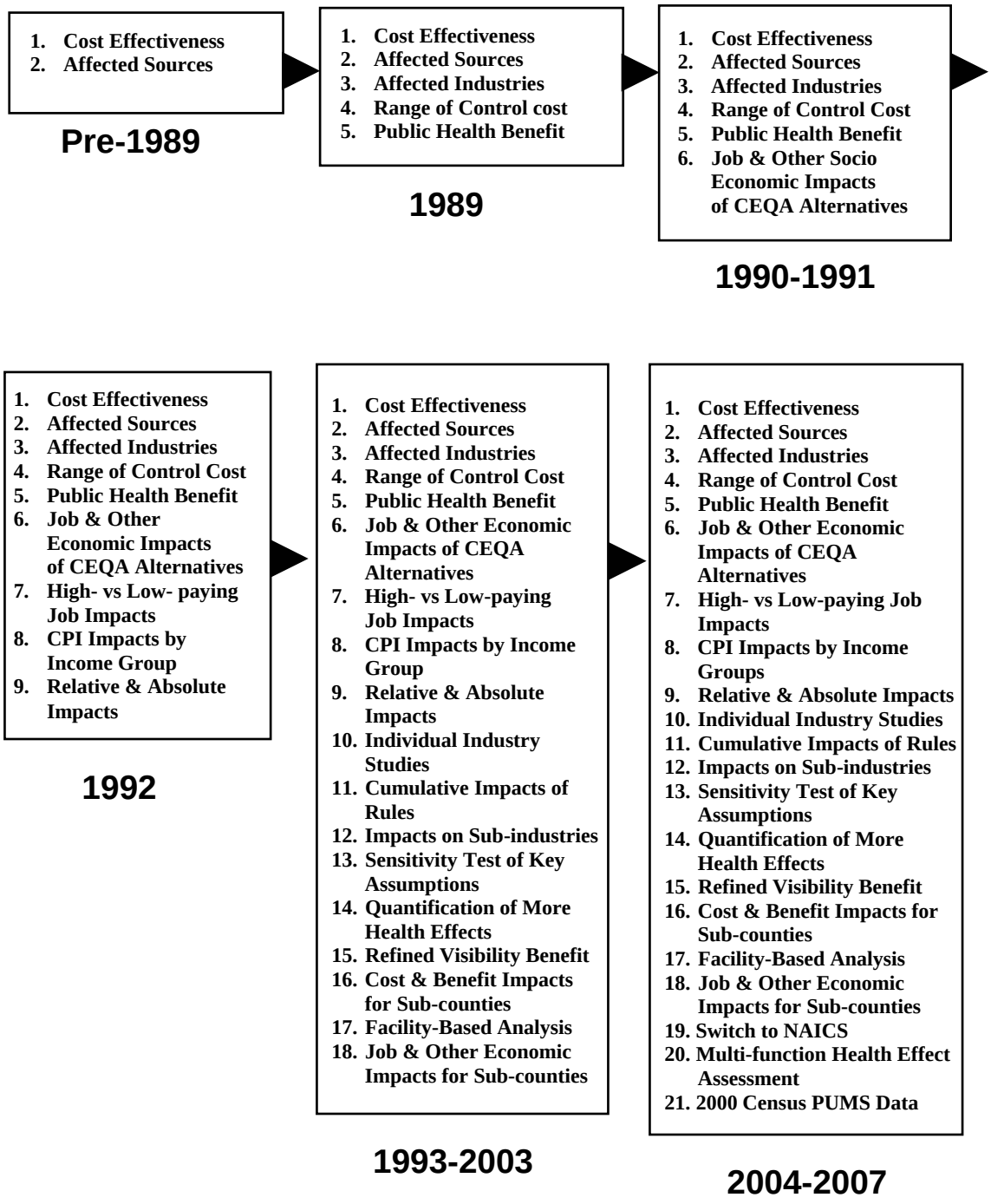
In 2000, towards the goal of expanding its analysis tools, District staff commissioned BBC Research and Consulting to examine approaches to assessing impacts of proposed regulations on a spectrum of facilities and to evaluating impacts of rules after their adoption. The study results indicated the need to employ a variety of external data sources, construct internal time series data, and explore data sharing opportunities with other governmental agencies.

