Improving EPA's Emissions Forecasting

Briefing for 16th Annual International Emissions Inventory Conference

Linda Chappell
US Environmental Protection Agency
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Goal

- To develop an emissions projections modeling approach for **stationary non-EGU sources** that is transparent, scientifically based, and consistent with current knowledge.

Outline

- History
- Interim approach
- Issues with former approach
- Plan for new forecasting approach

History of Project

- Emissions are routinely forecast to future years (2010, 2015, 2020, and beyond) for regulatory analyses, State Implementation Plan demonstrations, and other purposes
- In the recent PM National Ambient Air Quality Standard (NAAQS) analysis – future year emissions were held to current levels (emission control impacts considered) for **non-EGU stationary sources** as an "interim" analysis approach
- Briefed AA of OAR and EPA Administrator on the "interim" approach for the PM NAAQS
- EPA Administrator requested an Science Advisory Board (SAB) review of the "interim" methodology
- Briefing held for SAB in August 31, 2006
  - Council suggested improvements be made to EPA's "interim" approach
  - Commitment was made to develop new approach and to consult with the SAB

“Interim” Emissions Projections Approach

Projected Future Emissions = Current or Base Year Emissions *Emission Growth Adjustment *Emission Control Adjustment

Where: Emission Growth Adjustment = 1

Emission Control Adjustment = < 1

* **This means emissions in 2015 and 2020 are held to 2001 levels (less the impact of emission controls) for the PM NAAQS and Ozone NAAQS analyses for the stationary non-EGU sources only!**

Table 1. Emissions Inventory Projection Methods for the Interim Approach

Sector	Interim Projection Method Applied	Future-Year Base Case Projections
EGU	No	Integrated Planning Model (IPM)
Non-EGU Point Sources	Yes	Apply CAA mandated controls to base year emissions to project future emissions. Projected changes in economic activity not applied to emission projection.
Other Stationary Non-point	Yes	Apply CAA mandated controls to base year emissions to project future emissions. Projected changes in economic activity not applied to emission projection.
Fires	No	Average fires from 1996 through 2002 (based on state-total acres burned), with the same emissions rates and county distributions of emissions as in the 2001 NEI
Ag -NH3	No	Livestock – USDA projections of future animal population Fertilizer – Held constant at 2001 level
On-road	No	Projected vehicle miles traveled (VMT) DOE Energy Outlook VMT projections, future-year emissions rates from MOBILE6.2 model via National Mobile Inventory Model (NMIM)
Nonroad	No	NONROAD 2004 model via NMIM

Former Forecasting Approach

Projected Future Emissions = Current Emissions *Emission Growth Adjustment *Emission Control Adjustment

Where: Emission Growth Adjustment = > 1

Emission Control Adjustment = < 1

Past approach - EGAS Version 5

Problems with the above approach are illustrated on Figures 1-4 that follow.

EGAS (Economic Growth Analysis System) Overview

- EGAS is an economic and activity forecast tool that provides growth factors for emission inventory projections
- Three tiered approach
  - National Economic Tier – US final demand forecasts from Bureau of Labor Statistics
  - Regional Economic Tier – Economic models (e.g., REMI) translates non-fuel related national economic activity into regional economic activity estimates; fuel related combustion /production sectors rely on Census division combustion projections from DOE
  - Growth Factor Tier – Regional economic activity projections are translated into emissions growth factors

Figure 4
Comparison of 1997 PM NAAQS RIA Forescasts and NEI Actual Emissions
Non-EGU Stationary Sources Only[1]

