

E.H. Pechan & Associates, Inc.

Using Historical Information to Improve Emission Projections

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PECHAN

TERC Strategic Research Plan for 2007-2009

- ❖ Complete and accurate emission inventories are essential
- ❖ Devote attention to appropriate forecasting techniques
 - » Base year to attainment demonstration year
 - » Different forecasting techniques by source category
 - » Better documentation

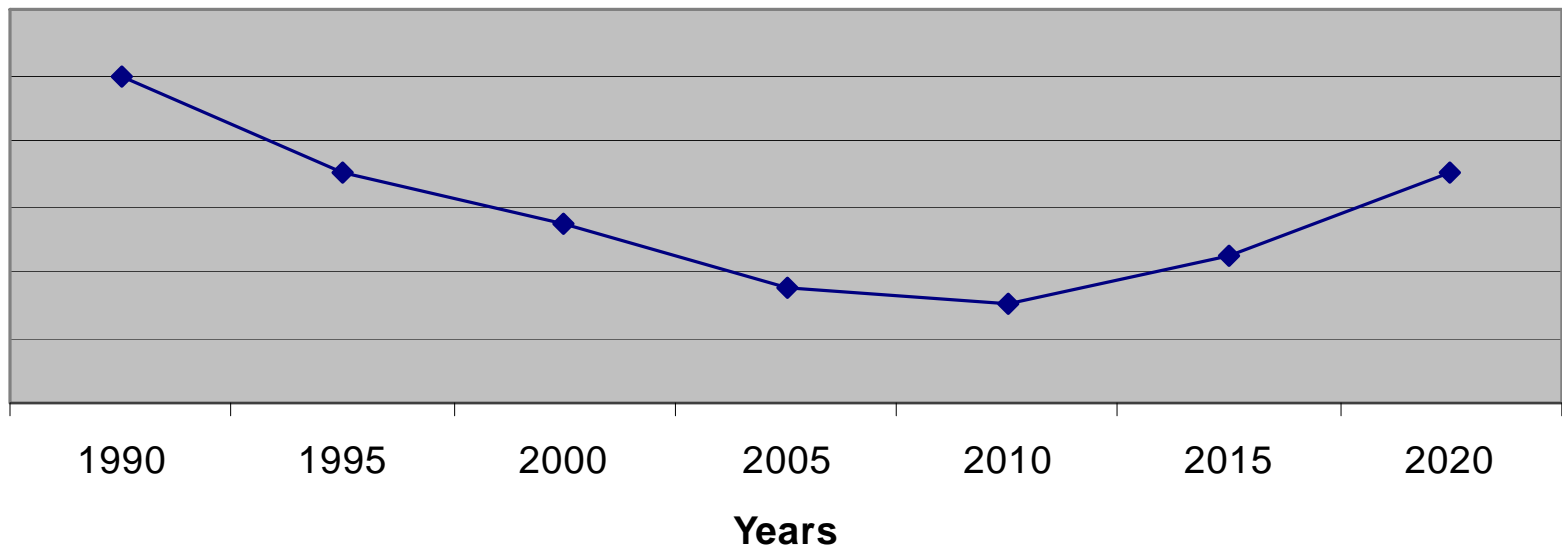
Project Proposal

- ❖ Perform analysis of recent historical emissions, activity, and control data to develop better forecasts.
- ❖ Develop better surrogates for emission generating activity by source category and geographic area.

Emission Projections by:

- ❖ Growth factors
 - » By SIC/NAICS code and region
- ❖ Control factors
 - » Accounts for the most recent regulations affecting source categories
 - » By geographic area

Criteria Pollutant Emissions



Background

❖ Emission Activity Projections

- » EGAS Defaults—Typically Use Regional/National Fuel Consumption Projections from DOE or State-level Industry Sector Sales Projections from REMI

employment?

- » How Closely Do Growth Surrogates Match Each Emission Activity?
- » How Well Do the Surrogate Forecasts Project Actual Emission Activity Changes?
- » What can we learn from analysis of historical behavior of an industry?