Beginning in 2000, published economic statistics at the industry level have moved away from the Standard Industrial Classification (SIC) system to the North American Industrial Classification System (NAICS) to include new and emerging industries such as information technologies, among others. In 2006, all the potentially affected point source facilities in the 2002 emission inventory were re-designated with appropriate NAICS codes. The Socioeconomic Report herein is performed in the NAICS framework.

The promulgation of federal new 8-hour ozone and $PM_{2.5}$ standards and newly-published epidemiological studies of health effects resulting from exposure to various pollutants prompted the District to re-examine its methodologies used to assess the health benefit of clean air. The District has been working with Stratus Consulting Inc. to include the most recent epidemiological research on ozone and $PM_{2.5}$ into the evaluation of health effects and to conduct sensitivity analyses on several issues related to the health benefit assessment.

In preparation for work for the 2007 AQMP, District staff has consulted with the AQMP Advisory Group, STMPRAG, and ECAG to discuss possible and future refinements to data collection, modeling, and socioeconomic processes. Such consultation will continue for strengthening data sharing between air quality, socioeconomic, and land use models.

FIGURE 1-1
Evolution of Socioeconomic Analysis



2007 AQMP SOCIOECONOMIC ISSUES

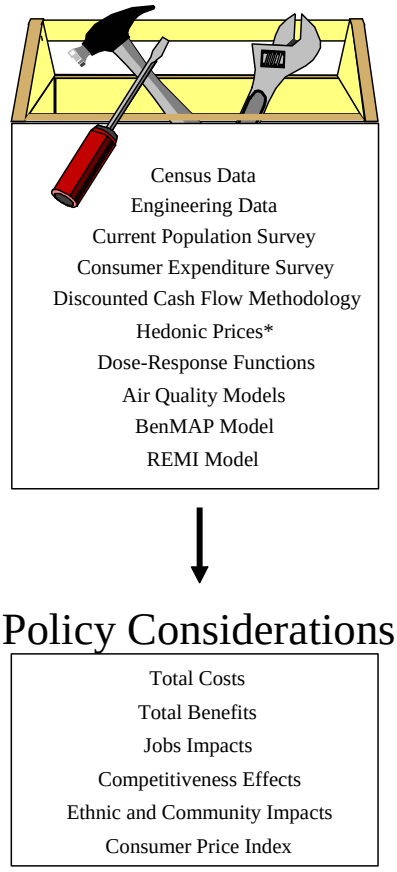
In addition to covering all the topics listed under the legal mandates previously described, this assessment addresses the following issues and provide estimates of:

- Benefits of the 2007 AQMP;
- Total implementation cost of the 2007 AQMP;
- Cost of the 2007 AQMP as compared to the benefits;
- Effect of quantifiable measures and benefits of the Plan on employment;
- Potential impacts on sub-county areas and socioeconomic groups;
- 2000 Census race and ethnicity distribution of workforce;
- Effect of the Plan on industrial competitiveness;
- Potential economic effects of the CEQA alternatives to the 2007 AQMP; and
- Key areas of uncertainty in this assessment.

ASSESSMENT METHODOLOGY

To assess the socioeconomic impacts of the 2007 Plan, District staff has relied on a variety of data sources, methods, and tools (Figure 1-2). The analysis is divided into a number of segments whose interrelationship is shown in Figure 1-3. The analysis is performed at the sub-county level by grouping contiguous census tracts that have similar political, geographical, and social characteristics. Los Angeles County is sub-divided into 11 regions, Orange County into four regions, and Riverside and San Bernardino Counties into two regions each.