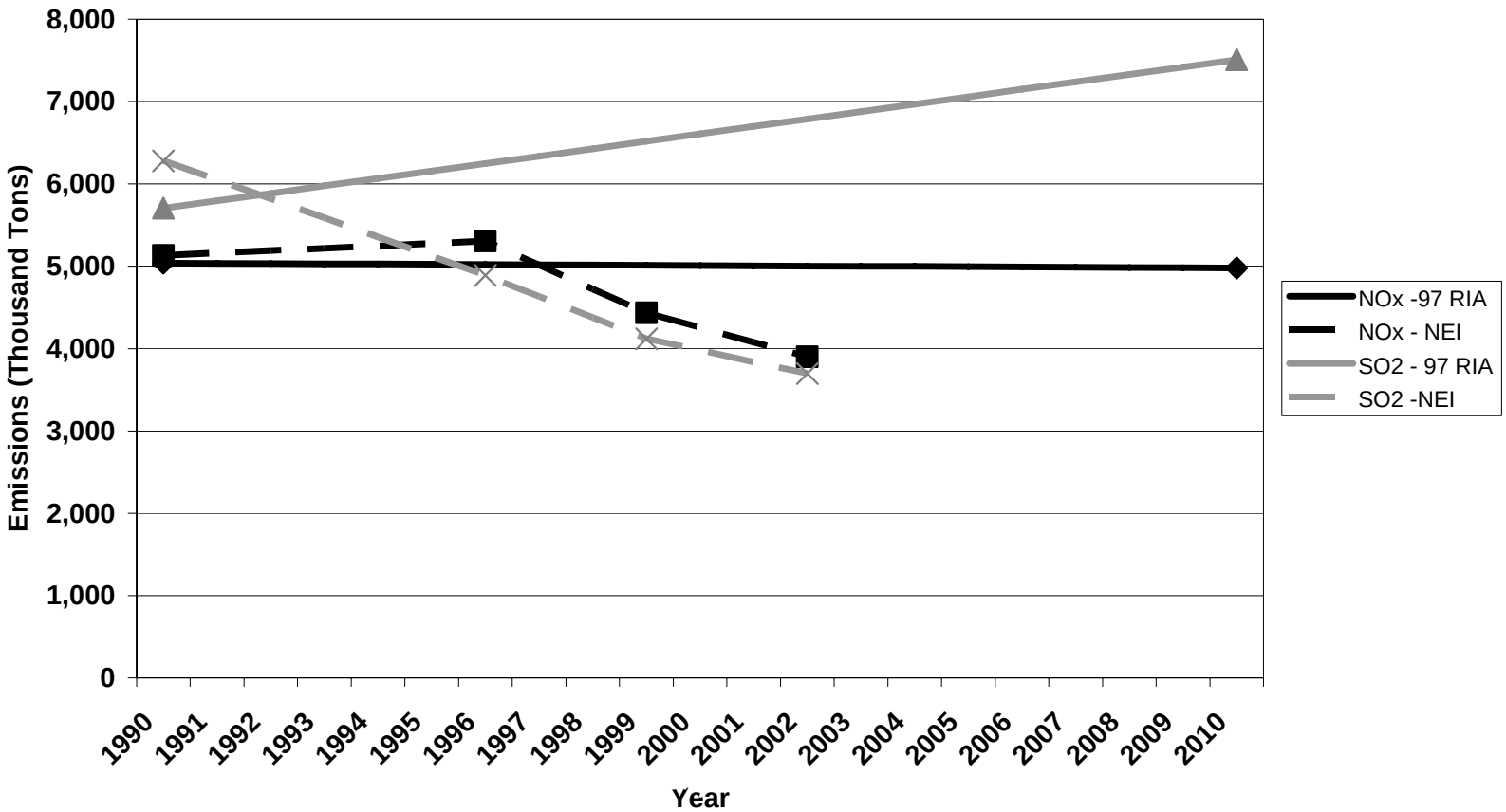
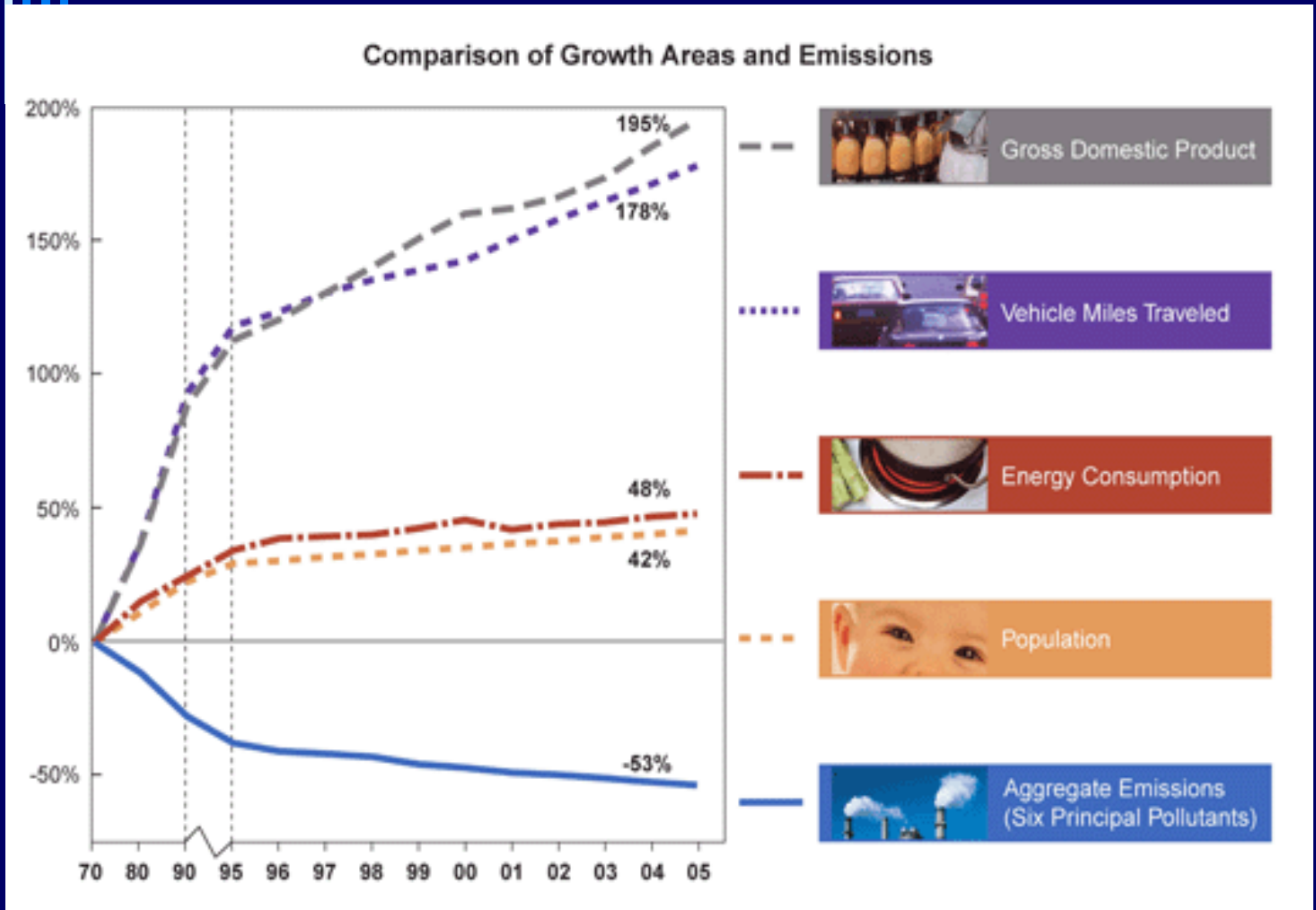