Background (cont'd)

❖ Emission Rate Projections

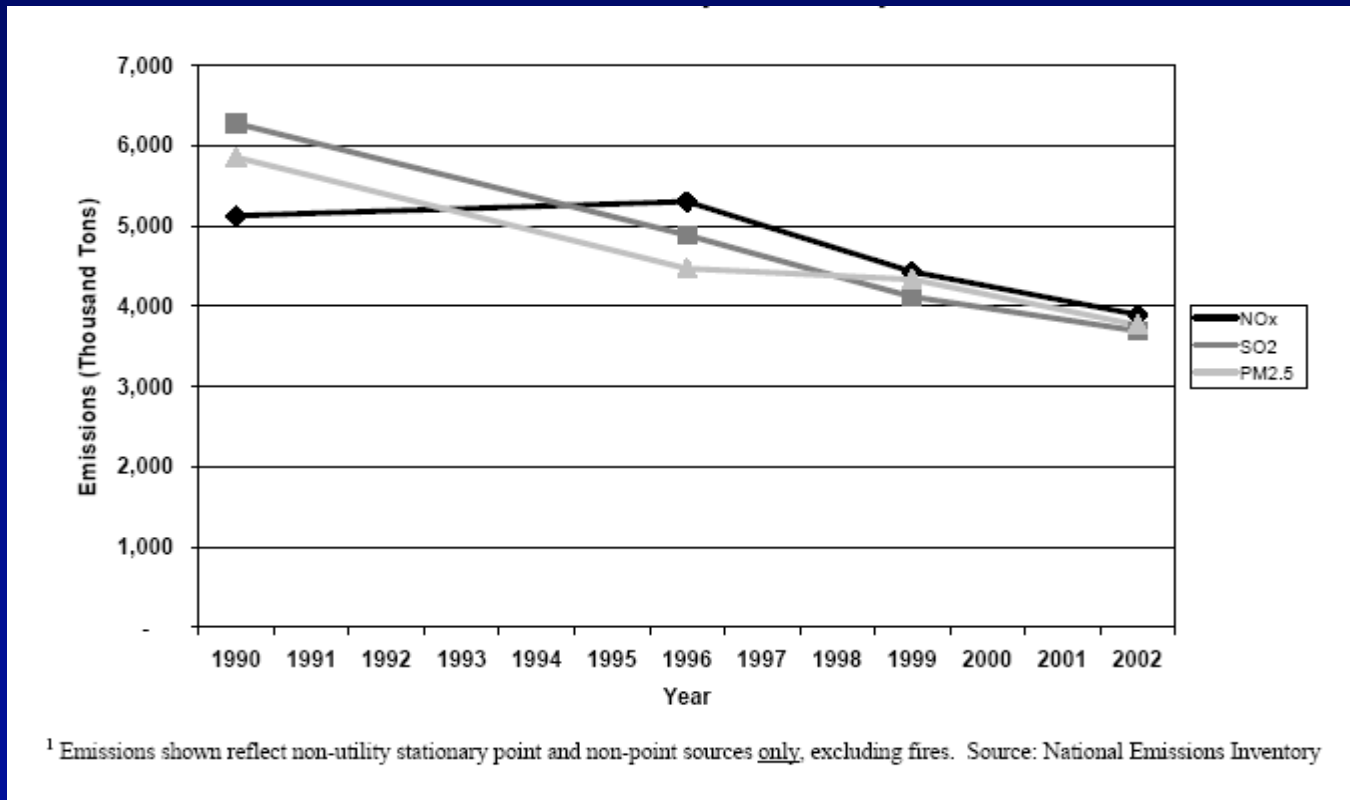
» Model Available Estimates of Emission Reductions from “On-the-Books” Controls

» Limitations

- Reduction estimates not available for certain controls (e.g., New Source Performance Stds.)
- Unanticipated control programs
- Other emission rate reductions (i.e., reductions from technology/process changes not mandated by emission control programs)