FIGURE 1-2
Assessment Tool Kit



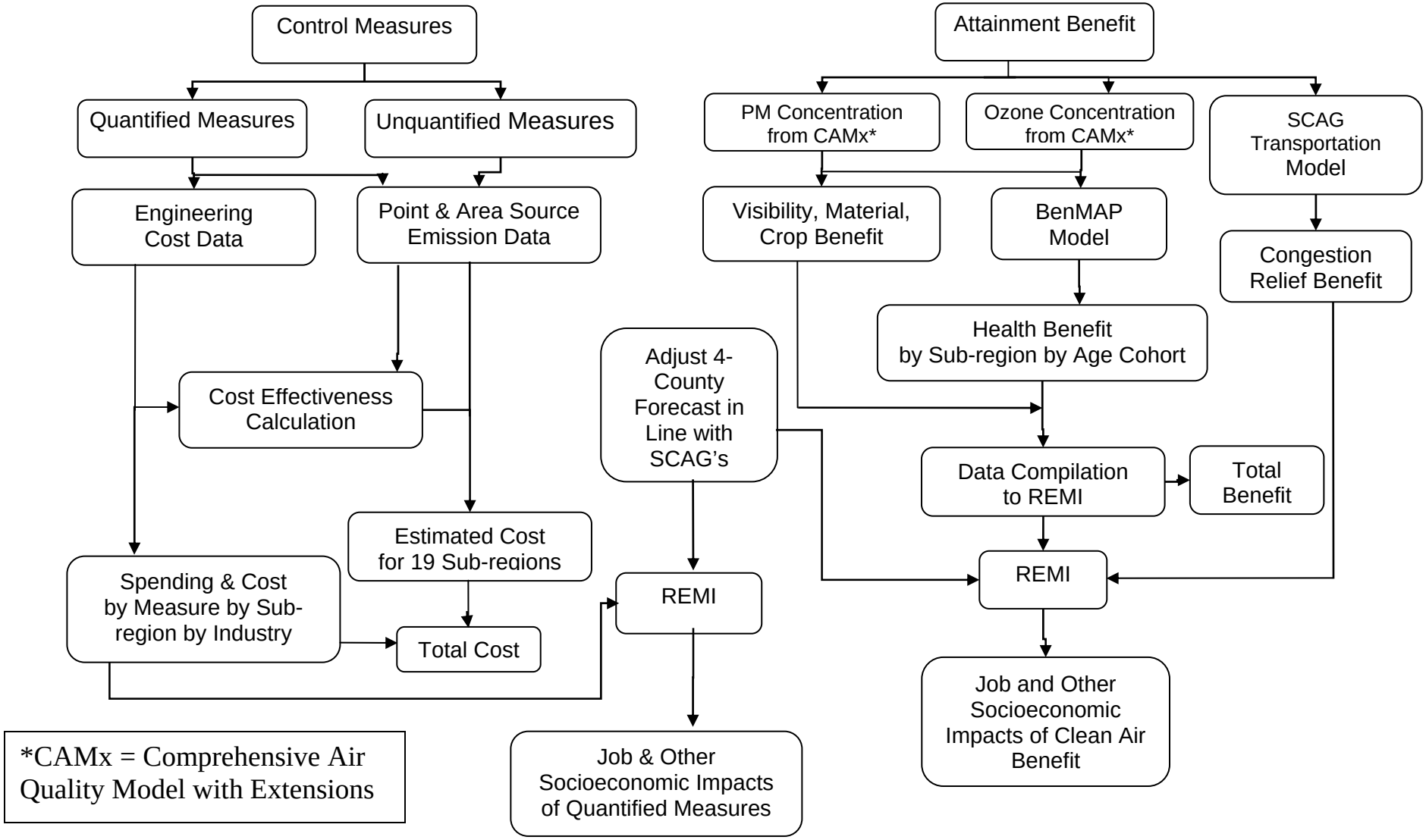
*See Glossary

The socioeconomic analysis period is from 2007 to 2025 to address various implementation dates of control measures and the resulting air quality benefits. The socioeconomic impacts of the 2007 AQMP are evaluated with respect to the baseline condition, which is continuation of adopted rules only.