Figure 2



Data Sources: US Department of Commerce, Bureau of Economic Analysis, US Dept. of Transportation, Federal Highway Administration, US Census Bureau, and US Department of Energy.

Figure 2
1990 -2002 Emission Inventories
Non-EGU Stationary Sources Only[1]

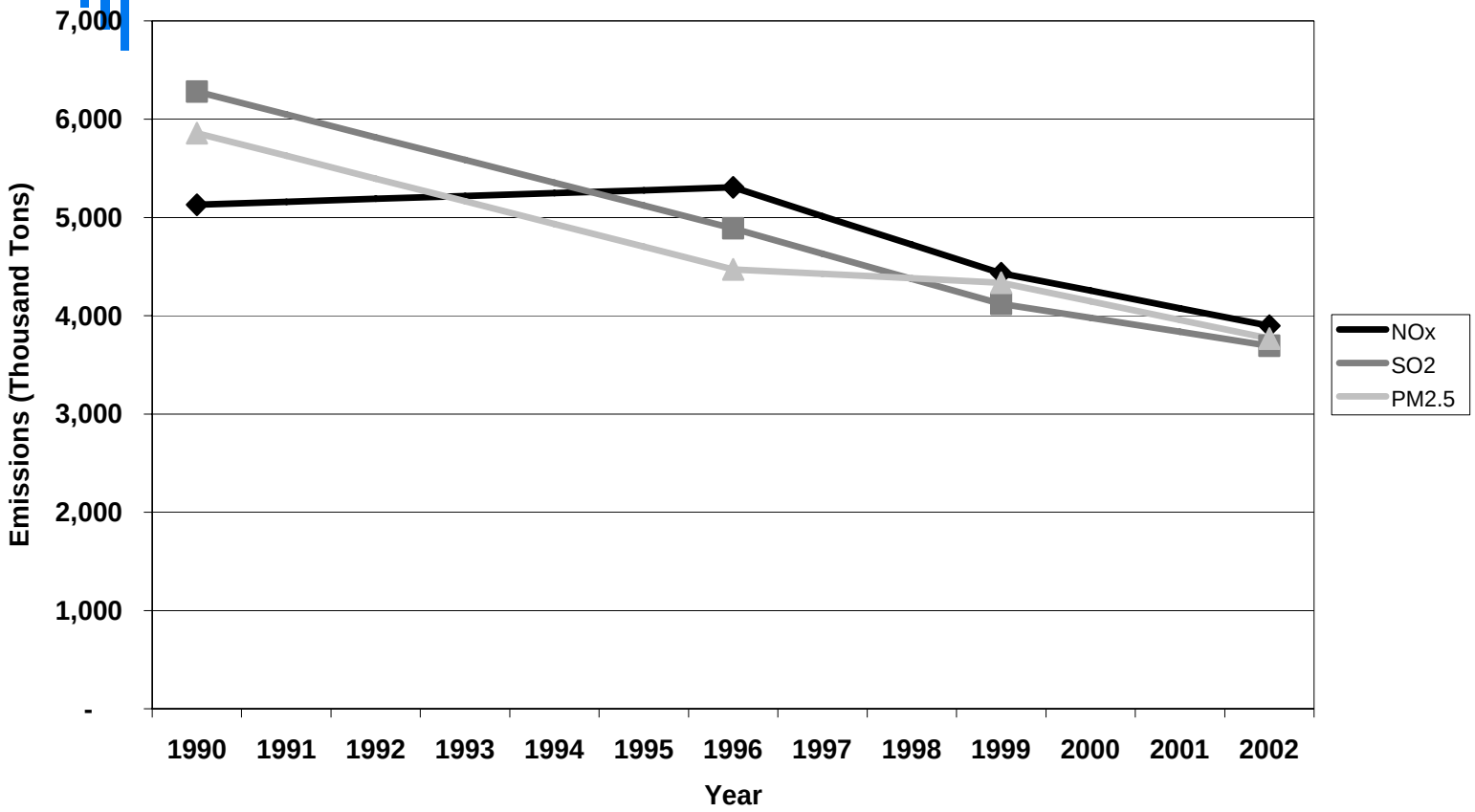
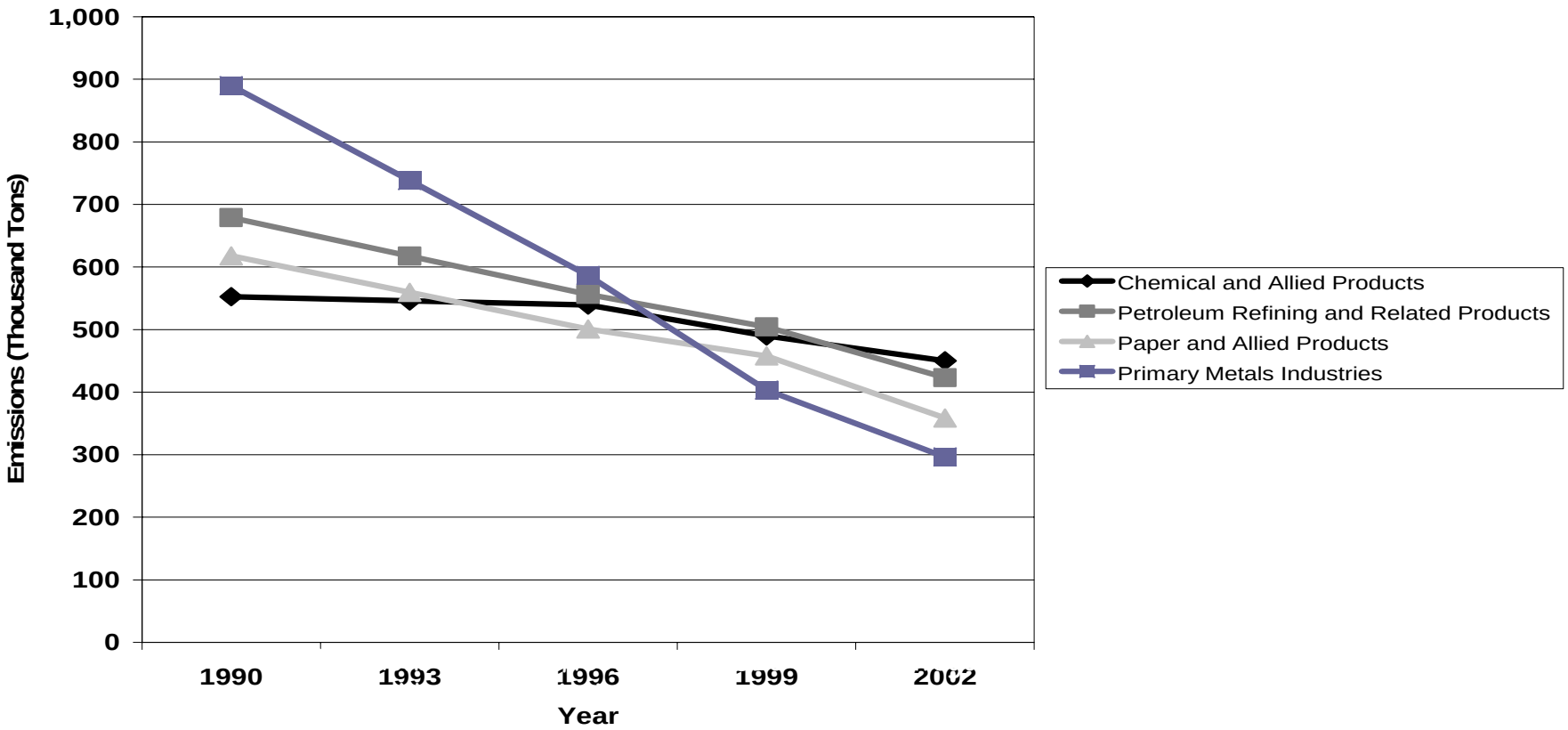