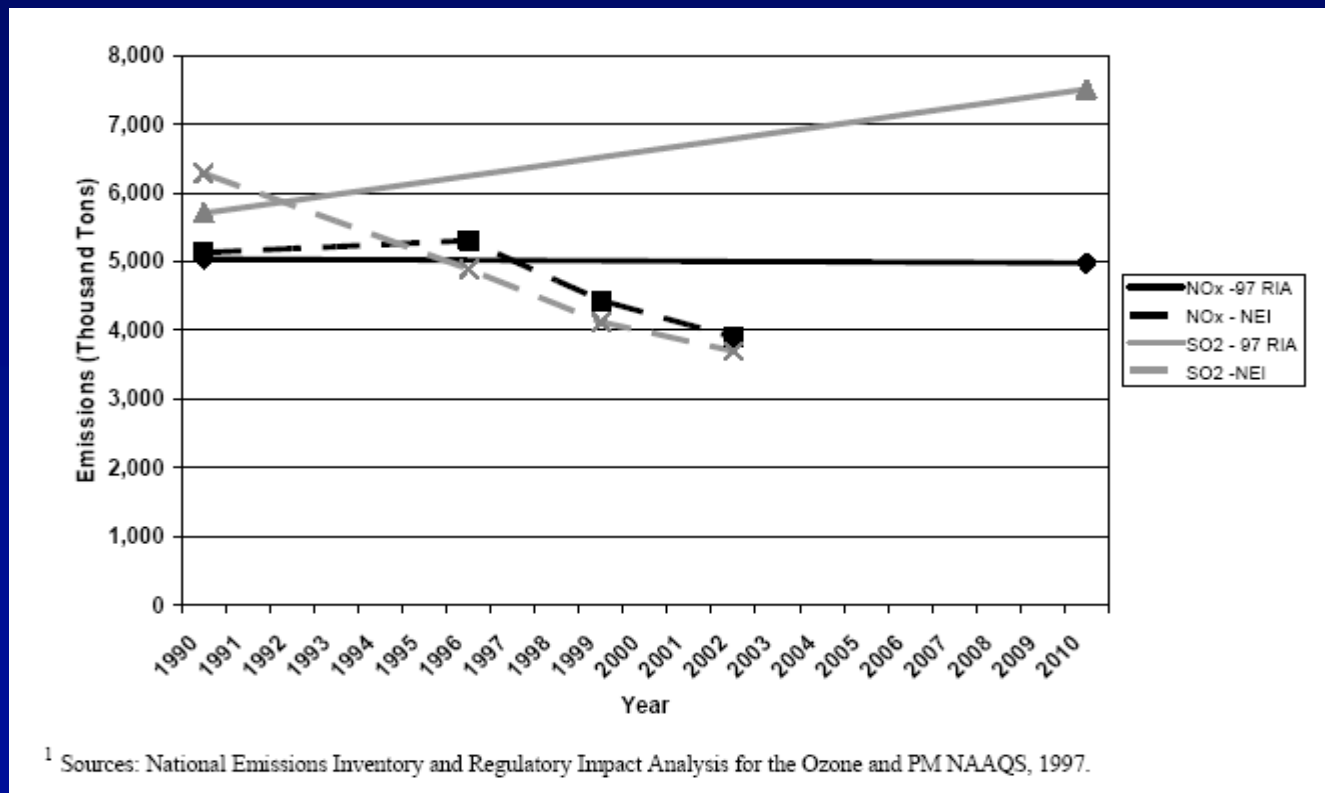
EPA 2006 PM NAAQS Regulatory Impact Analysis