Benefit Analysis

A two-step process is utilized to estimate the benefits expected from attaining the federal $PM_{2.5}$ and eight-hour ozone standards. The first step involves translating the improvements in air quality expected to result from the Plan into dollar values. Benefit categories with quantified relationships with air quality include crop yields, improved human health, the public's willingness to pay for improved visibility, reduced damage to building materials, and reduced vehicle miles and vehicle hours traveled. Established concentration-response relationships from recent research and air quality data from different air quality models are used to assess the benefits. The second step involves qualitatively describing the remaining types of

FIGURE 1-3
AQMP Socioeconomic Analysis



benefits that would result from implementing the Plan, but for which monetary benefit estimates are unavailable.

Cost Analysis

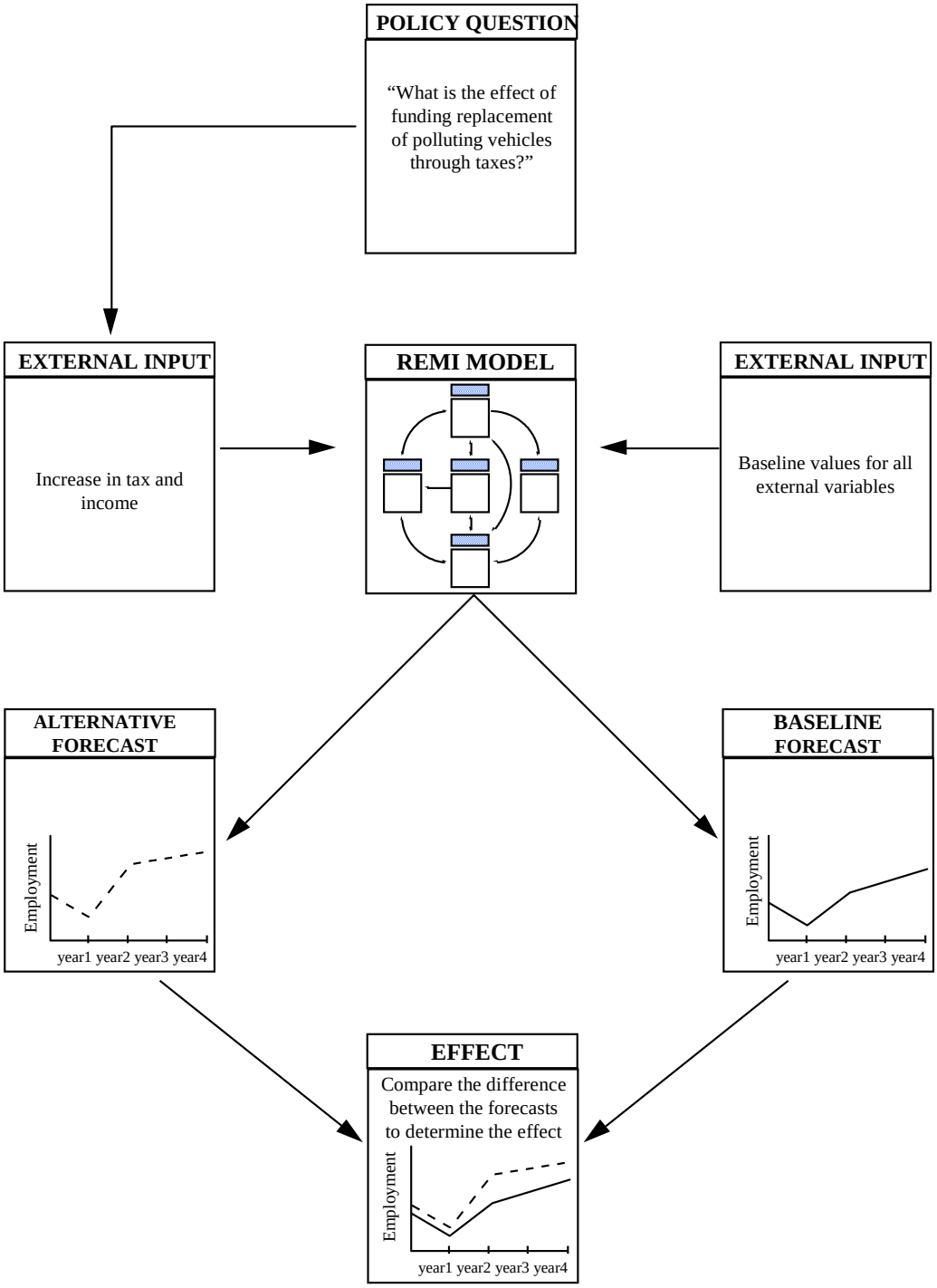
A two-step process is also employed to estimate the costs of the Plan. The first step involves the quantification of the Plan's impact based on those feasible measures for which cost estimates can be developed at this time. The discounted cash flow method is used to estimate the cost per ton of pollutant reduced for each control measure. The total cost of each control measure is also calculated. Based on the proportions of emission reductions, the total cost of each control measure is allocated to each sub-county region and NAICS code. For stationary sources, facility emission reductions are aggregated by sub-region and NAICS code according to the location of facilities. For area and mobile sources, emission reductions are assigned to air quality modeling grids. For the area sources, for example, population was used for consumer products and housing units were used for architectural coatings. For the mobile sources, emission factors from the ARB EMFAC 2007 as well as Vehicle Miles Traveled (VMT) from SCAG transportation model were used. These emission reductions are then aggregated to 19 sub-regions according to the correspondence between grid cells and sub-regions. Population at census tracts from the 2000 Census is used to split a grid cell that may be divided into more than one sub-region.