Figure 3
Historical SO2 Emission Trends for Large Industrial Categories



Why do emissions in the future differ from current emissions?

- Economic Activity
- Change in mix of productive activities within and between economic sectors
- Changes in vintage of capital
- Change in population, energy use, land use, or VMT
- Technological innovation
  - Productive process
  - Control technologies
  - Substitution of inputs of production (e.g., fuel switching)
- Emission controls, voluntary programs, and other initiatives to reduce air emissions

Three-Phased Approach

- Understand the relationships between current and future emissions using historical information
- Develop new plan
  - Tentative date ~ Fall 2007
- Make model changes necessary to implement new approach
  - Tentative Date ~ Fall 2008

Phase 1- Understanding the Relationships Between Current and Future Year Emissions

- Understanding key relationships is crucial
  - Collaborate with groups and individuals who complete emissions projections
  - Conduct analyses of historical relationships
  - Consider known future events
- Anticipate completion of phase 1 in summer/fall 2007

Phase 2- Develop a New Approach

- Based upon collaboration and analyses – will develop model of the relationship between emissions over time and causal factors – e.g., economic growth, technology change, population change, energy use, land use change, etc.
- Collaborate with SAB on new approach
- Develop and test new methods and models to incorporate changes
  - Seek method and models that are transparent and easily monitored and modified
- Anticipate this phase will occur from fall 2007 through summer 2008 (dates are tentative)

Phase 3 - Implement New Plan

- Test new approach methods and models
- Implement new methods and models into regulatory efforts and platform beginning fall/winter 2008

Ideas and Discussion

We’d like your ideas!