❖ Non-EGU Stationary Source Emission Trends

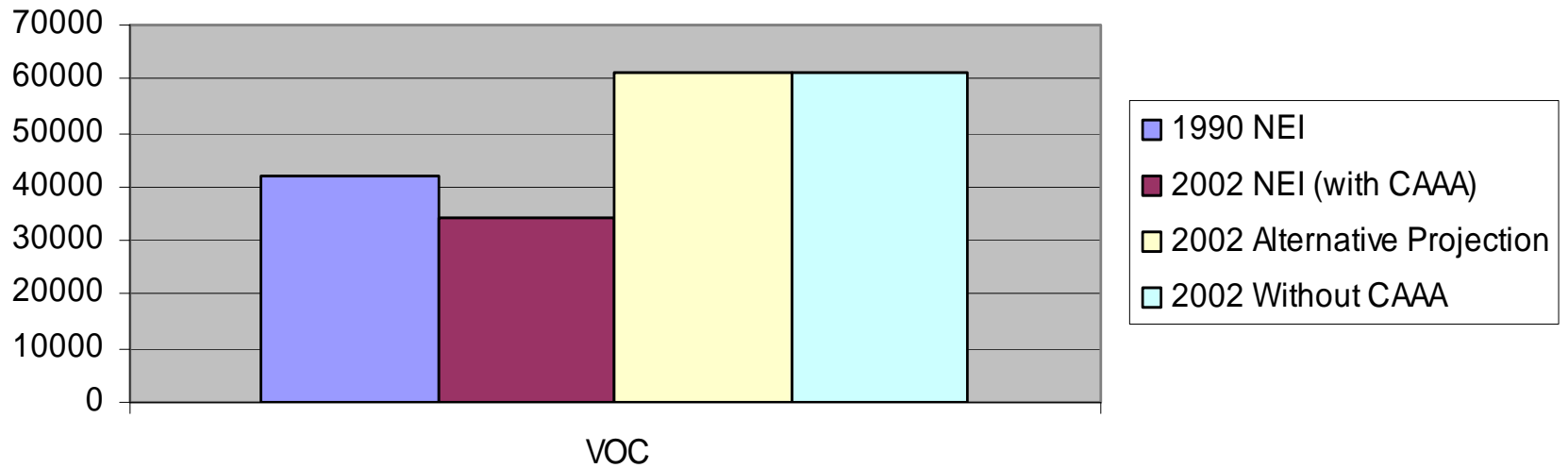


EPA 2006 PM NAAQS Regulatory Impact Analysis (cont'd)

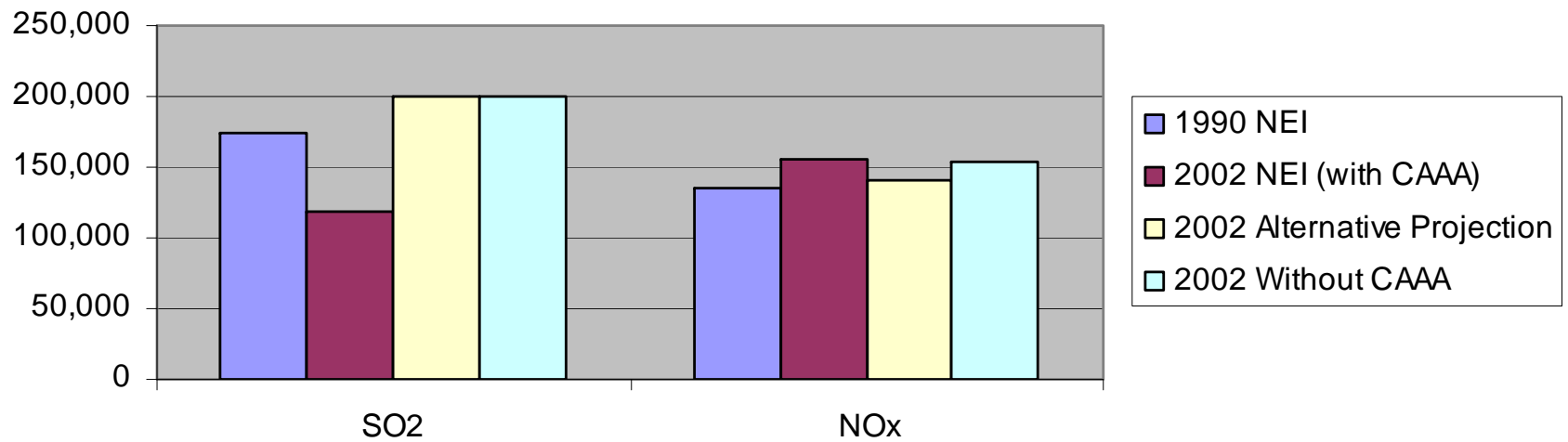
- ❖ Comparison of Total NO_x and SO₂: NEI Actual vs. Forecast from 1997 PM NAAQS RIA