The second step involves the projection of control costs for those unquantified measures in the Plan. In this second step, the average cost-effectiveness for quantified control measures is used as a surrogate cost for unquantified measures. That methodology is likely to over-predict costs if one considers the likelihood that costs will decrease as technology advances over the years. However, given the fact that only 47 percent of emission reductions can be quantified, this methodology could under-predict the cost of the last few tons of emission reductions in the black box needed for attainment. A sensitivity analysis is also provided to address this uncertainty.

Job and Other Socioeconomic Impact Analysis

To estimate job impacts and other socioeconomic impacts that may result from the quantifiable measures and clean air benefits, the REMI (Regional Economic Models, Inc.) 19-region 66-sector model is utilized. The REMI model incorporates state-of-the-art modeling techniques and the most recent economic data. The MIT report conducted on the District’s socioeconomic assessments found that the REMI model is “technically sound.” Figure 1-4 shows an example of how the REMI model can be used to assess the socioeconomic impact of a policy. Both the cost and benefit impacts are developed outside of the REMI model and are used as inputs to the REMI model.

FIGURE 1-4
Use of the REMI Model



The REMI model cannot be employed to assess the impacts of unquantified measures due to the lack of information on affected sources and control technology. Instead, the REMI model is used only for the quantifiable control measures and clean air benefits. The job impact of unquantified measures is approximated based on that of quantified measures. The assessment results from these two categories cannot be added because costs are associated with only 47 percent of emission reductions while clean air benefits are based on using all the emission reductions for attainment demonstration.

To assess the impacts on socioeconomic groups, the impacts on product prices from the REMI model are overlaid on consumption patterns of various income groups to examine the changes in consumer price indices of these income groups. The data on consumption patterns are from the Bureau of Labor Statistics' Consumer Expenditure Survey.

To assess the impacts on competitiveness of the four-county area, the following were considered: the region's share of national jobs in those industries whose products are also sold in the national market; the impacts of the Plan on product prices by industry; and the changes in imports and exports as a result of implementing the Plan's control measures. These factors are selected based on a review of effects of past public policies on a region's competitiveness.