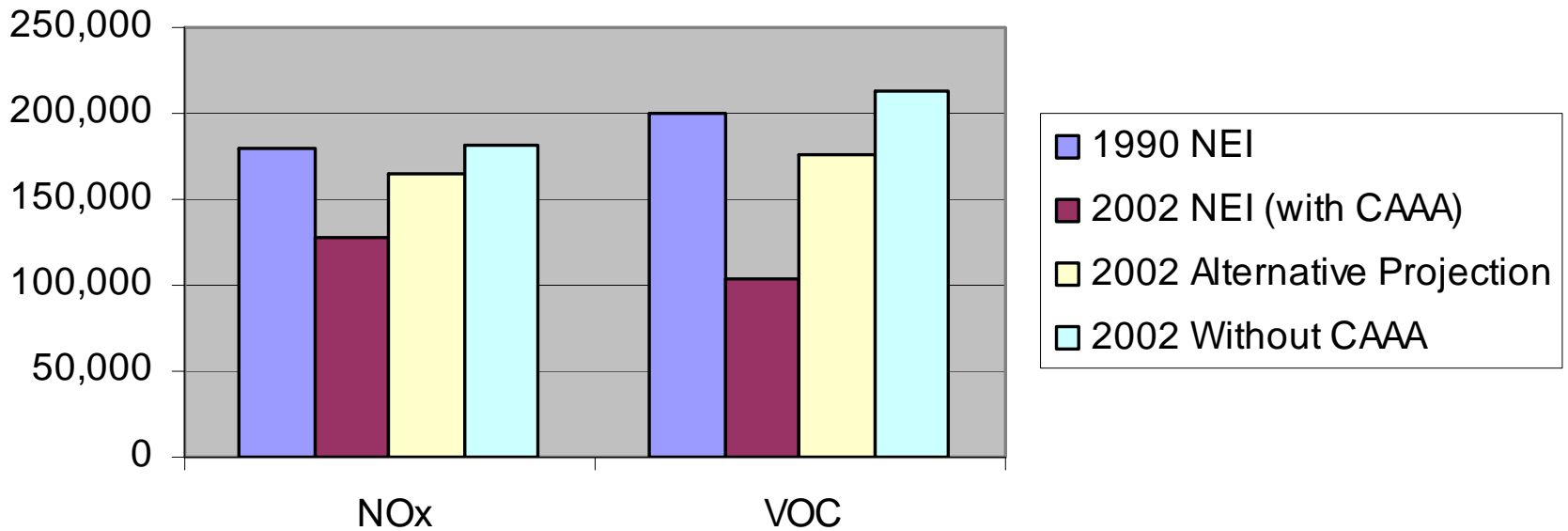
Auto Assembly Plants



Cement Manufacturing



Petroleum Refineries



Western States SO₂ Emissions Trends Analysis

Non-Smelter Non-EGU Point Sources

Reasons for 1990 to 1998 SO₂ Emissions Changes

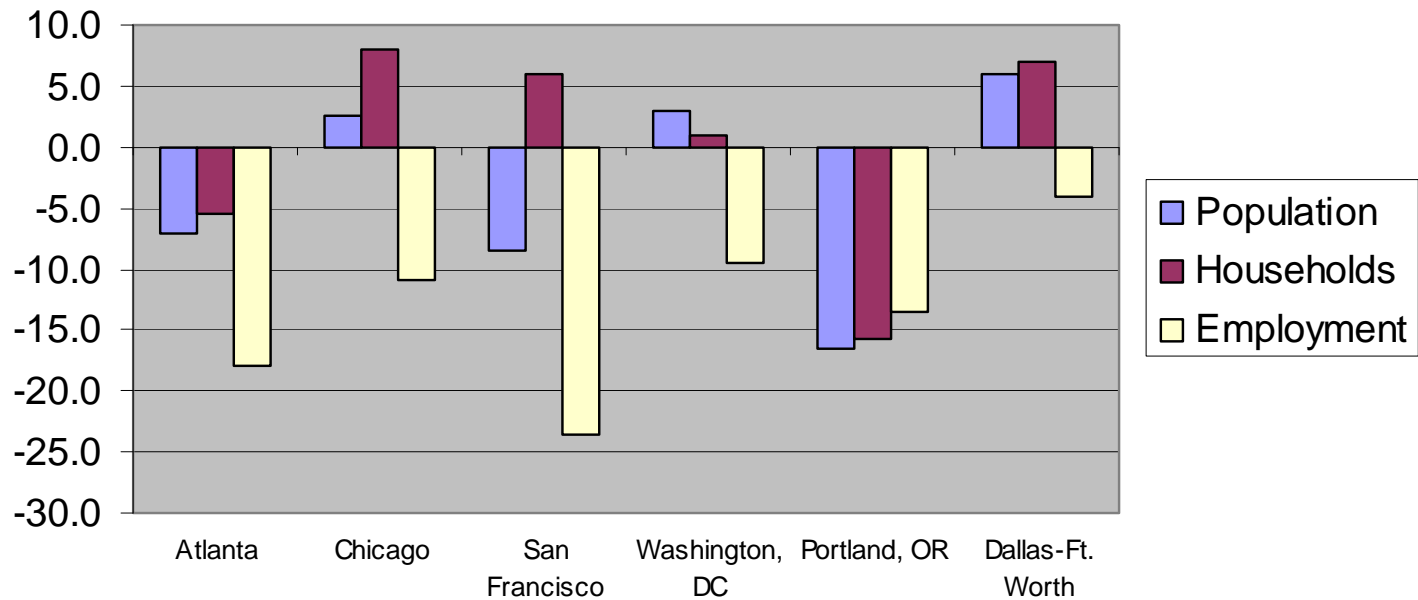
Primary Reason for Emission Change	1990 to 1998 SO ₂ Emissions Change (tpy)
Market driven production changes	(7,408)
Plant shutdowns	3,183
Process changes	13,081
Fuel switch	1,650
Controls in response to air regulations	22,544
Emission estimation method change	6,341
Total	39,391

Lake Michigan Region Study

Differences in EGAS vs. Historic-based Growth (2005-2018)

	EGAS	Historic-based
Diesel Locomotives	20%	0%
Industrial Boilers-Gas	20	-11.5
Refinery Process Heaters-Gas	41	21

Forecasts Made in 1980 for 2000 Metropolitan Population, Households, and Employment versus Actual Data for 2000



What do we need to do a Texas-specific analysis?

- ❖ Multiple historical data years for trends analysis
- ❖ Activity information-fuel consumption/ SCC units
- ❖ Control efficiency device

Key Texas Point Source Categories

- ❖ Petroleum refining
- ❖ Chemical manufacturing by sub-group
- ❖ Oil and gas transmission and distribution
- ❖ Cement manufacturing

Nonpoint Source Analyses

- ❖ Analyze available historical throughput data to determine past trends in activity
- ❖ Compile readily available emission activity data for geographic areas of interest to determine past trends in activity
- ❖ Research better surrogate data for emission activity projections – better reflect surrogates that are more closely related to the emission activity than the economic indicators in EGAS and that are specific to the region of interest

Benefits of Pursuing this Research

- ❖ Improved forecasts
- ❖ Documentation to convey better understanding of methods
- ❖ Better basis for decision-making about need for future controls
- ❖ Explanation/identification of drivers affecting pollution levels